ROAD ASSET MAINTENANCE, BUDGETARY ALLOCATION, REGULATORY FRAMEWORK AND PERFORMANCE OF ROAD AGENCIES IN KENYA

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DECLARATION

This thesis is my original work and has not previously in its entirety or in part been presented for a degree or other academic work.

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DEDICATION

This thesis is dedicated to my husband Mr. Kimani Rucuiya and our children Rucuiya, Muroba and Carol for their unwavering support. My Dad Mr. John Muroba who noticed my potential at a very tender age, passionately supported and encouraged me to focus on my dream. It is also dedicated to our grandchildren as an inspiration that they can desire, pursue and achieve their dreams despite the obstacles that might come along the way.

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ABSTRACT

The roads and highways of a developing nation are an essential resource for progress. In 2019, Kenya's road quality ranked 4.1 in the World Economic Forum's survey, indicating a decline in maintenance compared to 2017, resulting in high vehicle operating costs and hindering socioeconomic growth. The road systems are not very well managed and suffer from inadequate funding which could pose threat to road safety. Past empirical studies on the same have also reported mixed results, besides insignificant empirical explanation on the moderating effect of budgetary allocation and mediating effect of regulatory framework on the relationship between road assets and performance of road agencies. This research bridged the gap by establishing the relationship between road asset maintenance and road agency performance in Kenya, the mediating role of budgetary allocation and the moderating role of regulatory environment on the relationship. The specific objectives are to establish the effect of road assets maintenance on the performance of road agencies in Kenya, to assess the mediating effect of budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya, to assess the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya, to assess the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya. The study was based on administrative management theory and the budgeting theory. Positivism research philosophy and cross-sectional research design was used. The study target population comprised of the five road agencies in Kenya. The unit of observation comprised of 251 staff from the five road agencies in Kenya. The data was collected using self-administered questionnaires and used SPSS version 26 for diagnostic tests, correlations, and regression analysis. The results showed that there is moderate positive and significant correlation road asset maintenance, Budgetary Allocation and regulatory framework on performance of road agency in Kenya. The results revealed that there is significant effect of Road asset maintenance on the Performance of road agencies in Kenya and that there is a significant a partial mediation effect of budgetary allocation on the relationship between Road asset maintenance and performance of road agencies in Kenya. Additionally there is significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya. Further there is a significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya. The study recommends that top managers of the road agencies in Kenya emphasis on road assets maintenance as this significantly contributes to their performance and management effectiveness and efficiency in utilization of resource. Road authorities should establish a robust structure for budget planning and execution, as well as to diligently monitor and regulate their performance in order to address any potential discrepancies. It is essential for management to consistently implement the legal framework that serves as the foundation of the road maintenance industry.

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ACRONYMS AND ABBREVIATIONS

CLRM	Classical Linear Regression Model
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KRB	Kenya Roads Board
KURA	Kenya Urban Roads Authority
KWS	Kenya Wildlife Service
LCCA	Life cycle cost analysis
M&E	Monitoring and efficiency
MORT	The Ministry of Roads and Transport
MTP	The Kenya medium-term plan
PPP	Public Private Partnerships projects
RAM	Road Asset Maintenance
RF	Regulatory Framework,
RIA	Regulatory Impact Analysis
UK	United Kingdom
UNRA	Uganda National Roads Agency
USA	United states of America
WB	World Bank

OPERATIONAL DEFINITION OF TERMS

Budgetary Allocation: The amount of funding designated to each expenditure line.

Organizational Performance: Organisation's ability to use resources appropriately and efficiently in order to meet its goals

Road Agency Performance: Multi-faceted balance among road agencies in terms of effectiveness, efficiency, relevance, and financial feasibility.

Road Asset Maintenance: Structured approach to the operation, maintenance and improvement of physical road elements like bridges and pavements.

Regulatory Framework: The various regulations, practices and procedures that the Kenyan road agencies must abide by.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter represents the first portion of the research. This chapter provides an overview of this research project on road asset maintenance, budgetary allocation, regulatory framework and performance of road agencies in Kenya. The chapter discusses the background of the study, the problem it seeks to address, its purpose, objectives, assumptions, justification, significance, scope, limitations and delimitations of the study and finally the chapter summary. The chapter specifically identifies the areas of knowledge that are lacking and the problems that need to be solved, as well as the goals that will guide the research. Additionally, it underscores the importance of the research, as well as the extent, constraints, and boundaries of the study.

1.1 Background of the study

The provision of roads, trains, airports, water systems, and electrical networks is normally undertaken by the government of a country. Public infrastructure serves as the foundation for all economic operations. Nevertheless, it is common for governments to place emphasis on the construction of new infrastructure, despite the potential consequences of neglecting maintenance, which may result in degradation, significant issues, and even catastrophic events. Numerous instances of severe catastrophes resulting from the lack of infrastructure maintenance have been documented by the media (Gibson & Rioja, 2019). The catastrophic event that occurred in 2018, namely the collapse of the Morandi bridge, resulted in the unfortunate loss of 43 lives and left around 600 individuals without a place of residence. According to a report published by La Stampa newspaper in 1967, it was said that the concrete construction of the bridge would not need any maintenance. The catastrophe is often attributed to the persistent disregard for upkeep. The bridge's final collapse may be attributed to insufficient upkeep. Infrastructure maintenance often employs traditional contracting methods, whereby the

client organization establishes the requirements and chooses the contractor with the most competitive bid in terms of price via a tendering process. According to Gibson and Rioja (2019), the conventional maintenance contract compensates the contractor based on the number of repairs or replacements performed. This arrangement creates a counterproductive incentive structure, as the contractor stands to gain from systems that are less dependable.

The Transport Association of Canada (TAC, 2019) identified integration as being a crucial component of road asset management. The Road Asset Management System (RAMS) offers a comprehensive method for managing various administrative expenditures associated with roads, including those related to road users, work administration, environmental factors, and social impacts. This system utilizes current data sources to streamline and combine these administrative processes. The proposed solution incorporates pre-existing management systems for specific assets, such as the pavement management system, bridge management system, traffic management system, and safety management system. According to Easa and Yan (2019), the merger facilitates the provision of uniform system-wide data to the road agency, hence allowing the equitable distribution of money among various competing requirements such as pavement, structures, and other infrastructure demands.

The performance of road agencies in Europe is influenced by various factors, including the governance framework, road infrastructure quality, road safety measures, funding mechanisms, and environmental considerations (Albalate et al., 2020). The European Commission plays a significant role in shaping road safety policies across the European Union (EU) (European Commission, 2023). It provides funding and support for developing road networks and issues calls for proposals to improve road safety measures (European Commission, 2021). Additionally, national and regional governments, along with road agencies and other stakeholders, contribute to the development of road safety techniques and policies (Albalate et al., 2020). The quality of road infrastructure varies considerably across European countries (Joumard et al., 2020). Factors such as road length, completeness of the motorway network, design standards, and geographical obstacles can all influence road performance (Joumard et al., 2020). For example,

countries like the Netherlands are known for having high-quality road infrastructure (Rotaris et al., 2018), while others in Eastern Europe may face challenges with aging infrastructure (World Bank, 2019).

Road agencies in Europe rely on a diverse mix of funding mechanisms to support road infrastructure development and maintenance (Albalate et al., 2020). The European Union provides funding through grants, loans, and guarantees (European Commission, 2021). Additionally, road agencies rely on national budgets, user charges (e.g., tolls), and partnerships with the private sector (public-private partnerships) to finance projects and collect traffic data (Albalate et al., 2020). Environmental performance is an increasingly important aspect of road agency performance in Europe (Joumard et al., 2020). Efforts are underway to address traffic congestion, air quality, noise pollution, and greenhouse gas emissions associated with road transport (Joumard et al., 2020). The European Union aims to shift towards sustainable transportation modes and reduce the environmental footprint of the road transport sector (European Commission, 2021). This includes promoting electric vehicles, improving public transport infrastructure, and investing in green infrastructure solutions for road construction and maintenance (Joumard et al., 2020).

Richmond et al. (2016) argue that there has been a shift in the valuation process, with a decreased focus on traditional engineering and an increased reliance on the realms of economics and finance. The determination of the value of a road asset may be approached via several methods, such as considering the costs involved in restoring the asset to its original condition or the expenses required for its replacement. Road Maintenance Systems (RAMS) use current administrative data sources to provide a complete approach for including various charges, such as road user fees, works administration costs, environmental consequences, and social costs (Osman & Nikbakht, 2014). This methodology enables a more structured and adaptable method for making decisions; yet, it necessitates the participation of the community to comprehend the requirements and anticipations of stakeholders and the broader populace (Beitelmal et al., 2019).

Performance monitoring plays a crucial role in the maintenance of roads; since it involves the use of performance indicators to track progress towards the achievement of targets set by road agencies (Xu et al., 2020).The Department of Transportation is responsible for overseeing road maintenance and managing the transportation infrastructure in the United States. The department's objective in setting objectives for the transportation system is to ensure the dependability of road transportation (Willmert et al., 2018). The financial implications associated with the operation and maintenance of roadways in several European nations, such as Spain, England, and Germany, provide significant issues. Ensuring the incorporation of maintenance considerations throughout the design phase is crucial for attaining cost reductions. The use of life cycle cost analysis (LCCA) has emerged as a crucial tool for making informed investment choices, hence enhancing the effectiveness of this method (Tee & Ekpiwhre, 2019).

Renowned for its high-quality road infrastructure in Europe, the Netherlands has made significant investments in road development projects to enhance its network (Rotaris et al., 2018). This investment is crucial considering the country's status as a major European tourist destination, where efficient and safe road infrastructure plays a critical role in the tourism industry (Rotaris et al., 2018). Croatia has also embarked on ambitious road development projects to improve the quality of its road network. This focus on infrastructure development is particularly important for Croatia's tourism sector, where good road infrastructure is essential for attracting visitors (World Travel & Tourism Council, 2023).Emerging as a positive outlier, Turkey exhibits road quality exceeding that of some Western and Northern European countries (Şahin et al., 2020). The country's substantial investments in road infrastructure have propelled it past nations like Norway and the UK in terms of road quality (Şahin et al., 2020).

Kaiser and Barstow, (2022) have shown that countries that have implemented road maintenance strategies have seen cost savings ranging from 10 to 40%. In certain nations, such as the United States, the United Kingdom, Finland, Serbia, Croatia, Ukraine, and Estonia, a substantial amount of the domestic road infrastructure, specifically over 63%, is included under road maintenance endeavors. In the context of Argentina, it is evident that the implementation of road maintenance initiatives in 2019 had a significant role in

reducing the prevalence of deteriorated roads, resulting in a substantial decline from 25% to 5%. Road transit continues to be the prevailing means of transportation in several affluent Asian countries, such as Vietnam and Nepal. Regular maintenance is essential for ensuring the durability and operational efficiency of road infrastructure. The failure to properly attend to maintenance requirements may lead to substantial cost obligations related to eventual restoration and reconstruction efforts. In 2003, Nepal initiated a trial program focused on performance-based road repair. Nevertheless, the implementation of the program encountered difficulties arising from inadequate service delivery by the contractor and inefficient contract enforcement by the road agency, ultimately leading to its failure (Kaiser & Barstow, 2022).

The role of road transportation in promoting economic growth in African nations is of great importance, since it accounts for a significant proportion, ranging from 80% to 90%, of their total trade in goods and services. To ensure the efficient management of this vital resource, it is essential for governments to implement appropriate legislation, plans, and institutions. To assess the elements that promote or hinder the achievement of intended results, it is important to organize and analyze them (Suresh et al., 2021). The road network is a substantial public asset, owned by the government and managed by road agencies. The entities tasked with the operation, enhancement, and upkeep of the network have limitations in relation to their financial and human resources. Concurrently, it is imperative for them to additionally endeavor to meet the escalating expectations of the general populace in terms of safety, dependability, ecological sustainability, and comfort (Hayat et al., 2019). Road asset maintenance is a multifaceted approach that combines principles of engineering, ethical business conduct, and economic justification. In addition, the use of this approach also encompasses the evaluation of the financial value of the infrastructure asset, so enabling the allocation of investments towards the asset that merits the highest priority (Schoenmaker & De Bruijn, 2020).

The governance framework plays a critical role in shaping the performance of road agencies in Africa (Olowoporoku et al., 2021). National and regional governments, along with international organizations like the African Union (AU) and the World Bank, contribute to developing road safety policies and techniques (African Union Commission,

2013). The African Road Safety Observatory (ARSO) initiative, launched under the AU's auspices, aims to standardize road safety indicators across all African countries (African Union Commission, 2013). Additionally, a collaborative study by the African Development Bank (AfDB) and the World Bank examined road safety lead agencies in sixteen African countries, aiming to improve road safety outcomes (African Development Bank & World Bank, 2014). The quality of road infrastructure varies considerably across African countries (Ogunbajo et al., 2020). Factors such as road length, network completeness, design standards, and geographical obstacles can significantly influence road performance (Ogunbajo et al., 2020). Some African countries, like Namibia, are known for having well-maintained roads that are even considered tourist attractions (Pereira & Visser, 2019). However, challenges such as inadequate financing, lack of technical expertise, poor administration, and insufficient investment in research and development still hinder sustainable road maintenance practices in many African countries (Olowoporoku et al., 2021). Funding is crucial for supporting road infrastructure development and maintenance in African countries (Ogunbajo et al., 2020). The European Union, the African Development Bank, the World Bank, and other international organizations provide financial support through grants, loans, and partnerships with the private sector (Ogunbajo et al., 2020). The Sub-Saharan Africa Transport Policy Program (SSATP) conducted a study assessing the progress of road sector reforms and road agency performance in several African countries. This study focused on aspects like responsibility, ownership, and management practices within these agencies (SSATP, 2013).

In African countries, like to other developed areas, the term "infrastructure" refers to the basic physical and organizational structures that are required for the proper functioning of a civilization. These frameworks include several elements, including housing, security, industries, buildings, roads, bridges, health services, and governance, among other components. Infrastructure, as per the definitions provided by Olufemi (2020) and Sullivan and Sheffrin (2021), covers a range of constituent elements that are indispensable for the operational efficiency of an economy. These elements comprise firms, goods, services, and facilities. Therefore, the significance of infrastructure development in assessing the achievements of democratic leaders and its role as a vital

element of efficient democratic government cannot be overstated. However, the condition in several African countries has been marked by constraints on road maintenance as a result of increasing costs, limited resources, increased use of the road network, and budgetary constraints.

Over the course of the previous two decades, a notable decline in the condition of the Southern Africa Development Community (SADC) regional trunk road network has been noticed, mostly attributed to inadequate maintenance practices. The degradation of road infrastructure has resulted in the depletion of a considerable amount of the enormous expenditures made in this sector, hence exerting a detrimental effect on the economies of the area as a consequence of escalated transportation expenses. (Tee and Ekpiwhre, 2019; Jeong et al., 2021). The maintenance and upkeep of road assets hold immense importance. However, a significant proportion of road networks in many African countries are now experiencing a state of deterioration, owing to a range of contributing reasons. Based on a research undertaken by the World Bank, it was determined that a significant proportion, namely less than 50 percent, of the primary road infrastructure that is covered with pavement is in a state of optimal condition.

Furthermore, around 36 percent of the network was found to be in a state of acceptable condition, while the remaining 15 percent was classified as being in a state of poor condition. The current state might be compared to the condition of key streets that lack pavement, with just 38 percent meeting good standards, 31 percent categorized as fair, and an additional 31 percent considered to be in poor condition. The economic implications of road deterioration in Africa have been evaluated and found to be substantial, with a projected financial burden of USD 45 billion (World Bank, 2020). The significant number may be attributed to inadequate maintenance efforts throughout the previous two decades. Contrary to expectations, it is counterintuitive that the adoption of early preventive maintenance measures might have potentially led to a significantly reduced expenditure of less than USD 12 billion. South Africa boasts a relatively well-developed road network, but challenges remain with rural road maintenance and congestion in major cities (Dhliwayo et al., 2020). Rwanda has made significant strides in road infrastructure development, prioritizing paved roads and promoting efficient

logistics (World Bank, 2023). Ethiopia's road agency has been praised for its innovative approach to financing, utilizing road user charges and establishing a Road Fund (African Development Bank, 2021).

The World Bank (2020) said that the implementation of almost 2 million kilometers of road infrastructure in Sub-Saharan Africa has led to an estimated asset value of around US$150 billion. Unfortunately, as per the World Bank's assessment, the asset value saw a decrease exceeding 33% by 2020 due to inadequate and infrequent maintenance practices, leading to a fall in rural accessibility. In the Ethiopian setting, it has been noted that the degree of rural accessibility is significantly constrained, with around 21.5% of the rural populace residing within a proximity of 2 kilometers from a road that has the capacity to endure adverse weather circumstances (Assefa, 2018). Moreover, Asomani-Boateng et al. (2015) have discovered that the fundamental factor contributing to the decline in the value of road assets is the lack of timely maintenance. According to Adey et al. (2017), the allocation for infrastructure repair in Nigeria amounts to around USD 25 billion, or approximately seven percent of the nation's GDP.

Kenya faces challenges with corruption and maintenance backlogs, but recent investments aim to improve its road network (Onyango et al., 2022). Within the specific geographical setting, the government of Kenya has instituted many public road agencies and devolved administrations with the primary objective of supervising and managing the country's extensive road networks. The entities responsible for the management, development, and maintenance of various road networks in Kenya include the Kenya Roads Board (KRB), which oversees the Road Maintenance Levy Fund (RMLF); the Kenya National Highways Authority (KeNHA), which is in charge of managing, developing, and maintaining National and Trunk Roads in Classes S, A, and B; the Kenya Rural Roads Authority (KeRRA), which is responsible for the management, development, and maintenance of National Trunk Roads in Class C; the Kenya Urban Roads Authority (KURA), which is tasked with the management, development, and maintenance of Urban Roads in Cities and Municipalities; the Kenya Wildlife Service (KWS), which is responsible for the management, development, and maintenance of roads in National Parks and National Game Reserves; and the 47 County Governments,

which are responsible for the management, development, and maintenance of County Roads in Classes D and below (KRB, 2022)

The primary aim of creating road maintenance agencies is to enhance the effective management of the road network, a complex undertaking that requires the active participation and dedication of several stakeholders, with a special emphasis on road users. The Medium-Term Plan (MTP) of Kenya prioritizes the improvement and maintenance of road infrastructure. This document delineates several methodologies with the objective of augmenting the longevity and lifespan of road infrastructure, while also allocating distinct obligations and accountabilities to road maintenance entities for efficient execution. The efficacy of road authorities in Kenya has been insufficient, leading to suboptimal conditions of both paved and unpaved roads, despite their notable contributions. Despite the government's supply of funds for road rehabilitation, namely via fuel tax funding. Prior research has included investigations of the financial outlays related to product manufacturing, including both annual and cumulative costs. Nevertheless, despite the implementation of several initiatives, the status of key road networks continues to demonstrate inadequate standards (Greiner et al., 2021).

1.1.1 Road Assets Maintenance

The management of assets often entails the examination of a great number of factors, such as the levels of investment, the maintenance standards, and the economic relevance. When it comes to the management of infrastructure, these aspects may be evaluated using a variety of performance measures of the asset, such as the amount of time it is actually being used, its degree of safety, and its impact on the environment. The management of assets is susceptible to the influence of geographical and socio-economic elements that are present inside the firm, in addition to the established business processes (Schoenmaker & De Bruijn, 2020).

Road Asset Maintenance (RAM) refers to a systematic and structured approach that centers on the prioritizing and management of road infrastructure, including elements such as bridges and pavement. The primary objective of RAM is to effectively oversee, maintain, and enhance the overall state of these assets (Tee & Ekpiwhre, 2019).

According to the study conducted by Kim et al. (2018), the primary aim of this particular methodology is to effectively and consistently oversee tangible assets and their corresponding expenses, efficacy, and potential hazards throughout their complete lifespan, ultimately working towards the strategic goals of the organization. The aforementioned notion highlights the connection between asset management and the attainment of corporate goals.

The establishment of this link is achieved through the integration of several elements, such as strategic, operational, economic, engineering, and other activities. The ultimate goal is to provide the necessary service level in a manner that is both efficient and cost-effective. Hence, asset management may be seen as the focal point of convergence for several operations. In addition to the maintenance of bridges and pavements, the concept of RAM encompasses the entire infrastructure under the authority of the agency. The main aim of this effort is to ensure the preservation, restoration, and long-term sustainability of infrastructure throughout its entire lifecycle. The use of Random Access Memory (RAM) technology, in conjunction with the proposed integration of infrastructure asset maintenance, is anticipated to provide enhanced efficiency in resource allocation for the agency. The incorporation of a feedback loop that assesses progress in relation to objectives has significant significance, and the evaluation of performance is a crucial component within the RAM model. The current body of research has extensively investigated several aspects of road asset maintenance, thereby impacting the selection of variables for analysis in this study (Schoenmaker & De Bruijn, 2020).

Road asset management involves the efficient and effective administration of resources within a road agency, using a business-oriented approach. An essential aspect of this matter is to the need for road agency managers to establish a shared vocabulary with budget holders. This enables them to effectively illustrate the consequences of various investment choices (Kipkurui & Obura, 2018). The road asset management process necessitates the evaluation of the value of infrastructure assets, since this valuation plays a crucial role in establishing the order of importance for future investments in road assets. Community consultation plays a crucial role in the realm of road asset management, as it facilitates a comprehensive comprehension of stakeholder demands and public

anticipations. An additional crucial element in the use of road asset management systems pertains to the need of monitoring the performance of the road asset in relation to predetermined desired outcomes or performance objectives. One such strategy involves the use of performance indicators as a means of assessing the advancement made in attaining the goals set out by the road agency. Additional, easier methods include the direct documentation of the state of the road asset over time. Various methods exist for representing performance, including the percentile of the condition level, impacts on users, safety levels, environmental consequences, and economic considerations pertaining to the road network (Lima, McMahon, & Costa, 2021).

In their research, Arif and Bayraktar (2021) undertook an investigation into the use of various tactics adopted by transportation infrastructure firms operating inside the United States. The study focused on six core aspects of asset management, including information systems, strategic planning, outsourcing procedures, performance assessment, and decision-making processes. In their study, Hiepl and Sodikov (2017) conducted research to identify four fundamental components associated with the maintenance of road infrastructure. The aforementioned elements include several factors such as aims, financial resources, assets, and effectiveness. Additionally, Kamau and Human (2020) proposed a policy-level component that encompasses the development of long-lasting goals and the enhancement of transportation infrastructure. Furthermore, the research emphasized the many elements pertaining to budget management, such as the thorough examination of the budget, estimation of expenses, and implementation of monitoring and evaluation protocols. The evaluation of road asset upkeep undertaken by the Kenya Road Board involves a variety of elements. The elements included in this study are the degree of responsiveness shown towards road-related concerns, adherence to established inspection protocols, prioritization of road safety considerations, assessment of the environmental consequences associated with repair operations, and the amount of acceptance and satisfaction experienced by road users.

1.1.2 Budgetary Allocation

The fundamental contours of the phases that are included in the budgeting cycle are generally agreed upon by the majority of people. However, scholarly studies into the

reform of public fund management have brought to light the absence of a framework for the distribution of money that is broadly agreed by all parties concerned. This lack of a framework has made it more difficult to reform public fund management. According to Kwarteng (2018), the concept of budget allocations concentrates the bulk of its emphasis on the subsequent stages of a process, such as execution, monitoring, accounting, and assessment. This is because these phases are the ones that directly affect the outcome of the process.

According to Alam (2019), one alternative theory pertains to the process of allotting resources and revenue via mechanisms like as taxes, spending, and the management of public debt. In other words, this idea focuses on fiscal policy. It is vital for governments to correctly adopt and carry out a well-executed budget allocation if they want to be successful in accomplishing their long-term objectives and ambitions. This is because failure to do so will prevent them from being able to do so. In order to successfully address the demands of a number of various stakeholders while at the same time creating and maintaining relationships, this calls for the use of a broad range of efficient strategies and communication channels.

Establishing phases in a manner that is clear, succinct, and well-defined is of the highest value because it establishes a solid foundation for the subsequent stages of the execution process. This is because it sets the groundwork for the subsequent stages of the execution process. The components that have been stated above involve many different aspects, some of which include the annual financial plan, the maintenance of financial records, internal and external evaluations, supervisory activities, procurement procedures, and the transmission of information (Mkasiwa, 2020).It opens the door to the possibility of improved governance that adheres to the principles of public financial expertise, accountability, and transparency (Alam, 2019). This is because the distribution of funds within the budget provides a clear understanding of the interaction between the various departments and stakeholders. Not only does this paradigm make it feasible for people to share their points of view with one another, but it also fosters transparency and accountability in the process.

The framework for budget allocation has three major goals: to increase the government's financial discipline over the long term; to strategically prioritize the composition of expenditures; and to make it simpler for the government to carry out its operations by making use of plans. All three of these objectives are intended to be accomplished via the use of plans. In addition to this, the objective is to raise awareness of the need of responsible financial conduct while simultaneously enhancing the efficiency of the organization's resources.

1.1.3 Regulatory Framework

The phrase "regulatory policy" or "regulatory framework" is the word that is most often used when referring to the collection of laws, protocols, and agreements that are related to regulatory measures. These phrases describe the regulatory policy or regulatory framework. This category includes the laws that mandate the disclosure of important information by government agencies, the participation of the general public in meetings, and the publication of proposed regulations to the general public. In addition, regulatory policies include elements such as budgets, mandates, and legislative authorization of rules that are carried out at the level of the ministry or agency. The State Corporation Act of 2005 was passed in Kenya with the intention of laying the basis for a legal framework that governs the distribution of certain privileges and powers. The Chief Executive Officer (CEO) of the company is the one who has the authority to choose the one who will serve as the Chairman of the Board of Directors for the company. An in-depth review of the relevant rules is required in order to ascertain whether or not a particular regulatory policy is successful in achieving its intended goals.

According to Alrabiah and Drew (2020), and Coglianese (2021), doing an examination of the circumstances surrounding Regulatory Impact examination (RIA) is a necessary stage in the process of drafting rules that are both effective and efficient. This is the conclusion reached by both authors in their respective studies. The fundamental goal of this examination is to establish whether or not the legislation that was just approved is practical and useful. Within the sphere of academic study, major studies of a wide number of aspects of regulatory systems have been carried out by academics originating

from a variety of countries. These exams have been carried out by scholarly researchers. Mkasiwa (2020) completed a research project that included an examination of the regulatory frameworks that are linked with the administration and monitoring of state enterprises. During the course of this inquiry, a complete collection of laws, regulations, and procedures that are particularly pertinent to the context that is now under examination was compiled. According to the results of their study, Naliaka and Namusonge (2020) emphasized how crucial it is to build a regulatory framework in order to promote compliance as well as to encourage better transparency, professionalism, and efficiency in the procurement process. This was done in light of the fact that such a framework would have the potential to boost all of these factors.

Karungani and Ochir (2018) carried out a research with the objective of evaluating the policy regulatory framework that governs honesty, accountability, professionalism, and justice in the process of providing organizational services. Their findings were presented at a conference in 2017. The Kenya Road Board is accountable for monitoring the disbursement of money, the administration of those funds, and the evaluation of the efficiency of activities that are connected to the rehabilitation of roads. As a direct result of this, it is responsible for the implementation of legislation relating to road infrastructure. This responsibility includes the supervision of operations, the guarantee of high standards, the promotion of transparency and accountability, the facilitation of consistent standardization, and the facilitation of administrative coordination and control.

1.1.4 Organisational Performance

The government of Kenya has created a significant number of public road agencies with the goals of efficiently administering the nation's road network and preserving its condition. Examples of the aforementioned government agencies are the Kenya National Highways Authority, the Kenya Wildlife Services, the Kenya County administrations, the Kenya Rural Roads Authority, and the Kenya Roads Board. Both the formulation of road-related policies and the establishment of road-related standards are the responsibilities of the Ministry of Roads and Transport. They are the ones who are responsible for carrying out this duty. The Keystone Regulatory Board (KRB) is responsible for the administration of the Road Maintenance Levy Fund (RMLF), which

means that it is tasked with the responsibility of monitoring the allocation of funds for activities that are directly linked to road repair. This activity is carried out in order for the KRB to satisfy its legal requirements.

The Kenya National Roads Authority, often known as KeNHA, is in charge of overseeing the management of Kenya's national trunk roads, in addition to being responsible for their construction, maintenance, and repair. This responsibility is within the purview of the KeNHA's authority. The road network is divided into three unique classifications: Class A, Class B, and a specific subset of routes that is referred to as Class C. Class A is the most important classification, while Class B is the second most important classification. A subset of routes known as Class C is considered to be more specialized. Two separate organizations are assigned the responsibility of maintaining the many kinds of highways that fall within their respective spheres of authority. KeRRA is accountable for supervising the administration and maintenance of rural roads that are classified as Class D, Class E, and a section of Class C, in addition to supervising the maintenance and administration of other rural roads that are not classified. In contrast, it is KURA's job to maintain and administer urban roadways located within municipalities, especially those that are classified as national highways. Specifically, this responsibility extends to the management of national highways. These roadways are included in this classification.

According to the First Schedule of the Kenya Roads Act (2007), the Kenya Wildlife Service (KWS) is the organization that is assigned the duty of maintaining and supervising the administration of the road infrastructure that is located within Kenya's national parks and reserves. This responsibility falls under the KWS's jurisdiction. The establishment of these organizations has, as its major emphasis, the purpose of ensuring effective management of the road network. This was the fundamental motivation for the establishment of these organizations. It is vital for organizations that use roads to have distinct legal identities and aims, as well as suitable, reliable, and consistent financial resources and a professional and practical approach to the administration of roads. This is because the challenges that were outlined above make it essential for organizations to have separate legal identities. Because the Kenya Medium-Term Plan (MTP) includes

activities that are intended to extend the lifetime and resilience of roads, it is important for the relevant governmental institutions in Kenya to put the plan into action.

1.1.5 Performance of Road Assets and Road Asset Maintenance Agencies in Kenya

The road network in Kenya has a total distance of about 161,451 kilometers and possesses a monetary value exceeding Kshs 3.5 trillion. The comprehensive infrastructure in question signifies a substantial allocation of public funds within the country (KRB, 2022). Based on the findings of the 2022 economic survey report, the documented figure for the extent of bitumen-surfaced roads as of June 2021 stands at 21.8 thousand kilometers. According to the Kenya National Bureau of Statistics (KNBS, 2022), the aggregate distance, including paved super-highways, international trunk roads, and national roads, amounts to 11.1 thousand kilometers. Additionally, the length of paved main roads is reported to be 7.5 thousand kilometers. Table 1 provides a detailed summary of the total length of roads, classified by kind and category, from June 30th, 2017 to 2021. The data shown in the table provides a clear and comprehensive representation of the growth and development of road infrastructure throughout the designated timeframe.

Table 1: Kilometers of Roads by Type and Classification as at 30th June, 2017 – 2021

Kilometres

Surface Type/ Year	Earth/Gravel (Unpaved)					Bitumen(Paved)				
	2017	2018	2019	2020	2021*	2017	2018	2019	2020	2021*
National Roads										
Super Highway (S)	-	-	-	-	-	81	81	81	157	157
International Trunk Roads (A)	3,427	3,008	2,623	2,539	3,112	4,191	4,609	4,994	5,266	5,350
National Trunk Roads (B)	7,062	6,743	6,260	8,798	7,625	3,789	4,109	4,592	5,565	5,632
Primary Roads (C)	17,325	17,131	15,950	15,899	15,985	4,121	4,314	5,495	6,104	7,525
Sub-total	**27,814**	**26,882**	**24,833**	**27,236**	**26,722**	**12,181**	**13,113**	**15,162**	**17,092**	**18,664**
County Roads										
Secondary Roads (D)	9,819	9,424	9,224	8,551	9,150	1,305	1,699	1,899	1,225	1,432
Minor Roads (E)	12,974	12,843	12,643	10,539	11,523	1,074	1,205	1,405	717	645
Special Purpose Roads (F)	9,186	9,122	9,057	8,954	9,091	439	504	569	465	365
Unclassified Roads (G)	84,625	84,525	84,399	83,524	83,521	2,035	2,135	2,261	1,837	720
Sub-total	**116,604**	**115,914**	**115,323**	**111,567**	**113,285**	**4,853**	**5,542**	**6,133**	**4,244**	**3,162**
Grand Total	**144,418**	**142,796**	**140,156**	**138,803**	**140,007**	**17,034**	**18,655**	**21,295**	**21,336**	**21,826**

Source: Adopted from 2022 Economic Survey Report (KNBS, 2022).

Based on the findings of the economic survey report, it is projected that the government's spending on roads will increase from KSh 494.8 million in 2020 to KSh 534.6 million in 2021. The rise in funding allocated to the road sub-sector is responsible for this increase. During the fiscal year of 2019–2020, there was a decrease in government investment in roads, with the amount falling from KSh 592.9 million to KSh 494.8 million. Furthermore, Table 2 illustrates the rise in spending on other notable economic indicators within the construction industry.

Table 2: Selected Key Economic Indicators in the Construction Sector, 2017 – 2021

Indicator	Unit	2017	2018	2019	2020	2021*
Reported Real Value of Private Building Works Completed in Nairobi City County[1]	KSh Million	443.1	466.2	471.7	476.2	464.5
Reported Real Value of Public Building Works Wompleted by the SDH[1]	KSh Million	59.4	57.9	38.5	70.8	63.2
Government Expenditure on Roads	KSh Million	388.0	415.4	592.9	494.8	534.6
Cement consumption	000 tonnes	5,857.9	5,948.7	6,129.1	7,375.6	9,098.4
Private Employment*	000 persons	204.9	213.4	212.7	212.4	217.3
Public Employment	000 persons	8.5	8.6	8.8	9.1	9.2
Loans and Advances from Commercial Banks to the sector[2]	KSh Million	482,717.0	482,725.0	489,889.0	526,489.0	531,294.0

Source: Adopted from 2022 Economic Survey Report (KNBS, 2022).

The job of collecting funds for road maintenance has been allocated to the Kenya Road Board. Based on the findings of the economic survey report, there was a significant increase in the actual monetary inflow, with an upward trajectory from KSh 61.8 billion during the fiscal year 2019/20 to KSh 87.6 billion during the fiscal year 2020/21. Based on the projected trend, it is expected that there will be an impending reversal leading to a decrease to 54.1 billion Kenyan Shillings in the fiscal year 2021/2022. Based on the statistics presented by the Kenya National Bureau of Statistics (KNBS) in 2022, it is projected that the Fuel Levy Fund would see a reduction of 38.5 percent, with a decline from KSh 87.1 billion in the fiscal year 2020/21 to KSh 53.5 billion in the fiscal year 2021/22. Furthermore, it is anticipated that the revenue generated from transit tolls would see a little decline, decreasing from KSh 550 million in the fiscal year 2020/21 to KSh 539 million in the fiscal year 2021/22.

Table 3: Road Maintenance Funds (Ksh'M) by Source, 2017 – 2021

	2017/18	2018/19	2019/20	2020/21*	2021/22**
Fuel Levy	63,474	56,260	61,283	87,050	53,539
Transit Toll	474	539	550	550	539
Total	**63,948**	**56,799**	**61,833**	**87,600**	**54,078**

Source: Adopted from 2022 Economic Survey Report (KNBS, 2022).

On the contrary, the projected data for road passenger and freight traffic indicates a rise to KSh 1,785.4 billion by 2021. Based on the data shown in Table 4, it is projected that there would be a significant increase of 30.5% in road freight traffic, resulting in a total value of KSh 794.5 billion by the year 2021. In a similar vein, it is projected that there would be a modest growth of 6.7% in passenger traffic, resulting in a total of KSh 990.9 billion in the corresponding period.

Table 4: Road Transport Output (Ksh'M) for the period 2017 – 2021

	2017*	2018	2019	2020	2021*
Passenger Traffic	727,871	835,109	926,650	928,784	990,852
Freight Traffic+	467,128	542,029	605,340	608,618	794,505
Total Road Traffic Earnings	**1,194,999**	**1,377,138**	**1,531,990**	**1,537,403**	**1,785,356**

Source: Adopted from 2022 Economic Survey Report (KNBS, 2022).

The budgetary proposal put up by the Road Sector Investment Programme (RSIPII) serves as further substantiation of the inadequacy of government spending in addressing the country's requirements. The proposal recommends allocating an annual budget of around 100 billion Kenyan shillings for the purpose of road building. The current funding of 53.3 billion Kenyan shillings for road improvements has seen a substantial rise. As a result of this, there is now a deficit of KShs 46.7 billion. According to the organization, the mentioned shortage in funds is anticipated to impact the projected results of the RSIPII. As a result of this situation, there will be a need to get additional money in order to address the current budget shortfall and achieve the established objectives (KNBS, 2022).

According to Nugrahani and Jahja (2018) argue that the use of performance indicators is essential for conducting a precise assessment of the results achieved by agencies within

the domain of highways. Rafi et al. (2022) posit that the assessment of a road assets maintenance performance indicator's efficacy necessitates a comprehensive examination including many key considerations, including effectiveness, efficiency, relevance, and financial feasibility. In 1995, a group including scientific specialists reached the determination that the establishment of measurable comparisons across various road administrations lacks significant use unless it is thereafter accompanied by a detailed examination and assessment of the fundamental factors that contribute to any observed disparities.

In the absence of this factor, the group held the belief that the efficacy of conducting systematic comparisons would be significantly limited. The factors included in this study are journey duration, expenses borne by road users, allocation of resources for road infrastructure, risks faced by road users, road roughness, and the degree of satisfaction reported by road users. There exists a hypothesis suggesting that an augmentation in government expenditure allocated towards the building of new roads and maintenance of existing roads has had a role in enhancing the overall quality of road infrastructure. Figure 1 depicts a graphical representation showcasing a comparative analysis of the road conditions prevalent in the years 2009 and 2018.

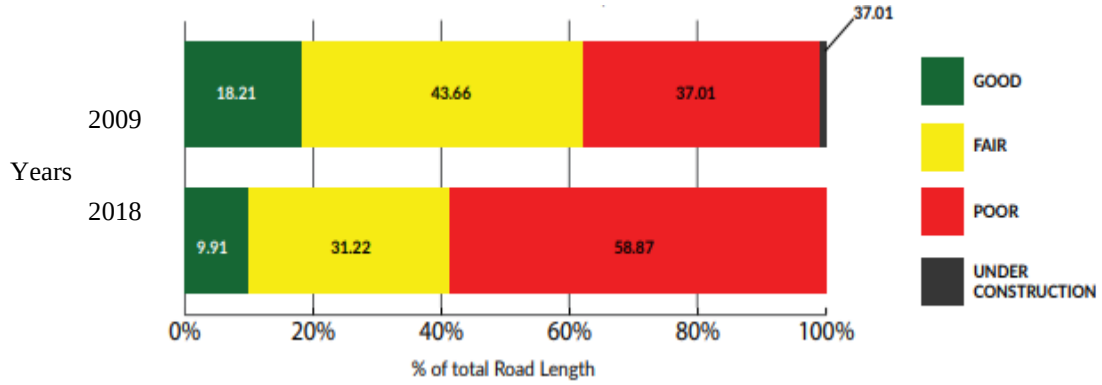

Figure 1: Road Condition Mix 2009/2018

Source: Annual Public Roads Program 2020/2021

From figure 1, the result shows that the overall condition mix of road assets maintenance in Kenya over the past decade has increased. Although poor network has declined from 58.87% to 37.01%, the road board authority observed the recorded figure is still significant and requires a big investment to bring that network to maintainable standards.

Similarly, the World Economic Forum's (WEF) assessment of the quality of roads survey "road quality indicator score" as measured by the "Rural Access Index (RAI)" – that is the proportion of the rural population who live within 2 km of an all-season road. The quality of Kenya road assets as at 2019 stood at 4.1 out of 7.0 which is the best rating. Within the period 2006-2019, the average value is 3.67 points, with a minimum of 2.22 points in 2006 and a maximum of 4.3 points in 2017. The trend analysis shown in figure 2 indicates a decline in quality of Kenya roads. This clearly demonstrates the reducing effect of road assets maintenance in the country.

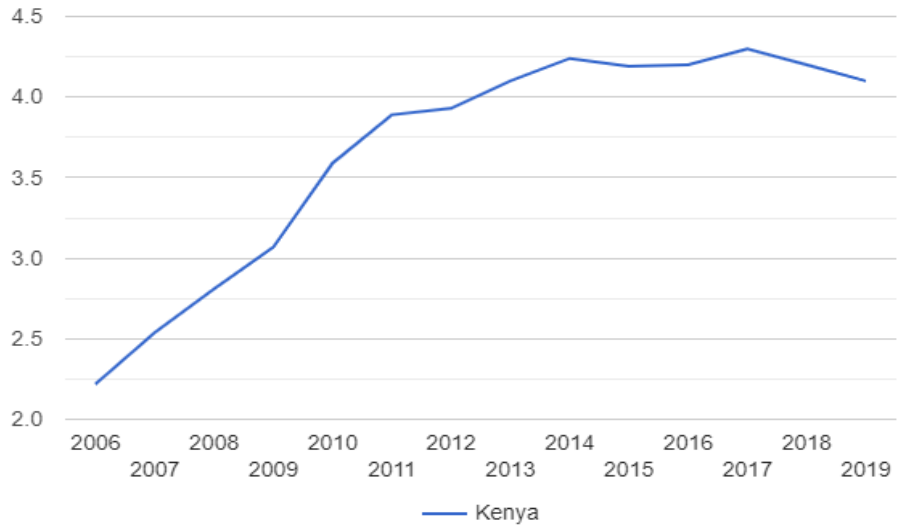

Figure 2: Kenya's Road Quality Indicator Trend (2006-2019)

Source: https://www.theglobaleconomy.com/Kenya/roads_quality/

Based on the data shown in Figure 1, there has been a noticeable increase in the overall composition of road infrastructure maintenance conditions in Kenya during the last decade. Despite a reduction in the incidence of insufficient network connection from 58.87% to 37.01%, the road board authority has observed that the remaining percentage is significant and requires a big financial commitment to attain sustainable network standards.

Similarly, the World Economic Forum (WEF) assesses the state of roads by using a metric known as the "road quality indicator score," which is derived from the "Rural Access Index (RAI)." The Rural Accessibility Index (RAI) quantifies the proportion of persons living in rural regions who possess proximity to a year-round road within a 2-

kilometer distance. In the year 2019, the road assets in Kenya received a rating of 4.1 out of 7.0, signifying the attainment of the best attainable grade. From 2006 to 2019, the average value of the variable in question was determined to be 3.67 points. The lowest recorded value of 2.22 points was documented in the year 2006, and the maximum recorded value of 4.3 points was observed in 2017. The visual depiction shown in Figure 2 demonstrates a noticeable decline in the overall state of road infrastructure in Kenya. This observation presents persuasive data on the consequences of decreased maintenance of road infrastructure in the country.

1.1.6 Kenya Road Agencies

Kenya's road infrastructure development and maintenance rely on a coordinated effort by several key road agencies (Kenya Roads Board, 2013). These agencies play a crucial role in ensuring the quality, safety, and connectivity of the road network throughout the country. The main road agencies in Kenya include the Kenya National Highways Authority (KeNHA), the Kenya Urban Roads Authority (KURA), and the Kenya Rural Roads Authority (KeRRA). Established under the Kenya Roads Act, 2007 (Republic of Kenya, 2007), KeNHA is responsible for developing, managing, rehabilitating, and maintaining national highways in Kenya (Kenya National Highways Authority, n.d.). This act empowers KeNHA by outlining its responsibilities and powers in overseeing the national road network, ensuring its quality, safety, and efficiency (Republic of Kenya, 2007). KeNHA focuses on constructing and maintaining major highways that connect different regions of the country. They collaborate with various stakeholders, including the government, private contractors, and international organizations, to achieve efficient and sustainable development of national roads (Kenya National Highways Authority, n.d.).

Similar to KeNHA, KURA is established under the Kenya Roads Act, 2007 (Republic of Kenya, 2007). This act provides the legal framework for KURA to undertake critical tasks related to urban road infrastructure (Republic of Kenya, 2007). KURA focuses on planning, design, construction, and maintenance of urban road infrastructure in major cities and towns across Kenya (Kenya Urban Roads Authority, n.d.). Their core mission is to improve urban mobility, reduce congestion, and enhance the overall urban

environment through well-developed and maintained urban road networks (Kenya Urban Roads Authority, n.d.). Also established under the Kenya Roads Act, 2007 (Republic of Kenya, 2007), KeRRA has a distinct mandate (Republic of Kenya, 2007). This act defines KeRRA's role in managing and maintaining rural road infrastructure in Kenya (Kenya Rural Roads Authority, n.d.). Their primary focus is developing, upgrading, and maintaining rural roads to improve accessibility and connectivity in rural areas (Kenya Rural Roads Authority, n.d.). This focus on rural infrastructure development supports agricultural activities and enhances socio-economic development in rural communities (Kenya Rural Roads Authority, n.d.).

These road agencies in Kenya work collaboratively with each other and other relevant government departments to ensure the effective implementation of road infrastructure policies and standards (Kenya Roads Board, 2013). They also leverage partnerships with international organizations, such as the World Bank and the African Development Bank, to access financial support and technical expertise for crucial road projects (Kenya Roads Board, 2013). This collaborative approach plays a significant role in fostering a robust and well-maintained road network across Kenya.

1.2 Statement of the Problem

According to Sustainable Development Goals (SDG) target 11.2, access to secure, affordable, accessible, and sustainable transport systems is to be provided by the year 2030 (UN-SDG 2030). In addition, Kenya's Vision 2030 aims to improve domestic and regional trade through the construction and rehabilitation of approximately 5,500 kilometers of roads, including 3,825 kilometers of national trunk roads and 1,675 kilometers of county roads (Kenya Vision 2030). Approximately 80% to 93% of passenger and cargo travel in Kenya is carried out by road (Greiner et al., 2021). This mode of transport accounts for more than 30% of the total output each year from 2010 to 2020. Despite its importance, roads are poorly managed and receive inadequate amounts of funding for repair and maintenance, thus leading to a substantial portion of the country's Ksh 3.5Trillion networks being in a state of disrepair (Mushori et al., 2020). Decline on government expenditure and road funds collection could be the main contributors as have been witnessed in the recent past. For instance, in 2020 asset

maintenance declined from Ksh 592.9M to Ksh. 494.8M, similarly to Fuel Levy Fund declined by 38.5% to KSh 53.5 billion in 2021/22 and transit toll collection from KSh 550 million in 2020/21 to KSh 539 million in 2021/22. Despite the decline in revenue and expenditures, road passenger and freight traffic output project a growth to KSh 1,785.4 billion in 2021. The overall condition mix of road assets maintenance over the past decade has increased, with poor network declining to 37.01% from 58.87% however this is still significant and requires a big investment to bring that network to maintainable standards.

Road assets stakeholders especially the public and road users do have a vested interest in road assets maintenance and standards, as poor road conditions can lead to fatalities, vehicle damage, increased fuel costs, and job loss (Alusa & Kalui, 2021). Although the introduction of the Kenya Roads Board in 2000 and the subsequent enactment of the Kenya Roads Act in 2007, with its provision for the creation of the KeNHA, KURA, and KeRRA, has been seen as a step towards improving the legal and institutional structures related to road development and preservation (Kiprono & Matsumoto, 2018), the quality of road assets is still below the expected standards. Latest ranking of Kenya's road quality as assessed by World Economic Forum's road quality indictors survey - in 2019 stood at 4.1 with a decline in trend from 2017 clearly demonstrating the reducing road assets maintenance resulting in high vehicle operating costs and restraining socioeconomic growth (Mushori et al., 2020). If the current situation on road asset maintenance is not addressed, it will be difficult for Kenya to achieve SDG 11.2 and the Kenya Vision 2030; therefore, a study on the performance of road agencies in Kenya charged with road asset maintenance is crucial.

Previous research and mixed results has primarily focused on evaluating the effectiveness of road agencies by examining factors such as resources (Hatry, 2018; Chan, Fwa & Tan, 2021), government policy, monitoring and evaluation (Espinet et al., 2018; Male et al., 2019), risk management, managers' competency, funding (Soekiman et al., 2018), equipment, technological innovation, and material procurement (Mahamadu et al., 2019). Multiple studies have been conducted in various contextual settings. Sodikov and Jamshid (2019) examined the road asset management systems in developing countries,

with a specific focus on Uzbekistan. Byaruhanga and Basheka (2017) conducted research in Uganda on the monitoring and performance of contractors involved in road infrastructure projects. There are methodological gaps in the existing studies. To address this, Priyatiningsih and Sutrisno (2020) undertook a study to examine the link between the road infrastructure asset management methodology and its environmental consequences. This study used a descriptive qualitative research approach, including road users as participants, whereas Harvey, M. O. (2012) investigated mathematical optimisation models for road maintenance. This research intends to bridge the existing gaps by establishing the nexus between road assets maintenance, budgetary allocation, and regulatory framework on the performance of Kenyan road agencies.

1.3 General Research Objective

The general objective of the study is to assess the road assets maintenance, budgetary allocation, regulatory framework and performance of road agencies in Kenya.

1.3.1 Specific Objectives

The specific objectives are:

i. To establish the effect of road assets maintenance on the performance of road agencies in Kenya,
ii. To determine the mediating effect of budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya,
iii. To examine the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.
iv. To evaluate the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

1.4 Significance of the Study

The fundamental purpose of this research is to deepen our grasp of the anchoring theory as it relates to management principles by comparing it to the existing knowledge base. In

particular, the findings of this study provide important components for the efficient management of road infrastructure. In addition, the major goal of this study is to develop a theoretical framework and analytical models that can be used to examine the moderating and mediating impacts of regulatory frameworks and budgetary allocations on road asset management. Another purpose of this research is to determine whether or not there is a relationship between regulatory frameworks and road asset management.

The outcomes of the research would also make a substantial intellectual addition to the process of either formulating new policies or revising existing ones. When the mediating impact of budgetary allocation is determined, it will give useful insights that can be used in the creation of strategies for budget allocation that may be used by road authorities and road asset repair programs. In a similar vein, an examination of the moderating effects of regulatory frameworks would give insights into deficiencies within the present system, in addition to pertinent policy suggestions to enhance the system's performance.

In addition, the findings of this research would be a substantial contribution to the area of management practice if they were to be published. More specifically, these insights would help a lot when it comes to helping managers make decisions about how to plan the maintenance of road assets, how to spend budget funds, and how to make sure that rules are followed. In addition, the research is able to identify management strategies related to road maintenance that have room for further development as an area of focus for future research.

1.5 Scope of the Study

The purpose of the study was to assess the road asset maintenance, budgetary allocation, regulatory framework, and performance of road agencies in Kenya. It was conducted at the Kenyan Road Agencies namely KeNHA, KURA, and KeRRA targeting participants to be drawn from project engineers, procurement personnel, and financial officers both the regional offices and the central office in Nairobi. The analysis was based on panel data covering a period of five years from 2017 to 2022, which corresponds to the period when the quality of road assets in Kenya registered a decline trend.

1.6 Limitation of the Study

The study to analyse road assets maintained by three agencies namely KeNHA, KURA, and KeRRA, leaving out those maintained by Kenya Wildlife Service (KWS), which is responsible for the management, development and maintenance of roads in National Parks and National Game Reserves; and The 47 County Governments which are responsible for the management, development and maintenance of County Roads (Classes D and below). The agencies not assessed controlled over 50% of road assets - especially memorable earth roads within the counties. The findings to be drawn by the study, thus might not present the true picture of the nation's road assets maintenance and budgetary allocation. Equally, devolved governments funding allocation on road assets for development and maintenance is not captured by the study, despite its significant in establishing the quality of road assets, which might also lead to inconclusive findings. Therefore, precautions need to be observed in generalization of the study findings.

1.7 Delimitation of the Study

The major aim of this research is to investigate and assess many factors pertaining to the maintenance of road assets, allocation of budgetary resources, regulatory framework, and the performance of road authorities within the specific context of Kenya. The study will be carried out within the organizational frameworks of the Kenya National Highways Authority (KeNHA), Kenya Urban Roads Authority (KURA), and Kenya Rural Roads Authority (KeRRA) entities. The research will primarily focus on persons fulfilling the roles of project engineers, procurement staff, and finance officials in both regional and central offices. The timeframe of the research spanned a period of six years, commencing in 2017 and concluding in 2022.

1.8 Chapter Summary

This chapter provided an extensive overview of the historical context of the study, as well as a thorough analysis of the conceptualization of the variables that are the subject of the inquiry. In addition, the problem statement of the study was discussed. Additionally, the paper describes the research challenge, the aims, the rationale, the scope, the limits, and the boundaries of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter offers a complete analysis of the topic of the research, which is the performance of road agencies in Kenya, and its purpose is to provide those findings. This chapter presents a comprehensive analysis of the theoretical framework, a comprehensive examination of the empirical findings, and a concise description of the research that has been done in the past. At the very conclusion of the chapter, a table is shown that provides a synopsis of the unanswered issues raised by the research.

2.1 Review of the Theoretical Literature

The process of theorizing encompasses the development and progression of a complete body of knowledge. According to Bendickson et al. (2016), it is essential to have a thorough understanding of the core theoretical frameworks in order to successfully use them in explaining various phenomena. Dumez (2018), recognizes the proposition that this technique implies the potential for a theory to impact practices, hence affirming its credibility. Moreover, as argued by Munesia (2014), the essence of a theory does not reside in its capability to precisely depict the actual world, but rather in its potential to mold and harmonize reality in accordance with the conceptual framework of the theory. This section critically analyzes the theoretical concepts that underpin the basis of this study. This study used four foundational theories, namely the administrative management theory, budgeting theory, the public interest theory of regulation, and the agency theory, serving as the guiding theoretical frameworks. The study was anchored on the administrative management theory.

2.1.1 The Administrative Management Theory

Henri Fayol established a comprehensive model of management consisting of fourteen key principles in the year 1925. This model is widely acknowledged as a major advancement in the field of administrative management theory. The model places considerable emphasis on the relationship between supervisors and their organizations in order to get an understanding of the goals of these organizations, develop efficient tactics

for attaining those objectives, and motivate employees to perform at their highest potential. According to Fayol's theory, management is characterized by several distinct elements. These include the division of labor, the exercise of authority and discipline, the unity of command and direction, prioritizing group interests over individual interests, compensation, centralization, the scalar chain, maintaining order, equity, stability in employee tenure, initiative, and fostering a sense of camaraderie (Fayol, 1930). These aforementioned attributes are the key factors that differentiate management from other organizational frameworks.

The fundamental assumptions of Administrative management theory encompass the following aspects: the utilization of scientific management principles to ascertain the most optimal approach for task completion; the selection of employees based on their skills and areas of expertise; the maximization of operational efficiency; decision-making authority vested in a singular individual or a limited group of authoritative figures; prioritization of productivity as the primary objective; and the elevation of profit growth as a paramount concern (Benn et al., 2014). The management theories provided by Fayol have faced substantial criticism due to the significant transformations that have occurred in management theory since his time.

The views he presents are seen as antiquated when compared to the prevailing ideas in contemporary culture, which prioritize leadership over management across many situations. The planning functions he has remain pertinent to the field of management, since they continue to be used for the purpose of overseeing tasks and personnel. The aforementioned functions served as the fundamental principles for the administrative school of management, which revolved on the six core functions of forecasting, planning, organizing, commanding, and coordinating. The present theory will function as a foundation for the independent variable "road assets maintenance" and will help to elucidating how the enhancement of predictable and controllable behaviors inside road agencies may lead to improved management of road assets, as per the specific criteria outlined in the research.

2.1.2 The Budgeting Theory

In 1987, Hirst presented an innovative theory of budgeting that advocated for the establishment of a control system to effectively detect and manage probable risks and rewards via the processes of planning and budgeting. This theory was referred to as the control system budgeting theory. According to Shields and Young (1993), the utilization of the aims and performance of an organization may be leveraged as a technique to achieve effective budgeting. This is one of the ways that this can be accomplished. Implementing a strategic strategy is crucial in order for a company to establish financial stability and properly anticipate its financial performance via budgeting. Both of these goals may be accomplished by a company. According to Wasieleski and Weber (2017), the majority of businesses use a standard operating process for yearly budgeting in order to successfully monitor their financial performance and spot any irregularities.

Budgets are a tangible representation of the financial consequences that an organization achieves as a direct result of its strategic objectives. They make it possible to identify the required resources in terms of both their time commitment and quantity. The establishment of standards serves two purposes: first, to make it easier to make a comparison between the actual performance and the anticipated budget, and second, to ascertain whether or not any corrective actions are necessary to rectify any disparities. According to Dmytriyev et al. 2021 and Lange & Bundy (2018), budgeting acts as a method that enhances the clarity of goals and objectives while also allowing the communication of performance results to individual workers. The idea of budgeting sheds light on the procedure of resource allotment as well as the accomplishment of goals that have been determined in advance. Budgets are an extremely important component of both the strategic planning and the actual execution of development initiatives carried out by Kenya's road authority. In addition to this, they serve as a basis for the process of monitoring and assessing progress by providing benchmarks in connection to goals and milestones that are to be achieved.

Budgetary theory provides insights into how financial resources are allocated to different sectors and agencies. In the context of road agencies in Kenya, budgetary theory helps understand how funds are allocated to support road asset maintenance, rehabilitation, and

development. It explores the decision-making process behind the allocation of financial resources to road agencies based on specific categories of roads. Budgetary theory encompasses performance-based budgeting, which focuses on linking budget allocations to the performance and outcomes of agencies. In the study, budgetary theory can be applied to assess the impact of budgetary allocation on the performance of road agencies in Kenya. It examines whether the allocation of funds based on performance criteria, such as road asset maintenance and regulatory compliance, influences the overall performance of road agencies.

2.1.3 The Public Interest Theory of Regulation

Pigou first put up the concept that would become known as the public interest theory of regulation in the year 1938 (Djankov et al., 2002). This theory provides both a normative direction for the acts that governments should take and a descriptive explanation of the actual behaviors that governments engage in, especially in democratic countries. According to the theoretical framework, political bodies should exert control over price mechanisms in order to stop natural monopolies from participating in practices of excessive pricing. n addition to this, they formulate safety regulations in order to reduce the likelihood of unfortunate events, such as fires or incidents involving widespread poisonings. In addition, governments regulate employment practices in order to counteract the monopolistic control that employers have over their staff members. In addition, they are in charge of monitoring the issue of securities, which is one of the many regulatory steps that they take to protect investors from fraudulent operations (Djankov et al., 2002). The public interest theory of regulation, which is often seen as a key notion in modern public economics, is founded upon two primary premises that are considered to be important to the field. According to the first assumption, uncontrolled markets almost always fail because they are faced with obstacles like monopolistic behaviors or externalities, both of which may lead to economic collapse. The later assumption argues that governments have good intentions and the required expertise to correct these market failings by means of regulatory measures. This is implied by the fact that this is the subsequent assumption.

Down (1962), who utilized this concept to solve the problem of market failure, is considered to be one of the most notable proponents of the theory. Down acknowledged that impartial courts had the ability to step in and enforce contractual duties in situations when competition and private agreements are unable to adequately resolve market problems. Additional proponents of the theory include Sutinen and Kuperan (1999), who used it to build an all-encompassing model that integrates economic theory with psychological and sociological theories. This makes their work an example of how the theory may be useful. The purpose of this model is to explain the elements, both real and intangible, that influence people' decisions about compliance with a certain set of rules. In doing so, it takes into consideration the social effect in addition to the more typical concerns of the costs and profits involved with participating in unlawful activity.

The public interest theory of regulation has been subjected to a number of criticisms, one of which is the assertion that markets and private agreements are able to efficiently solve the bulk of market issues without the intervention of the government or the use of any regulatory measures. In circumstances in which markets may be said to display defects, private litigation might provide as a method for resolving any issues that might develop between market participants. According to Djankov et al. (2002), another critique is that government regulators are perceived as ineffective, corrupt, and captured, which implies that regulation would make the issue worse. The capability of the theory to shed light on the regulatory framework of the moderator variable is the source of the research's applicability to the theory. The purpose of this theory is to shed light on the influence that formulating and enforcing rules, procedures, standards, and other compliance measures having to do with the maintenance of road assets has on the overall performance of road agencies in Kenya.

The public interest theory of regulation is relevant to this study. The study aims to examine the regulatory framework governing road agencies in Kenya. The public interest theory of regulation emphasizes the need for effective regulation to ensure that road agencies operate in the best interest of the public. It explores how the regulatory framework in Kenya is designed to promote transparency, accountability, and fairness in the allocation of budgetary resources and the performance of road agencies. In the

context of the study, it explores how the regulatory framework and budgetary allocation impact the overall performance of road agencies and, consequently, the welfare of the public. It examines whether the regulatory framework and budgetary decisions effectively address the needs of the public, such as road safety, accessibility, and connectivity.

2.1.4 Agency Theory

The agency theory, which was first developed by Stephen Ross and Barry Mitnick (Mitnick, 1975), places an emphasis on the significance of distinguishing between ownership and control, which results in the emergence of an inherent agency problem. The concept proposes the existence of a connection between the most important stakeholders, who are the shareholders, and the management boards, who serve in the capacity of spokespeople for the firm. According to the conceptual framework, shareholders, who are the principal owners of the company, choose managers to act as their agents so that the managers may carry out their responsibilities on their behalf. According to Mitnick and 1975's research, shareholders give management total influence over the execution of business activities. However, it is often seen that managers and agents frequently face obstacles while attempting to accomplish the obligations that have been allocated to them. This phenomena, which is generally referred to as the divergence of interests as suggested by the theory, may be observed very frequently.

The writers were aware of the essential role that the board plays in preventing unethical behavior on the part of managers and in effectively addressing any issues that may arise with the agency. The authors Parker et al. (2018) state that the idea of agency theory lends credence to the concept of a clear distinction between decision management and control. As a direct consequence of this, boards have gained a reputation for being independent. The conceptual architecture of agency theory is founded on the fundamental notion that both the principle and the agent are motivated by their own self-interest in order to achieve their own goals. When it comes to agency theory, the acceptance of self-interest as a basic assumption leads to the unavoidable existence of inherent conflicts (Mitnick, 1975). For this reason, in circumstances in which both parties are motivated by

their own self-interest, it is very likely that agents would prioritize their own self-interested goals, which may differ from the objectives of the principal and may even be in direct opposition to those objectives.

According to Murtaza et al. (2021), the theory places an emphasis on how important it is for boards of directors to be independent in order to protect the best interests of shareholders. As a result, the theory supports the idea that non-executive directors should be included on boards, given that these directors are seen to be the ones who are most equipped to successfully represent the concerns of shareholders. The aforementioned concept is of considerable significance in the field of study because it relates to the complex interaction that exists between those in charge of maintaining roadways and the general populace, who use their democratic right to vote for those in charge of the government. In this scenario, the general populace is the legal owner of road assets, and they are the ones who form road agencies via the proper governmental channels in order to exercise control over the administration of such assets. It is essential that those in charge of roads do their jobs in a manner that is to the greatest advantage of the general public. Nevertheless, due to the possibility of limitations in the general public's knowledge and capability to effectively manage the activities of road agencies, the government assumes the role of a governing body, which is frequently referred to as the "Board," to exercise supervision and ensure that road agencies operate in a manner that is consistent with the public's best interests. This ensures that road agencies operate in a manner that is in line with the public's best interests. As a result, this theoretical framework will act as the basis for the dependent variable in the study, and it will also help in clarifying the phenomena of performance exaptation among road agencies, as seen by the general public and enforced by the authorities of the government.

This study explores the relationship between the government (as the principal) and the road agencies (as the agents) responsible for road asset maintenance. The Agency Theory provides a framework to analyze how the government delegates authority to the road agencies and how the agencies act in the best interest of the government and the public. The Agency Theory emphasizes the need for monitoring and control mechanisms to

ensure that agents act in the best interest of principals. In the context of the study, it can be applied to evaluate how the regulatory framework and budgetary allocation enable effective monitoring and control of road agencies' performance. It examines whether there are mechanisms in place to hold road agencies accountable for their actions. The Agency Theory focuses on aligning the incentives of principals and agents to achieve desired outcomes. In the study, it can be used to assess how budgetary allocation and regulatory frameworks incentivize road agencies to perform well in terms of road asset maintenance. It examines whether the incentives provided by the government effectively motivate the road agencies to meet performance targets.

2.2 Empirical Literature Review

This section will look at different researched literature and articles from different authors that are related to this study. This will help us find the study gaps, which could be in the area of methodology, ideas, or setting.

2.2.1 Road Assets Maintenance and Organizational Performance

In their research, Sodikov and Jamshid (2019) investigated the road asset management systems in developing countries, focusing specifically on Uzbekistan. This research examined the primary concerns surrounding the effective management of current assets in a manner that optimizes public benefit, taking into account the constraints imposed by limited financial resources. The road asset management system was evaluated with regards to four key components, namely objectives, budget, asset, and performance. At the budget level, it is important to plan for yearly and multi-year financing, breakdown the budget, and estimate costs. Data management is crucial and involves tasks such as collecting inventory and condition data, managing databases, and analyzing traffic data. Performance modeling is necessary to predict future conditions and conduct network-level analysis. Programmed optimization is essential for conducting economic, environmental, and risk analyses, as well as multi-criteria analysis. Finally, implementation programs are needed to carry out the construction, maintenance, and operation of road assets. The current study assessed the effect of road assets maintenance on the performance of road agencies in Kenya.

During the years 2004–2008, Bal et al. (2013) carried out exploratory research on stakeholder involvement in the building and construction industries in the countries of Sweden, Australia, the United Kingdom, Italy, and the United States of America. They were able to collect information on the processes for communicating with stakeholders by conducting interviews with practitioners who were engaged in initiatives relating to sustainability. Based on these findings, one may draw the conclusion that a process consisting of six steps is required for effective stakeholder involvement. These steps include the following: identification of stakeholders, mapping of stakeholders to sustainability objectives, prioritisation, management, performance assessment, and execution of targets. It was also brought to everyone's attention how important it is to understand the sustainability agendas of stakeholders and to measure their success using key performance indicators. The current study assessed the effect of road assets maintenance on the performance of road agencies in Kenya

Harvey, M. O. (2012) explored mathematical optimisation models for road maintenance. Based on acceptable data, mathematical optimisation models may help allocate money between maintenance jobs and adjust the maintenance budget over time. The goal of maintenance optimisation is to balance costs and benefits while considering limits (Dekker, 1996). Choose between different treatment methods and implementation timelines for a road stretch. Delaying maintenance may be costly in the long run. Decision-makers can be informed by estimating the costs of underfunding maintenance. Maintenance is ‘all the technical and related administrative duties designed to preserve an object or system in, or restore it to, a condition in which it can perform its needed function’ (Dekker 1996). The asset has not improved. It is typical to do minor road modifications like widening or shoulder sealing alongside rehabilitations. If roads are not maintained, they may rapidly deteriorate, resulting in higher expenses for vehicle operation, dependability, and safety. If the road deteriorates too much, people may refuse to utilise it, resulting in lost economic and social advantages. Although gravel, sealed, and concrete roads and bridges need different upkeep, the same economic considerations apply. Safety requires roughening concrete roadways to lower skid resistance, maintain

slab joints, seal cracks, and replace slabs. Layers of crushed rock with either a chip seal (a thin coating of bitumen and crushed rock) or an asphaltic concrete seal (aggregate combined with bitumen binder) keep water out and give structural strength to sealed roads with flexible pavements. Pavements that distort when loaded and then return to their former shape are called ‘flexible pavement’. Concrete pavements are stiff. This research analysed the effect of road assets maintenance on the performance of road agencies in Kenya.

Priyatiningsih and Sutrisno (2020) conducted research that investigated the relationship between the road infrastructure asset management approach and its environmental implications. The objective of this research is to identify a suitable approach for managing road infrastructure assets by using an integrated asset management system and implementing asset management regulations that can effectively meet the expectations of the public. The implementation of a complete management strategy for initiatives in the field of management guarantees that the performance of assets belonging to service providers is aligned with the expectations of stakeholders, which includes road users. This study used a descriptive qualitative research design, focusing on the viewpoints of road users as participants. The participants were vehicle drivers from 50 transportation businesses, both for people and products. The data collection methods utilized in this study were interviews and observations. The findings demonstrate various dimensions of asset performance as perceived by the user. These dimensions encompass productivity, efficiency, effectiveness, resource utilization, and institutional factors. This performance is integrated within the asset management system, which is guided by management authority policies. These policies encompass service delivery aspects such as quality and mobility, as well as risk management and resource maintenance. If you use road infrastructure asset management strategies within an integrated management system, the research shows that you can get better services for road infrastructure assets. This approach encompasses five key performance aspects and places greater emphasis on asset management policies pertaining to the provision of road infrastructure asset services. The present study aimed at assessing the effect of road asset maintenance on the performance of road agencies in Kenya.

Zanule (2015) conducted a research study aimed at examining the traffic management system and road safety in Uganda. This research used theoretical frameworks derived from the disciplines of strategic management, management, and criminology to determine the need of adopting actions focused on improving transportation operations and preserving road assets. The researcher performed an observational study that demonstrated that the introduction of consistent road asset maintenance in Uganda led to a significant decrease in both traffic congestion and the frequency of deaths. Additional data has shown that the incorporation of comprehensive driver training initiatives, with the maintenance of road infrastructure, has led to a substantial decrease in the number of deaths. The current study assessed the effect of road assets maintenance on the performance of road agencies in Kenya

Byaruhanga and Basheka (2017) carried out research in Uganda on the monitoring and performance of contractors working on road infrastructure projects. The purpose of the research was to evaluate the connection between the monitoring of contractors and the performance of national road infrastructure projects in Uganda, as well as the connection between the performance of individual contractor monitoring components and the performance of national road infrastructure projects in that country. The selection of the procurement experts and engineers was accomplished via the use of purposeful sampling, whereas the selection of the private consultants, members of parliament, and responders from civil society organisations was carried out by the use of simple random sampling. The findings revealed that there are weak procurement rules, which lead to awarding road projects to incompetent contractors; that contractor monitoring is handled by unqualified, incompetent, and inexperienced professionals; that there is no contractors and contract supervisors appraisal system; that contractor payments are delayed, which affects timelines in service delivery; and that the Uganda National Roads Agency (UNRA) does not have a strong internal project monitoring and evaluation mechanism. The current study assessed the effect of road assets maintenance on the performance of road agencies in Kenya.

A study that was carried out by Wanjala, Iravo, Odhiambo, and Shalle (2017) investigated the impact that monitoring tactics have on the execution of projects carried out by Kenyan state corporations. Simple random sampling was the approach that was used throughout the selection process for the sample size, which was comprised of 65 state firms. Questions both open-ended and closed-ended were included on the questionnaires that were sent out to the population that served as the sample. This allowed for both types of responses to be acquired from the population. In the process of analyzing the data, both descriptive and inferential statistical methods, in addition to qualitative research methodologies, were used. Analyses based on the t-test and the Pearson correlation was used in order to evaluate the relationships that exist between the variables. The Shapiro-Wilk test was used in order to carry out the examination of the level of normality. According to the findings of the research, monitoring strategies (3 = 0.674, p 0.05) have a bearing on the overall performance of the project that may be considered statistically significant. The current study assessed the effect of road assets maintenance on the performance of road agencies in Kenya.

Kipkurui and Obura (2018) carried out research in Kenya to investigate the impact that road asset management has on the level of performance achieved by road agencies. The purpose of this research was to evaluate the influence of functional and management systems, consultation with stakeholders, and performance monitoring on the performance of road authorities. The authors used purposive sampling, a correlation survey methodology, and stakeholder theory in their research. According to the findings of a study, road asset management is a positive and substantial predictor of the performance of road agencies in Kenya. Furthermore, it accounted for 81.7% of the variation in performance. The current study examined the effect of road assets maintenance on the performance of road agencies in Kenya.

Macharia (2016) did research that examined the variables that influence the completion of road development projects in Embakasi, Nairobi County, Kenya. The objective of the research was to elucidate the many elements that have an impact on the successful completion of road projects. The research investigation centered on examining the impact

of many factors, including resource allocation, staff expertise, stakeholder engagement, and procurement protocols, on the successful execution of road construction endeavors. The research design used was a descriptive research design. The results indicate that the proficiency of personnel has a favorable impact on the successful execution of road construction projects. When staff members possess the necessary expertise, experience, and knowledge in this field, they are better equipped to carry out their assigned tasks effectively. The study also revealed that the involvement of stakeholders has a good and substantial impact on the successful completion of road building projects. Therefore, it is recommended that stakeholders be actively encouraged to participate in road projects. The current study examined the effect of road assets maintenance on the performance of road agencies in Kenya.

Kamau and Human (2015) conducted research in order to establish the extent to which monitoring and evaluation contributed to the successful completion of a project in Kenya. In order to discover the major elements that have an influence on the monitoring and evaluation methods, the researcher made the decision to perform an in-depth examination of the relevant literature. Even more, the things we already talked about were separated into four separate groups: how well the monitoring and evaluation team did their job, the monitoring strategy that was used, how much political influence there was, and what stage of the project it was in. According to the findings of the research, having support from management is an essential component in guaranteeing the effectiveness of monitoring and evaluation efforts. The current study examined the effect of road assets maintenance on the performance of road agencies in Kenya.

2.2.2 Road Asset Management, Budgetary Allocation and Organisational Performance

Over the course of many years, the governments of the United States of America, Taiwan, and the Guangdong Province of China were analysed in research carried out by Lee and Wang (2015). The purpose of the study was to determine the impact that budgetary allocation had on spending patterns. Their results were presented in an academic article that was published in the journal Finance and Accounting Research.

According to the findings of the research, the method by which monetary resources are allotted in each of the three nations has a number of repercussions on the pace at which expenditures are rising. These outcomes were determined by comparing the growth rates of total expenditures in each of the three countries. Additional evidence of a considerable link with growth was found in Taiwan; however, the regression coefficients for the United States and China indicated negative values, although they did not attain statistical significance. This might be because the United States and China have larger sample sizes than Taiwan does. In China, everything worked out just like this. The current study assessed the mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

Namara Beamanya (2021), assessed the performance of road maintenance local contractors in Uganda: a case of the Uganda National Roads Authority Lira station. The current study will assess the mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya. Road maintenance in Uganda is necessary to retain the road's original state, protect nearby resources, and assure user safety. Poor surface quality, markings, and signs on some roads indicate that the road sector has not improved enough, and the government is still losing billions of shillings in shoddy works and services delivered by road maintenance local contractors, increasing maintenance backlog. The Uganda National Roads Authority Lira Station case study evaluated local road repair providers. Using random and purposive selection, 87 respondents were chosen from 103 respondents. Static analysis was done on questionnaire data.

Critical elements impacting road maintenance local contractors' performance were identified using relative relevance index (RII). Through literature study and document analysis, significant road maintenance contractor performance criteria were discovered. For a framework to improve road maintenance local contractor performance, RII prioritized these elements. Contractor's managerial skills (RII= 0.1088), financial capacity (RII= 0.893), experience (RII= 0.855), cost factors (RII= 0.854), technology (RII= 0.846), procurement process on contractors selection (RII= 0.845), time factors (RII= 0.839), health & safety standards (RII= 0.838), and design changes (RII= 0.828)

were the critical factors affecting road maintenance loc A framework showed that road repair project planning relied on contractor management abilities and expertise. Local contractors' road maintenance project implementation depended on financial capacity, cost considerations, procurement procedure on contractor selection, health & safety requirements, schedule factors, and design revisions. Management abilities were the biggest element in Ugandan road repair contractors' performance, according to the research. The research advised focusing on contracts managing abilities as they had the biggest influence on Local Contractor performance. The current study assessed the mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

Ngah, Tai, and Bontis (2016) conducted a study to investigate the impact of knowledge management competencies on organizational performance within the public sector. The concept of a learning organization was included as a mediator in order to examine its impact on the correlation between knowledge management skills and organizational performance. The use of a conceptual framework proved to be a valuable approach in examining knowledge management skills within a governmental context in Dubai.A total of 255 questionnaires that met the criteria for usability were obtained from the survey. The participants in this study were executives, managers, and directors from the Roads and Transport Authority of Dubai, located in the United Arab Emirates. The conceptual model was tested using SPSS version 21 and AMOS version 20, both developed by IBM Corporation, based in Armonk, NY, USA. The results indicate that there is a strong and statistically significant correlation between knowledge management skills and organizational success. The link between knowledge management skills and organizational performance is entirely mediated by the concept of a learning organization. This research only focuses on the Roads and Transport Authority, an esteemed governmental entity inside the city of Dubai. This paper aims to provide practitioners with recommendations that provide alternative ways to address their inadequacies and establish methods to enhance the efficacy of their knowledge management skills. These recommendations are intended to facilitate continuous learning within the business. The present research aimed to evaluate the role of budgetary

allocation as a mediator in the association between road asset upkeep and the performance of road agencies in Kenya.

In research conducted by Wambui, Ombui, and Kagiri (2015), the objective was to investigate the many variables that influence the completion of road construction projects within Nairobi City County. The primary goals of this research were to assess the impact of project manager competence, project money, project equipment, and information technology on the successful completion of road building projects in Nairobi City County. The target demographic consisted of all personnel within the IT, finance, HR, and construction divisions. The research design used in this study was descriptive in nature. The research sample consisted of 2000 individuals employed at KURA in Nairobi. The research used a stratified random sampling methodology to get a sample size of 138 participants. The primary data collection tools used in this research were questionnaires, which underwent a pilot study to assess their validity and reliability. The collected data was subjected to analysis using descriptive statistics with the assistance of Statistical Package for Social Scientists (SPSS) version 22. The results were then presented in the form of tables and charts. The response rate was 70%. The research's findings show that a variety of factors, such as the availability and efficiency of project equipment, the skill of project managers, the availability of sufficient project funds, and the use of appropriate project technology, have a significant impact on the timely completion of road construction projects. The present research aimed to evaluate the role of budgetary allocation as a mediator in the association between road asset upkeep and the performance of road agencies in Kenya.

A study by Kaburi (2021) examined the effect of Performance Based Contracting on Road Asset Management in Kenya: A Case of Nairobi-Moyale Road in Kenya. The study was guided by the following specific objectives; to analyse the effect of monitoring intensity on road asset management, to determine the effect of road financing on road asset management, and to examine the effect of contractor’s competence on road asset management of Nairobi-Moyale Road. The researcher used explanatory and descriptive

research design. The population of the study was 127 and comprised of road contractors, road managers, company foremen, project engineers, Kenya National Highways Authority officials. Stratified random sampling was used to select the sample size which was a total of 104 respondents. A questionnaire was developed by the researcher based on the specific objectives of the study for data collection and it was pilot tested using ten respondents. Descriptive statistics was utilized for analysis of quantitative data to create mean, and standard deviation from the responses given by the respondents. Inferential statistics like correlation and regression analysis was used. The Statistical Package for Social Sciences (SPSS) version 26 program was used to organize and analyse the collected data. Study findings were presented in charts, tables, and graphs. Monitoring is regularly done through gathering and processing of vital project information and there has been continuous in the tracking of key elements of project by the those are involved in the maintenance of the road. Monitoring intensity had a Pearson correlation of ($r = 0.782$ p-value $< .05$), an indication of statistically significant relationship with road asset management. An adjusted R-square showed that monitoring intensity explains 60.7 % of variation in road asset management. Secondly, the governments through the ministry have created the right conditions for optimizing operation and maintenance of the road project. The study established that road financing had a Pearson correlation of ($r = 0.835$, p-value $< .05$). This was found to be statistically significant as the significant value was 0.000 which is less than 0.05. Thirdly, there are competent contractors who regularly deliver results that the organization desires and that project managers regularly receive education and attend training courses to update their skills. The study established that contractor's competence had a Pearson correlation of ($r = 0.719$, p-value $<.05$), this was found to be statistically significant as the significant value was 0.000 which is less than 0.05.

The study by Kaburi (2021) the regression analysis showed an adjusted R-square for the relationship between contractors' competence and road asset management, which was 0.511. This means that contractor's competence explains 51.10% of variation in road asset management. The study concludes that monitoring intensity influence road asset management. Monitoring is regularly done through gathering and processing of vital project information. Monitoring practices have been continuous in the tracking of key

elements of project. The governments through the ministry have created the right conditions for optimizing operation and maintenance. The ministry strongly strives for an explicit, long-term financing plan for project maintenance. There are competent contractors who regularly deliver results that the organization desires. The competencies are related to knowledge, skills, abilities, and attributes that form a person's job qualifications. Most of the organization provides professional learning training for project managers and other employees working on the project, including the ability to continue learning. The present research aimed to evaluate the role of budgetary allocation as a mediator in the association between road asset upkeep and the performance of road agencies in Kenya.

Wairimu (2016) carried out research on the variables impacting the completion of road development projects in Embakasi, Nairobi County, Kenya. The purpose of the study was to determine the factors, such as budget allocation, that influence the successful conclusion of road construction projects. The purpose of this study was to investigate the elements that influence the successful completion of road building projects. These factors include staff competency, budgetary allocation and financing level, stakeholder participation, and procurement procedures. In this particular study, a descriptive research design was employed as the approach. According to the findings of the study, the financial allocation and funding level have a statistically significant negative influence on the completion of the road construction project. On the other hand, the competency of the personnel and the engagement of stakeholders have a large and positive impact. The current study assessed the mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

Ngao (2014) carried out a study to investigate the influence that medium-term expenditures have on the budgeting process in Kenya, and they reported their findings. This was done in order to provide decision-makers with more accurate information. The requirement of taking into consideration cash flows when assigning budgets was found via the monitoring of real monthly cash flows in relation to the budgets that were assigned to the different departments. The comparison of the cash flows provided evidence that proved beyond a reasonable doubt that this assumption was correct. In

addition, it has been shown that the restricted availability of human resources, the limited financial resources, and the narrative data all have a significant impact on the distribution of budgets across county governments. This is the case regardless of the kind of government. When it was realised that each of these three elements contributed to the issue, this was one of the things that led to its discovery. The current study assessed the mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

2.2.3 Road Asset Maintenance, Regulatory Framework and Organizational Performance

Regulation of State Corporations in Kenya is carried out according to a patchwork of laws, rules, and procedures, all of which are grouped together under the umbrella term "regulatory frameworks." An investigation on the effect that the regulatory environment has on the efficiency of organizations was carried out. The results of this study suggested that there is a relationship between the two elements that can be regarded as moderating, and it was found that this link exists. Karungani and Ochir (2017) conducted a research to evaluate the manner in which the organizational performance of a procurement department is affected by the procurement policy and regulatory framework. According to the conclusions of the study, one of the required components for making changes to performance in the procurement sector is a complete policy and regulatory framework. The current study assessed the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

The study by Naliaka and Namusonge (2015) emphasizes the significance of following regulations as a crucial determinant of improving organizational performance. The facilitation of enhanced performance is attributed to several variables, including increased levels of openness, heightened professionalism, and advancements in procurement practices. The study findings suggest that organisations that strictly comply with the legislative framework of procurement policy have improved transparency, which in turn has a favourable influence on their overall performance. Moreover, the research

done by Owuoth and Mwangangi (2015) shows that the adoption of a comprehensive regulatory policy framework is linked to increased levels of transparency. As a result, it has been shown that this increased level of openness has a good effect on the overall performance of the company. The current study examined the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

In their study, Karanja and Ruguru (2023) conducted an assessment of the project management drivers and performance of road construction projects in Nairobi County, Kenya. The study was conducted with the aim of examining the impact of portfolio direction on the performance of road construction projects in Nairobi City County, Kenya, as well as investigating the influence of project sponsorship on the performance of road construction projects in the same region. The present study used a cross-sectional design methodology, using a descriptive technique within the framework of a positivist research paradigm. The focus of research in this study was on national government road projects spanning from 2007 to the present. The primary unit of analysis was the projects themselves, while the unit of observation was the senior management personnel assigned to each project. Hence, the study's target population consisted of 523 respondents. The researchers estimated the overall sample size for this study by using the method developed by Krejcie and Morgan (1970), resulting in a total of 222 respondents. The present research used a stratified random sampling technique in order to choose the study sample. The study used primary data collection methods, namely a semi-structured questionnaire. A pilot test was conducted on a sample of 22 respondents to assess the reliability and validity of the questionnaire. The data underwent analysis with the Statistical Package for Social Sciences (SPSS) version 23 software. The qualitative data that was obtained underwent examination using the method of content analysis and was thereafter presented in the form of prose. The analysis of quantitative data included the use of descriptive statistics, which were then presented in the form of tables and figures. The study further conducted correlation and regression analyses to examine the association between the variables under investigation and to evaluate the research hypothesis. The research findings indicate that the management of portfolios has a favorable and substantial impact on the overall outcomes of road building endeavors

within Nairobi City County, Kenya. Furthermore, the research findings indicate that project sponsorship has a favorable and substantial impact on the efficacy of road building endeavors in Nairobi City County, Kenya. The present research aimed to evaluate the mediating role of budgetary allocation in the association between road asset upkeep and the performance of road agencies in Kenya.

The purpose of the research that was carried out by Pedo et al. (2018) was to investigate the connection that exists between the regulatory climate and the results of public-private partnership (PPP) projects carried out in Kenya. The research investigated a population of 111 companies that were involved in road sector public-private partnership (PPP) projects using exploratory and descriptive study methodologies. It was shown, on the basis of the regression model analysis, that the regulatory framework had a statistically significant and favourably impactful impact on the performance of public-private partnerships (PPPs) in road projects within the setting of Kenya. The strategy used by the government helped to control the link that existed between the performance standards and the regulatory framework. The current study examined the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

In their study, Mushori, Rambo, and Wafula (2020) examined the moderating effect of process monitoring on the association between contractors' capability appraisal during tender award and the execution of road building infrastructure projects in Nairobi County, Kenya. The research used a combination of a cross-sectional descriptive survey research design and a correlation research approach. Stratified sampling and proportional sampling methods were used in order to determine the appropriate sample size. The use of simple random sampling facilitated the allocation of research equipment. A pilot test was conducted in order to ascertain the attainment of validity and reliability of the research tools. In order to protect the integrity of the data, it was considered crucial to have Cronbach alpha values that above 0.7. The quantitative data was subjected to descriptive analysis, whereby measures of central tendency and dispersion were determined using means and standard deviation. Karl Pearson, a prominent figure in the field of statistics, is well recognized for his significant contributions to the development

and advancement of the research used the use of the correlation coefficient to demonstrate the association between the variables. The current study examined the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

In a similar manner, Karungani and Ochir (2017) carried out a quantitative analysis with the objective of determining the impact that procurement policy and regulatory framework have on the performance of an organisation. Two hundred and eighty-seven individuals who work in the procurement department of the Nairobi county government were given a questionnaire to fill out. The findings of the study showed that a strong policy and regulatory framework is essential for performance enhancement. It also shown that greater performance is the result of a legislative and regulatory framework, which works to level the playing field for all parties participating in the procurement process. In addition to this, a policy regulatory framework boosts the organization's levels of integrity, responsibility, professionalism, and fairness, and it maximises the amount of service that is provided inside the organisation. The current study examined the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

Awino and Marendi-Getuno (2014) conducted research in order to conduct an analysis of the procurement cycle on the subject of transparency and ethics in the maintenance of road assets. The purpose of the research was to determine how a well-defined procurement strategy and regulatory framework governs the maintenance of roads assets. According to the findings of the research, having a legislative framework in place is essential for all stages of the procurement process, including ethics, transparency, and strategy. According to the findings of the investigation, a robust policy regulatory framework within the procurement system has the potential to contribute to improved organisational performance. This may be accomplished by fostering more transparency, openness, impartiality, honesty, and fair competition. There is a strong correlation between the presence of transparency, objectivity, and equality inside an organisation and the level of performance that it delivers. For this reason, having a thorough procurement regulatory policy framework is good for the functioning of an organisation. The current

study examined the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

2.2.4 Road Asset Maintenance, Budgetary Allocation, Regulatory Framework and Organizational Performance

In 2010, Queiroz and Kerali (2010) conducted a review of the institutional approaches to road maintenance in a selection of countries, including China, Brazil, Slovenia, New Zealand, the United Kingdom and the Slovak Republic. The review evaluated the various models of maintenance in terms of decentralization, financing, management structure and mode responsibility. The research also assessed the various factors that influence the efficiency of road agencies, along with the procedures taken to create a new institution or restructure an existing one. It was established that road and transport agencies could become more productive if their institutional structures were optimized. An executive agency or a privatized provider organization should be created to separate client and supplier functions. Moreover, user engagement should be encouraged through the implementation of oversight boards, advanced management information systems, and different methods of financing. The current study evaluated the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

A study was conducted by Byaruhanga and Basheka (2017) in Uganda with the purpose of investigating the link that exists between the monitoring of contractors and the overall performance of road infrastructure projects that are supported by the national government. Specifically, the researchers were interested in determining whether or not there is a correlation between the two. This study was conducted with the intention of determining the link that exists between the many different contractor monitoring components and the overall performance of the project. The selection of the engineers and procurement specialists was accomplished by a process that is known as deliberate sampling, while the selection of the members of parliament, private consultants, and civil society organisations was accomplished through a technique that is known as simple random sampling. According to the findings, the Uganda National Roads Agency had inadequate internal processes for the monitoring and assessment of projects. As a

consequence, the agency awarded projects to contractors who lacked the necessary level of expertise for the work, and the agency outsourced the management of monitoring to professionals who met the prerequisite qualifications. The current study evaluated the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

Sa'eed, Gambo, Inuwa, and Musonda (2020) conducted research to examine the impact of financial management methods on the technical performance of small-scale construction contractors in the northern region of Nigeria, with a focus on worldwide best practices. Prior research has posited that small-scale construction contractors in developing nations exhibit worse technical performance due to a lack of financial means to acquire essential assets during the first stages of a project. The technical performance of each contractor was assessed on a five-point Likert scale. This method is used to ascertain the average technical performance levels of the contractors. A proportional stratified random selection approach was used to pick experts in the sector for the administration of a questionnaire survey. The performance of the contractors was assessed via ANOVA with post hoc analysis. Additionally, the impact of contractors' financial management methods was examined by multiple regression analysis. The findings of this research suggest that contractors in Nigeria exhibit moderate levels of technical performance. Additionally, the study revealed significant impacts of financial management techniques on the technical performance of contractors involved in construction projects. The current study evaluated the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

A study by Bankunda, (2018) examined the effect of contractor management on the performance of selected road infrastructure projects at Uganda National Roads Authority (UNRA). The study was premised on the following research objectives: to examine the effect of contractor selection on performance of selected road infrastructure projects at UNRA, to assess the effect of contractor monitoring on performance of road

infrastructure projects at UNRA, to assess the moderating effect of the oversight role played by public procurement and disposal authority (PPDA) on the relationship between contractor selection, contractor monitoring and performance of road infrastructure projects at UNRA. In this study, a total number of 145 respondents were expected but 102 respondents returned the survey instruments representing a response rate of 70.3%. The data was collected using questionnaires and interviews and analysis was done using regression analysis and correlation coefficients for the quantitative findings. Qualitative analysis was done using content and thematic analysis. The findings revealed that there is a positive relationship between contractor selection, contractor monitoring and oversight role of PPDA and performance of road infrastructure projects. The results on contractor selection and performance of road infrastructure projects were r = .476**, p = 0.000 < 0.05, the results for contractor monitoring and performance of road infrastructure projects indicated that r = 0.427**, p = 0.000 < 0.05 and the results for oversight role of PPDA that r = 0.512, p = 0.00 > 0.05 thus there is moderating effect of oversight role played by PPDA on the relationship between contractor selection and performance of selected road infrastructure projects at UNRA. It was concluded that: regular assessment and evaluation is necessary in order to ensure effective contractor selection. Contractors selected at times are not well managed or reviewed to ensure they meet evolving business needs hence ending up in numerous complaints. There is need to ensure proper contractor selection and monitoring through transparent and flexible bidding processes and following advice of the Regulatory Agency. The current study evaluated the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

Mushori, Rambo, and Wafula (2020) conducted a study to examine the moderating effect of process monitoring on the association between contractors' capability assessment in tender awards and the execution of road building infrastructure projects in Nairobi County, Kenya. The research used a combination of a cross-sectional descriptive survey research design and a correlation research approach. Stratified sampling and proportional sampling methods were used in order to determine the appropriate sample size. The use of simple random sampling facilitated the equitable distribution of research equipment. A

pilot test was conducted in order to ascertain the validity and reliability of the research tools. In order to ensure the dependability of the data, it was considered crucial to have Cronbach alpha values that were above 0.7. The quantitative data underwent descriptive analysis, which included calculating measures of central tendency and dispersion using means and standard deviation. Karl Pearson, a renowned figure in the field of statistics, is well recognized for his significant contributions to the development and advancement of The research used the correlation coefficient to demonstrate the link between the variables. The appraisal of contractors' competence in tender awards alone accounted for 67.3% of the observed difference in road performance. The study's findings indicate that process monitoring has a significant role in moderating contractors' ability to effectively execute construction work, hence influencing road performance. The research also suggests that future efforts to build roads should put process monitoring at the top of their list of priorities. This will help make sure that the right materials and resources are used, which will lead to high-quality results and compliance with all laws, standards, and rules. The current study evaluated the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

2.3 Summary of Knowledge Gaps

This chapter has reviewed prior theoretical and empirical literature related to organizational performance and road asset maintenance in Kenya. Specifically, Classical management theory, budgeting theory, public interest theory of regulation and the agency theory were discussed in the theoretical literature review. The empirical literature review discussed previous studies on solutions to organizational performance and pinpointed gaps in road maintenance. In Kenya, concerns about road maintenance in the public sector have been attributed to a lack of ethical leadership, inadequate staff training, and poor organizational culture, and little or no stakeholder involvement in corporate governance. Studies have indicated that having regulations in place can lead to improved organizational performance. Naliaka and Namusonge (2015) proposed that compliance with a procurement regulatory framework is essential to achieve improved performance. A research conducted via Karungani and Ochir (2017) to establish the effect of the

regulatory framework and procurement policy on the performance of the county government of Nairobi results showed that a comprehensive policy and regulatory framework can promote transparency and enhance organizational performance. The current study examined the road asset maintenance, budgetary allocation, regulatory framework and performance of road agencies in Kenya.

2.4 Knowledge Gap

This research investigated the correlation between road maintenance and the performance of road agencies in Kenya. The four components of road maintenance were studied and regulatory framework and budgetary allocation were examined as moderating and mediating variables, respectively. The findings of this study add to what is already known in the literature by providing evidence on the effect of road maintenance on the performance of road agencies. The results are promising, although further research is needed to explore the critical linkages between road maintenance and agency performance in areas that have not been studied in depth.

Table 5: Summary of Research Gaps

Researcher(s)	Study	Methodology	Findings	Research Gaps	Focus of current study
Kipkurui and Obura (2018)	The effect of road asset management on performance of road agencies	Correlation survey design and purposive sampling technique	Road assets management shows a positive and significant predictor of road agencies performance	The study objective was to assess effect of functioning and management system, stakeholder consultation and performance monitoring on performance of the road agencies	Present study will analyse effect of budgetary allocation and regulatory framework and the performance of the road agencies
Byaruhanga and Basheka (2017)	Effects of contractor monitoring and performance of road infrastructure projects	Descriptive design, purposive sampling and target population of procurement professionals and engineers	Weak procurement rules negatively and significantly affects performance of road infrastructures projects	The assessed the relationship between contractors monitoring and performance of national road infrastructure projects in Uganda.	Present study to assess road assets maintenance, budgetary allocation, regulatory framework and performance of road agencies in Kenya.
Kamau & Mohamed (2015)	Effectiveness of the monitoring and evaluation role in Kenya: A Conceptual Framework	A desk top review research approach.	Significant effect of management support as a mediating factor between monitoring and evaluation and project success in roads assets maintenance.	This study only looked at M&E component of asset management, creating a conceptual gap.	The current study will consider all the factors, their interactions, and their effects on how well Kenya's road agencies function
Zanule (2015)	An analysis of road management system and road safety in Uganda	Descriptive Design, Stratified sampling	Standard road assets maintenance significantly diminished traffic congestion and fatalities in Uganda;	This study focused on road asset maintenance and road safety.	Present study to focus on road asset maintenance and performance of road agencies.
Sodikov and Jamshid (2015).	Assessment of road maintenance system in developing countries: A case of Uzbekistan	Descriptive Design	Policy issues (setting long-term goals and expanding the road network, and budget-level components) significantly affects road asset performance	The study focused on policy aspect of road asset maintenance	Present study to focus on performance of road agencies as moderated by regulatory framework

Researcher(s)	Study	Methodology	Findings	Research Gaps	Focus of current study
Kamau and Mohamed (2015)	Monitoring and evaluation contributed to project success in Kenya	Desktop literature review, factors that influence M&E	Strength of the M&E team, monitoring approach, political influence, and project lifecycle stage; Management support is an important factor in ensuring the success of a monitoring and evaluation.	The study was a desktop review	Present study is a research study.
Lee Wang (2015)	The effect of budgetary allocation on spending behaviour of the government of United States, Taiwan, and the Guangdong Province of China	Correlational analysis	Budget allocation had differing impacts on the spending growth rate; Significant relationship to growth was established in Taiwan, yet the regression coefficients for the U.S. and China were negative but not statistically significant	The study assessed budget spending pattern on road assets maintenance	Present study is to assess the mediating role of budget spending pattern.
Wairimu (2018)	Factors influencing completion of road construction projects in Embakasi, Nairobi county Kenya	The research design used was descriptive research design	Competency of staff and stakeholder participation positively and significantly influences completion of road construction projects, while budgetary allocation / funding level negatively and statistically influence road construction projects	This study assessed the direct effect of budgetary allocation in Nairobi County.	Present study is to evaluate the mediating role or effect of budgetary allocation in Kenya.
Odhiambo (2014)	The effect of medium term expenditure on the	Correlational design.	Budgetary controls, human capital, and	This study assessed budgetary allocation in	Present study to asses mediating effect of

Researcher(s)	Study	Methodology	Findings	Research Gaps	Focus of current study
	budgeting process in Kenya		narrative information were all has significant effect on budgetary allocation in county governments project	county government road projects	budgetary allocation in national government road assets projects.
Karungani (2018)	The effect of regulatory framework on organizational performance.	Descriptive design	Significant positive effect of regulatory framework on organisation performance	The study assessed direct effect of regulatory framework	Present study to assess moderating effect of regulatory framework
Pedo, Kabare, and Makori (2018)	Relationship between regulatory framework and the performance of Public Private Partnerships (PPP) projects in Kenya	Exploratory and descriptive research designs; Target population of 111 groups involved in the road sector PPP projects	The regression model indicated that the regulatory framework had a notable positive effect on the performance of PPP in road projects in Kenya, with the government policy moderating the connection between regulatory framework and performance	The study assessed direct effect of regulatory framework, with policy as a moderator	Present study to assess moderating effect of regulatory framework
Awino and Marendi-Getuno (2014)	Effects of procurement cycle on transparency and ethics in road assets maintenance	Descriptive design	Regulatory framework is critical for all aspects of the procurement cycle, including transparency, ethics, and approaches; sound policy regulatory framework in the procurement system can lead to enhanced organizational performance,	The objective of the study was to establish how well-defined procurement policy regulatory framework controls maintenance of roads assets	Present study is to assess how regulatory framework moderates the relationship between road assets maintenance and performance or road agencies.
Queiroz and Kerali (2021)	A review of the institutional approaches	Desktop literature review	Road and transport agencies institutional	The study was a desktop review of institutional	Present study is an evaluation of road

Researcher(s)	Study	Methodology	Findings	Research Gaps	Focus of current study
	to road maintenance in a selection of countries, including China, Brazil, Slovenia, New Zealand, the United Kingdom and the Slovak Republic		structures affects road agencies implementation of oversight boards, advanced management information systems, and different methods of financing	approach to rad maintenance.	agencies performance.

2.5 Research Hypotheses

From the reviewed literature, the following four objectives are developed for test and validation.

Ho_1: There is no significant relationship between road assets maintenance and performance of road agencies in Kenya.

Ho_2: There is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

Ho_3: There is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya.

Ho_4: There is no significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

2.6 Conceptual framework

According to Mugena and Mugenda (2012), a conceptual framework is a diagrammatic representation of the relationship between the independent and dependent variables. This graphical representation is the foundation upon which a research project is built. The specific variables in the study in Figure 3 were informed by road maintenance as the independent variable, performance of road agencies as the dependent variable, regulatory framework as the moderating variable, and budgetary allocation as the mediating variable. Through the interaction of the independent variable with the moderating and intervening variables, the performance of the organization is affected and can be measured in terms of efficiency, profitability, growth, and effectiveness.

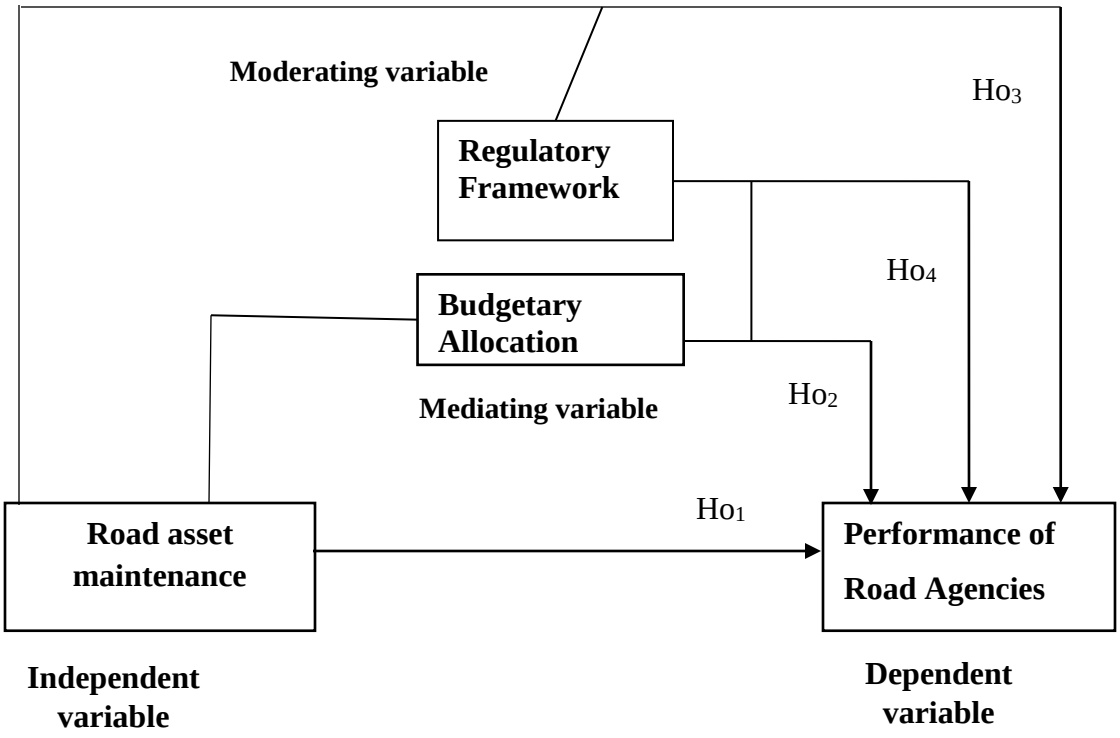

Figure 3: The Conceptual Framework

2.7 Operationalization of Variables

The variables in this study are conceptualized and operationalized as shown in Table 6.

Table 6: Operationalization of Variables

Name of Variable	Type of Variable	Operationalized indicators	Measurement Scale	Data Analysis method & Model	Question Section
Road Asset maintenance	Independent variable	- Speed of repair response to road defects, - Compliance with inspection plans, - Road safety - Environmental impact, - User satisfaction.	Ordinal or Ratio scales rated on a 5-point Likert type scale.	Descriptive and inferential method. Liner regression model	Section B
Regulatory frameworks	Moderating variable	- Oversight and quality control - Laws on	Ordinal or Ratio scales	Descriptive and inferential method.	Section C

Name of Variable	Type of Variable	Operationalized indicators	Measurement Scale	Data Analysis method & Model	Question Section
		transparency and accountability - Standards of road maintenance methodology(ies) - Policies on administrative coordination and control.	rated on a 5-point Likert type scale.	3 – steps moderation model using stepwise regression	
Budgetary allocation	Mediating variable	- Budgeting and budget planning. - Funds allocation adequacy. - Budget implementation performance - Budget monitoring, evaluation and control - Earned value Analysis	Ordinal or Ratio scales rated on a 5-point Likert type scale.	Descriptive and inferential method 4 – steps mediation model using hierarchy regression	Section D
Performance of road agencies	Dependent variable	- Roads maintenance Project's completion rate (Length of kilometers done) - Budgetary absorption rate (effectiveness & efficiency in resource utilization) - Value for money in road asset investments (Return on investment)	Ordinal or Ratio scales rated on a 5-point Likert type scale.	Descriptive and inferential method. 7 – steps moderation model using stepwise regression	Section E

2.8 Chapter Summary

This chapter has considered a variety of different pieces of literature pertaining to the subject matter that is being investigated. The objective of the literature review is to conduct a review of the published research that looks at what has been done in the past on relevant issues and the factors that are the subject of the current study. It encompasses the recording of material that is pertinent to the topic of the inquiry. The purpose of this task is to conduct an analysis of the variables, as well as to determine the technique and analysis that will be used in order to obtain the necessary data in order to make conclusions on the primary aim of the research. This section also includes conceptual frameworks, research gaps, research theories, and empirical literature reviews that are linked to the topic. In order to offer a crystal-clear knowledge of what this research is doing and why, all previous theoretical studies have been compiled and recognized.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents a detailed description of the research methodology used in this study. This chapter explores the research approaches and procedures used to tackle the research issues. The chapter offers a thorough explanation of the study's philosophy, research design, and study population. It includes details about the demography, types of data collected, sampling frame, sample size, sampling process, data collection instrument, pilot test, validity and reliability of the instrument, and ethical considerations.

3.1 Research Philosophy

According to the definition provided by Galliers (2016), research philosophy is a set of beliefs about the method by which study data pertaining to a certain phenomenon is to be obtained, processed, and applied. In addition, the philosophies of research methods are included in epistemology, which is the study of what is known to be true, in contrast to doxology, which is the study of what is thought to be true. In addition, Galliers (2016) has the opinion that the objective of science is the process of changing things that are believed into things that are known. This transformation from the doxa to the episteme is referred to as the scientific method. In the Western tradition of science, two main philosophies of study have been realised. These are the positivist, which is often referred to as scientific, and the interpretivist, which is sometimes referred to as antipositivist, as stated by Galliers (2016). Both of these philosophies have their roots in the scientific revolution of the 18th and 19th centuries. As a consequence, a study philosophy may be defined as a set of beliefs about the process of collecting data about a phenomenon, analysing that data, and using the knowledge that is generated to guide decision-making. The term "research philosophy" was coined by Saunders (2017), who described it as "a system of assumptions and ideas underlying the creation and evolution of knowledge in a specific area of study." According to Saunders (2017), the positivist premise that objective facts provide the greatest scientific evidence is likely to result in a large choice

of quantitative research methodologies. This is expected to be the case since the positivist assumption assumes that objective facts give the best scientific evidence.

Therefore, a research philosophy may be seen as a viewpoint on the techniques used to gather and analyse data related to a certain topic, as well as the subsequent application of the new information to make well-informed judgements. Saunders (2017) argues that research philosophy consists of a set of fundamental assumptions and conceptual frameworks that direct the development and progress of knowledge in a certain area of study. Saunders (2017) argues that the positivist paradigm suggests that objective facts are the strongest scientific evidence and thus have a major influence on the choice of quantitative research methods. Research philosophy, according to Bajpai (2011), is concerned with the source, nature and progress of knowledge. Four main research philosophies were identified: positivism, realism, interpretivism, and phenomenological. Positivism philosophy proposes a research strategy which is based on data collection and hypothesis formation (Hughes & Sharrock, 2016). Realism, on the other hand, to discover the existence and truth of objects in the human mind (Saunders et al., 2019). Interpretivism, as outlined by Mayer (2015), is a branch of epistemology which examines the differences between humans as social actors. Phenomenological philosophy concentrates on describing a lived experience of a phenomenon, concentrating on establishing meaning, behaviours, and narrative using longitudinal studies. The present research used a positivist philosophical framework by integrating established theories to formulate hypotheses, then subjecting them to evaluation and validation via the examination of study findings. Moreover, the researcher used positivist philosophy by maintaining objectivity in relation to the study components, using quantitative data analysis procedures, and thus achieving generalizability in the targeted research outcomes.

3.2 Research Design

According to Rubi and Babbie (2011), the term "research design" refers to the logical structures that make it possible to draw causal conclusions during the planning and execution of quantitative scientific research. According to Bryman and Bell (2015), a

study design may be thought of as a strategy that includes the process of data collection, collation, and analysis with the intention of producing knowledge that can be used for corporate decision-making. In addition, Bryman and Bell (2015) stated that the choice of a design for research is a reflection of the choices appertaining to the priority that was attributed to a variety of determinants of the process of the study. This idea was presented in their article, "The Choice of a Design for Research Is a Reflection of Priority Choices." The identified critical determinants include the significance attached to expressing causal relationships between research variables, generalising to larger groups of individuals in excess of those forming part of the research, comprehending individual behaviour and the meaning of that relationship in its identified social context, and having a temporal realisation of a social situation and their intricate inter-connections. All of these factors are important in determining the outcome of the research. According to the viewpoint of Cooper and Schindler (2014), the research design is the illustrative representation of the blueprint for the collection, collation, measurement, and subsequent analysis of study data for information. According to Cooper and Schindler (2014), the critical elements of a research design include activities and a time-based plan that are based on the study question, a guide for selecting sources and types of requisite information, a framework that allows the specification of the interactions among the research variables, and lastly, a procedural outline for each research activity.

Research design can be described as an organized plan for achieving the goals of a study and how to answer its associated questions (Saunders et al., 2019). This study will adopt a cross-sectional survey research design because the design is best suited for finding out the prevalence of a phenomenon, situation, problem, attitude or issue, by taking a cross-section of the population as it stands at the time of the study (Kumar, 2014). This study used the cross-sectional survey technique, which is typically associated with a deductive approach to answer questions regarding who, what, where, how much or how many (Cooper & Schindler, 2006). The design involved gathering information about a particular variable or sets of variables from individuals or entities of interest to provide a snapshot or cross section of population characteristics, attitudes, behaviours or opinions. The design chosen enabled the study gather, from sampled

participants, snapshot information that vividly described road assets maintenance and performance of road agencies in Kenya, clearly explaining on the mediation and moderation effect of budgetary allocation and regulatory framework.

3.3 Target Population

Target population of a study, as operationalized by Banerjee and Chaudhury (2010), is an entire group from which the researcher's information interest is required to be ascertained. The study target population comprised of the three road agencies in Kenya namely KeNHA, KeRRA, and KURA; Public Service Performance Management & Monitoring Unit (PSPMMU); and Kenya Road Board (KRB) as unit of analysis. The unit of observation comprised of management and staffs of these agencies, and drawn from Supply Chain, Finance and Engineering departments that are involved in road maintenance. The target population were chosen based on their statutory mandate in developing and maintaining road assets in the country. Two senior managers from PSPMMU - that monitors the performance of state agencies, and the officers from the KRB - that is responsible for disbursement and monitoring of the road maintenance levy fund – were included in the population of the study to triangulate findings from road agencies. Data obtained from the Human Resource Department of the respective road agencies gave a total population of 251 staffs in the department of supply chain management, finance, engineers and M&E units. This is shown in Table 7.

Table 7: Target Population

Department Category	Road agency organisation	Population (F)
Supply Chain	KeNHA	24
	KURA	25
	KeRRA	21
Finance	KeNHA	21
	KURA	25
	KeRRA	22
Engineers	KeNHA	35

	KURA	33
	KeRRA	41
Performance & Monitoring Unit	PSPMMU	2
Regulator	KRB	2
Total		**251**

Source: HRD data from KeNHA, KeRRA, KURA, KRB and PSPMMU (2023)

3.4 Sample Size and Sampling Design

Sampling is defined as a process of selecting a part of the total population present the whole group. According to Kothari and Gang (2014), this is done in order to create a miniature version of the larger population. According to Best et al. (2011) and Singh and Masuku (2014) a sample is that a small part of the total population which is selected for analysis. In order to acquire an accurate representation of the population, the study applied Role's Sample Determination formula (Charan & Biswas, 2013; Singh & Masuku, 2014) shown below.

$$n = \frac{N}{1 + Ne^2}$$

Where: n = the sample size

N= the target population

e = margin of error ($e \leq 0.05$)

The computed sample size taking 0.05 as the sampling margin of error, and target population of 151 therefore, is 153 as shown below.

$$n = \frac{251}{1 + 251(0.05)^2} = 154.22427 \cong 154$$

The study sample size represents about 61% of the target population, and is ideal and above the threshold of 30% provided by (C. Kothari & Gang, 2014) and (Kothari, 2019).

The study to applied stratification sampling technique, in which selection of respondents were informed by population categories so as to ensure resemblance of sample to population. Kothari (2019) postulates that this technique is idea for heterogenic population with distinct characteristics that can be grouped. The technique, thus ensured fair representation of population categories in the sample size.

The study divided the population into stratums based on the department for each road agency. The population of each subcategory or stratum was then determined and used to estimate weight or proportion that was then used to compute the respondents to be dram from each stratum. Thus, the proportionate sampling was adopted in selecting the respondent as shown in the sample frame Table 8. In addition, purposive sampling method was used in identifying two senior evaluation officers/managers for interview purposes from PSPMMU and KRB to provide data for triangulation of main research result and findings.

Table 8: Sample Frame

Department Category	**Road Agency**	**Population (N)**	**Weight (N/251)**	**Sample**
Supply Chain	KeNHA	24	0.0956	11
	KURA	25	0.0996	15
	KeRRA	23	0.0916	14
Finance	KeNHA	21	0.0837	13
	KURA	25	0.0996	15
	KeRRA	22	0.0956	11
Engineers	KeNHA	35	0.1394	21
	KURA	33	0.1316	20
	KeRRA	41	0.1633	24
Performance & Monitoring Unit	PSPMMU	2		2
Regulator	KRB	2		2
Total		**251**	1.0000	154

3.5 Data Collection Procedures

This research utilized primary data in order to answer the study's specific aims. A questionnaire was employed for this purpose due to its ability to allow respondents to fill it out without assistance, anonymously, and being relatively cheaper and faster than other methods while reaching a bigger sample size (Creswell, 2009). The questionnaire was divided into two parts. The first part focused on gathering demographic information about the participants and the second part encompassed data concerning highway

maintenance, the mediating effect of budgetary allocation, and the moderating effect of the regulatory framework on performance of road agencies in Kenya. The questionnaires were distributed to staff either in person, sent out, or administered online. Cooper and Schindler (2006) argued that the use of stuck to the questionnaire and now uniform collection of data. The questionnaire featured a five point Likert type scale, in which the respondents rated their views on a scale of 1 to 5. In order to achieve consistency and accuracy of data, only two key respondents were chosen from each road agency. These respondents were engineers, supply chain management officers, and financial officers as they are expected to provide the most informed answers to the study's objectives.

3.6 Pilot Testing

According to the opinions of Cooper and Schindler (2014), the phase of the research process that is devoted to the gathering of data often begins with the pilot testing of the data collection instrument. A preliminary test of the data collection instrument was carried out in advance of the main research endeavour in order to guarantee its applicability, efficiency, dependability, and validity. According to Cooper and Schindler (2014), the purpose of doing a pilot study is to provide some proxy data for the purposes of assessment and decision-making, as well as to identify any limits that may exist in the design and instruments of the research being conducted. According to Fraser et al. (2018), a pilot study is closely tied to and often comes before the bigger study. Additionally, a pilot study is sometimes considered synonymous with a feasibility study that is intended to guide the development of a large-scale research project. It is essential to emphasise the fact that a pilot study is, in essence, a risk-mitigation procedure that is carried out with the intention of lowering the likelihood of a larger research project being unsuccessful. According to Fraser et al. (2018), a pilot test is either a small-scale research project or a collection of observations created with the purpose of facilitating a choice about whether or not to proceed with a full-scale study. In other words, the results of a pilot test are used to inform the decision-making process that follows. As a result of this, volunteers for a pilot test should be recruited from the demographic that will be the focus of the study, and the protocol and processes that will be used to gather data should be replicated. According to Mugenda (2011), the sample size that is necessary to carry out a

pilot test should fall anywhere between 1% and 10% of the sample size that is required for the larger full-scale study.

The researcher carried out a pilot study at in three road agencies namely KURA, KeRRA and KeNHA. The choice of the pilot population was justified in that they also form the study population thus high degree of homogeneity in characteristics and attributes. Mugenda and Mugenda (2012) pointed out that the sample size to be utilised for testing is governed by cost, time and efficiency, however 5-10% of the study sample is accepted. The pilot test used was 10% of the study sample, which is 15 respondents (10% of 154). The data collected from the trial was used to evaluate the accuracy, clarity and appropriateness of the research tool (Mugenda & Mugenda, 2012). Respondents of the trial were asked to complete the questionnaire, with enough time to make any amendments if required. The pilot test respondents were not included in the final analysis.

The pilot study participants were excluded from the final research due to concerns about validity due to exposure bias. The pilot participants have previously been familiarized with the study's protocols, inquiries, or assignments. This level of familiarity may have an impact on how they respond in the final research. Participants may retain particular questions, anticipate the study objectives, or unconsciously modify their responses depending on their prior experience with the pilot. This may introduce bias to the data and undermine the internal validity of the research, resulting in inaccurate representation of the underlying connection between variables.

3.6.1 Validity of the Research Instruments

According to Bell et al. (2019), validity provides an explanation for the correctness and relevance of the conclusions that were reached from the results of the study. Mugenda and Mugenda (2012) found that the desire and competence of the participants to answer the questions on the questionnaire had a significant impact on the accuracy of the data obtained from the questionnaire. In order to determine whether or not the construct

validity of its variables was maintained, the research used the Kaiser-Meyer-Olkin (KMO) test of sample adequacy. According to Klein (2013), the KMO test estimates the sampling adequacy for each variable in the model as well as for the full model. This allows the test to determine whether or not a set of data is suitable for factor analysis. According to Williams et al. (2012), a KMO value of 0.50 is regarded as suitable or acceptable for the degree of sampling adequacy, with values more than 0.5 being preferable. The findings that were obtained from the constructs were put through Bartlett's Test of Sphericity to see whether or not they were from populations that had comparable variances. This was done so that the level of sampling adequacy could be determined. The content validity of the research was assured by having supervisors and experts in the area assess the questionnaire for clarity, relevance, and impartiality before it was sent to participants. The revisions to the questionnaire that were made as a result of their assessments helped to ensure that content validity would be attained.

3.6.2 Reliability of the Research Instruments

When talking about research results, "reliability" means how well those results can be trusted over a long period of time and how well they represent the whole group that the research was aimed at. Bell et al.'s (2019) definition of reliability is that a research instrument is considered reliable if it can be used to carry out an identical study using the same methods and still yield the same findings. In other words, reliability is determined by whether or not an instrument can be used to produce the same outcomes in an identical study. For the sake of this particular piece of research, questionnaires were the main tool that was used to gather data. During the process of piloting, the questionnaires' internal consistency was investigated in order to ascertain how reliable they would be. (Taber, 2018) proposed utilizing Cronbach's alpha with a cut-off of 0.7, which was believed to be trustworthy, in order to examine the internal consistency of the data that had been gathered. This was recommended as a method for determining whether or not the data had been collected accurately. This was done with the intention of establishing whether or not the data could be trusted in its current state.

3.7 Diagnostics Tests

The present study used several diagnostic tests in order to verify the adherence of the Classical Linear Regression Model (CLRM) and to choose suitable alternative models in the event that the assumptions of the CLRM are not met (Saunders et al., 2019). Prior to conducting the regression model, a series of pre- and post-estimation tests were performed. The diagnostic tests used included normality tests, multicollinearity tests, heteroscedasticity tests, and linearity tests. The aforementioned tests were deliberated over in the following sections.

3.7.1 Normality Test

Normality of data refers to when data is distributed evenly or equally on both sides of the mean value. Normality test is used to determine whether sample data has been drawn from a normally distributed population (within some tolerance) and that the data set is well modelled by a normal distribution (Hair et al., 2010). However, these are not always required for normality test in analysing the data, but are found to be better if the variables are normally distributed. The statistical method can assess the normality of the data (Hairet al., 2010). Kurtosis and Skewness tests and the Kolmogorov and Shapiro methods are primarily used by researchers to test the normality of data distribution (Hair et al., 2011).

These tests are conducted in order to determine the distribution of the data. Data that is not normally distributed provides estimates that have incorrect t-tests, F-tests, and chi-square test results (Razali &Wah, 2011). Non-normal distribution occurs when one of the variables has the wrong functional form. Kolmogorov-Smirnov (KS) Test was used to check for normality. The KS test is defined by the following hypothesis: H. The data follows normal distribution and HA: 0: The data does not follow a normal distribution (Pennsylvania State University, 2017a). Probabilities that are >0.05 indicates that the data is normally distributed while < 0.05 indicates that the data is not normally distributed.

This study applied SPSS 25.0 for initial descriptive statistics to identify Skewness and kurtosis. In addition, Kolmogorov-Smirnov and Shapiro-Wilk statistic tests (Field, 2013) were employed to examine the normality of data. The other test that was used to assess the normality is the Shapiro–Wilk test. This tests the null hypothesis that a given sample came from a normally distributed population. The test rejects the hypothesis of normality when the p-value is less than or equal to the value of alpha (level of significance which in this study will be set at 0.05). That is, should the value of significance of the Shapiro-Wilk Test result be found to be greater than 0.05, then the data was said to be normal and if it was below 0.05, then the data was said to significantly deviate from a normal distribution.

3.7.2 Test of Multi-collinearity

Multicollinearity is the extent to which a variable can be explained by the other variables (Loo et al., 2015). It also refers to the high inter-correlations among the predictor variables. Multicollinearity complicates the interpretation of the results as it becomes difficult to ascertain the effect of any single variable because of their interrelationships. Multicollinearity occurs when there is strong correlation between two or more variables in the model. A high level multicollinearity will increase the standard errors of the b-coefficients, and will generate a threat to the model, which can be problematic to multivariate analyses. Multicollinearity can be identified by checking the correlation matrix for high correlations. Another method to diagnose multicollinearity is to check the Variance Inflation Factor (VIF) and collinearity diagnostics of tolerance statistics.

A test of multi-collinearity was conducted to determine if any of the variables under consideration were significantly correlated with each other. VIF ranging from 1 to 10 indicate absence of multicollinearity while presence of multicollinearity is detected when VIF is more than 10 or less than 1 (Lindner, Puck & Verbeke, 2020). To evaluate this correlation, the Variance Inflation Factor (VIF) was utilized. If the VIF values surpass 10 (or 5 when using a more conservative approach) then there is a strong likelihood of multi-collinearity, which can have an adverse effect on the research (Newbert, 2008).

3.7.3 Test for Homoscedasticity

Homoscedasticity is the assumption of equal standard deviations of Y values about the population regression line, regardless of the value of X. Homoscedasticity is the extent to which the data values for the dependent and independent variables have equal variances (Hair, et al., 2010). However, if the variances happen to be unequal, then heteroscedasticity exists. Homoscedasticity refers to the level of homogeneity of variance that assumes dependent variable(s) exhibit equal levels of variance across the range of predictor variable(s) (Hair et al., 2010). It gives the assumption that the criterion variable exhibits equal levels of variance across the range of predictor variables. Thus, the normality is assumed because when the multivariate normality assumption is met, the relationships between variables are homoscedasticitic.

Homoscedasticity was assessed using the Levine's test which is an inferential statistic used to assess the equality of variances for a variable calculated for two or more groups (Levine, 1961). It tests if k samples do have equal variances (homogeneity of variance or homoscedasticity). The Levine's test, tests the null hypothesis that the population variances are equal. The study uses the 0.05 significance level to determine statistical significance so, if Levine's test shows a significance value of less than 0 .05, then it is concluded that the variances are significantly different meaning the study's statistical test (t-test or F-test) is invalid and therefore conclusive inferences cannot be made from it. Likewise, if Levine's test shows a significance value of greater than 0.05, then the conclusion is that the variances are not significantly different. This confirms the validity of t-test or F-test results (Bryk & Raudenbush, 1988; Anderson, 2013).

3.7.4 Test for Linearity

Linearity assumes a straight-line relationship between the predictor variables and the criterion variable (Kinuu et al., 2015). Linear regression needs the relationship between the independent and dependent variables to be linear. It is also important to check for outliers since linear regression is sensitive to outlier effects. Linearity was assessed by examination of a scatter plot of all the independent variables against the dependent

variable to measure if there is a straight-line relationship. A scatter plot of residuals and y values was obtained. Y values are taken on the vertical y axis, and standardized residuals were then plotted on the horizontal x axis. If the scatter plot follows a linear pattern that shows that linearity assumption is met. Nonlinearity is usually most evident in a plot of observed versus predicted values or a plot of residuals versus predicted values, which are a part of standard regression output. The points should be symmetrically distributed around a diagonal line in the former plot or around horizontal line in the latter plot, with a roughly constant variance. In multiple regression models, nonlinearity or no additivity may also be revealed by systematic patterns in plots of the residuals versus individual independent variables (Daoud, 2017).

3.8 Data Analysis

The use of Statistical Package for Social Sciences (SPSS) was employed to analyze quantitative data. The questionnaires were gathered and classified and the items within the survey were encoded in order to simplify data entry. Statistical data analysis incorporating both descriptive and inferential methods were adopted (Bell et al., 2019; Charan & Biswas, 2013; Creswell, 2009). Descriptive statistics, such as frequencies, mean, standard deviation and percentages, were utilized and the information were presented graphically and in the form of tables. Descriptive statistics enables the researcher to describe distribution of measurements or scores using a few indicators correlation and regression analysis was utilized for the inferential data analysis.

According to Taber (2018) the correlation technique is used to determine the nature and strength of relationship between two or more variables, while regression is used to determine the interdependency between the variables. Specifically, the study adopted Pearson correlation to establish the relationship between road assets maintenance, budgetary allocation, regulatory framework and performance of road agencies. Diverse regression analysis (liner, multiple, stepwise moderated and mediated) adopted to explain the interdependency between study variables. In addition, the study performed Conditional Process Modelling (PROCESS) to establish the intervening effect of budgetary allocation, and moderating effect of regulatory framework on the relationship between road assets maintenance and performance of road agencies; as well as the

moderated-mediated analysis on the same relationship as proposed by (Igartua & Hayes, 2021).

3.8.1 Objective One (Road Assets Maintenance and Performance of Road Assets Agencies)

The interdependency between road assets maintenance and performance of road assets agencies will be established using liner regression model. Simple regression attempts to determine whether independent variable can predict a given dependent variable (Stenius et al., 2017). The proposed empirical model to examine the statistical importance of the independent variable (road assets maintenance) on the dependent variable (road agencies performance) is shown in equation I:

$PERF = \beta_0 + \beta_1 RAM + \varepsilon$

Where; PERF = is the Performance of road agencies,

RAM = is the Road assets maintenance,

B_0 = is the intercept,

β_1 = is the regression coefficients,

ε = is the Error term

3.8.2 Objective Two (Mediation Effect of Budgetary Allocation)

Mediation is a hypothesized causal chain in which one variable affects a second variable that, in turn, affects a third variable. The Baron and Kenny model (Baron & Kenny, 1986) to be used in assessing how the prediction of a performance of road agencies changes with the introduction of mediator variable budgetary allocation, on its relationship with road assets maintenance. (Whisman & McClelland, 2005) explain that the test involves determining the statistical significance of the interaction between variables. The 4 models diagram and equations to be used for this objectives are:

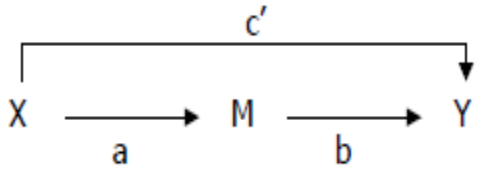

Figure 4: Mediation Model

Source: Adopted from (Hayes & Rockwood, 2020).

Step 1 to conduct a simple regression analysis with X predicting Y to test for path 'c' alone, as shown in Equation model 1.

$PERF = \beta_0 + \beta_1 RAM + \varepsilon$ …… Equation 1

Where; PERF = is the Performance of Road Agencies,

RAM = is the Road assets maintenance,

B_0 = is the intercept,

β_1 = is the regression coefficients,

ε = is the Error term

Step 2 to conduct a simple regression analysis with X predicting M to test for path 'a' using Equation model 2

$BA = \beta_0 + \beta_1 RAM + \varepsilon$ …… Equation 2

Where BA = Budgetary Allocation

Step 3 conduct a simple regression analysis with M predicting Y to test the significance of path 'b' alone as shown in model Equation 3

$PERF = \beta_0 + \beta_1 BA + \varepsilon$ …… Equation 3

Step 4 will conduct a multiple regression analysis with X and M predicting Y as shown in model Equation 4.

$PERF = \beta_0 + \beta_1 RAM + \beta_2 BA + \varepsilon$ …… Equation 4

The process outlined by Baron & Kenny (1986) guided analysis in establishing whether a zero-order relationship exists between the three variables in question. If any of the

relations from steps 1 through 3 are not significant, it is an indication that mediation is not possible. If, however, steps 1-3 show that the relations are significant, then it is necessary to move on to step 4. In this step, mediation is supported if the effect of RAM remains significant when controlling for BA. If RAM is not significant when BA is controlled, it can be concluded that there is full mediation. On the other hand, if both RAM and BA are found to significantly predict PER, then partial mediation exists.

3.8.3 Objective Three (Moderation Effect of Regulatory Framework)

Regression analysis (PROCESS Analysis method) (Hayes & Rockwood, 2020) was employed in establishing the moderating effect of regulatory framework (RF) on the relationship between road assets maintenance and performance of road agencies in Kenya. The model aided the study in predicting the dependent variable, that is performance of road agencies, differs across levels of independent variable "road assets maintenance" as may be interacted by the moderator variable "regulatory framework".

(Whisman & McClelland, 2005) noted if moderating variable affects the strength and direction between the independent and dependent variable, then the test involved determination of the statistical significance of the interaction term. The model questions are as follows;

$PERF = \beta o + \beta_1 RAM + \varepsilon$ ……. Equation 5

$PERF = \beta o + B_1 RAM + B_2 RF + \varepsilon$ ……. Equation 6

$PERF = \beta o + B_1 RAM + B_2 RF + B_3 RAM*RF + \varepsilon$ ……. Equation 7

Where: PERF = Performance of Road Agencies

RAM = Road assets Maintenance,

RF = Regulatory Framework

RAM*RF = interaction term (product of RAM and RF)

βo = is the constant term,

β_1, β_2 and β_3 – represents the regression coefficients

ε = Error term

The moderating effect – as assessed using PROCESS Analysis Model 1 – was explained by the result of change in coefficient of determination (R-Square Change) of the interaction terms. The change in R^2 indicated the present of mediation, with the conditional effect independent variable RAM when moderator variable RF is equal to mean, with plus and minus one, was used to determine if the moderation is relatively high or low respectively (Baron & Kenny, 1986; Hayes & Rockwood, 2020).

3.8.4 Objective Four (Moderated Mediation Effect)

The influence of a regulatory framework on the association between road maintenance and agency performance as mediated by budgetary allocation can be elucidated through a conditional process model with a mediation process (RM → BA → PERF) which is moderated by the RF → PERF effect of RM using the bootstrap resampling technique with 5000 resamples and in 95% bias corrected confidence intervals at each of the levels of the moderate (Igartua & Hayes, 2021). The study thus, adopts Hayes and Rockwood model for moderated mediation analysis (Hayes & Rockwood, 2020) shown in Figure 5.

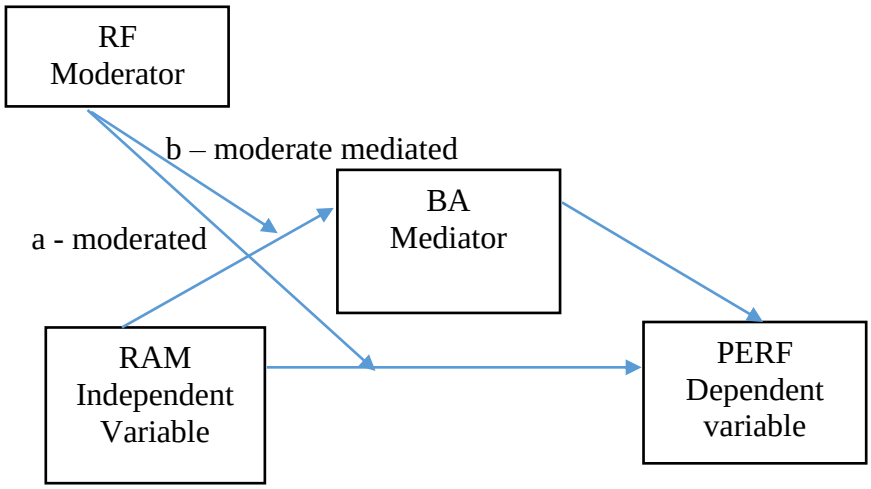

Figure 5: Moderated - Mediated Model

Source: Adopted and modified from Hayes and Rockwood (2020)

The moderated-mediated Model 8 of PROCESS analysis with a two-way interaction between predictors RAM and BA on RF to estimate the presence of moderation mediation effect. According to (Hayes & Rockwood, 2020) presence of moderated mediation is probed through conditional indirect effect of the moderator on mediation

effect as explained using coefficient of determination (R-Square), coefficients of interactions, and conditional effects for both direct and indirect effects.

The proposed model equations for this analysis are;

$BA = \beta_0 + \beta_1 RAM + \beta_2 RF + \beta_3 RAM*RF + \varepsilon$ ……. Equation 8

$PERF = \beta_0 + \beta_1 RAM + \beta_2 RF + \beta_3 BA + \beta_4 RF*BA + \varepsilon$ ……. Equation 9

Where: PERF = Performance of Road Agencies

RAM = Road assets Maintenance,

RF = Regulatory Framework

RAM*RF = interaction term (product of RAM and RF)

RF*BA = interaction term (product of RF and BA)

βo = is the constant term,

β_1, β_2 and β_3 – represents the regression coefficients

ε = Error term.

Table 9: Hypotheses and Data Analytical Models

	Objectives	Hypothesis	Analytical Method	Interpretation
1.	To establish the effect of road assets maintenance on the performance of road agencies in Kenya,	Ho_1: There is no significant relationship between road assets maintenance and performance of road agencies in Kenya.	Liner Regression Analysis **Equation:** $PERF = \beta_0 + \beta_1 RAM + \varepsilon$ Where; PERF = is the Performance of road agencies, RAM = is the Road assets maintenance, B_0 = is the intercept, β_1 = is the regression coefficients, ε = is the Error term	Significant of the variation explained and partial effects (R^2 change, F change, β, t is significant, P-value < 0.05)
2.	To assess the medi effect of budg allocation on relationship between assets maintenance the performance of agencies in Kenya	Ho_2: There is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.	Stepwise Regression Analysis (PROCESS MODEL 4) **Equations:** Step 1 - X predicting Y to test for path 'c' alone, $PERF = \beta_0 + \beta_1 RAM + \varepsilon$ Where; PERF = is the Performance of Road Agencies, RAM = is the Road assets maintenance, B_0 = is the intercept, β_1 = is the regression coefficients, ε = is the Error term Step 2 - X predicting M to test for path 'a' $BA = \beta_0 + \beta_1 RAM + \varepsilon$ Where BA = Budgetary Allocation	If any of the relations from steps 1 through 3 are not significant THEN mediation is not possible. If steps 1-3 are significant, and the effect of RAM remains significant when controlling for BA THEN mediation present. However, If RAM is not significant when BA is controlled, then Full mediation, and If both RAM and BA are significantly predicts PERF, then

	Objectives	Hypothesis	Analytical Method	Interpretation
			Step 3 - M predicting Y to test the significance of path 'b' alone. $PERF = \beta_0 + \beta_1 BA + \varepsilon$ Step 4 - Multiple regression with X and M predicting Y. $PERF = \beta_0 + \beta_1 RAM + \beta_2 BA + \varepsilon$	partial mediation exists. (R^2 change, F change, β, t is significant, P-value < 0.05)
3.	To assess the mode effect of regul framework on relationship between assets maintenance the performance of agencies in Kenya.	Ho_3: There is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya	Stepwise Regression Analysis (PROCESS MODEL 1) **Equations** $PERF = \beta o + \beta_1 RAM + \varepsilon$ $PERF = \beta o + B_1 RAM + B_2 RF + \varepsilon$ $PERF = \beta o + B_1 RAM + B_2 RF + B_3 RAM*RF + \varepsilon$ Where: PERF = Performance of Road Agencies RAM = Road assets Maintenance, RF = Regulatory Framework RAM*RF = interaction term βo = is the constant term, β_1, β_2 and β_3 – represents the regression coefficients ε = Error term	If a change in R^2 after addition of interaction term (moderator) is significant THEN mediation present. (R^2 change, F change, β, t is significant, P-value < 0.05)
4.	To assess the moderated mediated effect on the relationship between road	Ho_4: There is no significant moderated-mediated effect on the relationship	Moderated-Mediated Analysis (PROCESS MODEL 8) **Equations** $BA = \beta_0 + \beta_1 RAM + \beta_2 RF + \beta_3 RAM*RF + \varepsilon$ $PERF = \beta_0 + \beta_1 RAM + \beta_2 RF + \beta_3 BA + \beta_4 RF*BA + \varepsilon$ Where: PERF = Performance of Road Agencies	Coefficient of determination (R^2) to be used in estimate the conditional indirect effect of moderator on mediated effect if the null of 0.000 does not fall in

Objectives	Hypothesis	Analytical Method	Interpretation
assets maintenance and the performance of road agencies in Kenya	between road asset maintenance and performance of road agencies in Kenya.	RAM = Road assets Maintenance, RF = Regulatory Framework RAM*RF = interaction term (RAM and RF) RF*BA = interaction term (RF and BA) βo = is the constant term, β_1, β_2 and β_3 – represents the regression coefficients ε = Error term.	between the lower boundary (BootLLCI) and the upper boundary (BootULCI) of the 95% confidence interval. (P-value <0.05 shows a significant effect of the moderated-mediation effect).

3.9 Ethical Consideration

The research was conducted within the framework of ethical guidelines. Authorization from the relevant agencies were obtained prior to conducting the study. The researcher-maintained honesty and integrity in all aspects of the research. The respondents were accorded the respect they deserved and assured that all the responses they gave will be used purely for the purpose of this study. The selection of respondents were free from bias or discrimination.

3.9.1 Informed Consent

In order to perform the research, permission was sought from the applicable road agencies. Participants were asked to provide their consent to participate via email.

3.9.2. Voluntary Participation

The researcher obtained consent from participants prior to administering the surveys. The participants were informed that their participation is voluntary and that they are free to withdraw from the study at any time. The researcher made it clear to the respondents that the information given will only be used for the research. Furthermore, the researcher explained that obtaining meaningful results for the project depended on the respondents giving their views on the research topic.

3.9.3 Confidentiality

The researcher informed the participants that their responses in this survey will remain confidential and solely used for a research project at the Management University of Africa. They were assured that their anonymity and privacy will be respected throughout the duration of the study.

3.9.4 Privacy

The researcher made it clear to the respondents that the information collected for this research will be guarded in the strictest confidence and with the utmost privacy. The results were coded so that no respondent could be identified by name.

3.9.5 Anonymity

To ensure anonymity, the researcher informed the respondents that the information they provided will be kept confidential and therefore they will not be required to write their names on the questionnaire. It was also made clear to them that their anonymity will be protected during the duration of the study.

3.10 Chapter Summary

This chapter outlined the research methodology utilized in the study. It provided a description of the research methodology and explained the procedures to be used in conducting the study. In particular, the chapter described the research design that was used in the study, the target population, sampling and sampling procedure as well as data collection instruments. At the end of the chapter, validity and reliability of the instrument were described and the methodology that was used for data analysis are discussed. In addition, the ethical considerations of the research were discussed.

CHAPTER FOUR

DATA ANALYSIS AND RESEARCH RESULTS

4.1 Introduction

Analysis of road assets maintenance, budgetary allocation, regulatory framework and performance of road agencies in Kenya are discussed in this chapter along with the study's findings. The six sections covering the response rate, the outcomes of the pilot test, background information on the respondents, the diagnostic testing of the variables, descriptive analytics, and inferential analyses are discussed in this section. Data were also provided in the form of frequency distribution tables, which simplified the discussion and study findings clarity.

4.2 Response Rate

According to the definition offered by Rubin and Babbie (2011), a respondent of a study is a person who contributes pertinent data for analysis by responding to a research questionnaire or by participating in an interview with the researcher. The rate of response may be expressed as a percentage and is calculated by dividing the total number of people who take part in an investigation by the total number of people who are chosen for an examination. The response rate, also known as the completion rate or the return rate when it comes to self-administered surveys, is the proportion of questionnaires that are returned after being sent out (Rubin & Babbie, 2011). Another name for the response rate is the completion rate. A total of 154 questionnaires were administered out of which 122 were adequately filled, collected and used in the study translating into 79.2 percent response rate.

Table 10: Response Rate

Category	Frequency	Percent
Completely filled and returned Questionnaires	122	79.2
Unreturned Questionnaires	32	20.8
Total	**154**	**100**

The study achieved a high response rate at 79.2%. According to Mugenda and Mugenda's (2003) who recommended that a response rate of 50% is sufficient for analysis and reporting, a rate of 60% is normally good, and 70% and above rate is sufficient. This quantifies that the response rate from the study was suitable.

4.3 Demographic Characteristics

4.3.1 Highest level of education

This research aimed to gather data on the highest level of education of the respondent. The outcomes as shown in Table 7 shows that 3 respondents indicated that the hold doctoral (PhD) this represented 2.5% of the respondents, while 74 of the respondents had Master's degree which represented 60.7% of the respondents, those with Bachelor Degree were 42 representing 34.4% of the respondents. Finally the respondents with Diploma were 3 representing 2.5% of the respondents.

Table 11: Highest level of education

Education Level	Frequency	Percent
Doctoral (Ph.D)	3	2.5
Masters	74	60.7
Bachelor Degree	42	34.4
Diploma	3	2.5
Total	**122**	**100.0**

4.3.2 Number of years worked with the road sector

The respondents were asked to indicate the number of years worked in the road sector. From the responses to the question it was found that 1 respondent representing 0.8% had worked in the sector for 1 to 5 years, 10 respondents representing 8.2% had worked in the sector for 6 - 10 years,19 respondents representing 15.6% had worked in the sector for 11 - 15 years and 92 respondents representing 75.4% had worked in the sector 16 - 20 years.

This shows that majority of the respondents had worked in the sector for between 16 to 20 years and therefore had a good understanding of the sector and were therefore able to give valuable information for the study.

Table 12: Years worked with the road sector

Years	Frequency	Percent
1 - 5 Years	1	.8
6 - 10 Years	10	8.2
11 - 15 Years	19	15.6
16 - 20 Years	92	75.4
Total	**122**	**100.0**

4.3.3 Number of years worked with the agency

The study aimed to know the number of years the respondents had worked in the agency. According to the findings in Table 9, the respondents who had worked in the agency for a period of 1-5 years were 14 representing 11.5% of the respondents, the respondents who had worked in the agency for a period of 6- 10 years were 23 representing 18.9% of the respondents. The respondents who had worked in the agency for a period of 11 - 15 years were 79 representing 64.8% of the respondents while the respondents who had worked in the agency for a period of 16 - 20 years were 6 representing 4.9% of the respondents. Therefore had a good understanding of the respective agencies/organisation and were therefore able to give valuable information for the study.

Table 13: Number of years worked with the road agency/your organisation

Years	Frequency	Percent
1 - 5 Years	14	11.5
6 - 10 Years	23	18.9
11 - 15 Years	79	64.8
16 - 20 Years	6	4.9
Total	**122**	**100.0**

4.3.4 Number of years worked in the current position

The sort to understand the numbers of years the respondent had worked in the current position in the organisation. As shown in table 10, the respondents who had worked in the organisation for a period of 1 - 5 Years were 58 representing 47.5% of the

respondents, the respondents who had worked in the organisation for a period of 6 - 10 Years were 38 representing 31.1% of the respondents, the respondents who had worked in the organisation for a period of 11 - 15 Years were 25 representing 20.5% of the respondents and the respondents who had worked in the organisation for a period of 16 - 20 Years was 1 representing 0.8% of the respondents.

Table 10: Years worked in your current position/appointment

Year	Frequency	Percent
1 - 5 Years	58	47.5
6 - 10 Years	38	31.1
11 - 15 Years	25	20.5
16 - 20 Years	1	0.8
Total	**122**	**100.0**

4.4 Results of the Pilot Survey

Before beginning the study endeavour, a pilot test is conducted on the interview guide to determine its viability. Testing the research tool on a small sample of respondents enables input on how well they comprehend the data gathering tool. Additionally, it helps in figuring out whether the instrument reacts to the study questions as intended. A pilot test of the study's questionnaire was performed on a sample of 15 participants, representing 10% of the study sample size. The pilot study targeted KURA, KeRRA and KeNHA, however, the respondents from KURA, KeRRA and KeNHA that formed the pilot group did not participate in the actual study. The pilot tests included validity and reliability tests. The results are shown under validity and reliability sections 4.4.1 and 4.4.2 respectively.

4.4.1 Validity

The precision with which an instrument measures what it purports to measure is what is meant by validity (Bhattacherjee, 2012), A validity test is performed to make sure the measurement scale is indeed measuring the unobservable construct it was designed to. According to Bhattacherjee (2012), it may be evaluated using theoretical or empirical methods. The face and content validity subtypes of theoretical evaluation of validity, also

known as translational/content validity, are concerned with how well a theoretical construct's idea is conveyed through or reflected in an operational measure. For conceptual validity, the study used the Keyser Meyer Olkin (KMO) and Barlette's test of sphericity.

4.4.1.1 Content Validity

The steps advised by Cooper and Schindler (2013) were followed in order to establish content validity. It was specifically determined which scales were already in use from the literature, developed a data collection instrument, and distributed it to conveniently chosen population from KURA, KeRRA and KeNHA. These population's feedbacks for improvements in the survey tool's clarity, thoroughness, relevance, significance, and necessary depth were taken into consideration. Peers pursuing PhDs in management and leadership at MUA University examined the instrument again, and their feedback was taken into consideration. A final review of the data collection tool was done by supervisors and their valuable recommendation used to finalize the instrument. This procedure was done to ensure that the measurement scales items had adequately translated from theory, therefore measuring the constructs of the study adequately. The measure was thought to have attained face validity since the experts said it was clear that it provided appropriate coverage of the notion, as claimed by (Zikmund, 2003).

4.4.1.2 Construct Validity

Construct validity is the degree to which a test adequately measures the construct it is intended to measure. The degree to which operationalizations in your study the process of linking ideas to observations allow for inferences to be drawn about the constructs they are based on is referred to as construct validity. Because it still depends on how individuals perceive notions that are otherwise hard to quantify, this kind of measurement is regarded as subjective. Keyser Meyer Olkin (KMO) and Barlette's sphericity test were utilized in the study to assess construct validity (Dikko, 2016).

The Kaiser-Meyer-Olkin (KMO) Test serves as a barometer for the data's appropriateness for factor analysis. The test determines if there is sufficient sampling for both the overall

model and each individual variable. The percentage of variation among variables that may be regarded as common variance is represented by the statistic. The data may be factor analysed more effectively the lower the proportion. In general, the claims are valid, and the results are consistent with what they claim to measure if the KMO value is higher than 0.4 and the P-value of Barlette's test of sphericity is lower than 0.05.

Table 11: Construct Validity Result

Variable	KMO value	Sphericity
Road assets maintenance	0.826	0.00
Budgetary allocation	0.811	0.00
Regulatory framework	0.786	0.00
Performance of Road agency	0.751	0.00

Results in Table 11 show that road assets maintenance had a KMO value of 0.806 and Barlette's test of sphericity of 0.000<0.05 and thus the statements are valid/it measures what its purports to measure. Results in Table 10 show that budgetary allocation had a KMO value of 0.820 and Barlette's test of sphericity of 0.000<0.05 and thus the statements are valid/it measures what its purports to measure. Results in Table 11 show that regulatory framework had a KMO value of 0.782 and Barlette's test of sphericity of 0.000<0.05 and thus the statements are valid/it measures what its purports to measure. Results in Table 11 show that performance of Road agency had a KMO value of 0.759 and Barlette's test of sphericity of 0.000<0.05 and thus the statements are valid/it measures what its purports to measure.

4.4.2 Reliability test

This test helped in determining whether the significant research variables were internally consistent. This was fulfilled by performing a reliability test on the four important variables, as indicated in Table 12. When the four variables were tested on a scale, Cronbach Alpha coefficients greater than 0.7 were obtained, which was regarded as extremely dependable for delivering consistent findings over time. The following generalization was presented by George and Mallery (2003): A number of more than 0.9 is considered exceptional; more than 0.8 is good; more than 0.7 is acceptable; more than

0.6 is doubtful; more than 0.5 is bad; and less than 0.5 is unsuitable. The scale's items have a higher level of internal consistency when Cronbach's alpha coefficient is near 1.0.

Table 12: Reliability Analysis

Variable	Cronbach's Alpha	No. of Items	Item Deleted	Results
Road assets maintenance	0.752	11		Accepted
Budgetary allocation	0.906	10		Accepted
Regulatory framework	0.869	7	RF2	Accepted
Performance of Road agency	0.805	12		Accepted

Table 12 shows the dependability findings when a specific factor is taken out; road maintenance, budgetary allocation, regulatory framework and performance of road agency all have coefficient values over 0.8. The value of the Cronbach's alpha in this column, "Cronbach's Alpha if Item Deleted," represents what it would be if the given item were eliminated from the scale. The Cronbach alpha value of the regulatory framework improved to 0.869 after item RF2 was deleted. Typically, the dependability coefficient of Cronbach's alpha falls between 0 and 1. The coefficient genuinely has no lower bound, though. How close the Cronbach's alpha coefficient is to 1.0 is a measure of the internal consistency of the scale's items.

Table 14: Result of Cronbach's Alpha Reliability Test

Cronbach's Alpha	N of Items
0.884	40

The study indicated the numbers of items tested were 40 and the reliability Cronbach's Alpha was 0.884.

4.5 Diagnostic Test Results

In order to determine if the postulates of the Classical Linear Regression Model (CLRM) are being violated and to choose the most appropriate models for evaluation in the event that they are, the study employed a range of diagnostic tests. Thus, checks for pre- and post-estimation were performed before running the regression model. In this case, pre-estimation tests for Normality, multicollinearity, heteroscedasticity, and linearity were carried out. These sections go through each of them individually.

4.5.1 Test for Normality

To provide a more comprehensive view of the research's findings than merely the sample that was utilized, regression analysis's core premise is that the residuals in the dependent variable must be normal (Field, 2009). The study variables data was examined to see if it was normally distributed using the Kolmogorov-Smirnov test approach. The results in Table 13 indicate that the Kolmogorov-Smirnov Z statistic is 0.106 (P-value > 0.05) in this case. Since the null hypothesis was refuted and the P-value was less than 0.05, the alternative hypothesis was accepted. The study's data were consequently determined to be normally distributed and suitable for linear regression analysis. The results of the normality and Kolmogorov-Smirnov tests lead the study to reject the null hypothesis while supporting the alternative hypothesis.

Table 15: Kolmogorov-Smirnov Test

		Organisational performance
N		122
Normal Parameters a,b	Mean	4.76E-14
	Std. Deviation	0.898
Most Extreme Differences	Absolute	.103
	Positive	.066
	Negative	-103
Test Statistic		.105
Asymp. Sig. (2-tailed)		.001c

a. Test distribution is Normal.

b. Calculated from data.
c. Lilliefors Significance Correction

4.5.2 Autocorrelation Test

Using the Durbin-Watson statistic, autocorrelation was tested. The Durbin-Watson statistic is used to evaluate the degree of autocorrelation among the residuals of a particular regression analysis. The Durbin-Watson statistic's general rule states that values between 1.5 and 2.5 likely to suggest that a particular collection of data does not exhibit autocorrelation. The Durbin-Watson statistic in this study is shown in each summary of regression model output and falls between 1.5 and 2.5 which indicates that there is no autocorrelation in the data. In addition, the overall Durbin Watson's was 2.087 as shown in Table 14. This result implied there was no serial auto correlation in the data.

Table 16: Autocorrelation Test

Model	Durbin Watson
1	2.087

The distribution of the residuals was also shown using a graphic approach of evaluating residual independence.

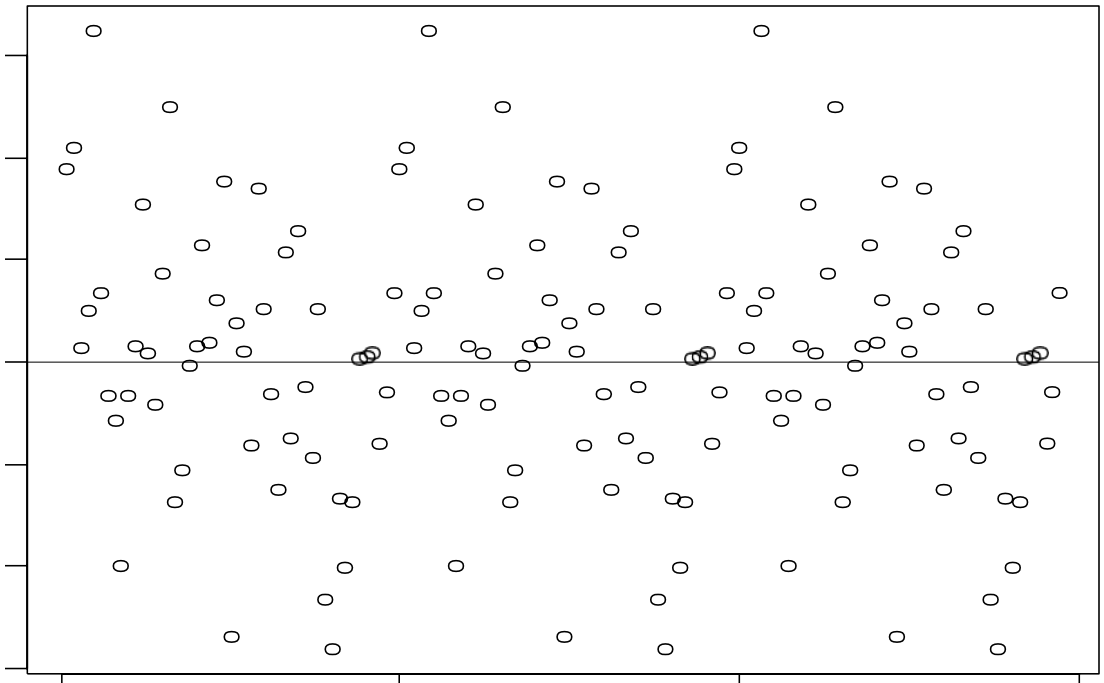

Figure 6: Distribution of Residuals

Figure 3 shows how the residuals, despite being on both the positive and negative ends, were distributed and bouncing around zero with no apparent pattern of distribution (Verbeek, 2012). This proved that the residuals had no positive or negative autocorrelation and were independent.

4.5.3 Multi-collinearity Test

There was a likelihood of multicollinearity given the characteristics of the independent variables under examination. When there is a significant correlation between two or more predictor (independent) variables in a multiple regression, Lynch (2003) highlighted multicollinearity as a concern. Utilizing the tolerance values and variance inflation factors, the multicollinearity issue was evaluated before to completing the multivariate analysis (VIF).

When the VIF is more than five (tolerance 0.20), according to the theories of Hair, Ringle, and Sarstedt (2013) and Mardikyan and Etin (2008), the regression coefficients are thought to be inaccurately assessed. The degree of tolerance and variance inflation factors (VIFs) were used to determine if multicollinearity existed among the independent variables. Table 15 displays the outcomes of the multicollinearity test using the level of

tolerance values and VIFs. According to the findings in Table 15, the independent variables' VIFs ranged from 1.294 to 2.049. The tolerance values, according to the results, varied from 0.559 to 0.732. Therefore, multicollinearity was not a significant issue when extrapolating the results of the multivariate study, as evidenced by the VIFs and tolerance values.

Table 17: Collinearity Statistics

	Tolerance	VIF
Performance of Road agency	.559	1.801
Regulatory Framework	.576	2.042
Road asset maintenance	.732	1.294
Budgetary allocation	.657	1.603

VIF was calculated utilizing SPSS in order to perform a multi-collinearity test. Tolerance is the portion of an independent variable's volatility that cannot be accounted for by another independent variable. VIF quantifies the degree to which multicollinearity inflates the variance of the regression coefficient, which in turn inflates the standard errors in an unreliable manner. Usually, 0.10 is used as the minimal tolerance cut off value. The results of the tests are shown in Table 15, which excludes multi-collinearity. Value shouldn't be less than 0.10 and VIF shouldn't be greater than 10 when multicollinearity tolerance isn't an issue (Newbert, 2008). In the absence of any correlation between two variables, all VIFs were 1. There is collinearity with that variable if the VIF for that variable is less than 5.

4.5.4 Homoscedasticity of the Residuals of Dependent Variable

The residuals of institutional sustainability were evaluated for homoscedasticity. The error term's variance is assumed to be constant (homoscedastic) by OLS (Greene, 2003). The error terms are said to as heteroscedastic if their variance is not constant (has a different variance). The test statistics and confidence intervals are biased when this

assumption is violated (Greene, 2003): The idea that the error variances are all equal or homoscedastic was evaluated using the Levene statistic.

Table 18: Test of Homogeneity of Variances

Levene Statistic	df1	df2	P-value
3.267	15	122	.000

We cannot entirely exclude the possibility that the variance of the dependent variable was homogenous since the likelihood linked with the Levene Statistic is 0.000, which is less than the 0.05 level of significance. The null hypothesis that there was no heteroscedasticity was further investigated using the Breusch-Pagan and Koenker test statistics. You should reject the null hypothesis and assert that the independent variable's variance was homoscedastic if the P-value is less than 0.05. 2003 (Greene). The Breusch-Pagan test employs a sizable sample and assumes that the residuals are normally distributed.

Table 19: Breusch-Pagan and Koenker Test for Heteroskedasticity

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.210	1	10.210	29.924	.000[b]
	Residual	40.945	120	.341		
	Total	51.156	121			

a. Dependent Variable: Performance of Road Agency
b. Predictors: (Constant), Road Asset Maintenance

Breusch-Pagan and Koenker test statistics for Table 17 are 10.210, with a P-value of 0.000. Due to the homogeneous/homoscedastic variance of the dependent variable and the likelihood of the Breusch-Pagan and Koenker test being 0.000, which is less than the 0.05 level of significance, we conclude that the null hypothesis cannot be accepted.

4.5.5 Linearity Test Result

Linearity was assessed through Pearson correlation coefficient which was reported in all cases (as R) alongside the associated R – Squared and adjusted R-Squared. The linearity test was done to ascertain whether the data distribution for different variables was linear to the dependent variable. This was to determine the suitability of using the linear regression test. From the results, all the factors were significant (that is $p<0.05$) thus no linearity relationship was reported.

4.6 Factor analysis

Factor analysis is a technique that involves conserving as much information as feasible while condensing the volume of data present in diverse variables into a smaller number of dimensions (factors) (Baets, 2002). The convergent validity of the hypothetical constructs was evaluated using factor analysis. According to Mabert et al. (2003), matrix coefficients below 0.5 should be discarded since they are insignificant, whereas factor loading values (total variance) greater than 0.5 should be recovered. It is done to reduce the data into a useful and manageable set of criteria (Sekeran, 2006). By identifying the elements, it is also possible to study the structure of the interrelationships (correlations).

4.6.1 Road Asset Maintenance

A factor analysis was performed on the road asset maintenance related statements. The research employed factor analysis to investigate the presence of associated variables and determine whether redundant data could be eliminated. The analysis facilitates the examination of the structure of interrelationships by identifying and defining various components. Using factor analysis, the dimensions of the statements within the Statistical Package for the Social Sciences (SPSS) software were reduced. The techniques of principal axis factoring and varimax rotation were utilised for this purpose. The objective was to reduce the quantity of data and identify the latent variable items that best explain the concept of road asset maintenance.

In this procedure, coefficients with absolute values of less than 0.3 were eliminated, resulting in the inclusion of only those variables with a high degree of significance and influence. According to Omondi (2022), coefficients with absolute values below 0.3 should be suppressed during component analysis. Coefficients with absolute values less than 0.3 indicate a weak relationship between the variable and the factor. In factor analysis, the goal is to identify variables that are strongly associated with the underlying factors. By eliminating weak coefficients, researchers focus on variables that have a more substantial impact on the factor structure (Fabrigar et al., 2013). Additonally coefficients with absolute values less than 0.3 may be less interpretable and less meaningful in the context of the factor analysis. Including variables with weak coefficients can complicate the interpretation of the factor structure and make it more challenging to identify clear patterns or themes (Fabrigar et al., 2013). This method ensures that only items with substantive relevance and impact are included in variable creation. The procedure for isolating the components complied with the Kaiser Criterion, which regards an eigenvalue of 1 or greater to be indicative of a distinct factor. In the context of road asset maintenance, all Ten (10) statements displayed factor analysis coefficients with absolute values greater than 0.30. Therefore, these statements were all incorporated into the construction of the composite variable representing road asset maintenance. According to Table 18, the Total Variance analysis reveals that the Ten (10) statements related to road asset maintenance can be effectively classified into a single factor. According to Hair et al. (2012), the aggregate variation accounted for by all components in social science research should fall between 45 and 60 percent. This study utilised a criterion of at least 45 percent of total variation being explained by the retrieved component. Appendix IV displays the factor loading of the retrieved items for road asset maintenance. Table 18 displays the components (items) and their proportional contribution to the total variance.

Table 20: Total Variance Explained for Road Asset Maintenance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.593	45.927	45.927	4.593	45.927	45.927
2	1.177	11.766	57.692			
3	.966	9.664	67.356			
4	.824	8.237	75.593			
5	.632	6.324	81.917			
6	.486	4.860	86.777			
7	.419	4.188	90.965			
8	.380	3.798	94.763			
9	.278	2.777	97.541			
10	.246	2.459	100.000			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization

4.6.2 Budgetary Allocation

A factor analysis was performed on the budgetary allocation related statements. The research employed factor analysis to investigate the presence of associated variables and determine whether redundant data could be eliminated. The analysis facilitates the examination of the structure of interrelationships by identifying and defining various components. Using factor analysis, the dimensions of the statements within the Statistical Package for the Social Sciences (SPSS) software were reduced. The techniques of principal axis factoring and varimax rotation were utilised for this purpose. The objective was to reduce the quantity of data and identify the latent variable items that best explain the concept of budgetary allocation.

In this procedure, coefficients with absolute values of less than 0.3 were eliminated, resulting in the inclusion of only those variables with a high degree of significance and influence. Coefficients with absolute values below 0.3 should be suppressed during component analysis. This method ensures that only items with substantive relevance and impact are included in variable creation. The procedure for isolating the components complied with the Kaiser Criterion, which regards an eigenvalue of 1 or greater to be indicative of a distinct factor. In the context of budgetary allocation, all Ten (10)

statements displayed factor analysis coefficients with absolute values greater than 0.30. Therefore, these statements were all incorporated into the construction of the composite variable representing budgetary allocation. According to Table 19, the Total Variance analysis reveals that the Ten (10) statements related budgetary allocation can be effectively classified into a single factor. According to Hair et al. (2012), the aggregate variation accounted for by all components in social science research should fall between 45 and 60 percent. This study utilised a criterion of at least 45 percent of total variation being explained by the retrieved component. Appendix IV displays the factor loading of the retrieved items for budgetary allocation. Table 19 displays the components (items) and their proportional contribution to the total variance.

Table 21: Total Variance Explained for Budgetary Allocation

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.764	47.643	47.643	4.764	47.643	47.643
2	1.279	12.791	60.434			
3	.857	8.571	69.005			
4	.674	6.739	75.744			
5	.517	5.170	80.914			
6	.474	4.740	85.655			
7	.451	4.509	90.164			
8	.387	3.869	94.033			
9	.326	3.257	97.290			
10	.271	2.710	100.000			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

4.6.3 Regulatory Framework

A factor analysis was performed on the regulatory framework related statements. The research employed factor analysis to investigate the presence of associated variables and determine whether redundant data could be eliminated. The analysis facilitates the examination of the structure of interrelationships by identifying and defining various

components. Using factor analysis, the dimensions of the statements within the Statistical Package for the Social Sciences (SPSS) software were reduced. The techniques of principal axis factoring and varimax rotation were utilised for this purpose. The objective was to reduce the quantity of data and identify the latent variable items that best explain the concept of regulatory framework.

In this procedure, coefficients with absolute values of less than 0.3 were eliminated, resulting in the inclusion of only those variables with a high degree of significance and influence. According to Omondi (2022), coefficients with absolute values below 0.3 should be suppressed during component analysis. This method ensures that only items with substantive relevance and impact are included in variable creation. The procedure for isolating the components complied with the Kaiser Criterion, which regards an eigenvalue of 1 or greater to be indicative of a distinct factor. In the context of regulatory framework, Seven (7) statements out of Eight (8) displayed factor analysis coefficients with absolute values greater than 0.30. Therefore, these Seven (7) statements were all incorporated into the construction of the composite variable representing regulatory framework while one (1) statement RF2 which had absolute values less than 0.30 was removed. According to Table 20, the Total Variance analysis reveals that the Seven (7) statements related budgetary allocation can be effectively classified into a single factor. According to Hair et al. (2012), the aggregate variation accounted for by all components in social science research should fall between 45 and 60 percent. This study utilised a criterion of at least 45 percent of total variation being explained by the retrieved component. Appendix IV displays the factor loading of the retrieved items for regulatory framework. Table 20 displays the components (items) and their proportional contribution to the total variance.

Table 22: Total Variance Explained for Regulatory Framework

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.501	50.008	50.008	3.501	50.008	50.008

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
2	1.077	15.390	65.397			
3	.679	9.705	75.102			
4	.534	7.623	82.726			
5	.457	6.528	89.254			
6	.405	5.787	95.041			
7	.347	4.959	100.000			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

4.6.4 Performance of Road Agency

A factor analysis was performed on the Performance of Road Agency related statements. The research employed factor analysis to investigate the presence of associated variables and determine whether redundant data could be eliminated. The analysis facilitates the examination of the structure of interrelationships by identifying and defining various components. Using factor analysis, the dimensions of the statements within the Statistical Package for the Social Sciences (SPSS) software were reduced. The techniques of principal axis factoring and varimax rotation were utilised for this purpose. The objective was to reduce the quantity of data and identify the latent variable items that best explain the concept of Performance of Road Agency.

In this procedure, coefficients with absolute values of less than 0.3 were eliminated, resulting in the inclusion of only those variables with a high degree of significance and influence. According to Omondi (2022), coefficients with absolute values below 0.3 should be suppressed during component analysis. This method ensures that only items with substantive relevance and impact are included in variable creation. The procedure for isolating the components complied with the Kaiser Criterion, which regards an eigenvalue of 1 or greater to be indicative of a distinct factor. In the context of Performance of Road Agency, all Ten (10) statements displayed factor analysis coefficients with absolute values greater than 0.30. Therefore, these statements were all

incorporated into the construction of the composite variable representing Performance of Road Agency. According to Table 21, the Total Variance analysis reveals that the Ten (10) statements related budgetary allocation can be effectively classified into a single factor. According to Hair et al. (2012), the aggregate variation accounted for by all components in social science research should fall between 45 and 60 percent. This study utilised a criterion of at least 45 percent of total variation being explained by the retrieved component. Appendix IV displays the factor loading of the retrieved items for Performance of Road Agency. Table 21 displays the components (items) and their proportional contribution to the total variance.

Table 23: Total Variance Explained for Performance of Road Agency

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.444	54.439	54.439	5.444	54.439	54.439
2	1.132	11.320	65.759			
3	.669	6.694	72.452			
4	.601	6.014	78.466			
5	.543	5.429	83.895			
6	.435	4.352	88.247			
7	.408	4.084	92.331			
8	.318	3.179	95.511			
9	.259	2.588	98.099			
10	.190	1.901	100.000			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

4.7 Descriptive Statistics

Descriptive statistics were utilized to correctly portray the distribution of scores or measures in the research using indices or statistics. The type of statistics or index used will depend on the study's variables and the scope of the measurements. For road asset maintenance, this section provides a descriptive analysis.

4.7.1 Descriptive Statistics for road asset maintenance

The road asset maintenance variable was assessed using a five-point Likert scale, with 1 denoting the lowest score - “Strongly Disagree” - and 5 denoting the highest – “Strongly Agree”. A detailed assessment of the data confirmed that the respondents recorded a high rating on the various statements used to gauge road asset maintenance. The results are shown in Table 22.

Table 24: Descriptive Results _ Road asset maintenance

	Statement	**D**	**N**	**A**	**Mean**	**STD**
RAM1	This organisation rigorous track roads defect across the country for inclusion in maintenance planning.	10 (8.7%)	5 (4.3%)	100 (87.0 %)	4.15	0.82
RAM2	This organisation adheres to a rigorous procedure for maintenance that corresponds to speed of road defects.	7 (6.1%)	10 (8.7%)	98 (85.2 %)	4.02	0.797
RAM3	The organisation has established standards for road inspection planning and plans compliance.	9 (7.8%)	11 (9.6%)	95 (82.6 %)	4.42	0.654
RAM4	This organisation ensures engineering fundamentals are compliance with inspection plan.	7 (6.1%)	10 (8.7%)	98 (85.2 %)	4.32	0.659
RAM5	The transport network is given worth through the assets of each road, demonstrating the	10 (8.7%)	8 (7.0%)	97 (84.3 %)	4.2	0.842

	Statement	D	N	A	Mean	STD
	significance of efficient movement of goods and people.					
RAM6	The capital worth of every road asset is ascertained by assessing the cost of restoring the asset to its original state or the cost of replacing it with an equivalent.	5 (4.3%)	7 (6.1%)	103 (89.6%)	4.02	0.909
RAM7	This body's method of road maintenance involves furnishing the necessary means to make the judgement needed to satisfy the public's requirements in a more systematized and adjustable manner.	12 (10.4%)	10 (8.7%)	93 (80.9%)	4.02	0.904
RAM8	During the road maintenance damaging effects of construction (noise, dust and vibration) are maintained to minimal or acceptable level.	15 (13.1%)	12 (10.4%)	88 (76.5%)	3.76	0.834
RAM9	There is elaborate measures in place to ensure that road assets maintenance has least destruction on ecosystem and prioritization of preservation of ecological features.	17 (14.8%)	14 (12.2%)	84 (73.0%)	4.02	0.760
RAM10	The road asset preservation system tracks the functioning of the road asset versus the predetermined desired outcomes	18 (15.7%)	15 (13.0%)	82 (71.3%)	4.14	0.884

Statement	D	N	A	Mean	STD
or performance objectives (ARICS).					

The results presented in Table 22, show that 100 respondents representing 87.0% of the respondents agreed that the organisation rigorously track roads defect across the country for inclusion in maintenance planning, 5 respondents representing 4.3% were neutral while 10 respondents representing 8.7% of the respondents disagreed as shown by a mean score of Mean = 4.15 and SD = 0.82, 98 respondents representing 85.2% of the respondents agreed that organisation adheres to a rigorous procedure for maintenance that corresponds to speed of road defects, 10 respondents representing 8.7% of the respondents did not give any opinion while 7 respondents representing 6.1% of the respondents disagreed as shown by a mean of 4.02 and SD of 0.797, 95 respondents representing 82.6% of the respondents agreed that the organisation has established standards for road inspection planning and plans compliance, 9 respondents representing 7.8% disagreed while 11 respondents representing 9.6% of the participants did not give their opinion (Mean = 4.42; SD = 0.654), 98 respondents representing 85.2% of the participants agreed that the organisation ensures engineering fundamentals are compliance with inspection plan, 10 respondents representing 8.7% of the participants did not any opinion while 7 respondents representing 6.1% of the participants disagreed (Mean = 4.32; SD = 0.659).

Regarding the statement that the transport network is given worth through the assets of each road, demonstrating the significance of efficient movement of goods and people, 97 of the respondents representing 84.3% agreed, 8 respondents representing 7.0% were neutral and10 respondents representing 8.7% of the respondents disagreed with the sentiment (Mean = 4.2; SD = 0.842), 103 respondents representing 89.6% of the respondents agreed that the capital worth of every road asset is ascertained by assessing the cost of restoring the asset to its original state or the cost of replacing it with an equivalent, 7 respondents representing 6.1% of the respondents were neutral and 5

respondents representing 4.3% of the respondents disagreed with the sentiment (Mean = 4.02; SD =0.909), 93 respondents representing 80.9% agreed that this body's method of road maintenance involves furnishing the necessary means to make the judgement needed to satisfy the public's requirements in a more systematized and adjustable manner, 10 respondents representing 8.7% of the respondents were neutral and 5 respondents representing 4.3% of the respondents disagreed were neutral while 12 respondents representing 10.4% of the respondents disagreed (Mean = 4.02; SD = 0.904), 88 respondents representing 76.5% of the respondents agreed that during the road maintenance damaging effects of construction (noise, dust and vibration) are maintained to minimal or acceptable level, 12 respondents representing 10.4% remained neutral while 15 respondents representing 13.1% of the participants disagreed with the sentiment (Mean = 3.76; SD = 0.834).

Also, 84 respondents representing 73.0% of the participants agreed that there is elaborate measures in place to ensure that road assets maintenance has least destruction on ecosystem and prioritization of preservation of ecological features, 14 respondents representing 12.2% of the participants were neutral while 17 respondents representing 14.8% of the participants disagreed (4.02; SD = 0.760). Lastly, 82 respondents representing 71.3% of the participants agreed that the road asset preservation system tracks the functioning of the road asset versus the predetermined desired outcomes or performance objectives (ARICS), 18 respondents representing 15.7% of the participants disagreed while 15 respondents representing 13.0% of the participants were neutral (Mean = 4.14: SD = 0.884).

4.7.2 Descriptive Statistics for Budgetary Allocation

The Budgetary Allocation aspect of the evaluation was evaluated using a five-point Likert scale, with 1 denoting the least favourable rating—Strongly Disagree—and 5 denoting the most favourable—Strongly Agree. The respondents scored highly on the numerous statements used to measure financial resource diversity, according to a thorough analysis of the data. Table 23 presents the findings.

Table 25: Descriptive Statistics for Budgetary Allocation

	Fundraising strategies	D	N	A	Mean	STD
BA1	There is in place appropriate framework for effective budgeting and budget planning.	20 (17.4%)	19 (16.5%)	76 (66.1%)	4.25	0.921
BA2	Key planning policy documents are promptly prepared and timely approved as per the budget cycle.	23 (20.0%)	18 (15.7%)	74 (64.3%)	4.39	0.698
BA3	Funds disbursements are based on approved road assets programs and projects as adequately provided in the budget statement.	15 (13.0%)	13 (11.3%)	87 (75.7%)	4.07	1.03
BA4	Funds disbursement to approved road assets programs and projects are promptly/timely and adequately done.	25 (21.7%)	28 (24.3%)	62 (54.0%)	3.59	1.043
BA5	The agency has an effective framework for implementing budget and other funds for road asset maintenance.	27 (23.5%)	30 (26.1%)	58 (50.4%)	4.39	0.623
BA6	The framework for implementing budget and other funds for road asset maintenance is effectively adhered to and consistently applied.	15 (13.0%)	8 (7.0%)	92 (80.0%)	4.07	0.825
BA7	The agency has an effective framework for monitoring and evaluating performance of budget and other funds for road asset maintenance.	26 (22.6%)	21 (18.3%)	68 (59.1%)	4.28	0.753
BA8	The framework for monitoring and	28	23	64	4.15	0.85

	Fundraising strategies	D	N	A	Mean	STD
	evaluating performance of budget and other funds for road asset maintenance is effectively adhered to and consistently applied by competent personnel.	(24.3%)	(20.0%)	(55.7%)		
BA9	This organization makes timely financial reports submission that enhances value for money assessment.	29 (25.2%)	25 (21.7%)	61 (53.1%)	4.39	0.65
BA 10	The internal audit committee strengthens internal controls in enhancing value for resource committed in road assets maintenance.	33 (28.7%)	27 (23.5%)	55 (47.8%)	4.3	0.81

The results presented in Table 23, show that 76 respondents representing 66.1% of the participants agreed that there is an appropriate framework in place for effective budgeting and budget planning, 19 respondents representing 16.5% of the participants were neutral while 20 respondents representing 17.4% of the participants agreed disagreed (Mean = 4.25; SD = 0.921), 23 respondents representing 20.0% of the participants disagreed that the key planning policy documents are promptly prepared and timely approved as per the budget cycle, 18 respondents representing 15.7% of the participants did not give any opinion while 74 respondents representing 64.3% of the participants disagreed with the sentiment (Mean = 4.39; SD = 0.698), 15 respondents representing 13.0% of the participants disagreed that the funds disbursements are based on approved road assets programs and projects as adequately provided in the budget statement, 13 respondents representing 11.3% of the participants did not give any opinion while 87 respondents representing 75.7% of the participants agreed with the sentiment (Mean = 4.07; SD = 1.03).

Additionally 25 respondents representing 21.7% of the participants disagreed that the funds disbursement to approved road assets programs and projects are promptly/timely and adequately done, 28 respondents representing 24.3% of the participants were neutral while 62 respondents representing 54.0% of the participants agreed (Mean = 3.59; SD = 1.043), 27 respondents representing 23.5% of the participants disagreed that the agency has an effective framework for implementing budget and other funds for road asset maintenance, 30 respondents representing 26.1% of the participants were neutral while 58 respondents representing 50.4% of the participants agreed (Mean = 4.39; SD = 0.623), 15 respondents representing 13.0% of the participants disagreed that the framework for implementing budget and other funds for road asset maintenance is effectively adhered to and consistently applied, 8 respondents representing 7.0% of the participants were neutral while 92 respondents representing 80.0% of the participants agreed (Mean = 4.07; SD = 0.825).

Also 68 respondents representing 59.1% of the participants agreed the agency has an effective framework for monitoring and evaluating performance of budget and other funds for road asset maintenance, 21 respondents representing 18.3% of the participants were neutral while 26 respondents representing 22.6% of the participants disagreed (Mean = 4.28: SD = 0.753), 28 respondents representing 24.3% of the participants disagreed that the framework for monitoring and evaluating performance of budget and other funds for road asset maintenance is effectively adhered to and consistently applied by competent personnel, 64 respondents representing 55.7% of the participants agreed while 23 respondents representing 20.0% of the participants did not give any opinion ((Mean = 4.15; SD = 0.85), further, 61 respondents representing 53.1% of the participants agreed that the organization makes timely financial reports submission that enhances value for money assessment, 25 respondents representing 21.7% of the participants were neutral while 29 respondents representing 25.2% of the participants disagreed (Mean = 4.39; SD = 0.65), and lastly, 5 respondents representing 47.8% of the participants agrees that the internal audit committee strengthens internal controls in enhancing value for resource committed in road assets maintenance, 27 respondents representing 23.5% of the participants did not give any opinion while 33 respondents representing 28.7% of the participants disagreed with the sentiment (Mean = 4.3; SD = 0.81).

4.7.3 Descriptive Statistics for Regulatory Framework

The assessment's regulatory framework variable was assessed using a five-point Likert scale, with 1 denoting the least favourable rating—Strongly Disagree—and 5 denoting the most favourable — Strongly Agree. A detailed assessment of the data confirmed that the respondents recorded a high rating on the various statements used to gauge strategic partnership. Table 24 presents:

Table 26: Descriptive Statistics for Regulatory Framework

		D	N	A	Mean	STD
RF1	Road agency has in place a structure regulatory framework for effective oversight and control of quality in road asset maintenance.	5 (4.4%)	6 (5.2%)	104 (90.4%)	4.3	0.659
RF2	The existing regulatory framework does not provide for overlaps in oversight and control of quality in road asset maintenance.	9 (7.8%)	15 (13.1%)	91 (79.1%)	3.2	0.996
RF3	The agency has legal framework for transparency and accountability of road assets maintenance.	11 (9.6%)	14 (12.2%)	90 (78.2%)	4.2	0.869
RF4	The existing laws on transparency and accountability promotes consistency in tracking and recording the status of road assets.	16 (13.9%)	24 (20.9%)	75 (65.2%)	4.1	0.801
RF5	The standardization of road maintenance methodology promotes a business-like strategy for road assets infrastructure.	8 (7.0%)	19 (16.5%)	88 (76.5%)	4.1	0.793

RF6	Standards of road maintenance methodology(ies) encourages best practices in road assets maintenance.	3 (2.6%)	11 (9.6%)	101 (87.8%)	4.3	0.728
RF7	The agency has in place robust and effective policies on administrative coordination and control of road assets operations and administration.	10 (8.7%)	10 (8.7%)	95 (82.6%)	4.2	0.768
RF8	Policies on administrative coordination and control furnishes a consolidated solution for handling administrative, operations, environmental or social concerns in the light of prevailing circumstances.	3 (2.6%)	6 (5.2%)	106 92.2%)	4.1	0.645

The results presented in Table 24, show that 104 respondents representing 90.4% of the participants agreed that road agency has in place a structure regulatory framework for effective oversight and control of quality in road asset maintenance 5 respondents representing 4.4% of the participants disagreed, 6 respondents representing 5.2% of the participants were neutral (Mean = 4.3; SD = 0.659), 90(78.2%) agreed that the agency has legal framework for transparency and accountability of road assets maintenance, 14 respondents representing 12.2% of the participants were neutral, 11 respondents representing 9.6% of the participants disagreed (Mean = 4.2; SD = 0.869), 75 respondents representing 65.2% of the participants agreed that the existing laws on transparency and accountability promotes consistency in tracking and recording the status of road assets, 24 respondents representing 20.9% of the participants were neutral, and 16 respondents representing 13.9% of the participants disagreed (Mean = 4.1; SD = 0.801), 88 respondents representing 76.5% of the participants agreed that the standardization of road maintenance methodology promotes a business-like strategy for road assets infrastructure. Additionally, 19 respondents representing 16.5% of the participants were neutral and 8 respondents representing 7.0% of the participants disagreed with the sentiments (Mean = 4.1; SD = 0.793), 101 respondents representing 87.8% of the

participants agreed that Standards of road maintenance methodology(ies) encourages best practices in road assets maintenance, 11 respondents representing 9.6% of the participants were neutral while 3 respondents representing 2.6% of the participants disagreed (Mean = 4.3; SD = 0.728).

Also, the result showed that 95 respondents representing 75.2% of the participants agreed that The agency has in place robust and effective policies on administrative coordination and control of road assets operations and administration, 10 respondents representing 8.7% of the participants were neutral while 10 respondents representing 8.7% of the participants disagreed (Mean = 4.2; SD = 0.768). Lastly, 106 respondents representing 92.2% of the participants agreed that Policies on administrative coordination and control furnishes a consolidated solution for handling administrative, operations, environmental or social concerns in the light of prevailing circumstances, 6 respondents representing 5.2% of the participants were neutral while 3 respondents representing 2.6% respondents representing disagreed (Mean = 4.1; SD = 0.645).

4.7.4 Descriptive Statistics for Performance of Road Agency

A five-point Likert scale was used to evaluate the Performance of Road Agency variable from the evaluation, with 1 signifying the lowest score, Strongly Disagree, and 5 denoting the highest score, Strongly Agree. An in-depth review of the data revealed that the respondents scored highly on the many statements used to gauge institutional sustainability as reflected in Table 25.

Table 27: Descriptive Statistics for Performance of Road Agency

		D	N	A	Mean	Std dev
PRA 1	The agency has been achieving its set annual road maintenance targets.	8 (6.9%)	7 (6.1%)	100 (87.0%)	3.8	0.572
PRA 2	Over the past five years, the agency has been registering an increase in the length of road assets maintained	9 (7.8%)	6 (5.2%)	100 (87.0%)	4.02	0.704

		D	N	A	Mean	Std dev
	or kilometres done.					
PRA 3	The agency has been achieving excellence (Above 95%) absorption rate of annual budget on road assets maintenance.	8 (7.0%)	9 (7.8%)	98 (85.2%)	3.75	0.888
PRA 4	Over the past five years, the agency has maintained a steady increase in budget absorption rate for road assets.	14 (12.2%)	6 (5.2%)	95 (82.6%)	3.87	0.813
PRA 5	The agency has been registering effectiveness and efficiency in resource utilization, and thus reduction in costs of operations.	15 (13.0%)	8 (7.0%)	92 (80.0%)	3.57	0.852
PRA 6	The organization has improved achieving value for money in road asset investments.	7 (6.0%)	18 (15.7)	90 (78.3%)	3.86	0.778
PRA 7	The agency return on investment has been progressing in the last five years.	8 (7.0%)	12 (10.4%)	95 (82.6%)	3.8	0.749
PRA 8	The customer satisfaction index has been improving.	9 (7.8%)	13 (11.3%)	93 (80.9%)	3.9	0.673
PRA 9	The cost incurred in completing business processes has been reduced considerably.	9 (7.8%)	15 (13.0%)	91 (79.1%)	3.49	0.867
PRA 10	Service delivery to the stakeholders has increased in the last five years.	9 (7.8%)	11 (9.6%)	95 (82.6%)	4.14	0.696

The results presented in Table 25, show that 5 respondents representing 6.9% of the participants disagreed that the agency has been achieving its set annual road maintenance

targets., 7 respondents representing 6.1% of the participants were neutral while 100 respondents representing 87.0% of the participants agreed with the sentiment (Mean = 3.8; SD = 0.572), 9 respondents representing 7.8% of the participants disagreed that over the past five years, the agency has been registering an increase in the length of road assets maintained or kilometres done, 6 respondents representing 5.2% of the participants were neutral while 100 respondents representing 87.0% of the participants agreed (Mean = 3.75; SD = 0.704), 98 respondents representing 85.2% of the participants agreed that the agency has been achieving excellence (Above 95%) absorption rate of annual budget on road assets maintenance, 9 respondents representing 7.8% of the participants were neutral while 8 respondents representing 7.0% of the participants disagreed (Mean = 3.75; SD = 0.888), 95 respondents representing 82.6% of the participants agreed that over the past five years, the agency has maintained a steady increase in budget absorption rate for road assets, 14 respondents representing 12.2% of the participants disagreed while a few 6 respondents representing 5.2% of the participants were neutral (Mean = 3.87; SD = 0.813).

Also, the results showed that 92 respondents representing 80.0% of the participants agreed that the agency has been registering effectiveness and efficiency in resource utilization, and thus reduction in costs of operations 8 respondents representing 7.0 of the participants were neutral, 15 respondents representing 13.0% of the participants disagreed (Mean = 3.57; SD = 0.852), 90 respondents representing 78.3% of the participants agreed that the organization has improved achieving value for money in road asset investments, 18 respondents representing 15.7% of the participants were neutral while 7 respondents representing 6.0% of the participants disagreed (Mean = 3.86; SD = 0.778). Additionally 95 respondents representing 82.6% of the participants agreed that the agency return on investment has been progressing in the last five years, 12 respondents representing 10.4% of the participants were neutral while 8 respondents representing 7.0% of the participants disagreed (Mean = 3.8; SD = 0.749). Further 93 respondents representing 80.9% of the participants agreed that the customer satisfaction index has been improving, 13 respondents representing 11.3% of the participants were neutral while 9 respondents representing 7.8% of the participants disagreed (Mean = 3.9; SD = 0.673). Also 91 respondents representing 79.1% of the participants agreed that the cost incurred in

completing business processes has been reduced considerably, 15 respondents representing 13.0% of the participants were neutral while 9 respondents representing 7.8% of the participants disagreed (Mean = 3.49; SD = 0.867). Lastly, 95 respondents representing 82.6% of the participants agreed that service delivery to the stakeholders has increased in the last five years, 11 respondents representing 9.6% of the participants were neutral while 9 respondents representing 7.8% of the participants disagreed with the sentiment (Mean = 4.14; SD = 0.696).

4.8 Correlation Analysis

Correlation analysis was conducted in the study to establish the nature and strength of relations between the variables. The linkage between the factors of road asset maintenance, budgetary allocation, regulatory framework, and performance of road agency were examined using correlation analysis. The mean score for each independent variable was calculated using SPSS, and the Pearson's correlation was found. The correlations were conducted at P-value of 0.05 with one asterisk (*) or 0.01 with two asterisks (**). The significance level indicates whether or not the correlation coefficient differs substantially from zero. When the P-value is 0.05 or below, there is statistically proven evidence of an association. If the P-value is greater than 0.05 or the significant threshold, correlation is not statistically significant (Statistics Solution, 2018). In Table 26, the correlation findings are displayed.

Table 28: Correlation Analysis

Variable		Y	X_1	X_2	X_3
Y	Correlation Coefficient	1.000			
	Sig. (2-tailed)	.			
X_1	Correlation Coefficient	.447**	1.000		
	Sig. (2-tailed)	.000	.		
X_2	Correlation Coefficient	.546**	.536**	1.000	
	Sig. (2-tailed)	.000	.000	.	
X_3	Correlation Coefficient	.594**	.476**	.537**	1.000

	Sig. (2-tailed)	.000	.000	.000	.

Key: X_1 = Road Asset Maintenance; X_2 = Budgetary Allocation; X_3 = Regulatory Framework; and Y = Performance of Road Agency.

The result of correlation analysis shown on Table 26 revealed there existed a moderate positive and significant correlation (r=0.447, p<0.05) between road asset maintenance and performance of road agency, the correlation results also showed that there is moderate positive and significant correlation (r=0.546, p<0.05) between Budgetary Allocation and performance of road agency. Additionally the correlation results also showed that there is moderate positive and significant correlation (r=0.594, p<0.05) between Regulatory Framework and performance of road agency.

4.9 Specific Objectives Findings

This section presents the result of each research objective based on analysed data. The results are based on regression analysis in establishing a link between road asset maintenance, budgetary allocation, regulatory framework, and performance of road agency. Hypotheses were examined using regression models namely linear, multiple, hierarchical, and stepwise regressions. Direct individual effects, combined effects, moderating effect, intervening effect, and moderation-mediation effect were analysed. Hypothesis tests were done based on parametric test using student's distribution statistics and z-scores at 95% level of significance.

4.9.1 Road assets maintenance and the performance of road agencies in Kenya

Objective one examined the effect of road assets maintenance on the performance of road agencies in Kenya. Null hypothesis 1, which stated there was no significant relationship between the road assets maintenance on the performance of road agencies in Kenya, was examined and tested using multivariate regression model. The outcomes of the regression model summary are shown in Table 27.

Table 29: Road assets maintenance on the performance of road agencies in Kenya

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.447[a]	.200	.193	.584	2.086

a. Predictors: (Constant), Road Asset Maintenance

b. Dependent Variable: Performance of Road Agency

The result of summary of model revealed: R value of 0.447, R-Square 0.200; and Adjusted R-Square 0.193. The coefficient of determination (R-Square) value indicated that 19% of performance of road agencies can be explained (accounted for) by road assets maintenance.

The ANOVA for Road Asset Maintenance is displayed in Table 28.

Table 30: ANOVA (F-Test) Analysis for Road assets maintenance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.210	1	10.210	29.924	.000[b]
Residual	40.945	120	.341		
Total	51.156	121			

a. Dependent Variable: Performance of Road Agency
b. Predictors: (Constant), Road Asset Maintenance

ANOVA results revealed F-Calculated (1, 121) = 29.924 which is greater than F-Critical (1, 121) = 2.78 at 95% confidence level. The findings further confirm that the regression model of performance of road agency is significant and supported by F = 29.924, p=0.000<0.05.

Result of regression coefficients beta values are shown in Table 29.

Table 31: Relationship between Road asset maintenance performance of road agency

Model	Unstandardised Coefficients		Standardized Coefficients	t	P-value
	B	Std. Error	Beta		
(Constant)	1.918	.362		5.297	.000
Road Asset Maintenance	.468	.086	.447	5.470	.000

a. Dependent Variable: Performance of Road Agency

b. Predictors: (Constant), Road Asset Maintenance

Result from Table 29 indicates that road assets maintenance has an unstandardized beta coefficient of 0.468, t-statistic value t=5.470 and probability value of p<0.005. This finding implies that road asset maintenance has a partial contribution of 0.468 on performance of road agencies. The contribution is significant as the probability value is less than 0.05. The summary of model for estimating performance of road agencies based on road asset maintenance is shown below.

(i)…….Performance of road agencies = 1.918 + 0.468 (Road asset maintenance)

As a result, the null hypothesis (*Ho_1*), which posited there is no significant relationship between road assets maintenance and performance of road agencies in Kenya was rejected. Consequently, the researcher concluded that there is indeed a significant effect of Road asset maintenance on the Performance of road agencies in Kenya.

4.9.2 Budgetary allocation, Road assets maintenance and the performance of road agencies in Kenya

The second objective of the study was to establish the mediating effect of budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya. The objective's null hypothesis stated that there is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya was tested using Baron and Kenny's (1986) mediation analysis based on a 4-stepwise methodology effect analysis (direct, indirect, total effect with mediator, total effect without mediator).

The Four Step Mediation Methodology (PROCESS Model 4) was adopted to establish the intervening effect as proposed by Baron and Kenny (1986) and Preacher and Hayes (2004). The direct and indirect effects of rad asset maintenance were derived for two models, one estimating the mediator budgetary allocation from road assets maintenance and the second estimating the road agencies performance from both road assets maintenance and budgetary allocation as shown in equations 3 and 4 respectively.

According to Baron and Kenny (1986) a Three Steps regression analysis establish that zero-order relationship existed among the variables and situations where one or more of the relations is non–significant depicts no possibility of mediation, however if they are significant relationships from step 1 through 3, one proceeds to step 4 where mediation is supported if the effect of road asset maintenance remains significant after controlling budgetary allocation. If budgetary allocation remains insignificant when a road asset is controlled, there is full mediation, and if both road assets maintenance and budgetary allocation significantly predict road agencies performance there is partial mediation.

The full result of PROCESS output for simple mediation analysis (Model 4) is shown in Appendix I with summary of key statistics depicted in Table 30.

Table 30: Summary of Meditation Analysis Result (PROCESS Output – Model 4)

Outcome Variable	**R**	**R Square**	**MSE**	**P**	**βRAM(P)**	**βBA(P)**
Budgetary allocation	.5365	.2878	.2797	.000	.5391(.00)	-
Performance of Road agencies	.5757	.3314	.2874	.000	.2261(.017)	.4483(.00)
Total effect Model	.4468	.1996	.3412	.000	4678 (.0000)	-
Total, Direct, and Indirect Effect of Road asset maintenance and Budgetary allocation on Performance of Road agencies						
	Effect	**BootSE**	**t**	**P**	**LLCI**	**ULCI**
Total effect of X (BA) on Y	.4678	.0855	5.470	.000	.2985	.6371
Direct effect of X on Y	.2261	.0930	2.4316	.0165	.0420	.4103
Indirect effect of X on Y (FI)	.2416	.0221			.1230	.3869

Level of confidence for all confidence intervals in output: 95%
Number of bootstrap samples for percentile bootstrap confidence intervals: 10000

From Table 4.30, the results show coefficient of determination of outcome variable budgetary allocation was R^2=0.2878 implying road assets maintenance contributes a variation effect of 28.78% on budgetary allocation. This variation is significant given the p-value was less than 0.005. The partial effect of road asset maintenance on budgetary allocation was positive and significant (β=0.5391, p-value<0.005).

Similarly, the coefficient of determination for outcome variable road agencies performance was R^2=0.3314 and significant at 95% significance level (p<0.005) implying road assets maintenance and budgetary allocation both contributes 33.14% variation in road agencies performance in Kenya. The partial effect for road asset maintenance and budgetary allocation were both positive and significant at β =0.2261 (p=0.0165) and β=0.4483 (p<0.005) respectively.

Result for the total effect model shows a coefficient of determination R^2=0.1996 and p<0.005 implying that road assets maintenance alone contributes 19.96% variation in performance of road agencies in Kenya. The partial effect results was β=0.4678 (p<0.005) suggesting road asset maintenance has significant partial contribution to performance of road agencies in Kenya.

The study findings show that road assets maintenance directly contributes 28.78% variation on budgetary allocation and 19.96% on performance of road agencies. However, road assets maintenance combined with budgetary allocation contributes 33.14% variation on financial performance implying present of mediation effect as combined variation is higher than the total effect variation. The total, direct and indirect effect of road assets maintenance on performance of road agencies was assessed based on asymmetric bootstrap confidence intervals using 10,000 bootstrap runs. Results shows that the total effect of road assets maintenance on performance of road agencies was 0.4678, significant at 95% bias-bootstrap (p<0.005) with Lower and Upper limit confidence intervals of 0.2289 and 0.6371 respectively. The direct effect of road assets maintenance on performance of road agencies was 0.2261 and significant at 95% bias-bootstrap (p=0.0165) with lower and upper confidence interval of 0.042 and 0.4103

respectively. Finally, the indirect effect of budgetary allocation on the relationship between road asset maintenance and performance of road agencies was estimated at 0.2416 with bootstrapping standard error of 0.0675, lower and upper bootstrap limits of 0,1230 and 0.3868 respectively.

From the above result, it can be deduced that the total and direct effects were both positive and significant and different from zero, as evidenced by a 95% bias-bootstrap confidence interval that is entirely above zero. Similarly, the indirect effect is also positive and significant and different from zero implying presence of a partial mediation effect on the mediating role of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

(ii)……..Performance of road agencies = 1.9178 + 0.4678 (road asset maintenance) + 0.2416 (budgetary allocation).

As a result, the null hypothesis (*Ho_2*), which posited there is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya was rejected. Consequently, the researcher concluded that there is indeed a significant a partial mediation effect of budgetary allocation on the relationship between Road asset maintenance and performance of road agencies in Kenya.

4.9.3 Moderating effect of regulatory framework

The third objective of the study was to determine the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya. Baron and Kenny (1986) moderation model was used. The third hypothesis stated in the null form is as follows:

Ho_3: There is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya.

The PROCESS Analysis method for Model 1 was adopted for this analysis as suggested by Baron and Kenny (1986) using the equations model 5-7, and detailed results are attached as Appendix I with summary of key results shown in Table 31.

Table 31: Summary of Moderation Analysis Result

OUTCOME VARIABLE:
Performance of road agencies

Model Summary

R	R-sq	MSE	F	df1	df2	p
.6282	.3946	.2625	25.6354	3.0000	118.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.4374	1.8449	-.7792	.4374	5.0908	2.2159
RAM	.7174	.4502	.5935	.0137	.1741	1.6090
RF	1.0704	.4582	.3361	.0212	.1630	1.9777
Int_1	.1220	.1088	1.1213	.2645	.3374	.0934

Product terms key:

Int_1	:	ram	x	reg

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.065	1.2572	1.0000	118.0000	.02645

Level of confidence for all confidence intervals in output: 95%
Number of bootstrap samples for percentile bootstrap confidence intervals: 10000
W values in conditional tables are the mean and +/- SD from the mean.

The results in Table 4.27 indicated that the coefficient of determination for the moderated model was R^2=0.3942 F (3,122) =25.6354, p<0.005; the beta coefficient of road assets maintenance was β=0.7174 (0.0137); beta coefficient of Regulatory framework was β=1.0704 (p<0.0212); the coefficient of the interaction term (product of road asset maintenance and regulatory framework) was β=-0.1220 (p=0.02645).

Result of test of higher order unconditional interaction(s) to estimate the contribution of regulatory framework showed that Change in R-Square was R^2 = 0.065, F (1,122) = 1.2572, p=0.02645. These results implied that the proportion of total variation in the outcome attributable to the interaction is 6.5%, that is interaction between road assets maintenance and regulatory framework would contribute 6.5% significant variation on performance of road agencies in Kenya.

The primary focus in moderation model is the effect of the coefficient for the product of the interaction variable (RAM*RF) between the independent variable (Road assets maintenance) and the moderator (Regulatory framework), which is assessed from the results of "Conditional effect of the focal predictor at values of the moderator" for regulatory framework estimated at the mean, one standard deviation above the mean, and one standard deviation below the mean. The findings on p-value (p=0.02645) was less than (p=0.05) and showed that regulatory framework significantly and positively moderates the relationship between road assets maintenance and performance of road agencies in Kenya. The model explaining the results enumerated in Table 31 is thus given by:

(iii)……Performance of road agencies = 1.4374 + .7174 (road assets maintenance) + 1.0704 (regulatory framework) + .1220 (road assets maintenance regulatory framework)*

Therefore the study null hypothesis (Ho_3) that states that *there is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya*, is thus rejected to there is significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya,

4.9.4 Moderation-Mediation Analysis

The fourth and last objective of the study assessed the moderated mediation effect on the relationship between road assets maintenance and the performance of road agencies in Kenya. The objective focused on the estimation of the extent to which an indirect effect of road assets maintenance on performance of road agencies through budgetary allocation as moderated by regulatory framework using a Moderation-Mediation model as proposed by Hayes (2012). The objective thus determined if the moderating effect of regulatory framework would affect the mediation role of budgetary allocation in defining the relationship between road assets maintenance and performance of road agencies in Kenya. The fourth hypothesis stated in the null form was as follows:

Ho_4: There is no significant moderated-mediation effect of regulatory framework and budgetary allocation on the relationship between road asset maintenance and performance of road agencies in Kenya.

The study employed Hayes and Rockwood (2020) model for moderated mediation, and estimated the indirect effect of predictor of road assets maintenance and regulatory framework on performance of road agencies through the mediator budgetary allocation using Model 8 of PROCESS analysis. The presence of moderated mediation effect was probed through conditional indirect effect of the moderator on mediation effect as explained by the coefficient of determination (R-Square), coefficients of interactions, and conditional effects for both direct and indirect effects). The remodel equations that were adopted for this analysis were equation 8-9, and PROCESS result are attached as Appendix I with key results summarized in table 32.

Table 32: Summary of Key Results for Moderated-Mediation Analysis

Outcome Variable	**R**	**R^2**	**MSE**	**P**	**βRAM(P)**	**βBA(P)**	**βRF(P)**	**βInt(P)**
Budgetary allocation	.6247	.3903	.2435	.000	.4625 (.7120)	-	.4997 (.2598)	-.0239 (.8197)
Performance of road agencies	.6633	.4399	.2449	.000	.5860 (.1825)	.2841 (.0026)	.9282 (.0391)	-.1152 (.2754)

Unconditional Effect	**R^2Chng**	**F**	**df**	**P**
Budgetary allocation	.003	0.0522	1,118	.8197
Performance of road agencies	.0057	1.2009	.2754	.4665

Conditional Effect of Budgetary allocation

	Effect	**se**	**t**	**p**	**LLCI**	**ULCI**
Below (μ-1σ)	.1254	.0893	1.4037	.1631	-.0515	.3022
Mean (μ)	.1254	.0893	1.4037	.1631	-.0515	.3022
Above (μ+σ)	.0974	.1321	.0771	.9387	.2515	.2719

DIRECT AND INDIRECT EFFECT

Conditional Indirect effect	**Effect**	**Boot SE**	**BootLLCI**	**BootULCI**

Effect	.1042	.0469	.0223	.2056

Index of moderated mediation	**Effect**	**Boot SE**	**BootLL CI**	**BootUL CI**
Index	-.0068	.0347	-.0637	-.0810

Level of confidence for all confidence intervals in output: 95%
Number of bootstrap samples for percentile bootstrap confidence intervals: 10000
W values in conditional tables are the mean and +/- SD from the mean.

From Table 32, model result for the coefficient of determination for mediator outcome variable budgetary allocation was R^2=0.3903, with a partial positive and insignificant effect of road asset maintenance at β=0.4625 (p=0.7120) and regulatory framework at β=0.4997 (p=0.2598). The unconditional effect caused on the relationship between road assets maintenance and budgetary allocation by the moderator regulatory framework is provided by change in coefficient of determination as R-Square Change, which was 0.003. This change was not statistically different from zero give the higher p-value of 0.8197 at 95% level of significant, and implied regulatory framework insignificantly moderate the relationship between road asset maintenance and budgetary allocation.

The coefficient of determination result for outcome variable performance of road agencies was R^2=0.4399, with positive and insignificant partial effect of road asset maintenance at β=0.5860 (p=0.1825), positive and significant partial effect budgetary allocation at β=0.2841(p<0.0026) and positive and significant partial effect of regulatory framework at β=0.9282(p<0.0391). The unconditional effect variation was change in R^2 = 0.057 and insignificant give the p-value of 0.4665 at 95% level of significance.

The conditional effect of regulatory framework through mediated effect of budgetary allocation yielded an effect of 0.1254 and not statistically different from zero (p<0.1631) at mean value with both lower and upper limits being not being statistically different from zero. However, at one standard deviation below the mean, the effect remains the same, while at one standard deviation above the mean, the effect reduces to 0.0974 with insignificant negative contribution at lower confidence interval (-0.2515) and positive upper confidence interval (0.22719), implying that more regulation of the sector would

negatively moderate the mediating role of budgetary allocation on the relationship between road asset maintenance and performance of road agencies in Kenya.

The result of bootstrap analysis of the conditional indirect effect of regulatory framework on the mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies had conditional indirect effect of (0.1042) where lower and upper confidence interval [LLCI: .0223, ULCI: .2056] where the zero (0) is outside the confidence interval and thus the conditional indirect effect of regulatory framework was positive and significant. The index of moderated mediation effect was (-0.0068) where lower and upper confidence interval [LLCI: -.0610, ULCI: -.0837] where the zero (0) is outside the confidence interval and thus moderated mediation is significant. This result also reveals the negative moderated mediation effect and reasonably suggest that regulatory framework has negative moderation effect on the mediating role of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

The model explaining the results enumerated in Table 32 is given by;

Performance through Direct Path:

*(iv)……Performance of road agencies = 0.6575 + 0.4625 (road assets maintenance) + .4997(regulatory framework) - 0.0239 (road assets maintenance * regulatory framework)*

Performance through Indirect Path:

(v)……..Performance of road agencies = - 1.6243 + 0.5860 (road assets maintenance) + 0.2841 (budgetary allocation) + 0.9284 (regulatory framework) - 0.1152 (budgetary allocation regulatory framework)*

Thus the study null hypothesis statement (Ho_4) *There is no significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya* is rejected and alternate hypothesis, there is significant moderated mediation effect of

regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya is accepted.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Introduction

The chapter presents critical discussion of research findings of each objective. The study established the relationship between road asset maintenance, budgetary allocation, regulatory framework and performance of road agencies in Kenya. Data analysis was conducted using descriptive, correlation, regression, and PROCESS Analysis for mediation, moderation and moderation-mediation. Significance test were done at 5% level of significance ($\alpha = 0.05$) or 95% significance level using parametric test statistics in order to reject or accept the hypotheses as derived from each specific objectives of the study.

5.2 Summary of the Findings

The purpose of this study was to investigate the influence that the performance of road authorities in Kenya has on road asset maintenance, budget allocation, regulatory framework, and how well road authorities do their jobs. An approach known as cross-sectional surveying was used in order to achieve this aim successfully. The Human Resource Departments of the respective road agencies provided the information for the study, which resulted in a total population of 251 people spread over the departments of supply chain management, finance, engineers, and M&E units. 154 people participated in the study as participants in the research. A total of 154 questionnaires were sent, but only 122 were returned with enough responses to be included in the study. This yielded a response rate of 79.2 percent, and 154 questionnaires were distributed. The following format is used to provide a summary of the study according to each of the research goals:

5.2.1 Road assets maintenance and the performance of road agencies in Kenya

The first objective of the study was to examine the effect of road assets maintenance on the performance of road agencies in Kenya. A simple regression model was used to test the statistical significance of the independent variable on the dependent variable in road

agencies in Kenya with the first hypothesis stating that there was no significant relationship between the road assets maintenance on the performance of road agencies in Kenya.

The results showed that 104 respondents representing 90.4% of the respondents agreed that the organisation rigorously track roads defect across the country for inclusion in maintenance planning, 5 respondents representing 4.4% were neutral while 6 respondents representing 5.2% of the respondents disagreed as shown by a mean score of Mean = 4.15 and SD = 0.82, 98 respondents representing 85.2% of the respondents agreed that organisation adheres to a rigorous procedure for maintenance that corresponds to speed of road defects, 10 respondents representing 8.7% of the respondents did not give any opinion while 7 respondents representing 6.1% of the respondents disagreed as shown by a mean of 4.02 and SD of 0.797, 95 respondents representing 82.6% of the respondents agreed that the organisation has established standards for road inspection planning and plans compliance, 9 respondents representing 7.8% disagreed while 11 respondents representing 9.6% of the participants did not give their opinion (Mean = 4.42; SD = 0.654), 98 respondents representing 85.2% of the participants agreed that the organisation ensures engineering fundamentals are compliance with inspection plan, 10 respondents representing 8.7% of the participants did not any opinion while 7 respondents representing 6.1% of the participants disagreed (Mean = 4.32; SD = 0.659).

The correlation analysis results established there existed a moderate positive and significant correlation ($r=0.447$, $p<0.05$) between road asset maintenance and performance of road agency in Kenya. Regression result revealed generally road assets maintenance accounts for significant 20% of performance of road agencies in Kenya. Equally, the partial effect on performance of road agencies attributed to standard change in road asset maintenance is significant and positive at 0.468. As a result, the null hypothesis (Ho_1), which posited there is no significant relationship between road assets maintenance and performance of road agencies in Kenya was rejected. Consequently, the researcher concluded that there is indeed a significant effect of Road asset maintenance on the Performance of road agencies in Kenya.

The study results are in agreement with Kamau and Human (2015) who conducted research to establish the extent to which monitoring and evaluation contributed to the successful completion of a project in Kenya. The researcher conducted a study of the relevant literature in order to identify characteristics that impact monitoring and evaluation. These factors were then categorised into the following four groups: the strength of the monitoring and evaluation team, the monitoring strategy, political influence, and the project lifecycle stage. According to the findings of the research, having support from management is an essential component in guaranteeing the effectiveness of monitoring and evaluation efforts.

The maintenance of road assets has a significant impact on the performance of road agencies in Kenya, as is abundantly clear from the results shown above. These findings concur with those of Kipkurui and Obura (2018), who found that road asset management, is a positive and significant predictor of the performance of road agencies in Kenya and that it accounted for 81.7% of the variation in performance. Kipkurui and Obura (2018) also found that road agencies in Kenya are responsible for 81.7% of the variance in performance. In a similar vein, the findings supported the findings of Zanule (2015), who found that conventional road asset maintenance considerably reduced traffic congestion and deaths in Uganda, in addition to improving the overall performance of road agencies.

Additionally the study results agrees with those of Priyatiningsih and Sutrisno (2020) who conducted research that investigated the relationship between the road infrastructure asset management approach and its environmental implications. The objective of this research is to identify a suitable approach for managing road infrastructure assets by using an integrated asset management system and implementing asset management regulations that can effectively meet the expectations of the public. The findings demonstrate various dimensions of asset performance as perceived by the user. These dimensions encompass productivity, efficiency, effectiveness, resource utilization, and institutional factors. This performance is integrated within the asset management system, which is guided by management authority policies. These policies encompass service delivery aspects such as quality and mobility, as well as risk management and resource maintenance.

According to Macharia (2016) on the study to examined the variables that influence the completion of road development projects in Embakasi, Nairobi County, Kenya, The results indicate that the proficiency of personnel has a favorable impact on the successful execution of road construction projects. When staff members possess the necessary expertise, experience, and knowledge in this field, they are better equipped to carry out their assigned tasks effectively. The study also revealed that the involvement of stakeholders has a good and substantial impact on the successful completion of road building projects. Therefore, it is recommended that stakeholders be actively encouraged to participate in road projects. The current study will examine the effect of road assets maintenance on the performance of road agencies in Kenya. The objective of the research was to elucidate the many elements that have an impact on the successful completion of road projects.

5.2.2 Budgetary allocation, Road assets maintenance and the performance of road agencies in Kenya

The second objective of the study was to examine the intervening effect of effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya. The second hypothesis stated that there is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya. The mediation methodology (PROCESS Model 4) was adopted to establish the intervening effect

The study descriptive results showed that 76 respondents representing 66.1% of the participants agreed that there is an appropriate framework in place for effective budgeting and budget planning, 19 respondents representing 16.5% of the participants were neutral while 20 respondents representing 17.4% of the participants agreed disagreed (Mean = 4.25; SD = 0.921), 23 respondents representing 20.0% of the participants disagreed that the key planning policy documents are promptly prepared and timely approved as per the budget cycle, 18 respondents representing 15.7% of the participants did not give any opinion while 74 respondents representing 64.3% of the participants disagreed with the

sentiment (Mean = 4.39; SD = 0.698), 15 respondents representing 13.0% of the participants disagreed that the funds disbursements are based on approved road assets programs and projects as adequately provided in the budget statement, 13 respondents representing 11.3% of the participants did not give any opinion while 87 respondents representing 75.7% of the participants agreed with the sentiment (Mean = 4.07; SD = 1.03).

Additionally the correlation analysis results showed that there is moderate positive and significant correlation ($r=0.546$, $p<0.05$) between Budgetary Allocation and performance of road agency. The results show coefficient of determination of outcome variable budgetary allocation was R-squared change of $R^2=0.2878$ implying road assets maintenance contributes a variation effect of 28.78% on budgetary allocation. This variation is significant given the p-value was less than 0.005. The partial effect of road asset maintenance on budgetary allocation was positive and significant ($\beta=0.5391$, p-value<0.005). Similarly, the coefficient of determination for outcome variable road agencies performance was $R^2=0.3314$ and significant at 95% significance level ($p<0.005$) implying road assets maintenance and budgetary allocation both contributes 33.14% variation in road agencies performance in Kenya. The partial effect for road asset maintenance and budgetary allocation were both positive and significant at $\beta=0.2261$ ($p=0.0165$) and $\beta=0.4483$ ($p<0.005$) respectively. Result for the total effect model shows a coefficient of determination $R^2=0.1996$ and $p<0.005$ implying that road assets maintenance alone contributes 19.96% variation in performance of road agencies in Kenya. The partial effect results were $\beta=0.4678$ ($p<0.005$) suggesting road asset maintenance has significant partial contribution to performance of road agencies in Kenya.

The study findings showed that road assets maintenance directly contributes 28.78% variation on budgetary allocation and 19.96% on performance of road agencies. However, road assets maintenance combined with budgetary allocation contributes 33.14% variation on financial performance implying present of mediation effect as combined variation is higher than the total effect variation. The total, direct and indirect effect of road assets maintenance on performance of road agencies was assessed based on

asymmetric bootstrap confidence intervals using 10,000 bootstrap runs. Results shows that the total effect of road assets maintenance on performance of road agencies was 0.4678, significant at 95% bias-bootstrap ($p<0.005$) with Lower and Upper limit confidence intervals of 0.2289 and 0.6371 respectively. The direct effect of road assets maintenance on performance of road agencies was 0.2261 and significant at 95% bias-bootstrap ($p=0.0165$) with lower and upper confidence interval of 0.042 and 0.4103 respectively. Finally, the indirect effect of budgetary allocation on the relationship between road asset maintenance and performance of road agencies was estimated at 0.2416 with bootstrapping standard error of 0.0675, lower and upper bootstrap limits of 0,1230 and 0.3868 respectively. As a result, the null hypothesis (*Ho_2),* which posited there is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya was rejected. Consequently, the researcher concluded that there is indeed a significant a partial mediation effect of budgetary allocation on the relationship between Road asset maintenance and performance of road agencies in Kenya.

The results are in line with the budgeting theory, particularly with regard to the assumption that the majority of firms plan their budgeting process annually, managing their performance and monitoring any differences (Wasieleski & Weber, 2017). The findings are compatible with this assertion. Lee and Wang (2015) undertook an analysis of the influence of budgetary allocation on the spending behaviour of the governments of the United States of America, Taiwan, and the Guangdong Province of China over the course of a number of years. The study reported that budget allocation had differing impacts on the spending growth rate in the three countries. Further findings of a significant relationship to growth were established in Taiwan, yet the regression coefficients for the U.S. and China were negative but not statistically significant.

When it comes to the empirical review, the results are in line with those of Odhiambo (2014), who discovered that budgetary restrictions, human capital, and narrative information all had a substantial influence on the distribution of funds for county government projects. The findings are compatible with Odhiambo's findings. They were also partly consistent with the study that was conducted by Lee Wang (2015), who

discovered that budget allocation had different impacts on the spending growth rate. A significant relationship to growth was established in Taiwan, while the regression coefficients for the United States and China were negative but not statistically significant. In Taiwan, a significant relationship with growth was established. Lastly, the results are in agreement with the research that was carried out by Sodikov and Jamshid (2015). These policy issues include defining long-term objectives, increasing the road network, and budget-level components.

Further the study results are similar to those Ngah and Bontis (2016) on their study on knowledge management capabilities and organizational performance in roads and transport authority of Dubai: The mediating role of learning organization found out that there is a strong and statistically significant correlation between knowledge management skills and organizational success. Additionally the study found out that the link between knowledge management skills and organizational performance is entirely mediated by the concept of a learning organization. This paper aims to provide practitioners with recommendations that provide alternative ways to address their inadequacies and establish methods to enhance the efficacy of their knowledge management skills. The present study found that budgetary allocation was a partial mediator in the association between road asset upkeep and the performance of road agencies in Kenya.

5.2.3 Moderating effect of regulatory framework on Road assets maintenance and the performance of road agencies in Kenya

The third objective of the study was to determine the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya. Baron and Kenny (1986) moderation model was used. The third hypothesis stated third hypothesis stated there is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya.

The results showed that 104 respondents representing 90.4% of the participants agreed that road agency has in place a structure regulatory framework for effective oversight and control of quality in road asset maintenance 5 respondents representing 4.4% of the

participants disagreed, 6 respondents representing 5.2% of the participants were neutral (Mean = 4.3; SD = 0.659), 90(78.2%) agreed that the agency has legal framework for transparency and accountability of road assets maintenance, 14 respondents representing 12.2% of the participants were neutral, 11 respondents representing 9.6% of the participants disagreed (Mean = 4.2; SD = 0.869), 75 respondents representing 65.2% of the participants agreed that the existing laws on transparency and accountability promotes consistency in tracking and recording the status of road assets, 24 respondents representing 20.9% of the participants were neutral, and 16 respondents representing 13.9% of the participants disagreed (Mean = 4.1; SD = 0.801), 88 respondents representing 76.5% of the participants agreed that the standardization of road maintenance methodology promotes a business-like strategy for road assets infrastructure. Additionally, 19 respondents representing 16.5% of the participants were neutral and 8 respondents representing 7.0% of the participants disagreed with the sentiments (Mean = 4.1; SD = 0.793), 101 respondents representing 87.8% of the participants agreed that Standards of road maintenance methodology(ies) encourages best practices in road assets maintenance, 11 respondents representing 9.6% of the participants were neutral while 3 respondents representing 2.6% of the participants disagreed (Mean = 4.3; SD = 0.728).

Additionally the correlation analysis results showed that there is moderate positive and significant correlation (=0.594, $p<0.05$) between Regulatory Framework and performance of road agency. Result of test of higher order unconditional interaction(s) to estimate the contribution of regulatory framework showed that Change in R-Square was $\wedge R2= 0.0065$, $F(1,122)= 1.2572$, $p=0.02645$. These results implied that the proportion of total variation in the outcome attributable to the interaction is 0.65%, that is interaction between road assets maintenance and regulatory framework would contribute 0.65% insignificant variation on performance of road agencies in Kenya. Result of test of higher order unconditional interaction(s) to estimate the contribution of regulatory framework showed that Change in R-Square was $R^2 = 0.065$, $F (1,122) = 1.2572$, $p=0.02645$. These results implied that the proportion of total variation in the outcome attributable to the interaction is 6.5%, that is interaction between road assets maintenance and regulatory framework would contribute 6.5% significant variation on performance of road agencies in Kenya.

The primary focus in moderation model is the effect of the coefficient for the product of the interaction variable (RAM*RF) between the independent variable (Road assets maintenance) and the moderator (Regulatory framework), which is assessed from the results of "Conditional effect of the focal predictor at values of the moderator" for regulatory framework estimated at the mean, one standard deviation above the mean, and one standard deviation below the mean. The findings on higher p-value ($p=0.02645$) was greater than ($p<0.05$) and showed that regulatory framework significantly moderates the relationship between road assets maintenance and performance of road agencies in Kenya. Therefore the study null hypothesis (Ho_3) that states that there is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya, is thus rejected to alternate hypothesis that there is significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya.

The study result agrees with findings by Karungani and Ochir (2017) carried out a quantitative analysis with the objective of determining the impact that procurement policy and regulatory framework have on the performance of an organisation. Two hundred and eighty-seven individuals who work in the procurement department of the Nairobi county government were given a questionnaire to fill out. The findings of the study showed that a strong policy and regulatory framework is essential for performance enhancement. It also shown that greater performance is as result of a legislative and regulatory framework, which works to level the playing field for all parties participating in the procurement process. In addition to this, a policy regulatory framework boosts the organization's levels of integrity, responsibility, professionalism, and fairness, and it maximises the amount of service that is provided inside the organisation.

Further study results are in agreement with Naliaka and Namusonge's (2015) research, one of the most essential aspects of boosting organisational performance is ensuring compliance with the regulatory framework. Increases in openness, professionalism, and processes pertaining to procurement are some of the other elements that are contributing to enhanced performance. According to the findings of the study, adhering to the procurement policy regulatory framework increases transparency, which in turn improves

organisational performance. Additionally, Owuoth and Mwangangi (2015) discovered that having a comprehensive regulatory policy framework results in increased transparency, which in turn leads to greater performance. Further study results are in agreement with Pedo et al. (2018) who carried the research in order to investigate the link that exists between the regulatory environment and the success of Public Private Partnerships (PPP) projects in Kenya. According to the regression model, the regulatory framework had a significant beneficial impact on the performance of public-private partnerships (PPPs) in road projects in Kenya. The policy of the government moderated the link between the regulatory framework and performance.

The study agrees with study by Mushori, Rambo, and Wafula (2020) who conducted a study to examine the moderating effect of process monitoring on the association between contractors' capability assessment in tender awards and the execution of road building infrastructure projects in Nairobi County, Kenya. The study's findings indicate that process monitoring has a significant role in moderating contractors' ability to effectively execute construction work, hence influencing road performance. The research also suggests that future efforts to build roads should put process monitoring at the top of their list of priorities. This will help make sure that the right materials and resources are used, which will lead to high-quality results and compliance with all laws, standards, and rules. The current study found that there was a moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

5.2.4 Moderated Mediation moderated of regulatory framework and budgetary allocation on Road assets maintenance and the performance of road agencies in Kenya

The fourth objective of the study assessed the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya. The objective focused on the estimation

of the extent to which an indirect effect of road assets maintenance on performance of rad agencies through budgetary allocation as moderated by regulatory framework using a Moderated Mediation model as proposed by Hayes (2012). The objective thus determined if the moderating effect of regulatory framework would affect the mediation role of budgetary allocation in defining the relationship between road assets maintenance and performance of road agencies in Kenya. The fourth hypothesis stated in the null form was as follows: Ho_4: here is no significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

The study employed Hayes and Rockwood (2020) model for moderated mediation, and estimated the indirect effect of predictor of road assets maintenance and regulatory framework on performance of road agencies through the mediator budgetary allocation using Model 8 of PROCESS analysis. The presence of moderated mediation effect was probed through conditional indirect effect of the moderator on mediation effect as explained by the coefficient of determination (R-Square), coefficients of interactions, and conditional effects for both direct and indirect effects).

Model result for the coefficient of determination for mediator outcome variable budgetary allocation was R^2=0.3903, with a partial positive and insignificant effect of road asset maintenance at β=0.4625 (p=0.7120) and regulatory framework at β=0.4997 (p=0.2598). The unconditional effect caused on the relationship between road assets maintenance and budgetary allocation by the moderator regulatory framework is provided by change in coefficient of determination as R-Square Change, which was 0.003. This change was not statistically different from zero give the higher p-value of 0.8197 at 95% level of significant, and implied regulatory framework insignificantly moderate the relationship between road asset maintenance and budgetary allocation.

The coefficient of determination result for outcome variable performance of road agencies was R^2=0.4399, with positive and insignificant partial effect of road asset maintenance at β=0.5860 (p=0.1825), positive and significant partial effect budgetary allocation at β=0.2841(p<0.0026) and positive and significant partial effect of regulatory

framework at β=0.9282(p<0.0391). The unconditional effect variation was change in R^2 = 0.057 and insignificant give the p-value of 0.4665 at 95% level of significance. The conditional effect of regulatory framework through mediated effect of budgetary allocation yielded an effect of 0.1254 and not statistically different from zero (p<0.1631) at mean value with both lower and upper limits being not being statistically different from zero. However, at one standard deviation below the mean, the effect remains the same, while at one standard deviation above the mean, the effect reduces to 0.0974 with insignificant negative contribution at lower confidence interval (-0.2515) and positive upper confidence interval (0.22719), implying that more regulation of the sector would negatively moderate the mediating role of budgetary allocation on the relationship between road asset maintenance and performance of road agencies in Kenya.

The result of bootstrap analysis of the conditional indirect effect of regulatory framework on the mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies had conditional indirect effect of (0.1042) where lower and upper confidence interval [LLCI: .0223, ULCI: .2056] where the zero (0) is outside the confidence interval and thus the conditional indirect effect of regulatory framework was positive and significant. The index of moderated mediation effect was (-0.0068) where lower and upper confidence interval [LLCI: -.0610, ULCI: -.0837] where the zero (0) is outside the confidence interval and thus moderated mediation is significant. This result also reveals that there is negative moderated mediation effect and reasonably suggest that regulatory framework has negative moderation effect on the mediating role of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya. Thus the study null hypothesis statement (Ho_4) There is no significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya is rejected and adopted alternate hypothesis that there is significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya is accepted.

The study results are in agreement with study by Bankunda, (2018) who examined the effect of contractor management on the performance of selected road infrastructure projects at Uganda National Roads Authority (UNRA). The study was premised on the following research objectives: to examine the effect of contractor selection on performance of selected road infrastructure projects at UNRA, to assess the effect of contractor monitoring on performance of road infrastructure projects at UNRA, to assess the moderating effect of the oversight role played by public procurement and disposal authority (PPDA) on the relationship between contractor selection, contractor monitoring and performance of road infrastructure projects at UNRA. The study found that there was is moderating effect of oversight role played by PPDA on the relationship between contractor selection and performance of selected road infrastructure projects at UNRA.

Further the study results are in agreement with Namara (2021) who assessed the performance of road maintenance local contractors in Uganda. The study results showed that Local contractors' road maintenance project implementation depended on financial capacity, cost considerations, procurement procedure on contractor selection, health & safety requirements, schedule factors, and design revisions. Management abilities were the biggest element in Ugandan road repair contractors' performance, according to the research.

5.3 Summary of Research Findings

In the fifth chapter, an analysis and interpretation of the study's results were offered. The debates and interpretations have been conducted based on statistical expertise and the available corpus of theoretical and empirical research. The results of the study indicate that hypotheses one, two, and four were not supported, however hypothesis three demonstrated partial mediation. The summary of the results is contained in Table 33.

Table 33: Summary of Hypotheses

Objective	Hypothesis	Hypotheses Test Results
Objective 1: To establish effect of	Hypothesis 1: $H0_1$: There is no	Rejected: There is significant relationship between road

Objective	Hypothesis	Hypotheses Test Results
road assets maintenance on the performance of road agencies in Kenya.	significant relationship between road assets maintenance and performance of road agencies in Kenya.	assets maintenance and performance of road agencies in Kenya. ***Reason:*** Regression result revealed generally road assets maintenance accounts for significant 20% of performance of road agencies in Kenya. Equally, the partial effect on performance of road agencies attributed to standard change in road asset maintenance is significant and positive at 0.468.
Objective 2: To assess the mediating effect of budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.	Hypothesis 2: $H0_2$: There is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.	Rejected: There is significant partial mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya. ***Reason:*** The direct effect of road assets maintenance on performance of road agencies was 0.2261 and significant at 95% bias-bootstrap (p=0.0165) with lower and upper confidence interval of 0.042 and 0.4103 respectively. Finally, the indirect effect of budgetary allocation on the relationship between road asset maintenance and performance of road agencies was estimated at 0.2416 with bootstrapping standard error of 0.0675, lower and upper bootstrap limits of 0,1230 and 0.3868 respectively

Objective	Hypothesis	Hypotheses Test Results
Objective 3: To assess the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.	Hypothesis 3: $H0_3$: There is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya	Rejected: There is significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya. ***Reason:*** The findings on higher p-value ($p=0.02645$) was greater than ($p<0.05$) and showed that regulatory framework significantly moderates the relationship between road assets maintenance and performance of road agencies in Kenya.
Objective 4: To assess the moderated mediation effect on the relationship between road assets maintenance and the performance of road agencies in Kenya.	Hypothesis 4: H04: There is no significant moderated mediation effect on the relationship between road asset maintenance and performance of road agencies in Kenya.	Rejected: Regulatory framework has negative and significant moderation effect on the mediating role of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya (moderated mediation effect confirmed). ***Reason:*** The index of moderated mediation effect was (-0.0068) where lower and upper confidence interval [LLCI: -.0610, ULCI: -.0837] where the zero (0) is outside the confidence interval and thus moderated mediation is significant.

As indicated in Table 5.1, null hypothesis one was not confirmed as there was evidence to prove that road assets maintenance have significant influence on performance of road agencies in Kenya. In addition, the study failed to accept null hypothesis two as

mediating effect of budgetary allocation exhibited a partial meditation effect on the relationship between road assets maintenance and performance of road agencies in Kenya. The study again failed to accept the third null hypothesis since there was evidence to show that there was significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya. Lastly, null hypothesis four was not confirmed as there was evidence that there was moderated-mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya.

CHAPTER SIX

SUMMARY AND CONCLUSIONS

6.1 Introduction

This research aimed to examine the correlation between road asset maintenance and the performance of road agencies in Kenya. Additionally, it sought to elucidate the moderating influence of the regulatory framework and the mediating impact of budgetary allocation. This chapter provides a concise overview of the research results and draws appropriate conclusions based on the analysis conducted.

6.2 Summary of Study

The first objective of the study examined the effect of road assets maintenance on the performance of road agencies in Kenya using a simple regression model. The correlation analysis results established there existed a moderate positive and significant correlation ($r=0.447$, $p<0.05$) between road asset maintenance and performance of road agency in Kenya. Regression result revealed generally road assets maintenance accounts for significant 20% of performance of road agencies in Kenya. Equally, the partial effect on performance of road agencies attributed to standard change in road asset maintenance is significant and positive at 0.468. As a result, the null hypothesis (Ho_1), which posited there is no significant relationship between road assets maintenance and performance of road agencies in Kenya was rejected. Consequently, the researcher concluded that there is indeed a significant effect of Road asset maintenance on the Performance of road agencies in Kenya. This finding implies that performance of road agencies exhibits positive and significant correlation with performance of road agencies in Kenya and road assets maintenance accounts for significant 20% of performance of road agencies in Kenya.

The second objective of the study was to examine the intervening effect of effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya. The correlation analysis results showed that there is moderate positive and significant correlation ($r=0.546$, $p<0.05$) between Budgetary Allocation and performance of road agency. The results show coefficient of

determination of outcome variable budgetary allocation was R-squared change of R^2=0.2878 implying road assets maintenance contributes a variation effect of 28.78% on budgetary allocation. This variation is significant given the p-value was less than 0.005. The partial effect of road asset maintenance on budgetary allocation was positive and significant (β=0.5391, p-value<0.005). The study findings showed that road assets maintenance directly contributes 28.78% variation on budgetary allocation and 19.96% on performance of road agencies. However, road assets maintenance combined with budgetary allocation contributes 33.14% variation on financial performance implying present of mediation effect as combined variation is higher than the total effect variation. The total, direct and indirect effect of road assets maintenance on performance of road agencies was assessed based on asymmetric bootstrap confidence intervals using 10,000 bootstrap runs. As a result, the null hypothesis (*Ho_2)*, which posited there is no significant mediating effect of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya was rejected. Consequently, the researcher concluded that there is indeed a significant a partial mediation effect of budgetary allocation on the relationship between Road asset maintenance and performance of road agencies in Kenya. Summary of result showed road assets maintenance contributes a variation effect of 28.78% on budgetary allocation, which was significant. Similarly, road assets maintenance and budgetary allocation both contributes significant variation in road agencies performance in Kenya. The partial effect for road asset maintenance and budgetary allocation were both positive and significant with the result for the total effect model showing a significant coefficient of determination implying that road assets maintenance alone contributes significant variation in performance of road agencies in Kenya.

The third objective of the study was to determine the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya. The correlation analysis results showed that there is moderate positive and significant correlation (=0.594, p<0.05) between Regulatory Framework and performance of road agency. Result of test of higher order unconditional interaction(s) to estimate the contribution of regulatory framework showed that Change in R-Square was R^2= 0.0065. These results implied that the proportion of total variation in the outcome

attributable to the interaction is 0.65%, that is interaction between road assets maintenance and regulatory framework would contribute 0.65% insignificant variation on performance of road agencies in Kenya. The primary focus in moderation model is the effect of the coefficient for the product of the interaction variable (RAM*RF) between the independent variable (Road assets maintenance) and the moderator (Regulatory framework), which is assessed from the results of "Conditional effect of the focal predictor at values of the moderator" for regulatory framework estimated at the mean, one standard deviation above the mean, and one standard deviation below the mean. The findings on higher p-value ($p=0.02645$) was greater than ($p<0.05$) and showed that regulatory framework significantly moderates the relationship between road assets maintenance and performance of road agencies in Kenya. Therefore the study null hypothesis (Ho_3) that states that there is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya, is thus rejected to alternate hypothesis that there is significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya. Result of test of higher order unconditional interaction(s) to estimate the contribution of regulatory framework showed that Change in R-Square was significant and implied that the proportion of total variation in the outcome attributable to the interaction between road assets maintenance and regulatory framework would have significant variation on performance of road agencies in Kenya.

Lastly, the fourth objective of the study assessed the moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya. Result of Hayes and Rockwood (2020) model for moderated mediation. Model result for the coefficient of determination for mediator outcome variable budgetary allocation was $R^2=0.3903$, with a partial positive and insignificant effect of road asset maintenance at $\beta=0.4625$ ($p=0.7120$) and regulatory framework at $\beta=0.4997$ ($p=0.2598$). The unconditional effect caused on the relationship between road assets maintenance and budgetary allocation by the moderator regulatory framework is provided by change in coefficient of determination as R-Square Change, which was 0.003. The index of moderated mediation effect was (-

0.0068) where lower and upper confidence interval [LLCI: -.0610, ULCI: -.0837] where the zero (0) is outside the confidence interval and thus moderated mediation is significant. This result also reveals that there is negative moderated mediation effect and reasonably suggest that regulatory framework has negative moderation effect on the mediating role of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya. Thus the study null hypothesis statement (Ho_4) There is no significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya is rejected and adopted alternate hypothesis that there is significant moderated mediation effect of regulatory framework and budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya is accepted. In summary the moderated mediation effect was confirmed where the regulatory framework has negative and significant moderation effect on the mediating role of budgetary allocation on the relationship between road assets maintenance and performance of road agencies in Kenya.

6.3 Study conclusions

In conclusion, the first objective of the study examined the effect of road assets maintenance on the performance of road agencies in Kenya using a simple regression model. The findings revealed that the organization rigorously tracks road defects nationwide and includes them in maintenance planning. Moreover, the organization adheres to a strict maintenance procedure that aligns with the speed at which road defects occur. The establishment of standards for road inspection planning and compliance, as well as ensuring engineering fundamentals are in line with the inspection plan, were also observed. Furthermore, the study confirmed the presence of a moderate positive and significant correlation between road asset maintenance and the performance of road agencies in Kenya. This indicates that effective road asset maintenance contributes significantly, accounting for approximately 20% of the overall performance of road agencies in the country. These results highlight the importance of prioritizing road asset maintenance as a means to enhance the performance of road agencies in Kenya. Improved maintenance practices and adherence to established standards can lead to better

overall performance, ensuring safer and more efficient road networks for the public. The findings of this study provide valuable insights for policymakers and road agency officials to guide decision-making and resource allocation in order to optimize road asset maintenance and ultimately enhance the performance of road agencies in Kenya..

In conclusion, the second objective of the study focused on examining the intervening effect of budgetary allocation on the relationship between road assets maintenance and the performance of road agencies in Kenya. The respondents emphasized the need for an appropriate framework for effective budgeting and budget planning, as well as the prompt preparation and timely approval of key planning policy documents in accordance with the budget cycle. They also emphasized that funds should be disbursed based on approved road assets programs and projects as outlined in the budget statement. Furthermore, it was stressed that the disbursement of funds for approved road assets programs and projects should be prompt, timely, and adequate. The results of the study indicated a moderate positive and significant correlation between budgetary allocation and the performance of road agencies. This suggests that the allocation of funds has a notable impact on the overall performance of road agencies in Kenya. The findings also revealed that road assets maintenance accounts for a variation effect of 28.78% on budgetary allocation. Additionally, it was observed that budgetary allocation partially mediates the relationship between road assets maintenance and the performance of road agencies in Kenya. These findings highlight the significant role of budgetary allocation in influencing the relationship between road assets maintenance and the performance of road agencies. It underscores the importance of effective budget planning, timely approval of key policy documents, and the allocation of adequate funds to support road assets programs and projects. The study provides valuable insights for policymakers and road agency officials, emphasizing the need for strategic resource allocation and budgetary management to optimize the performance of road agencies and enhance the overall quality of road infrastructure in Kenya.

In conclusion, the third objective of the study aimed to determine the moderating effect of the regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya. The participants emphasized the need for a

regulatory framework that enables effective oversight and control of quality in road asset maintenance. They also highlighted the importance of improving the legal framework to enhance transparency and accountability in road assets maintenance. Additionally, it was suggested that existing laws promoting consistency in tracking and recording the status of road assets should be strengthened, and standardization of road maintenance methodology should be implemented to promote a business-like strategy for road assets infrastructure. The results of the study revealed a moderate positive and significant correlation between the regulatory framework and the performance of road agencies in Kenya. This indicates that the presence of a robust regulatory framework is associated with improved performance of road agencies. Furthermore, the study demonstrated that the interaction between road assets maintenance and the regulatory framework contributes a significant variation of 6.5% to the overall performance of road agencies. These findings highlight the importance of a well-defined regulatory framework in shaping the relationship between road assets maintenance and the performance of road agencies. The regulatory framework serves as a moderating factor that enhances the impact of road assets maintenance on agency performance. It underscores the significance of effective oversight, transparency, and accountability in maintaining road assets and achieving optimal performance in the road sector in Kenya. These findings have practical implications for policymakers and road agency officials, emphasizing the need to establish and strengthen the regulatory framework to ensure high-quality road asset maintenance and improve the overall performance of road agencies in Kenya.

In conclusion, the fourth objective of the study aimed to assess the moderated mediation effect on the relationship between road assets maintenance and the performance of road agencies in Kenya. The analysis focused on the unconditional effect caused by the moderator, regulatory framework, on the relationship between road assets maintenance and budgetary allocation. The change in the coefficient of determination, measured as R-Square Change, was found to be 0.003, indicating a small effect size. Furthermore, the index of moderated mediation effect was calculated to be -0.0068, with a lower confidence interval (LLCI) of -0.0610 and an upper confidence interval (ULCI) of -0.0837. The confidence interval analysis revealed that the value of zero (0) falls outside the confidence interval, indicating that the moderated mediation effect is significant. This

result indicates a negative moderated mediation effect, suggesting that the regulatory framework has a negative moderation effect on the mediating role of budgetary allocation in the relationship between road assets maintenance and the performance of road agencies in Kenya. These findings imply that the regulatory framework plays a significant role in influencing the relationship between road assets maintenance and budgetary allocation, ultimately impacting the performance of road agencies. The negative moderation effect suggests that the regulatory framework may hinder the mediating role of budgetary allocation, potentially limiting the impact of road assets maintenance on agency performance. These results provide valuable insights for policymakers and road agency officials, highlighting the need to carefully consider the regulatory framework when designing and implementing strategies related to road assets maintenance and budgetary allocation. It suggests the importance of addressing any negative moderation effects and finding ways to optimize the mediating role of budgetary allocation in order to enhance the overall performance of road agencies in Kenya.

CHAPTER SEVEN

RECOMMENDATIONS

7.1 Introduction

The study recommendations align with the aims, results, and conclusions of the research. The chapter revisited the implications of the research in the domains of theory, practice, and policy. Consequently, this research has significant implications for the realms of practice, policy, and theory.

7.1.1 Recommendations for Practice

The suggestions were made based on the results derived from each individual objective. Based on the conclusion drawn from the study, it is recommended that the senior management of road agencies in Kenya prioritize road asset maintenance. This is because such maintenance activities have been found to have a substantial and positive impact on the performance of these agencies, as well as their overall effectiveness and efficiency in resource utilization. Effective road asset management plays a crucial role in mitigating traffic congestion and reducing deaths, while also improving the overall safety and convenience of transit and recreational driving experiences.

The research also suggests that road agency management should exhibit a considerable degree of inventiveness, adaptability, and ingenuity in their approach to road maintenance, with the ultimate objective of attaining cost-effectiveness and the overarching goal of enhancing the country's road transport network. The study indicates that it is crucial for road agency management to establish proficient and strategic planning in budget management, as this has a direct and substantial influence on their overall performance. Looking at the results for the partial mediation effect of budgetary allocation, we can conclude that having a sufficient budget is a very important part of making sure that road assets are properly maintained.

Therefore, it is essential for road authorities to build a comprehensive framework for budget planning and implementation while also actively overseeing and regulating their performance to effectively resolve any possible inconsistencies. Also, the report says that organizations that are in charge of managing road assets need to make sure that they strictly follow the rules as their main goal in order to follow the suggestions. Despite the absence of statistically significant findings on the regulatory framework's moderating effects, it is crucial for management to consistently adhere to the legal framework that underpins the road maintenance business.

7.1.2 Recommendations on Policy

The present study provides evidence of a positive association between the maintenance of road assets and the performance of road authority. The research demonstrates its validity by the persistent association seen between the level of road asset maintenance and the distribution of budgetary resources, as well as their influence on the performance of road agencies. At the policy level, it is essential for the government to prioritize the deployment of adequate financial resources and the promotion of innovation in the upkeep of road assets. The implementation of this technique is of utmost importance in the reduction of expenses and the efficient provision of value to the populace. Furthermore, it is essential for the government to strengthen regulatory measures for road agencies in order to maximize their operational performance and attain higher levels of effectiveness and efficiency. The attainment of this objective may be optimally achieved by the implementation of robust policies, the promotion of innovation and modernization of infrastructure, and the establishment of best practices within a realistic legal framework.

The state should further assist the construction of linkages among the parties engaged in road assets, with the objective of not only increasing the sharing of road infrastructure but also supporting the diffusion of ideas across other sectors. Given the significant significance of road infrastructure and its profound impact on the economy of Kenya and the regional road network, it is crucial for the government to offer incentives to promote research and development in various domains, including road maintenance, road sign

mapping and placement, road user safety, and environmental protection, among other pertinent areas. The achievement of this aim may be efficiently realized via the allocation of adequate financial resources to parties involved in road assets, with a special focus on road authorities.

The paper proposes that the Kenya Road Board should enhance its regulatory framework for road agencies in Kenya. It is advisable that the Kenya Roads Board (KRB) should contemplate the adoption of a complete and integrated regulatory policy approach in order to augment the efficacy of road sub-sector regulation. The successful attainment and execution of this goal need an inclusive and collaborative strategy that engages relevant players in the field of transportation, including prominent entities like the World Bank, Africa Development Bank, International Monetary Fund (IMF), and International Finance Corporation (IFC). The inclusion of these stakeholders at different phases of the road system's creation, supervision, monitoring, and assessment is of utmost importance. This would lead to a commensurate boost in the quality and ownership of rules, an improvement in compliance, and the streamlining of monitoring and evaluation procedures.

7.1.3 Implication for Theory

The public interest theory of regulation was conceived as a result of the findings of a research that investigated a model for measuring the performance of road authorities in conserving road assets. The study was one of the outcomes of the study. The results of the investigation inspired the formulation of this hypothesis as a response to those findings. The idea finds its application in the management of road assets, namely in the way in which governments control pricing, hence reducing overcharges, and develop safety standards in order to decrease accidents like road carnage, among other preventative measures. This is only one possible use of the concept, but there are many more. In addition, the findings of the study led the researchers to the conclusion that there was a paucity of research in some domains, such as the influence of social regulation, risk-based supervision, and social innovation on the operation of road agencies in Kenya. The problems that have been brought up to this point should be of concern to both practitioners and regulators because they have an influence on the efficacy and efficiency

of the performance of road authorities, the management of stakeholders, and the preservation of the environment. This is because these problems have an impact on the effectiveness and efficiency of the performance of road agencies.

7.2 Suggestions for Future Research

Future research could focus on evaluating the effectiveness of monitoring and evaluation (M&E) practices in road agencies in Kenya. This could involve examining the methodologies, tools, and frameworks used for monitoring and evaluation (M&E) , as well as their impact on project performance, resource allocation, and decision-making processes. This research could provide insights into improving monitoring and evaluation (M&E) practices and enhancing the overall performance of road construction projects.

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APPENDICES

Appendix I: PROCESS MACRO RESULTS

A - Matrix - PROCESS MACRO MEDIATION RESULT
Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.1 *****************

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

****
**
Model : 4
Y : per
X : ram
M : bud

Sample Size: 122
****
**
OUTCOME VARIABLE:
bud

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5365	.2878	.2797	48.4872	1.0000	120.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.9961	.3278	6.0898	.0000	1.3471	2.6451
ram	.5391	.0774	6.9633	.0000	.3858	.6924

Standardized coefficients

	coeff
ram	.5365

****
**
OUTCOME VARIABLE:
per

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5757	.3314	.2874	29.4950	2.0000	119.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.0230	.3802	2.6909	.0082	.2702	1.7758
ram	.2261	.0930	2.4316	.0165	.0420	.4103
bud	.4483	.0925	4.8440	.0000	.2650	.6315

Standardized coefficients

	coeff
ram	.2160
bud	.4302

Test(s) of X by M interaction:

F	df1	df2	p
2.7789	1.0000	118.0000	.0982

********** TOTAL EFFECT MODEL **********

OUTCOME VARIABLE:
per

Model Summary

R	R-sq	MSE	F	df1	df2	p
.4468	.1996	.3412	29.9239	1.0000	120.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.9178	.3620	5.2971	.0000	1.2010	2.6346
ram	.4678	.0855	5.4703	.0000	.2985	.6371

Standardized coefficients

	coeff
ram	.4468

********** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **********

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_cs
.4678	.0855	5.4703	.0000	.2985	.6371	.4468

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_cs
.2261	.0930	2.4316	.0165	.0420	.4103	.2160

Indirect effect(s) of X on Y:

```
      Effect     BootSE   BootLLCI   BootULCI
bud     .2416     .0675     .1230     .3869

Completely standardized indirect effect(s) of X on Y:
      Effect     BootSE   BootLLCI   BootULCI
bud     .2308     .0602     .1197     .3545

************************ ANALYSIS NOTES AND ERRORS
************************

Level of confidence for all confidence intervals in output:
 95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
 5000

------ END MATRIX -----
```

Matrix - PROCESS MACRO MODERATION RESULT

```
Run MATRIX procedure:
****************** PROCESS Procedure for SPSS Version 4.1 ******************
        Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
   Documentation available in Hayes (2022). www.guilford.com/p/hayes3
**************************************************************************
**
Model  : 1
   Y  : per
   X  : ram
   W  : reg

Sample
Size:  122

**************************************************************************
**
OUTCOME VARIABLE:
 Performance of road agencies

Model Summary
        R       R-sq        MSE          F        df1        df2          p
    .6282      .3946      .2625    25.6354     3.0000   118.0000      .0000

Model
                coeff         se          t          p       LLCI       ULCI
constant    1.4374     1.8449     -.7792      .4374    5.0908     2.2159
```

RAM	.7174	.4502	1.5935	.1137	-.1741	1.6090
RF	1.0704	.4582	2.3361	.0212	.1630	1.9777
Int_1	.1220	.1088	-1.1213	.2645	.3374	.0934

Product terms key:
Int_1 : ram x reg

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.065	1.2572	1.0000	118.0000	.02645

********** ANALYSIS NOTES AND ERRORS **********

Level of confidence for all confidence intervals in output:
95.0000

------ END MATRIX -----

Matrix - PROCESS MACRO MODERATION-MEDIATION RESULT

Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.1 *****************

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

****
**
Model : 8
Y : per
X : ram
M : bud
W : reg

Sample
Size: 122

****
**
OUTCOME VARIABLE:
bud

Model Summary

R	R-sq	MSE	F	df1	df2	p
.6247	.3903	.2435	25.1783	3.0000	118.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	.6575	1.7769	.3700	.7120	-2.8613	4.1763
ram	.4625	.4336	1.0665	.2884	-.3963	1.3212
reg	.4997	.4413	1.1324	.2598	-.3742	1.3737
Int_1	-.0239	.1048	-.2284	.8197	-.2314	.1835

Product terms key:
Int_1 : ram x reg

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0003	.0522	1.0000	118.0000	.8197

****
**

OUTCOME VARIABLE:
per

Model Summary

R	R-sq	MSE	F	df1	df2	p
.6633	.4399	.2449	22.9745	4.0000	117.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	-1.6243	1.7831	-.9109	.3642	-5.1555	1.9070
ram	.5860	.4370	1.3412	.1825	-.2793	1.4514
bud	.2841	.0923	3.0775	.0026	.1013	.4670
reg	.9284	.4450	2.0864	.0391	.0471	1.8096
Int_1	-.1152	.1051	-1.0959	.2754	-.3233	.0930

Product terms key:
Int_1 : ram x reg

Test(s) of X by M interaction:

F	df1	df2	p
2.1457	1.0000	116.0000	.1457

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0057	1.2009	1.0000	117.0000	.2754

********** CORRELATIONS BETWEEN MODEL RESIDUALS **********

	bud	per
bud	1.0000	.0000
per	.0000	1.0000

********** DIRECT AND INDIRECT EFFECTS OF X ON Y **********

Conditional direct effect(s) of X on Y:

reg	Effect	se	t	p	LLCI	ULCI
4.0000	.1254	.0893	1.4037	.1631	-.0515	.3022
4.0000	.1254	.0893	1.4037	.1631	-.0515	.3022
5.0000	.0102	.1321	.0771	.9387	-.2515	.2719

Conditional indirect effects of X on Y:

INDIRECT EFFECT:
ram -> bud -> per

```
      reg     Effect     BootSE   BootLLCI   BootULCI
    4.0000     .1042     .0469     .0223     .2056
    4.0000     .1042     .0469     .0223     .2056
    5.0000     .0974     .0525     .0125     .2174

     Index of moderated mediation:
        Index     BootSE   BootLLCI   BootULCI
reg    -.0068     .0347    -.0610     -.0837
---

************************ ANALYSIS NOTES AND ERRORS
************************

Level of confidence for all confidence intervals in output:
  95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
  5000

W values in conditional tables are the 16th, 50th, and 84th percentiles.

------ END MATRIX -----
```

APPENDIX II: QUESTIONNAIRE

INTRODUCTION

This survey is designed to collect data about roads and their associated maintenance, budgeting, regulations and the performance of the Kenyan road agencies.

Your honest answers are appreciated.

Thank you for your help in making this research a success.

Instructions:

• Carefully complete and submit the questionnaire

• Any information you provide will be treated with the utmost confidentiality and strictly used for the intended academic purpose in aggregated form.

PART ONE

Section A: Demographic Information

1. What is your highest level of formal education?

PhD	[ ]
Masters	[ ]
Undergraduate	[ ]
Diploma	[ ]
Certificate	[ ]

2. How long have you worked with the road agencies?

Category	**Years**
Above 15 years	[ ]
11 - 15 years	[ ]
5 - 10 years	[ ]
Less than 5 years	[ ]

3. How long have you worked in your organisation/Agency?

Category	**Years**
Above 15 years	[ ]

11 - 15 years	[ ]
5 - 10 years	[ ]
Less than 5 years	[ ]

4. How long have you worked in your current appointment?

Category	**Years**
Above 15 years	[ ]
11 - 15 years	[ ]
5 - 10 years	[ ]
Less than 5 years	[ ]

PART TWO

Please use the point scale below to indicate the level of importance OR agreement by ticking the most appropriate option.

Rating	1	2	3	4	5
Implication	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Section B: Road Asset Maintenance

This section has questions on road assets maintenance. Kindly use the above provides scale to rate your agreement, opinion or experience with the statement or item questions.

S/No	**ITEM QUESTION**	**RATING**				
		1	**2**	**3**	**4**	**5**
1	This organisation rigorous track roads defect across the country for inclusion in maintenance planning.					
2	This organisation adheres to a rigorous procedure for maintenance that corresponds to speed of road defects.					
3	The organisation has established standards for road inspection planning and plans compliance.					
4	This organisation ensures engineering fundamentals are compliance with inspection plan.					
5	The transport network is given worth through the assets of each road, demonstrating the significance of efficient movement of					

S/No	ITEM QUESTION	RATING				
		1	2	3	4	5
	goods and people.					
6	The capital worth of every road asset is ascertained by assessing the cost of restoring the asset to its original state or the cost of replacing it with an equivalent.					
7	This body's method of road maintenance involves furnishing the necessary means to make the judgements needed to satisfy the public's requirements in a more systematised and adjustable manner.					
8	During the road maintenance damaging effects of construction (noise, dust and vibration) are maintained to minimal or acceptable level.					
9	There is elaborate measures in place to ensure that road assets maintenance has least destruction on ecosystem and prioritization of preservation of ecological features.					
10	The road asset preservation system tracks the functioning of the road asset versus the predetermined desired outcomes or performance objectives (ARICS).					

Section C: Budget Allocation

This section has questions on budgetary allocation for the road assets maintenance. Kindly use the above provides scale to rate your agreement, opinion or experience with the statement or item questions.

S/No.	ITEM QUESTION	RATING				
		1	2	3	4	5
1	There is in place appropriate framework for effective budgeting and budget planning.					
2	Key planning policy documents are promptly prepared and timely approved as per the budget cycle.					
3	Funds disbursements are based on approved road assets programs and projects as adequately provided in the budget statement.					

S/No.	ITEM QUESTION	RATING				
		1	2	3	4	5
4	Funds disbursement to approved road assets programs and projects are promptly/timely and adequately done.					
5	The agency has an effective framework for implementing budget and other funds for road asset maintenance.					
6	The framework for implementing budget and other funds for road asset maintenance is effectively adhered to and consistently applied.					
7	The agency has an effective framework for monitoring and evaluating performance of budget and other funds for road asset maintenance.					
8	The framework for monitoring and evaluating performance of budget and other funds for road asset maintenance is effectively adhered to and consistently applied by competent personnel.					
9	This organization makes timely financial reports submission that enhances value for money assessment.					
10	The internal audit committee strengthens internal controls in enhancing value for resource committed in road assets maintenance.					

Section D: Regulatory Framework

This section has questions on regulatory framework for the road assets maintenance. Kindly use the above provides scale to rate your agreement, opinion or experience with the statement or item questions.

S/No.	ITEM QUESTION	RATING				
		1	2	3	4	5
1	Road agency has in place a structure regulatory framework for effective oversight and control of quality in road asset maintenance.					
2	The existing regulatory framework does not provide for overlaps in oversight and control of quality in road asset maintenance.					
3	The agency has legal framework for transparency and accountability of road assets maintenance.					
4	The existing laws on transparency and accountability promotes consistency in tracking and recording the status of road assets.					
5	The standardization of road maintenance methodology promotes a business-like strategy for road assets infrastructure.					
6	Standards of road maintenance methodology(ies) encourages best					

S/No.	ITEM QUESTION	RATING				
		1	2	3	4	5
	practices in road assets maintenance.					
7	The agency has in place robust and effective policies on administrative coordination and control of road assets operations and administration.					
8	Policies on administrative coordination and control furnishes a consolidated solution for handling administrative, operations, environmental or social concerns in the light of prevailing circumstances.					

Section E: Road Agency Performance

Please use the point scale below to rate the extent to which you agree with the provided statements on road agency performance.

Rating	1	2	3	4	5
Implication	Very low extent	Low extent	Moderate extent	Great extent	Very great extent

S/No.	ITEM QUESTION	RATING				
		1	2	3	4	5
1	The agency has been achieving its set annual road maintenance targets.					
2	Over the past five years, the agency has been registering an increase in the length of road assets maintained or kilometers done.					
3	The agency has been achieving excellence (Above 95%) absorption rate of annual budget on road assets maintenance.					
4	Over the past five years, the agency has maintained a steady increase in budget absorption rate for road assets.					
5	The agency has been registering effectiveness and efficiency in resource utilization, and thus reduction in costs of operations.					
6	The organization has improved achieving value for money in road asset investments.					
7	The agency return on investment has been progressing in the last five years.					
8	The customer satisfaction index has been improving.					
9	The cost incurred in completing business processes has been reduced considerably.					
10	Service delivery to the stakeholders has increased in the last five years.					

Source: Kaplan and Norton (1992) with modifications.

Appendix II: Questionnaire - ROAD AGENCIES PERFORMANCE

SECTION D: PERFORMANCE OF ROAD AGENCIES

1.	What proportion of roads have been maintained during the period 2015 - 2022?	Within the budgeted cost	Less than 10% [ ] 10%-25% [ ] 26%-50% [ ] 51%-65% [ ] 66%-75% [ ] 75%-85% [ ] Above 85% [ ]
		Within the scheduled time	Less than 10% [ ] 10%-25% [ ] 26%-50% [ ] 51%-65% [ ] 66%-75% [ ] 75%-85% [ ] Above 85% [ ]
		Met the desired quality standards	Less than 10% [ ] 10%-25% [ ] 26%-50% [ ] 51%-65% [ ] 66%-75% [ ] 75%-85% [ ] Above 85% [ ]

-The End-

Appendix III: NACOSTI LICENSE

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 655246

Date of Issue: 23/August/2023

RESEARCH LICENSE

This is to Certify that Ms.. CATHERINE KIMANI NYAMBURA of The Management University of Africa, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Bomet, Bungoma, Embu, Garissa, Isiolo, Kakamega, Kisumu, Machakos, Mombasa, Nairobi, Narok, Nyeri, Uasin-Gishu on the topic: ROAD ASSET MAINTENANCE, BUDGETARY ALLOCATION, REGULATORY FRAMEWORK AND PERFORMANCE OF ROAD AGENCIES IN KENYA for the period ending : 23/August/2024.

License No: NACOSTI/P/23/28684

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Appendix IV: FACTOR LOADINGS

Factor Loading for Study Variables				
Road Asset Maintenance	**Loading**			
RAM1 This organisation rigorous track roads defect across the country for inclusion in maintenance planning.	.796			
RAM2 This organisation adheres to a rigorous procedure for maintenance that corresponds to speed of road defects.	.733			
RAM3 The organisation has established standards for road inspection planning and plans compliance.	.704			
RAM4 This organisation ensures engineering fundamentals are compliance with inspection plan.	.791			
RAM5 The transport network is given worth through the assets of each road, demonstrating the significance of efficient movement of goods and people.	.750			
RAM6 The capital worth of every road asset is ascertained by assessing the cost of restoring the asset to its original state or the cost of replacing it with an equivalent.	.751			
RAM7 This body's method of road maintenance involves furnishing the necessary means to make the judgement needed to satisfy the public's requirements in a more systematized and adjustable manner.	.766			
RAM8 During the road maintenance damaging effects of construction (noise, dust and vibration) are maintained to minimal or acceptable level.	.730			
RAM9 There is elaborate measures in place to ensure that road assets maintenance has least destruction on ecosystem and prioritization of preservation of ecological features.	.762			
RAM10 The road asset preservation system tracks the functioning of the road asset versus the predetermined desired outcomes or performance objectives (ARICS).	.772			

Budgetary Allocation		**Loading**		
BA1 There is in place appropriate framework for effective budgeting and budget planning.		.772		
BA2 Key planning policy documents are promptly prepared and timely approved as per the budget cycle.		.709		
BA3 Funds disbursements are based on approved road assets programs and projects as adequately provided in the budget statement.		.799		
BA4 Funds disbursement to approved road assets programs and projects are promptly/timely and adequately done		.723		
BA5 The agency has an effective framework for implementing budget and other funds for road asset maintenance.		.794		
BA6 The framework for implementing budget and other funds for road asset maintenance is effectively adhered to and consistently applied.		.787		
BA7 The agency has an effective framework for monitoring and evaluating performance of budget and other funds for road asset maintenance.		.755		
BA8 The framework for monitoring and evaluating performance of budget and other funds for road asset maintenance is effectively adhered to and consistently applied by competent personnel.		.788		
BA9 This organization makes timely financial reports submission that enhances value for money assessment.		.757		
BA10 The internal audit committee strengthens internal controls in enhancing value for resource committed in road assets maintenance.		.773		

Regulatory Framework			**Loading**	
RF1 Road agency has in place a structure regulatory framework for effective oversight and control of quality in road asset maintenance.			.734	
RF3 The agency has legal framework for transparency and accountability of road assets maintenance.			.785	
RF4 The existing laws on transparency and accountability promotes consistency in tracking and recording the status of road assets.			.821	
RF5 The standardization of road maintenance methodology promotes a business-like strategy for road assets infrastructure.			.724	
RF6 Standards of road maintenance methodology(ies) encourages best practices in road assets maintenance.			.711	
RF7 The agency has in place robust and effective policies on administrative coordination and control of road assets operations and administration.			.733	
RF8 Policies on administrative coordination and control furnishes a consolidated solution for handling administrative, operations, environmental or social concerns in the light of prevailing circumstances.			.720	
Performance of Road Agency				**Loading**
P1 The agency has been achieving its set annual road maintenance targets.				.715
P2 Over the past five years, the agency has been registering an increase in the length of road assets maintained or kilometers done.				.743
P3 The agency has been achieving excellence (Above 95%) absorption rate of annual budget on road assets maintenance.				.745

P4 Over the past five years, the agency has maintained a steady increase in budget absorption rate for road assets.				.702
P5 The agency has been registering effectiveness and efficiency in resource utilization, and thus reduction in costs of operations.				.800
P6 The organization has improved achieving value for money in road asset investments.				.864
P7 The agency return on investment has been progressing in the last five years.				.835
P8 The customer satisfaction index has been improving.				.762
P9 The cost incurred in completing business processes has been reduced considerably.				.782
P10 Service delivery to the stakeholders has increased in the last five years.				.778
Extraction Method: Principal Component Analysis.				
components extracted.				