Moderating Effect of Regulatory Framework on Road Assets Maintenance and the Performance of Road Agencies in Kenya

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ABSTRACT

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. 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. 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. This research intends to bridge the existing gaps by establishing the nexus between road assets maintenance, and regulatory framework on the performance of Kenyan road agencies. The study objective was to examine the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya. The study was guided by Administrative management theory, The Public Interest Theory of Regulation and the Agency 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, descriptive, and regression analysis. 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 0.0065, 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 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).

Keywords: Road *Assets Maintenance; regulatory framework; Performance; Road agencies; Kenya*

1.1 Introduction

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).

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).

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.

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

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.

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 Regulatory Framework

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.

1.1.3 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. 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.

1.2 Statement of the Problem

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. This research intends to bridge the existing gaps by establishing the nexus between road assets maintenance, and regulatory framework on the performance of Kenyan road agencies.

1.3 Research Objective

i. To examine the moderating effect of regulatory framework on the relationship between road assets maintenance and the performance of road agencies in Kenya.

1.4 Research Hypothesis

Ho_1: There is no significant moderating effect of regulatory framework on the relationship between road asset maintenance and performance of road agencies in Kenya.

2.0 LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1 The Administrative Management Theory

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 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. This is done to prevent natural monopolies from engaging in excessive pricing practices. In 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 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.

2.1.3 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.

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.
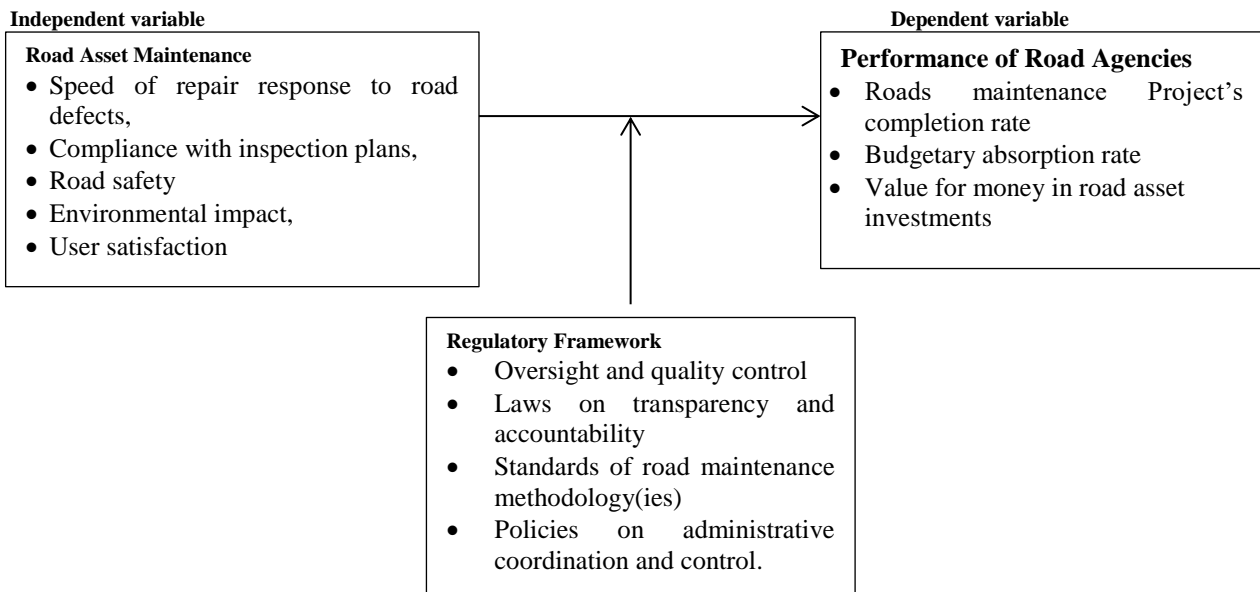
2.2 Empirical Literature Review

2.2.2 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.

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.

2.3 Conceptual framework

Independent variable

Road Asset Maintenance
- Speed of repair response to road defects,
- Compliance with inspection plans,
- Road safety
- Environmental impact,
- User satisfaction

Dependent variable

Performance of Road Agencies
- Roads maintenance Project's completion rate
- Budgetary absorption rate
- Value for money in road asset investments

Regulatory Framework
- Oversight and quality control
- Laws on transparency and accountability
- Standards of road maintenance methodology(ies)
- Policies on administrative coordination and control.

3.0 Research Methodology

3.1 Research Philosophy

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. 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

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).

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.

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. 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≤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 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 1. 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 1: 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).

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. 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).

3.7 Research Model Equations:

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)

β_o = 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).

4.0 DATA ANALYSIS AND RESEARCH RESULTS

4.1 Demographic Characteristics

The outcomes as shown in Table 2 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. 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.

Table 2: Demographic Characteristics

Demographic Profile		Frequency	%
Highest level of education	Doctoral (Ph.D)	3	2.5
	Masters	74	60.7
	Bachelor Degree	42	34.4
	Diploma	3	2.5
Number of years worked with the agency	1 - 5 Years	14	11.5
	6 - 10 Years	23	18.9
	11 - 15 Years	79	64.8
	16 - 20 Years	6	4.9
Years worked in your current position/appointment	1 - 5 Years	58	47.5
	6 - 10 Years	38	31.1
	11 - 15 Years	25	20.5
	16 - 20 Years	1	0.8

According to the findings in Table 2, 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.

4.2 Hypothesis Testing

4.2.1 The 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 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 3.

Table 3: 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 2 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 (Ho₁) 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.

4.3 Result Discussions

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 $R^2 = 0.0065$, $F(1,122) = 1.2572$, $p=0.02645$. 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_1) 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.

5.0 CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the 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.

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. Moreover, it will enhance the facilitation of information sharing, the promotion of well-informed decision-making processes, the advancement of learning opportunities, the fostering of transparency and accountability, and the promotion of capacity building within the road sub-sector.

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