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IMES LOGIC MODEL AND THE PERFORMANCE OF ROAD PROJECT IN KENYA

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ABSTRACT

This study sought to establish the relationship between IMES logic model and the performance of road projects in Kenya through hypothesis testing and at the same time establish the moderating effect of Project Risks on the relationship between IMES logic model and performance of road projects in Kenya. The unit of analysis was the road construction projects implemented by National Government Road Agencies (KURA, KeRRA, and KeNHA) in Kenya, while the unit of observation was the project managers involved in the implementation of these road construction projects. The population for the research was 188 projects initiated and completed between the year 2015 and 2022 by the three agencies. The overall sample size for this study was determined using a formula by Fisher's exact formula, which obtained 126 respondents. This study employed stratified random and purposive sampling method to select the study sample. Primary data was used and was collected using a semi-structured questionnaire. Samples of the questionnaire were pilot tested with 18 respondents to test for reliability and validity. The data was analyzed using the Statistical Package for Social Sciences (SPSS). The qualitative data collected was analyzed using thematic analysis and presented in text form. Quantitative data was analyzed using descriptive statistics and presented in tables and figures. The study concluded that evaluation logic model positively and significantly influences performance of road projects in Kenya. In addition, the study concluded that project risks have significant moderating effect on the relationship between integrated monitoring and evaluation systems and performance of road projects in Kenya. Based on the findings, the study recommends that the management of road projects in Kenya should integrate real-time data monitoring and feedback mechanisms within the logic model framework. By embedding continuous performance tracking into the evaluation process, project managers can make timely and informed decisions, promptly address emerging challenges, and align implementation strategies with desired outcomes. In addition, the study recommends that the management of road projects in Kenya should embed proactive risk management protocols within the M&E framework. This involves identifying potential risks early in the project lifecycle and continuously assessing their likelihood and impact through the M&E system.

Key Words: IMES Logic Model, Project Risks, Performance of Road Project

Background of the Study

Effective and efficient execution of public infrastructure projects is a central contributor to economic growth of a nation. In fiscal planning, countries allocate resources, from either from loans or taxes, through direct procurement or public-private partnerships, to build roads, houses, railways and bridges. All these projects contribute to national development. However, there are cases of project failure in terms of quality, cost, stakeholder management and time. Diaz's (2020) classification of reasons for project failures includes poor management decisions and change in fundamental variables of the project. In road infrastructure projects in Kenya, the government has attempted to forestall management related problems by professionalizing project management process. In project management processes, monitoring and evaluation tools should be deployed deliberately, to ensure project success. Governments have adopted qualitative and quantitative tools like checklists, key performance indicators, plans and dashboards to improve road project performances (Tengan *et al*. 2021). An integrated approach to monitoring and evaluation is continuously being adopted by governments as a technique for efficient delivery of projects. This technique has different parts whose effect on the project performance may vary. It has been suggested that this system as a whole function only fairly (Welime, 2019). These suggestions have however not been quantitatively justified. For improvement of performance of roads projects in public sector, it is essential to understand the effectiveness the variables of this monitoring and evaluation tools. However, there is scarce literature on the performance of the variables of this tool. Presented in this work is a proposal to analyze the performance of the National Integrated Monitoring and Evaluation System (NIMES). This proposed work contributed to the existing debate on effectiveness of monitoring and evaluation, by singling out performances of specific aspects of the NIMES.

Road projects are vital components in economies in global scales. Globally, for example, there has been heavy investment in road infrastructure, mostly meant to boost their local economies. However, there have been cases of poor performance of these projects, with a number of them being cancelled. In the United States (US), as cited in Huo *et al*., (2018), 77% of the America's freeway projects failure is attributed to cost overruns. In Norway, cost overruns accounted for 7.9% of project failure (Amadi & Higham, 2017). Road projects cause environmental degradation and pollution during and after construction. In Thailand, it was estimated that the country would need to invest roughly 4.2trillion baht in infrastructure projects during the period of 2014-2020. Of this, about 71% was to be allocated to transportation projects. Accordingly, the country was expected to deplete its natural resources more rapidly in the coming years due to the construction of these projects (Kokkaew & Rudjanakanoknad, 2017). It is thus clear that failures, like the cost overruns and unsustainable tendencies are bound to occur in road projects when managed poorly especially in terms of monitoring. Project performance in road and bridge construction has also had challenges in the United States of America (USA). Falcetelli *et al*., (2022) however reported that monitoring experts use advanced structural health monitoring (SHM) for infrastructure project assessment, which is thought to be accurate. The accuracy notwithstanding, the large sizes of most bridge structures make the techniques cost prohibitive. This cost prohibition could be one of the reasons why visual verification method is also employed. Culligan, (2019) explored some of the challenges posed this verification method, especially for monitoring construction and maintenance of bridges. Here, performance has been affected by multiple errors resulting from different ratings provided by different inspectors. The method has also been said to be time and labor intensive. Tanzania as one of the middle-income countries in the world, road transport is the most widely used form of transport. Road transportation carry over 90% of the passengers and 75% of the freight traffic in the country.

Road project performance in Africa has similarly had challenges. A case in point is in Nigeria. Project performance in this country has been hampered by cost overruns. Anigbogu et al., (2019) cited overruns of 39.7 %, and these have been said to be the highest in the world. This is despite the formation of Department of Monitoring and Evaluation in 2010. Radin *et al*., (2017) state that this department was meant to improve stakeholder management in road construction projects. In South Africa, just as in Nigeria, there have been reports of road project performance failure. Nyakala *et al*., (2019) study indicated that road construction projects indicate that 30.1% to 39.4% does not attain efficiency. This was attributed to poor project control. Road transport is one of the most used forms of transport in Tanzania. This carries over 90% of passenger and 75% freight traffic annually. Tanzania's Strategic development stresses that extensive and efficient road infrastructure is essential in growth of the country's economy.

Despite this being one of the strategic focus, Tanzania still faces the problem of road project failures. Studies have shown that one of the main causes of failure is by not completing the projects on schedule which goes up to an estimate of 110%. Although performance of the same has been noted as a hindrance, investments in road projects in Kenya have improved. In Kenya, road projects failed at a rate of 80%, according to Lakmeeharan et al., 2020's study of time performance. Kenya has, however, embraced the use of an Integrated Monitoring and Evaluation System, which is worth highlighting. This system was hoped to contribute to improvement of performance of road projects. It is vital to understand the level of contribution of this system to this performance. This project explored the contribution of this system to performance of road projects, with focus of the roads constructed by KeNHA and KeRRA. These national entities are responsible for construction of national government road networks.

Road infrastructure development in Kenya has been a key focus of the government as part of its broader economic development agenda. Improving road networks is critical to facilitating trade, enhancing mobility, and connecting rural areas to urban centers (Rumenya & Kisimbi, 2020). Over the years, Kenya has invested heavily in upgrading existing roads and constructing new highways to boost transportation efficiency. These projects have aimed to reduce travel time, lower vehicle operating costs, and improve access to markets and services, which in turn stimulates economic growth and social development (Mokua & Kimutai, 2023). One of the notable road projects in Kenya is the Standard Gauge Railway (SGR) corridor road upgrades, which complement the rail transport by enhancing road connectivity along key trade routes. The government, through the Kenya National Highways Authority (KeNHA), has been implementing major road expansion projects, such as the Nairobi–Mombasa highway and various bypasses around major towns to ease congestion (Omunga & Gitau, 2022). Additionally, the development of rural roads under programs like the Kenya Rural Roads Authority (KeRRA) has played a significant role in improving accessibility for agricultural communities, allowing farmers to transport their produce more efficiently (Mohamud & Pedo, 2022).

However, road projects in Kenya face several challenges including funding constraints, land acquisition issues, and environmental concerns. While some projects are financed through public funds, others rely on loans and partnerships with international development agencies (Siamanda & Wairimu, 2024). Effective management and maintenance of these roads remain critical to ensuring their long-term usability and sustainability. Despite these challenges, the continued investment in road infrastructure is vital for Kenya's Vision 2030, which aims to transform Kenya into a middle-income economy with enhanced regional integration and competitiveness (Rumenya & Kisimbi, 2020).

Statement of the Problem

Kenyan roads record an annual growth in traffic by 8.3 %. Growth in the number of developed roads is not however in tandem with this traffic growth. This disparity has been said to hinder growth of Gross National Product by 0.9 % (Wafula, 2017). According to Wambui and Mercy, (2019) road network projects in Kenya get precedence in budgetary allocations. In the financial year 2013/2014, for example, 7.7% of the budget was allocated to the ministry of transport and infrastructure. According to Beldinne and Gachengo, (2022) Kenya allocated $954mn, $1.1bn, $1.3bn in 2013/14, 2014/15, 2015/2016 respectively for roads. Despite these high budgetary allocations, there are recorded performance problems in road construction projects. Such problems include cost overruns, delivery delays, cases of poor quality finishing and non-adherence to scope of work. Annual reports of KENHA have revealed some of the projects performing poorly. Out of the 34 projects reported in the 2021-2022 Annual Report, half of them have a cost performance index below 1.0. In the same report, slightly more than half of the projects have a negative cost variance (KENHA, 2022). Out of the nine Auditors General's Report (2022) sampled projects in KERRA, four were behind schedule. Similar observations have been made in the Auditor Generals (2020) report for KURA, with more than half of the sampled projects behind schedule. An audit for FY 2020/21, done by KRB, showed that KeNHA had an accountability rating of 82.52%, while KURA and KeRRA achieved 79.85% and 67.36% ratings, respectively. The accountability index ratings measure the performance of road authorities in the implementation of roadwork programs financed by KRB (KRB, 2022). Researchers and Project Management experts have developed interest in understanding the poor performance of road projects. Some of the issues investigated include contract management, schedule, Project Risks, financial controls and government policies (Oyolla, 2019). Other studies, for instance work reported by Njeru & Kirui, (2022), Mucheke & Paul, (2019) and Abdi & Kimutai, (2018) suggest that performance of road construction projects is dependent on Monitoring and Evaluation practices.

These studies provide invaluable information on the roles played by different aspects of project management and road project performance. However, there is limited works carried out to analyze the role of IMES logic model on performance of road projects in Kenya. As well, there is no framework for evaluating the performance of this system. This study therefore attempted to analyze IMES logic model and performance of road projects in Kenya.

Specific Objectives

The following are the specific objectives that guided this study:

i. To establish the relationship between IMES logic model and the performance of road projects in Kenya
ii. To determine the moderating effect of project risks on the relationship between IMES logic model and performance of road projects in Kenya

Theoretical Literature Review

Evaluation Theory

Many scholars have explored the theoretical and application aspects of evaluation since the 1960s (Khan *et al*., 2023). The evaluation literature, (Spaaij *et al*., 2019), encompasses a range of fields including health, education, and social welfare. Evaluation as a project management concept emerged from a diverse field of applied social sciences. The main purpose of evaluation theory is to identify realistic procedures that evaluators can use to come up with knowledge about the

significance of social programs. The theory consists of five main components which include practice, use, knowledge, valuing, and social programming (King & Alkin, 2019). Many M&E specialist design evaluations around methodology. Thompson *et al*., (2022) suggests a more holistic approach which starts with theory. In the approach, first, the evaluators should consider the purpose of the evaluation to determine its theoretical foundation. This is then followed by the development of evaluation questions to inform methodology. The evaluators should focus on the overall purpose of evaluation. By focusing on theory at the onset of a project, client needs are ensured through the process. Evaluation Logic Model is designed on the fundamentals of Evaluation Theory. The model is believed to be complete based on its resources, activities, input and output then the outcome. This theory therefore enabled the study define the correct aspects of IMES Evaluation Logic Model and how they affect Road project performance.

Program Theory

Program Theory is the assumption that the program's design, activities, and execution will lead to the achievement of the outcomes intended by the clients. A clear Program Theory lays out a logical description of why the activities to be provided will lead to the benefits you intended (Mertens & Wilson, 2018). The theory is used to determine the theoretical sensibility of the program. It explains why, how, and under what conditions the program effects occur. It also predicts the outcomes of the program, and specifies the requirements necessary to bring about the desired program effects (Skivington, *et al*., 2021). Program theory uses three components to define a program. These are the program activities, the intended outcomes and the mechanisms through which to achieve (Guattari-Stafford, 2019). These processes ensue during the program implementation hence contributing to achieving the desired outcome. Olsson *et al*., (2023) point out that, a detailed description of the mechanisms of the program theory include information about the important steps, links, and phases of the expected transformation process as well as some implementation issues. The output should specify the nature, expected timing, side effects, and pattern of change as well as interrelationships among outcomes. The output is divided into immediate, intermediate, and long-term impacts. Implementation issues necessary for carrying out the program's services, for example, resources and implementation issues such as supplies, materials, and skills should be captured. The aspects of program theory form the components of Project Risks. This hence proves to be essential in analysis of road Project Risks and how it affects the objectives verses results. This theory was used to come up with a conclusion on how road Project Risks affect the influence of IMES logic model on road project performance.

Conceptual Framework

A conceptual framework is a visual or written product that explains graphically or in narrative form the main things to be studied. This includes the key factors, concepts and the presumed relationships among them (Sarma *et al*., 2021).

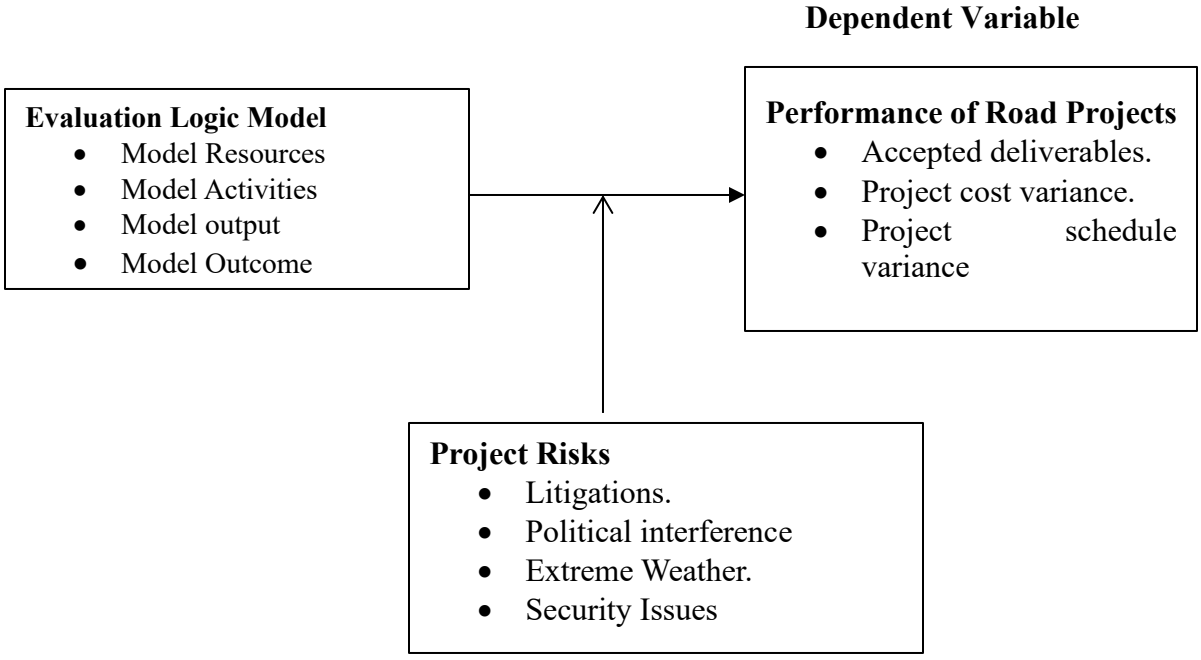

Figure 1: Conceptual Framework

Evaluation Logic model

Evaluation Logic Model is a systematic and visual framework used to illustrate the relationships between the resources, activities, outputs, outcomes, and impacts of a program or intervention, providing a clear pathway from inputs to ultimate goals (Pradhan, 2020). The logic model helps to map out how the components of integrated monitoring and evaluation system such as data collection mechanisms, reporting processes, and feedback loops contribute to specific activities like continuous monitoring and timely decision-making (Ohkubo, Harlan & Ahmed, 2020). Model Resources, often called inputs, refer to the essential assets, materials, and conditions necessary to implement the integrated monitoring and evaluation system for projects. These resources include financial funding allocated for monitoring activities, human capital such as trained staff or evaluators with expertise in project management and data analysis, technological tools like data management software and real-time tracking systems, and institutional support from relevant agencies or stakeholders (Tiruneh, Nigatu & Magge, 2022).

Model Activities are the specific actions or processes undertaken using the available resources to implement the integrated monitoring and evaluation system effectively. These activities may include designing data collection protocols, conducting regular field inspections, compiling progress reports, and holding stakeholder review meetings to assess project status (Babiker, Ali & Eltahir, 2020). Model Outputs are the direct products or tangible results generated by the integrated

monitoring and evaluation system activities. These include documented deliverables such as periodic monitoring reports, updated project dashboards, issue logs, and evaluation summaries (Agostino, Kyalo & Mulwa, 2021). Outputs serve as concrete evidence that the monitoring activities have taken place and provide the data necessary for assessing project performance. Outputs include measurements of work completed versus planned milestones, budget utilization reports, or compliance checklists indicating adherence to technical specifications and safety standards (Mwaguni, Mbugua & Rambo, 2021). Model Outcomes represent the short- and medium-term effects or changes that result from using the outputs generated by integrated monitoring and evaluation system activities. These outcomes include improved decision-making based on accurate and timely information, enhanced accountability of project teams, more efficient resource allocation, and early identification and resolution of implementation challenges (Pradhan, 2020).

Project Risks

Project risks refer to the potential events, conditions, or uncertainties that, if they occur, may have a negative impact on the achievement of a project's objectives, including scope, time, cost, quality, and overall performance (Alawneh *et al*, 2022). These risks may arise at any stage of the project lifecycle and can disrupt progress, inflate budgets, compromise safety, or lead to project failure if not effectively managed. Identifying and assessing project risks is a critical aspect of integrated monitoring and evaluation systems, which aim to provide timely information and early warnings to support risk mitigation strategies (Abdul-Rahman, Wang & Ariffin, 2024). Litigations refer to legal proceedings or disputes brought before a court of law, which can significantly disrupt the progress of infrastructure projects. These legal challenges may stem from issues such as contract disputes, land acquisition conflicts, environmental concerns, non-compliance with regulatory requirements, or disagreements between stakeholders (Igihozo & Irechukwu, 2023). The presence of ongoing or anticipated litigation can delay project timelines, increase costs, and damage stakeholder relationships. Furthermore, litigations may result in court injunctions that halt project activities until the legal matter is resolved, sometimes lasting months or even years. In such scenarios, resources may be diverted to legal fees and settlements instead of core project activities (Gregory & Sovacool, 2022).

Political interference refers to the undue involvement of political actors or government officials in the decision-making, implementation, or oversight processes of a project, often driven by political motives rather than technical or operational considerations (Aduma & Kimutai, 2023). This may manifest in the arbitrary allocation of resources, forced changes in project design, biased contractor selection, or sudden shifts in priorities based on political agendas. Such interference can undermine project efficiency, compromise transparency, and erode public trust (Chege & Kinoti, 2022). Extreme weather refers to severe or unseasonal climatic conditions that can adversely affect infrastructure projects. Extreme weather events can delay construction schedules, damage partially completed structures, reduce worker productivity, and increase maintenance and repair costs (Njogu, 2023). In regions prone to such conditions, weather unpredictability poses a significant operational risk. Moreover, climate-related disruptions can compromise the integrity and lifespan of infrastructure, leading to frequent breakdowns and increased costs in the long term (Alawneh *et al*, 2022). Security issues encompass a wide range of threats that can compromise the safety of personnel, equipment, and infrastructure during the implementation of a project. These threats can include theft, vandalism, violent conflicts, terrorism, community unrest, and other forms of physical insecurity (Bagenda & Ndevu, 2024). In some regions, insecurity may hinder access to construction sites, disrupt logistics and supply chains, or deter skilled workers from operating in high-risk areas.

Empirical Literature Review

Evaluation Logic Model and Project Performance

Pradhan (2020) conducted a study on the effect of manifestation of an advanced fuzzy logic model coupled with geo-information techniques to landslide susceptibility mapping and their comparison with logistic regression modeling in Malaysia. This paper presents the use of fuzzy logic relations for landslide susceptibility mapping on part of Selangor area, Malaysia, using a Geographic Information System (GIS) and remote sensing data. As a result, the combined data and knowledge derived model were useful for landslide susceptibility mapping considering the prediction accuracy. As a conclusion, in this paper, both the data derived model (frequency ratio) and the knowledge-derived model (fuzzy logic) were combined

Martinek (2020) conducted a study on the effect of enhancing youth development programs through logic model assessment USA. This purpose of the article is to describe how a logic model can be used to evaluate the fidelity of youth development programming. The study found that in order to fully grasp how the logic model is used several elements will be described in this section. The study concluded that finally, having a continuous pattern of evaluation will certainly insure, in long run, that a program will experience success.

Duah *et al* (2023) conducted a study on the effect of points of entry dynamics: understanding the cross-border threats for Ebola virus disease and COVID-19 in Ghana using a logic model approach. This study employed a mixed-methods design, where quantitative variables were examined for relationships and effect size interactions using multiple linear regression techniques and the wild bootstrap technique. The study found that the most general findings were that laboratory capacity and Kotoka International Airport testing center positively predicted COVID-19 procurement, and public health response and airline boarding rule negatively predicted COVID-19 procurement. The study concluded that contextual understanding of the COVID-19 pandemic and Ebola epidemic is vital for strengthening PoE mitigation measures and preventing disease importation.

Babiker, Ali and Eltahir (2020) conducted a study on the effect of use of logic model in evaluating the training program of Babiker Badri scientific association for women studies in Sudan. Primary data were collected using a comprehensive structured questionnaire however; secondary data were collected from the organization's reports and relevant published sources. The results of the descriptive statistics revealed that the majority of respondents who attended the training program were below the age of 40 years, had low educational attainment and most of them been married. The study concluded that intermediate outcomes were educated women, practicing their acquired knowledge in all aspects of life.

Mwaguni, Mbugua and Rambo (2021) conducted a study on the effect of logical model and research projects enhancement in public universities in the coast region of Kenya. Data analysis was by inferential and descriptive statistics; mean, frequencies, percentages and standard deviation. The study established that logical model with an average mean of 3.564 and a standard deviation of 0.785 does not have a significant influence on research project enhancement in public universities. The study concludes that treasury should increase funding in public universities and regular training and sensitized on utilizing the logical model.

Pedersen, Wehrmeyer and Nygaard (2020) conducted a study on the effect of commercial yet social: the practices and logics models of bringing mini-grid electricity to rural villages in Kenya. The paper explores how four different mini-grid firms in Kenya draw on both a commercial logic model and a social welfare logic model in their everyday operational activities in order to achieve

their goals. The paper finds that firms using a blending approach seem to derive synergies from integrating the two logics models into their work. The study concluded that however, more research is needed to improve understanding of this link and of the organizational drivers that underpin each approach.

Project Risks and Project Performance

Alawneh *et al* (2022) assessed the Development of a new method for assessing project risks in sustainable building construction projects in developing countries: The Case of Jordan. For this purpose, a literature review and structured interviews were performed to identify the risks. Additionally, questionnaire surveys were conducted, and the relative relevance index and analytic hierarchy process were utilized to assess the probabilities and impacts of these risks on time and cost. After that, a focus group discussion was conducted. According to the the risks' probability and impacts on time and cost, the top-scoring risks include changes to the original design, budgeting inaccuracies owing to a lack of experience with sustainable building projects, additional costs incurred as a result of the use of sustainable building construction materials and equipment, inadequate or inaccurate sustainable design information, insufficient funds from clients, inadequate project planning for a sustainable building project, a tight project schedule for a sustainable building project, and insufficient identification of sustainable construction's scope. The study concluded that the risks associated with implementing sustainable building construction projects provide a substantial obstacle to the global expansion of sustainable construction.

Igihozo and Irechukwu (2023) determined the project risk and performance of Mpazi channel construction project in Nyabugogo, Kigali-Rwanda. The descriptive research design with a mixed qualitative and quantitative approach was used to a sample of 118 respondents selected from 168 target population using stratified sampling technique and Sloven's formula. SPSS Statistical software was used in the analysis of the collected data into descriptive statistics by the help of mean and standard deviation. The results of this research have shown that project risk identification and performance of Mpazi channel construction project has a highly positive and significant relationship. The correlation results have also revealed a significant relationship between project risk management strategy and performance of Mpazi channel construction project. The research also found that a combination of project risk identification, risk management plan and risk plan response contributed to the majority of the Mpazi Channel construction project success. Thus, the researcher concluded that the project risks have an impact on the performance of the Mpazi Channel construction project.

Kiprop and Muchelule (2024) researched on construction project risks and performance of Kenya urban roads authority projects in central region of Kenya. Descriptive survey design was adopted where 217 respondents (engineers and contractors) working with Kenya Urban Roads Authority projects in central region of Kenya were targeted. A sample of 140 respondents was drawn and administered with questionnaires. Both descriptive and inferential analysis was done. The study inferential statistics established that constructions risk significantly influence performance of Kenya Urban Roads Authority projects in central region of Kenya. Specifically, technical risks had the highest influence on performance, followed by Client related risks, then financial risks. Socio-political risks had the least influence on performance of Kenya Urban Roads Authority projects in central region of Kenya. The study concluded that constructions project risks significantly influence performance of Kenya Urban Roads Authority projects in central region of Kenya.

Oyieyo, Rambo and Ndiritu (2023) examined the construction project risks and completion of public private partnership project in Kenya. The study adopted descriptive survey design and targeted the entire management of Sondu-Miriu Hydroelectric Power project totaling 85 obtained

from the contracting parties where a sample of 71 was selected through proportionate sampling. Questionnaires and interview schedules were used for data collection while Cronbach Alpha was used as a measure of reliability. Quantitative and qualitative techniques were used in data analysis where multiple regression analysis was used to establish the relationship between the variables. The study found that: construction risks: construction time overrun, construction cost overrun and labor related risks significantly influence completion of construction public private partnership projects such that as construction risks increase, completion of public private partnership project decline. The study concluded that project risks significantly influence completion of construction public private partnership projects.

RESEARCH METHODOLOGY

Research Design

This study used a descriptive research design to meet the stated objectives. This study involves collection of data about a phenomenon of interest and presenting it statistically, without interfering with the study variables (Veal, 2017). Under this design, this study assessed the performance of IMES logic model on performance of road projects in Kenya.

To establish the meaning, (Stahl & King, 2020) states that positivist researchers believe that they can reach a full understanding based on experiment and observation. Therefore, positivism allows us to gain objective scientific information. This study applied positivism research paradigm since it is directly connected to the knowledge of objectivism.

Population

The target population for this work focused on all road projects (188 in number) initiated under KeNHA, KURA and KeRRA, from 2015 and completed by 2022. This period is based on the history of implementation of IMES. IMES was introduced in 2011 but its implementation started in 2014 (Muchiri, 2022). The first two years of its implementation have been considered in this work as a preparation phase. The year 2015 is therefore considered appropriate for analysis of the performance of IMES. The focus of the study was also on project completion in order to eliminate projects that fall under maintenance and those that are ongoing.

The unit of analysis was the road construction projects implemented by National Government Road Agencies (KURA, KeRRA, and KeNHA) in Kenya, while the unit of observation was project managers involved in the implementation of these road construction projects.

Sampling Techniques and Sample Size

To get the sample size of study, this work used a two-stage method, known as the Fisher's exact formula. The Fisher's first stage sample sizing is presented by:

$$n = \frac{Z^2 * \text{p}\,(1 - \text{p})}{C^2}$$

Where

n is the assumed sample size for infinite population

p is the population proportion. This is not known and it is advised to use 50 % in such cases

C is the margin of error due to sampling and this study will use 5 %

Z is the measure of standard deviations away from the mean score, and will be read off from the

z-score table. For 0.05, the Z-score is 1.96

$$n = \frac{1.96^2 \text{x } 0.50(1 - 0.50)}{0.05^2}$$

n=385

The second stage sizing, used to correct the assumed sample size, is presented by:

$$n' = \frac{n}{1 + \frac{Z^2 * \text{ p } (1 - \text{p})}{C^2 * N}}$$

Where

n is the actual sample size

N is the total population, which, for road projects in this study is 188.This is KeNHA 21 projects, KeRRA 135 projects and KURA 32 projects

Substituting the values into the formula:

$$n' = \frac{385}{1 + \frac{1.96^2 \text{x } 0.50(1 - 0.50)}{0.05^2 \times 188}}$$

$$n' = 126$$

In this study, Purposive sampling was used to sample respondents from KeNHA, KeRRA and KURA. Here, each project formed a stratum. Each project manager of the sampled projects initiated from the financial year 2015/2016 and completed by 2020/2022 was interviewed. The focus was on this group because they are qualified respondents when it comes to expertise in project management. Purposive sampling was also used to identify six end year Annual project progress reports and annual financial reports from KeNHA and KeRRA and KURA belonging to the specific projects during the period of study.

Table 1: Target Population and Sample Size

Members	Members per project	Target Population	Sample Size	Percentage size	Sample
KeNHA	1	21	14	11.1 %	
KeRRA	1	135	91	72.2%	
KURA	1	32	21	16.7%	
Total		**188**	**126**		

Data Collection Procedures

This study used questionnaires for data collection. A questionnaire is a research instrument that consists of a set of questions or other types of prompts that aims to collect information from a respondent (Brace, 2018). The questionnaire had open ended and close ended questions. These questions tested the relationship between the use of various aspects of IMES logic model and performance of road projects completed within the period of study. The study used both in person and email data collection procedure. For far flanked officers, this work involved sending emails to

the respondents. For officers in accessible areas likes Nairobi, Nakuru, Mombasa, in person questionnaire administration will be used.

Data Analysis and Presentation

This research used both descriptive and inferential data analysis tools. The descriptive tools used included use of mean, median, mode and standard deviation. Statistical significance tests were used to reject or fail to reject the hypotheses. This involved the use of Analysis of Variance (ANOVA). The inferential statistics computation was carried out using the Statistics Calculator, Version 3.0 Beta. The statistical test of significance was performed at the 95% confidence level. (ANOVA) is an analysis tool used in statistics that splits an observed aggregate variability found inside a data set into two parts which is systematic and random factors (Turkmen *et al*., 2019). Bunea *et al*., (2019) opine that analysts use the ANOVA test to determine the influence that independent variables have on the dependent variable in a regression study. Multiple regressions were used to establish the relationship between the variable (IMES Logic model) and made inferences in relation to the performance of road projects. The model was also used to examine the moderating effects of Project Risks on performance of IMES Logic model in enhancement of performance of road projects in Kenya.

The overall multiple regression model was:

$$\mathbf{Y=\alpha+\beta_1 X_1+\varepsilon}$$

The overall moderated multiple regression model was expressed as;

$$\mathbf{Y=\alpha+\beta_1 X_1 * Z + \varepsilon}$$

Where: Y=Dependent variable (performance of road projects),

α - The constant,

β_1- IMES Logic model,

ε- The error

The strength of the relationship was determined by the value of r2 . The value of r2 ranges from 0 to 1. A value of 0 shows no relationship and 0.5 shows moderate relationships while a value between 0.7 and 1.0 shows strong relationship. The analyzed findings were presented in form of frequency tables, pie charts and bar charts.

RESEARCH FINDINGS AND DISCUSSION

Descriptive Statistics

Evaluation Logic Model

The first objective of the study was to examine of the IMES Evaluation logic model on performance of road projects in Kenya. The study findings in Table 2 illustrate that 43.6% of the respondents indicated that evaluation Logic Model resources affects the performance of road projects to a large extent, 20% of the respondents indicated to a very large extent while 30% indicated to a medium extent and 5.5% indicated to a small extent. On a five-point scale, the average mean of the responses was 3.76 which implies that majority of the respondents agreed on the statement; however, the answers were varied as shown by the standard deviation of 0.867. This finding agrees with Ngacho and Das (2014) study on a multidimensional performance evaluation framework of CDF construction projects by considering all relevant measures of performance. The study concluded that evaluation framework should constitute six factors with six key performance

indicators namely time, cost, quality, safety, site disputes and environmental impact. The study found out that these key performance indicators have an influence towards overall performance of construction projects with time being the most important measure followed by cost while safety comes last in the performance evaluation of CDF construction projects. On the statement whether "Evaluation Logic model input affects the performance of road projects", 39.1% of the respondents indicated to large extent, 30% indicated to a very large extent while 24.5% indicated to a medium extent and 6.4% indicated to a small extent. The mean score for responses on this statement is 3.93 which imply that majority of the respondents agreed to a large extent on the statement; however, the answers were varied as shown by the standard deviation of 0.896. The respondents were further asked to indicate whether evaluation Logic Model activities affects the performance of road projects; 51.8% of the respondents indicated to a very large extent, 38.2% indicated to a large extent, and 10% indicated to a medium extent. The mean score for the statement is 4.42 implying that majority of the respondents agreed on the statement; however, the answers were varied as shown by the standard deviation of 0.669. In regards to whether, Evaluation Logic Model output affects the performance of road projects; fifty-five-point five (55.5) percent of the respondents indicated to a very large extent, while 34.5% indicated to a large extent and 10% indicated to medium extent. The aggregate mean score for this section was 4.14 which imply that IMES evaluation logic model affects the performance of road projects to a large extent

Table 2: IMES Evaluation Logic Model

Statement	No influence	Small extent	Medium extent	Large extent	Very large extent	Mean	Std. Deviation
Evaluation Logic Model resources affects the performance of road projects.	0.9%	5.5%	30.0%	43.6 %	20.0%	3.76	0.867
Evaluation Logic model input affects the performance of road projects.	0.0%	6.4%	24.5%	39.1 %	30.0%	3.93	0.896
Evaluation Logic Model activities affects the performance of road projects.	0.0%	0.0%	10.0%	38.2 %	51.8%	4.42	0.669
Evaluation Logic Model output affects the performance of road projects.	0.0%	0.0%	10.0%	34.5 %	55.5%	4.45	0.672
Aggregate Score	**0.2%**	**3.0%**	**18.6%**	**38.9 %**	**39.3%**	**4.14**	**0.776**

Project Risks and Performance of road Projects

The second objective of the study was to determine the moderating effect of project risks on the relationship between IMES logic model and performance of road projects in Kenya. The subsequent section below present the findings of the moderation effect of project risks.

4.5.5.1 Project Risks and IMES Evaluation Logic Model and Performance of Road Projects

The respondents were asked to indicate whether Litigations enhances the effect of Evaluation Logic Model on the performance of road projects, 38.2% of the respondents indicated to a very

large extent, 37.3% indicated to a large extent, and 24.5% indicated to a medium extent. The mean score for the statement is 4.14 implying that majority of the respondents agreed on the statement; however, the answers were varied as shown by the standard deviation of 0.784. In regards to whether, Political interference enhances the effect of Evaluation Logic Model on the performance of road projects; 61.8% of the respondents indicated to a very large extent, 25.5% indicated to a large extent and 12.7% indicated to a medium extent. The mean score for the statement was 4.49 which imply that majority of the respondents agreed with the statement; however, the answers were varied as shown by the standard deviation of 0.714. Additionally, 52.7% of the respondents indicated that Extreme weather enhances the effect of Evaluation Logic Model on the performance of road projects to a very large extent, 31.8% to a large extent and 13.6% to a medium extent. The mean score for the statement was 4.35 which imply that the respondents agreed with the statement to a very large extent.

On whether security issues enhance the effect of Evaluation Logic Model on the performance of road projects; 43.6% of the respondents indicated to a very large extent, 39.1% indicated to a large extent while 13.6% indicated to a medium extent. The mean score for the statement was 4.21 which imply that majority of the respondents agreed with the statement; however, the answers were varied as shown by the standard deviation of 0.879. The aggregate mean score for this section was 4.30 which imply that project risk and IMES evaluation logic model influences the performance of road projects to a large extent.

Table 3: Project Risks and IMES Evaluation Logic Model

Statement	No influence	Small extent	Medium extent	Large extent	Very large extent	Mean	Std. Deviation
Litigations enhances the effect of Evaluation Logic Model on the performance of road projects	0.0%	0.0%	24.5%	37.3%	38.2%	4.14	0.784
Political interference enhances the effect of Evaluation Logic Model on the performance of road projects.	0.0%	0.0%	12.7%	25.5%	61.8%	4.49	0.714
Extreme weather enhances the effect of Evaluation Logic Model on the performance of road projects.	0.0%	1.8%	13.6%	31.8%	52.7%	4.35	0.785
Security issues enhance the effect of Evaluation Logic Model on the performance of road projects.	1.8%	1.8%	13.6%	39.1%	43.6%	4.21	0.879
Aggregate Score	**0.5%**	**0.9%**	**16.1%**	**33.4%**	**49.1%**	**4.30**	**0.791**

Test for Hypothesis One

The first specific objective of the study was to establish the relationship between IMES logic model and the performance of road projects in Kenya. The associated null hypothesis was that IMES Evaluation Logic model has no significance impact on performance of road projects in Kenya. A univariate analysis was conducted in which performance of road projects in Kenya was regressed on evaluation logic model.

The R-Squared depicted the variation in the dependent variable that can be explained by the independent variables. The greater the value of R-squared the greater the effect of independent variable. The R Squared can range from 0.000 to 1.000, with 1.000 showing a perfect fit that indicates that each point is on the line. As indicated in Table 4, the R-squared for the relationship between evaluation logic model and performance of road projects in Kenya was 0.225; this is an indication that at 95% confidence interval, 22.5% of variation in performance of road projects in Kenya can be attributed to changes in evaluation logic model. Therefore, evaluation logic model can be used to explain 22.5% of changes in performance of road projects in Kenya but there are other factors that can be attributed to 77.5% change in performance of road projects in Kenya.

Table 4: Model Summary for Evaluation Logic Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.473[a]	.225	.224	.67231

a. Predictors: (Constant), evaluation logic model

The analysis of variance was used to determine whether the regression model is a good fit for the data. It also gave the F-test statistic; the linear regression's F-test has the null hypothesis that there is no linear relationship between the two variables. From the analysis of variance (ANOVA) findings in Table 5, the study found out that that Prob>$F_{1, 108}$= 0.000 was less than the selected 0.05 level of significance. This suggests that the model as constituted was fit to predict performance of road projects in Kenya. Further, the F-calculated, from the table (31.30) was greater than the F-critical, from f-distribution tables (3.929) supporting the findings that evaluation logic model can be used to predict performance of road projects in Kenya.

Table 5: ANOVA for Evaluation Logic Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.109	1	9.109	31.30	.000[b]
	Residual	31.376	108	0.291		
	Total	40.485	109			

a. Dependent Variable: performance of road projects in Kenya

b. Predictors: (Constant), evaluation logic model

From the results in Table 6, the following regression model was fitted.

$$Y = 0.346 + 0.362\ X_1$$

(X_1 is Evaluation Logic Model)

The coefficient results showed that the constant had a coefficient of 0.346 suggesting that if performance of road projects in Kenya was held constant at zero, performance of road projects in Kenya would be 0.346 units. In addition, results showed that evaluation logic model coefficient

was 0.362 indicating that a unit increase in evaluation logic model would result in a 0.362 improvement in performance of road projects in Kenya. It was also noted that the P-value for evaluation logic model coefficient was 0.000 which is less than the set 0.05 significance level indicating that evaluation logic model was significant. Based on these results, the study rejected the null hypothesis and accepted the alternative that evaluation logic model has positive significant influence on performance of road projects in Kenya.

Table 6: Beta Coefficients for Evaluation Logic Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.346	.090		3.844	.000
	Evaluation Logic Model	0.362	0.097	0.361	3.732	0.000

a. Dependent Variable: performance of road projects in Kenya

Test for Hypothesis Two

The second objective of the study was to determine the moderating effect of project risks on the relationship between IMES logic model and performance of road projects in Kenya. Moderation happens when the relationship between the dependent variable and the independent variables is dependent on a third variable (moderating variable). The effect that this variable has is termed as interaction as it affects the direction or strength of the relationship between the dependent and independent variable. To achieve the second research objective, the study computed moderating effect regression analysis. This (moderating effect regression analysis) also guided the study in testing the second research hypothesis. Project risks (M) was introduced as the moderating variable.

Ho_2: Project Risks has no significance moderating effect on relationship between IMES logic model and performance of road projects in Kenya.

The study combined the variable (IMES logic model) to form a new variable X. The study then used stepwise regression to establish the moderating effect of project risks (M) on the relationship between independent variable (X) and performance of road projects in Kenya (Y). From the model summary findings in Table 7, the first model for which is the regression between IMES logic model (X) without moderator, project risks (M) and interaction, the value of R-squared was 0.356 which suggests that 35.6% change in performance of road projects in Kenya can be explained by changes in IMES logic model. The p-value for the first model (0.000) was less than the selected level of significance (0.05) suggesting that the model was significant. The findings in the second model which constituted IMES logic model, project risks and performance of road projects in Kenya (X*M) as predictors, the r-squared was 0.621. This implies that the introduction of project risks in the second model led to a 0.265 increase in r-squared, showing that project risks positively moderates performance of road projects in Kenya.

Table 7: Model Summary for Moderation Effect

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.597[a]	.356	.357	.65170	.356	386.860	1	108	.000
2	.788[b]	.621	.620	.52727	.621	537.10	2	107	.000

a. Predictors: (Constant), IMES logic model

b. Predictors: (Constant), IMES logic model, project risks, Interaction (X*M)

From the model summary findings in Table 8, the F-calculated for the first model, was 281.996 and for the second model was 438.141. Since the F-calculated for the two models were more than the F-critical, 3.929 (first model) and 3.081 (second model), the two models were good fit for the data and hence they could be used in predicting the moderating effect of project risks on performance of road projects in Kenya.

Table 8: ANOVA for Moderation Effect

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	72.191	1	72.191	281.996	.000[b]
	Residual	27.621	108	0.256		
	Total	99.812	109			
2	Regression	111.287	2	55.644	438.141	.000[c]
	Residual	13.621	107	0.127		
	Total	124.908	109			

a. Dependent Variable: performance of road projects in Kenya

b. Predictors: (Constant), IMES logic model

c. Predictors: (Constant), IMES logic model, project risks, Interaction

Further, by substituting the beta values as well as the constant term from the coefficient's findings for the first step regression modelling, the following regression model was fitted:

$Y = 0.244 + 0.329X$

Where X is IMES logic model

The findings show that when IMES logic model is held to a constant zero, performance of road projects in Kenya will be at a constant value of 0.244. The findings also show that IMES logic model has a statistically significant effect on performance of road projects in Kenya as shown by a regression coefficient of 0.329 (p-value= .002).

By substituting the beta values as well as the constant term from model 2 emanating from the second step in regression modeling the following regression model was fitted:

$Y= 0.297 + 0.281\ X + 0.341\ M + -0.354\ X*M$

Where X is IMES logic model; M is project risks and X*M is the interaction term between IMES logic model and project risks.

The findings show that when IMES logic model, project risks, interaction (X*M) are held to a constant zero, performance of road projects in Kenya will be at a constant value of 0.297. The model also indicated that IMES logic model had a positive and statistically significant effect on performance of road projects in Kenya as shown by a regression coefficient of 0.281 (p-value= 0.003). However, it is seen that project risks had a negative and significant effect on performance of road projects in Kenya as shown by a regression coefficient -0.341. On the other hand, IMES logic model and project risks (X*M) also had a negative and insignificant effect on performance of road projects in Kenya as shown by a regression coefficient of -0.354 (p-value= 0.000).

It is therefore seen that IMES logic model on its own has 28.1% effect on performance of road projects in Kenya. However, when interacted with project risks, it has an effect of -35.4%. This is

a clear indication that introduction of project risks as moderating variable has a negative influence on performance of road projects in Kenya. The study therefore fails to reject the null hypothesis that project risks has no significant moderating effect on the relationship between IMES logic model and performance of road projects in Kenya.

Table 9: Beta Coefficients for Moderation Effect

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.244	.063		3.873	.000
	IMES logic model	.329	.088	.328	3.739	.002
2	(Constant)	0.297	0.079		3.759	.000
	IMES logic model	.281	.073	.282	3.849	.003
	project risks	.-341	.091	.340	-3.747	.061
	Interaction (X*M)	.-354	.093	.255	-3.806	.062

a. Dependent Variable: performance of road projects in Kenya

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Evaluation Logic Model and Project Performance

The first null hypothesis test was 'IMES Evaluation Logic model has no significance impact on performance of road projects in Kenya. The study found that evaluation logic model is statistically significant in explaining performance of road projects in Kenya. The influence was found to be positive. This means that unit improvement in evaluation logic model would lead to an increase in performance of road projects in Kenya. Based on the findings, the study concluded that evaluation logic model positively and significantly influences performance of road projects in Kenya.

Project Risks and Project Performance

The second research hypothesis tested was that 'Project Risks has no significance moderating effect on relationship between IMES logic model and performance of road projects in Kenya. The study found that project risks had a negative and significant effect on performance of road projects in Kenya. On the other hand, interaction of IMES logic model (X*M) also had a negative and insignificant effect on performance of road projects in Kenya. It is therefore seen that IMES logic model on its own has 28.1% effect on performance of road projects in Kenya. However, when interacted with project risks, it has an effect of -35.4%. This is a clear indication that introduction of project risks as moderating variable has a negative influence on performance of road projects in Kenya. The study therefore fails to reject the null hypothesis that project risks has no significant moderating effect on the relationship between IMES logic model and performance of road projects in Kenya.

Recommendations

The study therefore recommends that the management of road projects in Kenya should integrate real-time data monitoring and feedback mechanisms within the logic model framework. By embedding continuous performance tracking into the evaluation process, project managers can

make timely and informed decisions, promptly address emerging challenges, and align implementation strategies with desired outcomes.

In addition, the study recommends that the management of road projects in Kenya should embed proactive risk management protocols within the M&E framework. This involves identifying potential risks early in the project lifecycle and continuously assessing their likelihood and impact through the M&E system.

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