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IMES HUMAN RESOURCE CAPACITY FOR MONITORING & EVALUATION AND THE PERFORMANCE OF ROAD PROJECT IN KENYA

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ABSTRACT

Road projects in Kenya have been characterized by substandard quality of work, cost overruns, poor stakeholder management and poor schedule management. This has been attributed to poor project management systems. This study therefore sought to establish the relationship between human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation 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 human resource capacity 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 human resource capacity for monitoring & evaluation and performance of road projects in Kenya. Based on the findings, the study recommends that the management of road projects in Kenya should invest in continuous professional development and technical training for project personnel at all levels. By equipping engineers, project managers, supervisors, and support staff with up-to-date skills in modern construction techniques, project management tools, and regulatory compliance, the quality and efficiency of project execution are greatly enhanced.

Key Words: IMES Human Resource Capacity for Monitoring & Evaluation, Project Risks, Performance of Road Project

Background of the Study

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 human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation and performance of road projects in Kenya.

Specific Objectives

The following are the specific objectives that guided this study:

i. To assess the relationship between IMES Human Resource Capacity and the performance of road projects in Kenya
ii. To determine the moderating effect of project risks on the relationship between human resource capacity for monitoring & evaluation and performance of road projects in Kenya

Theoretical Literature Review

Game Theory

Game theory has a very clear sequence. Most of the theory features were introduced by von Neumann and Morgenstern in (1944) (Naveed et al., 2021). Holler et al., (2020) states that John Nash later proposed a 'solution' to the problem of how rational players would play called the Nash equilibrium. This idea was that players would adjust strategies until no player will benefit from changing. This meant that all players are choosing strategies that are best responses to other player's moves. In 1960s there was a realization that a certain repeated behavior in one-shot games could differ in a big way from an individual one-shot game. Individual player's dimension matters in Probabilistic Risk Analysis. Players throughout a system incur costs to increase system dependability for the public good. Individual strategies at the system level should be in line with collective desires at the system level. Game theory is one of the natural tools used to analyze individual-collective conflicts that affect risk (Makino, *et al*., 2021). According to Neogi, (2021) conflicts arise in series, parallel, and summation systems over which player to incur the cost of risk reduction. Frequently, these systems correspond to the four most common games in game theory, which are the coordination game, the battle of the sexes and the chicken game and the prisoner's dilemma. Networked systems have become a core aspect in running of organizational operations. Therefore, any system breakdown has a direct impact on the organization. Such risks and security threats are the consequences of the information technology revolution, which at the same time has brought immense productivity gains and business opportunities. According to Zhu and Rass, (2018) the current all-encompassing connectivity of today's information systems presents challenges to security. With these challenges, protection using traditional methods has become costly. This means, a new perspective and theoretical foundation are needed to understand security from a strategic and decision-making perspective. Game theory provides a natural framework to track the Risk aspects between the threat and defense. This theory therefore enabled the researcher to dissect the structure of IMES in relation to information security Mitigation measures.

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 Human Resource Capacity for Monitoring & Evaluation 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).

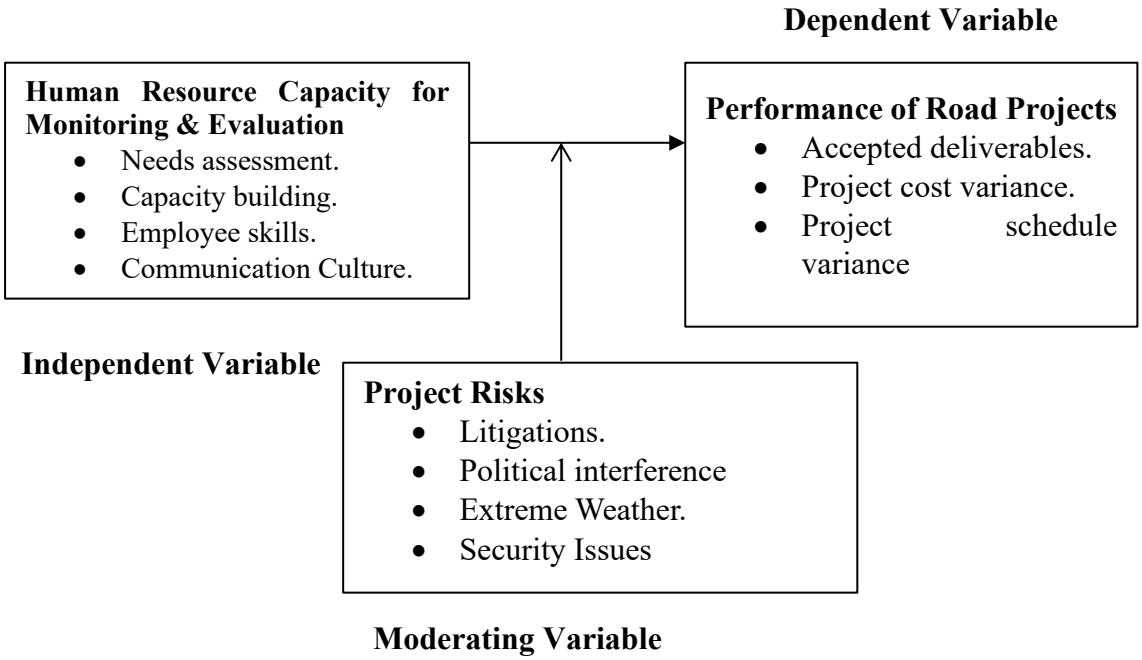

Figure 1: Conceptual Framework

Human Resource Capacity for Monitoring & Evaluation

Human Resource Capacity for Monitoring and Evaluation (M&E) refers to the availability, competence, and effectiveness of personnel responsible for designing, implementing, managing, and utilizing monitoring and evaluation processes within a project or organization (Naseri, Khalil & Sabrah, 2023). It encompasses the technical knowledge, analytical skills, practical experience, and professional qualifications of staff involved in M&E activities, including data collection, performance tracking, impact assessment, and reporting. Needs Assessment is a systematic process used to identify and evaluate the gaps between current conditions and desired outcomes within a project or organization. Needs assessment helps determine what resources, skills, tools, or structural changes are required to improve the effectiveness of M&E systems (Arubayi, Eromafuru & Egbule, 2020). It involves collecting

data from various stakeholders to understand existing capacities, challenges, and priorities. The findings guide decision-makers in allocating resources strategically, ensuring that interventions are targeted and relevant (Ingabire, 2020).

Capacity Building refers to the ongoing process of developing and strengthening the abilities of individuals, teams, and institutions to perform effectively in their roles. Capacity building involves equipping staff with the knowledge, tools, and competencies necessary to carry out tasks such as data collection, analysis, reporting, and performance evaluation (Mbatha, 2021). This may include formal training programs, mentoring, on-the-job learning, workshops, and knowledge-sharing platforms. Employee Skills refer to the specific technical and soft competencies that personnel bring to their roles within an organization or project. This includes skills such as data analysis, report writing, statistical reasoning, use of digital tools, and understanding of M&E frameworks and indicators (Mwaniki & Gathenya, 2020). Soft skills, including critical thinking, communication, problem-solving, and teamwork, are equally important as they influence how effectively employees collaborate and apply their technical knowledge. The presence of skilled employees enhances the reliability and usefulness of monitoring data, enabling timely and evidence-based decision-making (Naseri, Khalil & Sabrah, 2023). Communication Culture refers to the set of norms, practices, and values that govern how information is shared, received, and interpreted within an organization or project team (Mulska, Vasyltsiv & Sabrah, 2023). A strong communication culture supports transparency, inclusiveness, and open dialogue, which are essential for effective M&E. Where multiple stakeholders are involved, clear and consistent communication ensures that M&E findings are accurately understood and acted upon (Moghadam, Amiresmaili & Sadeghi, 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

Human Resource Capacity for Monitoring & Evaluation and Project Performance

Naseri, Khalil and Sabrah (2023) conducted a study on the effect of analysis of human resources capacity for health in Afghanistan. Two questionnaires were used for data collection. One gathered information about the characteristics of HRH in 2020 and the other collected budgetary data for 2017–2020 to analyze budget allocation and expenditure by NGOs on the health workforce. The study found that a rigorous HRH information system is essential for strengthening the health system in a country. The study concluded that there is a gross shortage and large gender imbalance in the Afghanistan health workforce. It is essential to maintain and increase current financial and technical investments to ensure sustainability and enhance the fragile health system in Afghanistan.

Mulska, Vasyltsiv and Sabrah (2023) conducted a study on the effect of conservation of rural Arubayi, Eromafuru and Egbule (2020) conducted a study on the effect of human resource capacity and employee performance: the role of individual absorptive capacity in the Nigerian oil sector. It employed a cross-sectional survey research design. The population size comprised 1,274 employees of the selected firms and sample size of 274 employees. The results revealed that HRD has a positive significant relationship with employee performance. Results also showed that individual absorptive capacity has a positive significant relationship with HRD and employee performance, implying that individual absorptive capacity moderates the relationship between the independent and dependent variables. In conclusion, HRD was found to play a significant role in employee performance in the selected companies in Nigeria.

Ingabire (2020) conducted a study on the effect of human resource capacity building and retention: a challenge for the Rwandan Public Sector. A descriptive quantitative study design was used to collect data on the participants‟ perceived reasons as to why, after training, civil servants are likely to quit the public sector, together with the measures participants feel the Rwanda Public sector could put in place to retain the employees after training, as well as the human resource challenges facing Rwandan public sector. The findings demonstrate that 45% of the respondents do not intend to continue working in the Public Sector after training due to both financial considerations and workplace working conditions. The conclusions shows that certain variables were important in influencing respondents either to leave or remain in the public sector after training

Moris, Alakhras and Eid (2021) conducted a study on the effect of human resources capacity building in accessible tourism in Egypt. Data were collected through semi-structured interviews with different stakeholders related to Accessible Tourism issue. This is followed by a questionnaire to human resources in travel agencies and hotels. The study found that this research contributes to improving the quality of the experience of People with disabilities and seniors in the Egyptian context. The study concluded that the growing market of Accessible Tourism presents a strong challenge to the Egyptian tourism sector to meet different needs in terms of mobilizing the investments in human resources, enhancing policies and engaging both the private and public sectors so as to serve such an important and promising market sector.

Ahmed, Kariuki and Mathu (2024) conducted a study on the effect of health systems' capacity in availability of human resource for health towards implementation of universal health

coverage in Kenya. The study utilized a Convergent-Parallel-Mixed-Methods design, incorporating both quantitative and qualitative approaches. The study sampled diverse population groups and randomly selected health facilities. The study findings highlight crucial challenges in healthcare professional availability and distribution in Kenya. The study concluded that the UHC pilot program has not effectively enhanced healthcare facilities to meet the standards for staffing, calling for additional interventions.

Wairiuko, Nyonje and Omulo (2020) conducted a study on the effect of human resource capacity and adoption of e-government for improved service delivery in Kajiado County, Kenya. Quantitative data was collected through open and closed-ended questionnaires while qualitative data was collected through an interview guide. Regression models and correlation were used to analyze inferential data and test hypotheses. The study found that human resource capacity had a strong positive influence on adoption of E-government. The study concludes that human resource capacity has a significant influence on the adoption of E-government in the County Government of Kajiado

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 human resource capacity for monitoring & evaluation 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 Sample size
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 human resource capacity

for monitoring & evaluation 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.

3.9 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 (human resource capacity for monitoring & evaluation) 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 human resource capacity for monitoring & evaluation 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 Human Resource Capacity for Monitoring & Evaluation,

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

Human Resource Capacity for Monitoring & Evaluation

The first objective of the study was to assess the relationship of IMES human resource capacity for monitoring and evaluation on performance of road projects in Kenya. Table 2 shows that 36.4% of the respondents agreed that Needs assessment has an influence on the performance of road projects to a very large extent, 24.5% indicated to a large extent while 17.3% indicated to a small extent, 13.6% indicated to a medium extent and only 8.2% indicated that Needs assessment has no influence on the performance of road projects. On a five-point scale, the average mean of the responses was 3.64 which implies that majority of the respondents agreed on the statement; however, the answers were varied as shown by the standard deviation of 1.346. On the statement whether "Capacity building has an influence on the performance of road projects", 28.2% of the respondents indicated to a very large extent, 26.4% indicated to a large extent. This observation agrees with the study by Kokkaew (et al., 2022) which sought to

investigate the empirical evidence of the impacts of human resource management on knowledge management on non-financial OP of infrastructure construction firms in Thailand. The study indicated that there is a positive and direct relationship between HRM and KM, between knowledge and non-financial OP. Additionally, 19.1% of the respondents indicated capacity building influence to a medium extent, 16.4% indicated to a small extent. However, 10% of the respondents indicated that Capacity building has no influence on the performance of road projects. The mean score for responses on this statement is 3.46 which imply that majority of the respondents agreed to a moderate extent on the statement; however, the answers were varied as shown by the standard deviation of 1.325.

On the statement whether, Employee skills has an influence on the performance of road projects; 45.5% of the respondents agreed to a large extent, 23.6% agreed to a very large extent while 21.8% agreed to a medium extent and 9.1% indicated that Employee skills has no influence on the performance of road projects. The mean score for the statement was 3.75 which imply that majority of the respondents agreed with the statement; however, the answers were varied as shown by the standard deviation of 1.104. In regards to whether, Communication Culture has an influence on the performance of road projects; 59.1% of the respondents agreed to a large extent, 16.4% agreed to a very large extent while 3.6% agreed to a medium extent, 12.7% agreed to a small extent and 12.7% indicated that Communication culture has no influence on the performance of road projects. The mean score for the statement was 3.63 which imply that majority of the respondents agreed with the statement; however, the answers were varied as shown by the standard deviation of 1.148. The aggregate mean score for this section was 3.62 which imply that IMES human resource capacity for monitoring and evaluation influences the performance of road projects to a large extent.

Table 2: Human Resource Capacity for Monitoring & Evaluation

Statement	No influence	Small extent	Medium extent	Large extent	Very large extent	Mean	Std. Deviation
Needs assessment has an influence on the performance of road projects.	8.2%	17.3%	13.6%	24.5%	36.4 %	3.64	1.346
Capacity building has an influence on the performance of road projects.	10.0%	16.4%	19.1%	26.4%	28.2 %	3.46	1.325
Employee skills has an influence on the performance of road projects.	9.1%	0.0%	21.8%	45.5%	23.6 %	3.75	1.104
Communication culture has an influence on the performance of road projects.	8.2%	12.7%	3.6%	59.1%	16.4 %	3.63	1.148
Aggregate Score	**8.9%**	**11.6%**	**14.5%**	**38.9%**	**26.2 %**	**3.62**	**1.231**

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 human resource capacity for monitoring & evaluation and performance of road projects in Kenya. The subsequent section below present the findings of the moderation effect of project risks.

Project Risks and IMES Human Resource Capacity for Monitoring & Evaluation

The respondents were asked to indicate whether Litigations increases IMES Information Security Mechanism significance on the performance of road projects, 60% of the respondents indicated to a very large extent, 28.2% indicated to a large extent, and 3.6% indicated to a medium extent as shown in Table 3. The mean score for the statement is 4.32 implying that majority of the respondents agreed on the statement; however, the answers were varied as shown by the standard deviation of 1.133. In regards to whether, Litigations increases IMES Information Security Mechanism significance on the performance of road projects; 57.3% of the respondents indicated to a very large extent, 32.7% indicated to a large extent and 1.8% indicated to a medium extent. The mean score for the statement was 4.31 which imply that majority of the respondents agreed with the statement; however, the answers were varied as shown by the standard deviation of 1.115. In addition, 35.5% of the respondents indicated that Extreme weather increases IMES Information Security Mechanism significance on the performance of road projects to a very large extent, 28.2% to a large extent and 19.1% to a medium extent. The mean score for the statement was 3.74 which imply that the respondents agreed with the statement to a large extent. On whether security issues increase IMES Information Security Mechanism significance on the performance of road projects; 25.5% of the respondents indicated to a very large extent, 39.1% indicated to a large extent while 19.1% indicated to a medium extent. The mean score for the statement was 3.65 which imply that majority of the respondents agreed with the statement; however, the answers were varied as shown by the standard deviation of 1.184. The aggregate mean score for this section was 4.01 which imply that project risk and IMES human resource capacity for monitoring and evaluation influences the performance of road projects to a large extent.

Table 3: Project Risks and IMES Human Resource Capacity

Statement	No influence	Small extent	Medium extent	Large extent	Very large extent	Mean	Std. Dev.
Litigations increase IMES Information Security Mechanism significance on the performance of road projects.	8.2%	0.0%	3.6%	28.2%	60.0%	4.32	1.133
Political interference increases IMES Information Security Mechanism significance on the performance of road projects.	8.2%	0.0%	1.8%	32.7%	57.3%	4.31	1.115
Extreme weather increases IMES Information Security Mechanism significance on the performance of road projects.	8.2%	9.1%	19.1%	28.2%	35.5%	3.74	1.261
IMES Information Security Mechanism significance on the performance of road projects.	8.2%	8.2%	19.1%	39.1%	25.5%	3.65	1.184
Aggregate Score	**8.2%**	**4.3%**	**10.9%**	**32.1%**	**44.6%**	**4.01**	**1.173**

Test for Hypothesis One

The first objective of the study was to assess the relationship between IMES Human Resource Capacity and the performance of road projects in Kenya. The corresponding hypothesis was IMES Human Resource Capacity for Monitoring & Evaluation has no significance impact on performance of road projects in Kenya.

A univariate analysis was therefore conducted to test the null hypothesis. From the model summary findings in Table 4, the r-squared for the relationship between human resource capacity and performance of road projects in Kenya was 0.213; this is an indication that at 95% confidence interval, 21.3% variation in performance of road projects in Kenya can be attributed to changes in human resource capacity. Therefore, human resource capacity can be used to explain 21.3% change in performance of road projects in Kenya. However, the remaining 78.7% variation in performance of road projects in Kenya suggests that there are other factors other than human resource capacity that explain performance of road projects in Kenya

Table 4: Model Summary for Human Resource Capacity

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.462[a]	.213	.212	.75632

a. Predictors: (Constant), Human Resource Capacity

The analysis of variance was used to determine whether the regression model is a good fit for the data. 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 (29.18) was greater than the F-critical, from f-distribution tables (3.929) supporting the findings that human resource capacity can be used to predict performance of road projects in Kenya.

Table 5: ANOVA for Human Resource Capacity

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.119	1	18.119	29.18	.000[b]
	Residual	67.017	108	0.621		
	Total	85.136	109			

a. Dependent Variable: performance of road projects in Kenya

b. Predictors: (Constant), human resource capacity

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

$$Y = 0.212 + 0.321 X_3$$

(X_3 is Human Resource Capacity)

The coefficient results showed that the constant had a coefficient of 0.212 suggesting that if human resource capacity was held constant at zero, performance of road projects in Kenya would be at 0.212 units. In addition, results showed that human resource capacity coefficient was 0.321 indicating that a unit increase in human resource capacity would result in a 0.321 unit improvement in performance of road projects in Kenya. It was also noted that the P-value for human resource capacity was 0.000 which is less than the set 0.05 significance level indicating that human resource capacity was significant. Based on these results, the study

rejected the null hypothesis and accepted the alternative that human resource capacity has positive significant influence on performance of road projects in Kenya.

Table 6: Beta Coefficients for Human Resource Capacity

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.212	.056		3.785	.000
	human resource capacity	0.321	0.083	0.322	3.867	0.000

a. Dependent Variable: performance of road projects in Kenya

Test for Hypothesis Five

The second objective of the study was to determine the moderating effect of project risks on the relationship between human resource capacity for monitoring & evaluation 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 seond research hypothesis. Project risks (M) was introduced as the moderating variable.

Ho_2: Project Risks has no significance moderating effect on relationship between IMES human resource capacity for monitoring & evaluation and performance of road projects in Kenya.

The study combined all the variable (human resource capacity for monitoring & evaluation) 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 human resource capacity for monitoring & evaluation (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 human resource capacity for monitoring & evaluation. 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 human resource capacity for monitoring & evaluation, 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), human resource capacity for monitoring & evaluation

b. Predictors: (Constant), human resource capacity for monitoring & evaluation, 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), human resource capacity for monitoring & evaluation
c. Predictors: (Constant), human resource capacity for monitoring & evaluation, 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 human resource capacity for monitoring & evaluation

The findings show that when human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation; M is project risks and X*M is the interaction term between human resource capacity for monitoring & evaluation and project risks.

The findings show that when human resource capacity for monitoring & evaluation, 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 human resource capacity for monitoring & evaluation 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, interaction of human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation 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
	human resource capacity for monitoring & evaluation	.329	.088	.328	3.739	.002
2	(Constant)	0.297	0.079		3.759	.000
	human resource capacity for monitoring & evaluation	.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

Human Resource Capacity and Project Performance

The first null hypothesis test was 'IMES Human Resource Capacity for Monitoring & Evaluation has no significance impact on performance of road projects in Kenya. The study found that human resource capacity is statistically significant in explaining performance of road projects in Kenya. The influence was found to be positive. This means that unit improvement in human resource capacity would lead to an increase in performance of road projects in Kenya. Based on the findings, the study concluded that human resource capacity 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 human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation and project risks (X*M) also had a negative and insignificant effect on performance of road projects in Kenya. It is therefore seen that human resource capacity for monitoring & evaluation 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 human resource capacity for monitoring & evaluation and performance of road projects in Kenya.

Recommendations

The study therefore recommends that the management of road projects in Kenya should invest in continuous professional development and technical training for project personnel at all levels. By equipping engineers, project managers, supervisors, and support staff with up-to-date skills in modern construction techniques, project management tools, and regulatory compliance, the quality and efficiency of project execution are greatly enhanced.

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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