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Influence of Risk Avoidance on Implementation of KeRRA Road Construction Projects in Migori County, Kenya

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Abstract

The purpose of this study was to establish the influence of risk avoidance on implementation of KeRRA road construction projects in Migori County, Kenya. In this study implementation was measured as a function of project accomplishment within the set time lines, meeting quality checks and meeting budgetary requirements. The study adopted the theory of constraints. The target populations included 91 contractors and 450 Constituency Roads Committee Members [CRC]. Through a sampling size formula, a total of 38 contractors and 192 CRC members were selected using simple random sampling technique. Primary data was obtained through questionnaires to contractors and CRC members while, Validity of research instruments was established through piloting, while reliability was tested using test retest method. Inferential statistics of Multiple Linear Regression was applied to determine the influence of risk avoidance on implementation of KeRRA road construction projects by testing the hypothesis for the study. Statistical significance was assessed at 5 percent-level of significance ($p<0.05$). The study established that implementation of road construction projects in Migori County was slightly below average ($M=2.66$, $SD=1.48$). Application of risk avoidance is minimal ($M=2.94$, $SD=1.37$). Risk avoidance strategy accounted for 65.0% of change in implementation of KeRRA road construction projects. When a moderator, stakeholder participation was introduced in the model, it accounted for 82.3% of the change. The study concluded that continuous application of risk avoidance as a risk management strategy at KeRRA immensely boosts implementation of road construction projects. The study recommends that all contractors to familiarize themselves with latest technology in the construction sector so as to be strategically equipped to successfully implement road construction projects in Migori County

Keywords: *Risk Avoidance, Implementation, Road Construction*

1. Introduction

Implementation of roads, by nature, involves many risks and instituting a risk management strategy in road construction projects is always inescapable (Silva & Ricardo, 2020). According to Tyrrel (2020) risk management strategy is an important discipline in project management especially in the road construction industry. A vigorous risk management strategy can help contractors to reduce their exposure to risks and enhance the rate of success of implementation of projects in general (Tyier & Frost, 2021). Sylwia (2022) defines risk management strategy as the trend and scope of an organization to manage uncertainties through alignment of resources within a mystifying environment, to achieve project goals.

In the global arena, it is generally evident that road construction projects are critical for economic growth and poverty reduction since they play a major role in improving competitiveness, enabling trade and integrating countries to the rest of the world (Miller et al., 2021). In the United States of America, targeted efforts to improve implementation of road projects led to significant reduction in highway fatalities through use of risk avoidance. In the United States of America (USA) use of risk avoidance as a risk management strategy has greatly improved the rate of road projects implementation (Roslin, 2019). According to Amjad et al. (2021) in a study on civil engineering assessment of compliance to planned cost and time for implemented municipal roads projects in Palestine, a myriad of factors can potentially affect the process by which strategic plans are turned into organizational action but when the construction firms started to use risk avoidance project implementation success rates started to increase. They further noted that unlike strategy formulation, risk avoidance is often seen as something of a craft, rather than a science as it is more practical and straightforward.

Tserng et al. (2021) suggest that a risk avoidance strategy is the amalgamating element that brings stability and course to activities and decisions in road projects. In the study, it is further argued that for a strategy to be effective, it has to be simple, steady and be of a long term in nature (Segal, 2020). With the increase in competition in the road construction sector, road construction firms need to gauge both their internal and external surroundings where they operate. It is also critical to evaluate the resources accessible as opposed to what are necessary. Effective project implementation is critical in all infrastructure development endeavours and it is also the most challenging, yet the most significant phase of any strategy (Norazian et al., 2021). The notion of infusion of risk management strategies during project implementation has been gaining momentum in the process of human empowerment and development, use of risk avoidance in construction projects in Malaysia has been employed with great success (Shabab et al., 2021).

In its study that focused on project risk management practices of Oromia roads construction Enterprises in Ethiopia, Teshome (2021) has shown that risk avoidance is very crucial in the implementation of the road construction projects and maintenance of the completed roads in the country. This view is supported by Vukawanadi and Mkandawire (2021) who carried out an investigation into risk management practices on road maintenance projects under city roads jurisdiction in Malawi and found out that with an increased emphasis on project risk management systems, specifically risk avoidance, most construction firms have been meeting

the project targets in terms of budget and quality. Contemporary development scholars have been advocating the inclusion of risk management strategies in development projects as they believe the avowed objectives of any project cannot be fully achieved unless risks are avoided. Similarly, referring to the experience of rural development programs, Watema and Tulirinya (2021) in a study of project implementation and risk management in relation to project success in Uganda argues that it is not surprising that, after a comprehensive use of risk avoidance as a risk management strategy, the rate of success of project implementation has been higher.

In his study that focused on the myth of community participation in development in Tanzania, Shah (2020) has affirmed that risk avoidance influences the implementation of various development projects. In the study, five projects were lined up for study. These projects were the infrastructural projects implemented in the water and sanitation sector, transport sector, hospitals, schools and communication infrastructure. The contractors (line workers like project managers and consultants) formed the members who were interviewed. In the study, 85% of the respondents strongly agreed with the idea that the risk management strategy adopted was very critical since they provided a forewarning for the projects, 88% of the respondents opined that the risk avoidance was very crucial in alleviation of risk impact on the overall project implementation success. Indeed, risk avoidance in road projects implementation is not a new thing in Tanzania and Zanzibar Island. The people of Tanzania after independence were motivated by their leaders to adopt a number of models that required every community member to participate in one way or the other in bettering their community by engaging themselves in various community development projects, risk avoidance was a common feature of Government policy on project implementation by then (Shah, 2020).

In Kenya, a Price Waterhouse Coopers [PwC] research that covered 1,644 road projects in six counties in the lake region in 2021, found that in Kakamega County the rate of implementation and completion of road projects was at 82%, Kisumu County was at 75%, Busia County 70%, Kisii County 73%, Nyamira County 67% Homabay County 48% and Migori County 40%. The research further revealed that only three Counties completed their projects with a one hundred percent on time and within budget success rate. In this category Kakamega County again was the leading with a one hundred percent success rate while Migori was last with 48% the rest of the Counties either failed to meet the objectives or did not meet the deadlines set and given budget. In another similar research study KPMG carried out an analysis of road infrastructure in Migori County and the Neighbouring Kisii County in 2021, both KURA and KeRRA roads were included in the study. According to the report, approximately 70% of KeRRA roads have suffered at least one project implementation failure within the year of study, on the other hand Kenya Urban Roads Authority [KURA] road projects implemented in the same region posted 98% completion rate. Major studies conducted and done based on critical success factors of project management have shown that risk management strategies are an important part of project implementation success (KPMG, 2022).

1.1 Statement of the Problem

Many KeRRA road projects in Kenya are faced with a myriad of problems in the course of their implementation, key amongst them include extensive delays which provide fertile ground for litigation, time and cost overruns, shoddy road works and total abandonment. According to KeRRA (2020) report on implementation of selected roads in Migori, road networks in the County is made up of 1,928 kilometres out of which 25% is gravel and 75% is earth as at February 2020, and it is estimated that 65 % of the roads in Migori County are in poor condition. According to a Klynveld Peat Marwick Goerdeler [KPMG] (2020) report, framing a reliable risk management strategy is a challenging task for any road construction firm, however, if the precise strategy has been identified, making that strategy work by engaging it throughout the project ensures implementation success to a large extent. A recent review of road construction projects in Machakos County by National Transport and Safety Authority [NTSA] (2019) revealed that when risk avoidance strategy was instituted by the county Government few road construction projects fell behind implementation schedule. Most research on risk management strategies indicates that several models have been developed in recent years, however the majority present dissimilar results. This dissimilarity is an indication that no consensus has been reached on the essential elements that should constitute a watertight risk management strategy model. The dynamics of road projects implementation has not been adequately addressed as most empirical literature has largely focussed on building constructions with few addressing road constructions. It is against this backdrop that the current study wishes to establish the influence of risk avoidance on implementation of KeRRA road construction projects in Migori County, Kenya.

1.2 Research Objectives

To establish the influence of risk avoidance on implementation of KeRRA road construction projects in Migori County, Kenya.

1.3 Research Hypothesis

Risk avoidance has no significant influence on the implementation of road construction projects in Migori County, Kenya.

1.4 Theoretical foundation

This study was guided by Goldratt's theory of constraints (Goldratt, 1984). The theory states that a system is faced by constraints that limit it from achieving its objectives. Some of these limiting factors emanate from Capital-specifically project funding, time schedules and quality of the final product. In this theory, constraints define the output of a system and the aim of the chief executive officer [CEO] and the top management is to find appropriate ways to minimize the constraints of a system in the organization. In this way, the organization can effectively be able to realize its goals and maximize profit. The theory describes the causes of system constraints and also gives a clue about the best ways to deal with these constraints (Goldratt, 2006).

Organizations operate with the help of a system. A system can be described as an independent and interrelated process which works together in turning inputs into outputs in pursuit of specific goals. The limitation for this system is a constraint which prevents the system from its efforts of achieving organizational goals (Hair, et al. 2021). Both independent

and the dependent variable can draw allusions from this theory as both the County which is the supervising authority and the Contracted road construction firm can both be referred to as organizations which operate with the help of a system. The dependent variable is implementation of road construction projects which has to be judged on the behavior of the indicators of time cost and quality, these three indicators are quite reliant on their own measures of constraints.

The theory of constraints is applicable in this study since budget schedules, timely completion of projects and maintenance of quality are constraints that road contractors have to deal with when implementing road projects. The contractors have to invent ways within their means to overcome these risks, the most potent remedy is risk avoidance (Simpeh et al. 2021). Some of the most common bottlenecks that affect performance of road projects include inadequate capital, congested timelines and inappropriate technical skills which compromise quality. These limitations are majorly responsible for projects not being completed on time and even abandonment of some of the road projects (Wafula, 2020). It is important to note that the delays results in cost overruns and when a project is abandoned, it leads to loss of public funds. More emphasis should be put on the significance of project teams to identify the constraints and establish effective risk management strategy to deal with the identified constraints. It is at this particular stage that risk avoidance come in handy as it can be employed by the project team to mitigate the adverse effects of the challenges faced. The theory of constraints is therefore very crucial for both the independent and dependent variable in this study.

2. Literature Review

Mishra and Adhikari (2020) define avoidance of risk as avoidance of opportunity. That is, rather than taking calculated risks, they skip anything that contains any risk. This, of course, reduces the number of options that are available to achieve stated objectives. In development projects, it often means that the product is weakened by excluding the latest technical advances. A safer, risk-free strategy can lead to an unsuccessful project just as much as a project with risk. Though Razi and Razi and Ramli (2020) maintain that when we talk about risk avoidance, we are talking about qualifying risk, not avoiding it. In view of the differences noted in the definitions above, the definition of risk avoidance adopted for this study is derived from Rezaee et al. (2020) who defines it as the elimination of the risk by removing the cause. It may lead to not doing the activity or doing the activity in a different way. They further state that the project manager may also change or isolate the objective that is in trouble and that some risks can be avoided by an early collection of information by improving communication between stakeholders or by use of expert advice. An example of this approach includes extending the schedule or changing the scope of the project activity. Another example could be a risk which is too hazardous that it may lead to loss of life and is avoided by shutting down the project altogether. This definition is considered appropriate because it gives the definition from the context of construction projects sector which encompasses road construction projects.

Zidane and Andersen (2020) studied delay factors in road construction projects in France and argued that the most important process in risk management consists of trying to attach a reasonable estimate of the likelihood of each of the risk events occurring to determine whether to avoid it after all. Both correlation and regression analysis were used to estimate the scale and nature of the avoidance relationship. The first research objective sought to examine the effect of risk avoidance on project performance. The findings revealed that

risk avoidance had a positive and significant effect on project performance as indicated by p-value = .559; Sig value = .000 < 0.005. A risk impact matrix can be constructed for this purpose. The risk matrix reflects all identified project risks, each prioritized according to the probability of its occurrence, along with the potential consequences for the project, the project team, or the sponsoring organization should the worst come to pass. Probability combined with consequences provides a sense of overall risk impact. With such prioritization scheme, the project team is better able to focus their attention where their energy can do the most good. After a project team has worked through and completed a detailed matrix, it is better equipped to recognize the sorts of risks to which the project is subject and the 'criticality' of each of those risks in terms of their potential impact on project implementation (Shabbab et al., 2021). Clearly, the types of risks that are most likely to be avoided are those that the project team classifies as having both high likelihood of occurring (probability) and high potential for harming the project (Impact). Risks that fall into this category require a detailed contingency planning in order to adequately protect the project development cycle (Keller & Shrar, 2021). These studies show the need for risk avoidance but failed to be clear and specific on the indicators of risk avoidance.

According to Adeyele and Osemene, (2020) time overruns on construction projects is directly caused by: quality problems; low productivity; improper construction methods; poor communication between involved parties; delayed payments in completed contracts; poor site management and inadequate supervision. In view of the findings, a best practice system for risk management in road construction projects in Nigeria has been developed with an implementation guide to help contractors to successfully implement risk management on their construction projects. Suitable risk responses, also in the form of recommendations have been identified. The strategies include actions to be taken to respond to risks based on their perceived significance or acceptability as well as some positive risk mitigation responses, such as exploiting, sharing, enhancing and accepting, and other negative risk responses, such as avoidance, transfer and acceptance (Osuizugbo, 2020). This study focused more on the negative risk factors, causes and their relationships on general construction projects, there is need for a study that focuses on risk avoidance and its influence particularly on road construction implementation since the level of adoption of formal risk management strategies is not looked at either.

Teshome (2021) in Ethiopia discusses deeply the concept of risk and uncertainty and its effect on construction projects management as one of the challenges facing construction industry in developing countries. It concludes by advocating for systematic approach to risk avoidance and uncertainties management as the optimal prerequisite for road construction industries to overcome the associated challenges. In the NGO world implementation outcomes of projects is seen in the context of improving the standard of living of the community (Watema & Tulirinya, 2021). While implementing community projects, Iganga Local Government works hand in hand with several partner NGOs that running different projects in the area. Plan International, one of the NGOs implementing community projects in Iganga designed several projects such as piped water, construction of office blocks for local government, extension of local government workers' houses and latrines. They leveraged on risk avoidance for the success of the projects (Plan International, 2021). These studies addressed the core issue of risk management and underscored the relevance of risk avoidance in project implementation; however they did not link the influence of the risk avoidance measures in uncertainties prevalent at every phase of these projects life cycle hence their results cannot be generalized for road projects which are done by road contractors, at times works are sub-contracted, a gap which the current study explored conclusively.

Banyenzaki (2020) study in Uganda sought to determine the influence of contract management practices on implementation of road construction projects disagrees with the above notion and states that the main challenge to implementation of road construction projects is risk and uncertainty that project faces, due to evolving and emerging conditions through the project lifecycles, organizations and environment. He further emphasizes that there is need for an effective and deliberate approach to risks and uncertainties management. Chepkemoi (2021) study in Machakos County noted that only 20.8 per cent of the projects in Kenya were implemented on time and within budget, while 79.2 per cent exhibited some form of failure. According to the study, the major causes of failures were insufficient implementing capacity, poor project management, weak project design and political interference. In order to sustainably implement infrastructure projects, it is necessary that the construction industry build sufficient capacity to undertake the projects to ensure timely, quality and cost effective implementation of these development projects (Omondi & Muchelule, 2022). All these studies, though generally concur that risk avoidance is crucial in project implementation, they, however, have failed to specify if the inclusion of this aspect of risk management strategy gives purely positive results.

Ombati, (2020) in another study which sought to find out the influence of risk management practices on implementation of roads construction projects in the North Rift Region of Kenya, discovered that there had been no clearly written down Risk Management Policy, although there were a number of properly laid down procedures in dealing with a number of activities which in a way mitigates against risks. The research also found out that there was laxity in the implementation and adherence to set procedures and that staff were not fully oriented on their appointment regarding conditions of service, risk management policy among others which affected the delivery of organizational goals. Ombati (2020) report therefore recommended a quick process towards ratifying and adopting a risk management strategy policy, to review some procedures, emphasize on the need to follow the procedures and create an office dedicated to risk management. These studies did not interrogate the influence of risk avoidance on the overall road project implementation. It is with this in mind that the current study sought to evaluate the influence of risk avoidance as a course of action which funding agencies involved in road construction sector may undertake to ensure successful implementation of road projects.

Simiyu (2020) study of KeRRA roads in the devolved units in Kenya observed that these risk factors ought to be recognized before project implementation, from the conception phase. The findings of the two studies revealed that risks are important in projects but did not highlight on how their use in construction projects can turn around the current shortcomings in the construction industry which is the key focus of the current study. Ochenge (2021) explored project management practices and implementation of road infrastructure projects done by local firms in the lake basin region of Kenya. The study area encompassed Migori, Homabay, Siaya, Kisumu, Kisii and Nyamira. The study employed both the descriptive and explanatory research design based on a survey. The target population comprised of 41 road infrastructure projects in the Lake Basin Region constructed by local firms between 2011 and 2016. The study targeted 95 respondents who comprised of project managers, project contractors, monitoring and evaluation officials from the government and elected local leaders. A semi structured questionnaire was used to collect primary data. Quantitative data was analyzed using both descriptive and inferential statistics. Multiple regression analysis was used to determine the effect of the project management practices on the implementation of road projects constructed by local firms. The results indicated that project resource mobilization, project monitoring and control; group dynamics management and project risks management had significant effects on the implementation of road infrastructure projects. The area of study is too

extensive and its results may not mirror the exact situation in Migori in particular. This informed the decision to narrow down the study to a particular county for a more comprehensive analysis.

3. Methodology

In this study Concurrent triangulation research design was employed. A research design is the plan or the overall strategy for conducting research (Segal, 2020). Concurrent triangulation method involves converging or merging quantitative and qualitative data in order to provide an all-inclusive analysis of the research problem. In this design, the investigator collects both forms of data at the same time and then integrates the information in the interpretation of the overall results (Creswell, 2023). This can be diagrammatically represented as shown in Figure 1.

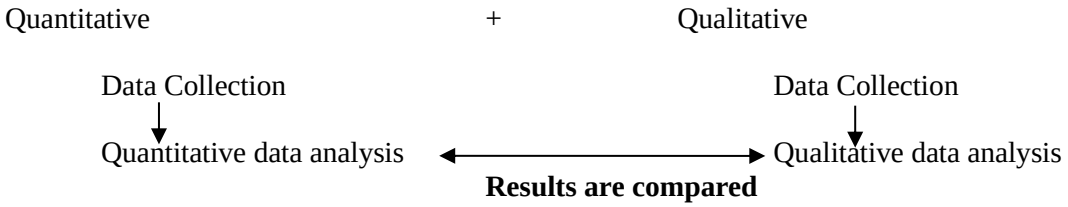

Fig 1: Concurrent Triangulation

Source: Creswell & Creswell (2023)

Data for this study was collected through use of a questionnaire and an interview schedule. These two data sets were then analysed and compared to determine convergence or divergence.

The study targeted a population of 541 individuals, including 91 contractors (50 main contractors and 41 subcontractors) who were awarded road construction projects in Migori County between 2020 and 2023, as well as 450 Constituency Roads Committee (CRC) members from 50 projects. The sampling employed both probability and non-probability methods, selecting 38 contractors and 192 CRC members using simple random sampling. Data collection involved structured questionnaires for contractors and CRC members and semi-structured interviews for consultant engineers, ensuring confidentiality and voluntary participation. Quantitative data were analyzed using descriptive and inferential statistics via SPSS software, with regression analysis employed to determine the relationship between risk avoidance and project implementation. Results were evaluated at a 95% confidence level, adhering to assumptions of normality and equal variance to explore the influence of independent variables on road construction outcomes.

4. Results

This study sought to examine how risk avoidance strategies are taken into consideration in KeRRA road construction projects in Migori County. Several statements on risk avoidance measured on a Likert scale of five were provided to respondents. The feedback they provided is summarised using descriptive statistics in Table 1.2.

Table 1.2: Risk Avoidance and Implementation of KeRRA Road Construction Projects in Migori County

statements	N	Mean	Std. Deviation
We ensure that all health and safety measures are followed during construction of the road project	229	3.9956	.96199
Efforts have been put in place to minimise occurrence of accidents by project workers and other stakeholders during roads construction	229	4.0873	1.19988
Alternative plans on any health incident have been developed prior to project commencement to forestall incidents that may cause delays in the construction project	229	3.8428	1.34807
All contracted workers are provided with prior training and awareness before embarking on project works	229	1.8908	1.54220
There are many refresher courses undertaken by stakeholders involved in the roads sector	229	1.7205	1.34444
The contractor uses learned modern technological methods of road construction to eliminate wastage and maximise on project resources	229	2.6376	1.32605
The road construction work plan and quality standards is followed to the latter and reduces chances of incidents of substandard works	229	2.1485	1.59075
Regular inspection of quality supplies is done to make sure that no major issues on quality arise that could delay road construction work	229	3.5284	1.53478
Suppliers previous record is one of the vetting processes followed during pre-qualification to ensure that products supplied during road construction are of high quality	229	2.6157	1.53923
Valid N (Listwise)	**229**	**2.9408**	**1.3764**

Source: Field Data (2023)

Statistics in table 1.2 indicate that most respondents agree (*M*=3.99, *SD*=0.96) that they make sure that all health and safety measures are followed during road construction processes in order to avoid risks. If health and safety measures are not followed, it might result to injuries, deaths, disabilities to the workers, residents and also increased legal costs for the agencies involved in road construction. Hence making sure that occupational, health and safety measures are followed helps to avoid the above mentioned risks.

Respondents also agree (*M*=4.08, *SD*=1.19) that efforts have been put in place to minimise occurrence of accidents by all stakeholders during road construction. As mentioned above, if all measures pertaining to safety are adhered to and followed by all parties, incidents of accidents will be greatly minimised hence effective implementation of KeRRA road construction projects. It is also established that most respondents agree (*M*=3.84, *SD*=1.34) that alternative plans on any health incidents have been developed before road projects commencement to address incidents which in one way or another might delay road construction. This suggests that in case an accident occurs during road construction, appropriate measures and remedial actions are already in place to take care of the victim while also ensuring that work progress is not interrupted.

When asked as to whether all contracted workers are given prior training and awareness of risks before embarking on road construction, many disagreed (*M*=1.89, *SD*=1.54) with the statement. This means that training and awareness on risks associated with road construction projects is not provided to all workers involved in KeRRA projects in Migori, which puts their lives at risk in case of accidents. Training also helps construction workers to be aware of ways of responding to risk if it occurs during road construction. The same can be equated with findings on refresher courses being offered where many strongly disagree (*M*=1.72, *SD*=1.34) with the statement.

Aside from the road construction workers, statistics reveal that refresher training and awareness programmes for KeRRA road projects stakeholders is not provided. This means that many stakeholders are not conversant with current measures of avoiding risks during road construction. The respondents are somehow undecided (*M*=2.63, *SD*=1.32) on the statement that the road project contractors utilize modern technological systems of road construction to eliminate wastage and maximise effective resource utilisation. This means that half of the contractors have embraced modern methods of road construction that are cost effective while others use the unconventional or outdated methods which are associated with high wastage of resources. The wastage of resources increases the costs of road construction which is passed on to members of the public.

Asked whether road construction work plan and quality standards are followed to the latter to reduce risk incidents occurring, most of the respondents disagree (*M*=2.14, *SD*=1.59). This means that a lot of substandard road works are done because the parties involved in road construction processes do not follow set quality standards during project execution. As is also revealed at the beginning, most respondents agree (*M*=3.52, *SD*=1.53) that there is regular inspection of road construction materials supply to ensure that issues of quality are adhered to. Ensuring that the road construction adheres to quality standards and set specifications is critical to the longevity and safety of road infrastructure. Inadequate quality control leads to maintenance issues and increased costs over time. Therefore, project stakeholders normally undertake regular inspection to ensure that quality of materials is up to the standards and henceforth helps to avoid risks associated with supply of substandard materials for KeRRA road construction projects.

As a way of ensuring that previous risks are avoided, most respondents disagree (*M*=2.61, *SD*=1.53) that suppliers' previous record is checked during vetting process that is pre-qualification, to ensure that the products they supply are of high quality. The reasons for them to disagree with the response is because different contractors are also suppliers of the materials and therefore what they normally check is contractors previous experience as a yardstick of determining their capacity to implement new project and not suppliers since they are not party to the contract with KeRRA.

Composite data show that most respondents appear to agree and disagree (*M*=2.94, *SD*=1.37) on risks avoidance strategies in implementation of KeRRA road projects in Migori county. This suggests that risk avoidance strategies are not applied across the board in all KeRRA road construction projects and, therefore, incidents of risks are evident during the process of road construction.

4.1 Risk Avoidance and Implementation of KeRRA Road Construction Projects in Migori County

In any construction project, it is allowed that technical plans and costs are reviewed to ensure that risks are avoided. This means that a contractor or the supervision engineer can advise the implementing agencies to avoid situations, locations and events which may result to risk occurrence by exploring alternative options available in advance. Several statements on risk avoidance measured on a Likert scale of five were provided to respondents. The feedback they provided is summarised using descriptive statistics in Table 1.3.

Table 1.3: Risk Avoidance and Implementation of KeRRA Road Construction Projects in Migori County

statements	N	Mean	Std. Deviation
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Alternative plans on any health incident have been developed prior to project commencement to forestall incidents that may cause delays in the construction project	229	3.8428	1.34807
All contracted workers are provided with prior training and awareness before embarking on project works	229	1.8908	1.54220
There are many refresher courses undertaken by stakeholders involved in the roads sector	229	1.7205	1.34444
The contractor uses learned modern technological methods of road construction to eliminate wastage and maximise on project resources	229	2.6376	1.32605
The road construction work plan and quality standards is followed to the latter and reduces chances of incidents of substandard works	229	2.1485	1.59075
Regular inspection of quality supplies is done to make sure that no major issues on quality arise that could delay road construction work	229	3.5284	1.53478
Suppliers previous record is one of the vetting processes followed during pre-qualification to ensure that products supplied during road construction are of high quality	229	2.6157	1.53923
Valid N (Listwise)	**229**	**2.9408**	**1.3764**

Source: Field Data (2023)

Statistics in table 1.3 indicate that most respondents agree (*M*=3.99, *SD*=0.96) that they make sure that all health and safety measures are followed during road construction processes in order to avoid risks. If health and safety measures are not followed, it might result to injuries, deaths, disabilities to the workers, residents and also increased legal costs for the agencies involved in road construction. Hence making sure that occupational, health and safety measures are followed helps to avoid the above mentioned risks.

Respondents also agree (*M*=4.08, *SD*=1.19) that efforts have been put in place to minimise occurrence of accidents by all stakeholders during road construction. As

mentioned above, if all measures pertaining to safety are adhered to and followed by all parties, incidents of accidents will be greatly minimised hence effective implementation of KeRRA road construction projects. It is also established that most respondents agree (*M*=3.84, *SD*=1.34) that alternative plans on any health incidents have been developed before road projects commencement to address incidents which in one way or another might delay road construction. This suggests that in case an accident occurs during road construction, appropriate measures and remedial actions are already in place to take care of the victim while also ensuring that work progress is not interrupted.

When asked as to whether all contracted workers are given prior training and awareness of risks before embarking on road construction, many disagreed (*M*=1.89, *SD*=1.54) with the statement. This means that training and awareness on risks associated with road construction projects is not provided to all workers involved in KeRRA projects in Migori, which puts their lives at risk in case of accidents. Training also helps construction workers to be aware of ways of responding to risk if it occurs during road construction. The same can be equated with findings on refresher courses being offered where many strongly disagree (*M*=1.72, *SD*=1.34) with the statement.

Aside from the road construction workers, statistics reveal that refresher training and awareness programmes for KeRRA road projects stakeholders is not provided. This means that many stakeholders are not conversant with current measures of avoiding risks during road construction. The respondents are somehow undecided (*M*=2.63, *SD*=1.32) on the statement that the road project contractors utilize modern technological systems of road construction to eliminate wastage and maximise effective resource utilisation. This means that half of the contractors have embraced modern methods of road construction that are cost effective while others use the unconventional or outdated methods which are associated with high wastage of resources. The wastage of resources increases the costs of road construction which is passed on to members of the public.

Asked whether road construction work plan and quality standards are followed to the latter to reduce risk incidents occurring, most of the respondents disagree (*M*=2.14, *SD*=1.59). This means that a lot of substandard road works are done because the parties involved in road construction processes do not follow set quality standards during project execution. As is also revealed at the beginning, most respondents agree (*M*=3.52, *SD*=1.53) that there is regular inspection of road construction materials supply to ensure that issues of quality are adhered to. Ensuring that the road construction adheres to quality standards and set specifications is critical to the longevity and safety of road infrastructure. Inadequate quality control leads to maintenance issues and increased costs over time. Therefore, project stakeholders normally undertake regular inspection to ensure that quality of materials is up to the standards and henceforth helps to avoid risks associated with supply of substandard materials for KeRRA road construction projects.

As a way of ensuring that previous risks are avoided, most respondents disagree (*M*=2.61, *SD*=1.53) that suppliers' previous record is checked during vetting process that is pre-qualification, to ensure that the products they supply are of high quality. The reasons for them to disagree with the response is because different contractors are also suppliers of the materials and therefore what they normally check is contractors previous experience as a yardstick of determining their capacity to implement new project and not suppliers

since they are not party to the contract with KeRRA.

Composite data show that most respondents appear to agree and disagree (*M*=2.94, *SD*=1.37) on risks avoidance strategies in implementation of KeRRA road projects in Migori county. This suggests that risk avoidance strategies are not applied across the board in all KeRRA road construction projects and, therefore, incidents of risks are evident during the process of road construction.

The empirical analysis also involved carrying out the following diagnostic tests:

H_0: Risk avoidance has no significant influence on implementation of KeRRA road construction projects in Migori County.

Implementation of KeRRA road construction projects = f (risk avoidance, random error)

$y=\beta_{0+}$ RAV $_{+}\varepsilon$

The equation involves establishing the significance of effects independent variable; risk acceptance, risk avoidance, on the implementation of road projects. Here, the combined interaction effect and the moderator variable were assumed and kept constant (not included in the model). The model summary results are provided in Table 1.4.

Table 1. 4: Model Summary on RAV and IP

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.840[a]	.705	.700	.54792717

a. Predictors: (Constant), RAV

Source: Field Data (2023)

Results in Table 1.4 reveal that the correlation coefficient R is 0.840 which is quite high. The adjusted R-squared is 0.700 which means that 70.0% of changes in the implementation of KeRRA road construction projects can be explained by the risk avoidance strategy at different levels included in equation. The remaining 30.0% can be accounted for by other variables that were not included in the model. To establish the fitness of the model, an f-test was conducted and results presented in Table 1.5.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	160.750	4	40.187	133.858	.000[a]
	Residual	67.250	224	.300		
	Total	228.000	228			

a. Predictors: (Constant), RAV,
b. Dependent Variable: IP

Source: Field Data (2023)

According to the findings, there are 228 (N-1) total degrees of freedoms. With four predictors, the regression effect has four degrees of freedom. The prediction model is statistically significant, F (4, 224) =133.858, p=0.001). This means that the independent variable included in the model have a strong collective influence on the dependent variable. In other words, the model explains a significant portion of the variance in the dependent variable. There is therefore sufficient evidence to conclude that the regression model fits the data better than the model with no predictor variables. Hence, the predictor variables in the model actually improve the fit of the model. Further, Table 1.6 presents the regression coefficient results for the model.

Table 1.6 Coefficientsa of RAV and IP

Model		Coefficients B	Std. Error	t	Sig.
1	(Constant)	8.727	.036	.000	1.000
	RAV	.764	.052	14.647	.000

a. Dependent Variable: IP

Source: Field Data (2023)

The multiple linear regression function can be written as:

$y = 8.727 + 0.764\text{RAV}\ldots$

The correlation coefficients of risk management strategies are positive and significant for; risk avoidance (β =0.764, |t| =14.647, p=0.001). It can be seen that risk avoidance strategies have significant effects (|t|> $|t_{05}|$) on the implementation of KeRRA road construction projects. It can, therefore, be concluded that risk avoidance strategy predictors improves roads projects implementation in Migori County, Kenya.

5. Discussions

Odimabo (2020) in a study of risk management system in building and construction projects in Nigeria found out that 70.7% of construction risks can be prevented through risk avoidance. Some of the risk avoidance strategies found to be regularly employed in implementation of KeRRA road construction projects in Migori county involved minimisation of accidents occurrence by ensuring that all aspects of occupational safety and health standards are completely adhered to. The observance of health and safety measures is key in avoiding risks associated with workplace injuries which may bring additional costs in terms of treatment and compensation. In agreement to the study findings, Gain and Mishra (2021) found out that compliance with safety health and environmental standards implementation had significant impact on road construction success in India. Risk may also occur even after following occupational safety and health standard guidelines and, therefore, the respondents indicated that they ensured there are alternative plans in place to address health incidents before and during project implementation period. Regular quality inspection is also done to ensure that risks associated with sub-standard works and supplies are avoided during KeRRA road construction projects implementation in Migori County.

In summary, the current study revealed that risk avoidance strategies are averagely implemented in KeRRA road construction projects in the area. It found out that there is significant relationship (β=0.339, |t|=6.047, p=0.001) between risk avoidance strategies and implementation of KeRRA road projects in Migori County. This suggests that continued use of risk avoidance measures enhances implementation of KeRRA road construction projects. Even when the moderator variable, which is stakeholder participation is introduced, the relationship remains significant (p<0.05) leading to the rejection of the fourth null hypothesis. The study finding is in conformity with Tserng et al. (2021) in a study on developing a risk management process for infrastructure projects in Taiwan. The study argues that risk avoidance influences cost deviations, which eventually affect the different stages of construction projects, with direct or indirect consequences for all processes in the system. Such deviations are, in most cases, the most reliable indicator to evaluate the success, or even the failure of the projects. They argue further that basic

project risk avoidance strategy processes do control the unexpected issues that might affect the level of success in the project phase, or the whole project. Project risk management has become one of the most important aspects of project management, so much so that significant international organizations have issued standards on it. The findings also concur with Silva (2020) study conducted on risk management in road construction works in USA; the study was quantitative and used the fuzzy analytic hierarchy process and the ideal and anti-ideal concept. It is, therefore, necessary to control costs, making estimates as accurate as possible or alternatively avoid the risky undertakings, to ensure both the quality requirements and the deadlines of such projects are met.

Similarly, Tabachnick et al. (2020) study on the attitude of large construction firms in USA was also in agreement. The study employed descriptive survey with a sample size of 358 obtained through stratification from a target population of 3,336. Closed ended questionnaires were used for data collection and subjected to quantitative analysis. The results of this study concurred with those of the current study as they showed that the risk factors rated as intolerable should be avoided and/or given more attention. The intolerable risk factors are mainly related to personnel, management, and site conditions. The personnel risk factors could be avoided by allowing more supervision to the site activities by a different entity. Increasing the number of site supervisors should help decrease the number of accidents during project life. According to the study, the risk factors associated with management and site conditions should be avoided by maintaining an effective safety program that focuses on overall safety, equipment safety, safety manuals and literature. The risk responses should be reviewed periodically throughout the project life cycle to make sure the desirable results are achieved.

In contrast, findings by Norazian et al. (2021) suggest that risk avoidance is not important. They argue that risk avoidance is still a fresh concept in the Malaysian road construction industry and is rarely used by the established contractors yet the Malaysian infrastructure is one of the finest in the world. Moreover, Zultakiyuddin et al. (2020) supports the view that Malaysian road construction practitioners should be more proactive in practicing risk management strategies. To further cement this view, Roshana and Akintoye (2020) confirm that risk avoidance is yet a rhetorical subject in the Malaysian construction industry due to a lack of knowledge and a clear policy. They further state that, road contractors are very unwilling to apply risk management tools to reduce the operational expenses of projects. Their understanding on the advantages and impact of risk avoidance is rather low. These contrasting study findings are further confirmed by Norazian et al. (2021) while observing that risk avoidance is practiced by companies with high reputation, stable financial status and dealing in large construction projects, and also that, the number of practitioners in Malaysia are only a few.

In another contrasting study, Ombati, (2020) sought to find out the influence of risk management practices on implementation of road construction projects in the North Rift Region of Kenya. The study results are inconsistent with the current study finding as it revealed that there had been no clearly written down risk avoidance policy in most projects undertaken in the North Rift region of Kenya. Although there are a number of properly laid down procedures in dealing with uncertainties which in a way mitigate against some

perceived risks, most contractors do ignore them. The study also found out that there was laxity in the implementation and adherence to set procedures and that staff were not fully orientated on their appointment regarding conditions of service, risk avoidance policy among others which affected the delivery of organization goals, especially project implementation success. Ombati (2020) recommends a quick process toward ratifying and adopting a robust risk management strategy policy, review of some procedures and emphasis on the need to follow procedures and create an office dedicated to risk management within the oversight bodies.

6. Conclusion and Recommendations

6.1 Conclusion

The study concluded that risk avoidance strategies are implemented at an average level across various road projects in the County. Some of the risk avoidance strategies that were applied included; putting in place measures to minimise occurrence of accidents in project sites, ensuring that occupational health and safety measures are strictly followed and having alternative plans on any health incidents which have been developed prior to commencement of the project in order to forestall incidents that may cause delays in road projects construction. There is a significant influence ($p<0.05$) of risk avoidance strategies on implementation of KeRRA road construction projects in Migori County. This result suggests that continuous application of risk avoidance strategies at KeRRA could enhance the implementation of roads projects.

6.2 Recommendations

To ensure effective application of risk avoidance strategies during construction of roads, there is need for all contractors to familiarize themselves with latest technology in the construction sector so as to be strategically equipped for successful implementation of road projects in Migori County. There is also need for all the stakeholders involved in the roads construction sector especially CRC members and the target beneficiaries to attend regular refresher courses to enable them perform supervisory and oversight roles in all road projects well. KeRRA ought to ensure that all firms awarded contracts to construct roads engage staff possessing the right qualifications and appropriate training to ensure timely road project implementation and with the right quality.

6.3 Suggestions for Further Research

A study on the environmental impacts of KeRRA road construction projects including land denudation, waterway contamination and biodiversity loss. There is also need to explore sustainable road construction practices that may minimize resulting negative impacts.

References

Amjad, I., Reema, B., & Sameer, A. (2021). Civil Engineering Assessment of compliance to planned cost and time for implemented municipal roads projects in Palestine. Available online at www.sciencedirect.com

Anna, C.C. & Sabrina G. C. R. (2020). 'Choosing project risk management techniques. A theoretical framework', *Journal of Risk Research 18,* (2).

Banyenzaki, M. (2020). Contract Management Practices and Implementation of the Road Construction Projects in Wakiso District – Uganda.

Chepkemoi, J. (2021). Influence of Project Management Skills on Implementation of road

projects in Machakos County, Kenya. M.A. Project, University of Nairobi.
Creswell, J.W. (2023). Research design: Qualitative, quantitative, and mixed methods approach (3rd Ed.). Thousand Oaks: Sage.
Creswell, J.W., & Plano Clark, V.L. (2020). Designing and conducting mixed methods research (2nd Ed.). Thousand Oaks: Sage.
Gain, H. & Mishra, A.K. (2021). "Impact of Risk Management Practice on Success of Road Construction Project", *International Social Mentality and Researcher Thinkers Journal, 7*(54), 3467 - 3475.
Goldratt, E.M. (1984). Critical Chain, Great Barrington, MA: North River Press, 0-88427-153-6
Goldratt, E.M. (2006). The Haystack Syndrome, Croton - On - Hudson, New York: North River Press.
Gujarati, D. (2020). Basic Econometrics (4th Ed.). New Delhi DN: *McGraw Hill.*
Hair, J. F., Tomas, M. H., Christian, M. R.,Marko, S., Nicholas, P. D & Soumya, R. (2021). Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R.. A Workbook. More information about this series at http://www.springer.com/series/16374
Kazemi, A., Kim, E.-S. & Kazemi, M.H. (2021). "Identifying and prioritizing delay factors in Iran's oil construction projects", *International Journal of Energy Sector Management, 15*(3), 476-495, doi: 10.1108/IJESM-04-2020-0006.
Keller, G. & Shrar, J. (2021). *Low Volume Roads Engineering - Best Management Practices Field Guide*, USTATED in cooperation with US Forest Service and Conservation Management Institute of Virginia Polytechnic Institute and State University.
KeNHA (2020). Road Projects in Kenya. Retrieved from http://www.kenha.co.ke#
Kenya Rural Roads Authority (KeRRA) (2020). Migori Region/County Routine maintenance of selected roads. Available at: https://kerra.go.ke/index.php
Kenya Urban Roads Authority (KURA) (2021). The state of Kenyan Urban Roads. Available at : www.kura.go.ke
KPMG, (2020). Global business and infrastructure in the developing countries in the decline. Kpmg.com/xx/en/media/press release.html
Miller, C., Packham, G. & Thomas, B. (2021). '"Harmonization between main contractors and subcontractors: a prerequisite for lean construction?" *Journal of Construction Research, 3*(1), 67-82.
Mishra A. K. & Adhikari R. (2020). Urban Road Construction Risk Management. Available at: *https://www.researchgate.net/Urban*
Morgan, D.L. (2020). Integrating qualitative and quantitative methods: A Pragmatic approach. Thousand Oaks: Sage
Norazian, M. Y., Hamimah, A., Ahmand, F. O. & Kamaruzaman, J. (2021). "Clients' perspectives of risk management practice in Malaysian construction industry," *Journal of Politics and Law, 1*(3), 121 – 130.
Ochenge, M. D. (2021). Project management practices and implementation of road infrastructure projects done by local firms in the lake basin region, Kenya. D.Phil Thesis, Kenyatta University.
Odimabo, O. O. (2020). Risk management system to guide building construction projects' in developing countries: a case study of Nigeria. D.Phil Thesis University of Wolverhampton.
Okema, J.E. (2020). Risk and Uncertainty Management of Projects: Challenges of construction industry.
Ombati, R. M. (2020). Influence of Risk Management Practices on Implementation of Roads Construction Projects: Case of Kenya Urban Roads Authority, North Rift Region, Kenya. *The international journal of humanities & social studies*.

Omondi, V. O. & Muchelule, Y. (2022). Project Risk Management on Performance of Kenya Rural Roads Authority in Siaya County. *International Journal of Social Sciences Management and Entrepreneurship 6*(1):

Osuizugbo, I.C. (2020). Failure Factors Affecting Building Project Success in Nigeria: Design and Construction Phase. *IOSR Journal of Mechanical and Civil Engineering, 16* (1), 01-11.

Plan international. (2021). The 2014 annual audit report of humanitarian, child centred development organization. Plan International.

PMBOK (2020). Construction Extension to A Guide to the Project Management Body of Knowledge. Project Management Institute.

PwC Kenya (2022). Counties outlook: An audit of the state of the development of infrastructure in the Counties. Available at: https://www.pwc.com/gx/en

Qazi, A. & Gaudenzi, B. (2020). 'Supply chain risk management: creating an agenda for future research', *Int. Journal of Engineering Science and Technology, 18* (2), 875 – 891.

Razi, P.Z., Ali, M.I. & Ramli, N.I. (2020). "Ahp-based analysis of the risk assessment delay case study of public road construction project: an empirical study", *Journal of Engineering Science and Technology, 14* (2), 875-891.

Rezaee, M.J., Yousefi, S. & Chakrabortty, R.K. (2020). "Analysing causal relationships between delay factors in construction projects: a case study of Iran", *International Journal of Managing Projects in Business, 14*(2), 32-56.

Roshana, T. & Akintoye, A. (2020). "*Process improvement of construction projects in Malaysia,*" in Proc. 2nd Scottish Conference for Postgraduate Researchers of Built and Natural Environment, Glasgow Caledonian University, 263-273.

Roslin, A.R. (2019). Construction Management Association of America, http:cmaanet.org/choosing-delivery-method.

Segal, T. (2020). Common Methods of Measurement for Investment Risk Management. Available from: https://www.investopedia.com/ask/answers/041415/what-are-some-common-measures-risk-used-riskmanagement.asp

Shabbab, A. A., Bassam, A. T., Wesam, S. A. &Tareq, J. S. (2021). Risk Management Strategies in Construction Organizations. The Open Civil Engineering *Journal Content list* available at: https://opencivilengineeringjournal.com

Silva, J. & Ricardo, B. (2020). Risk management in road construction works - A quantitative analysis of cost deviations from a project owner's standpoint www.ijcab.org/journals

Simiyu J. K. (2020). Challenges of strategy implementation in a devolved government system: A study of Kenya Rural Roads Authority. MBA Project, University of Nairobi.

Simpeh, F., Bamfo-Agyei, E. and Amoah, C. (2021). "Barriers to the implementation of COVID- 19 safety regulations: insight from Ghanaian construction sites", *Journal of Engineering, Design and Technology*.

Sylwia, P. (2022). The evolution of risk management. *The Małopolska School of Economics in Tarnow Research Papers Collection,* 53(1–2), 95–107 DOI: 10.25944/znmwse.2022.01-2.95107.

Szymanski, P. (2020). Risk management in construction projects. Determinants of risk behaviour: effects of perceived risks and risk attitude on farmer's adoption of risk management strategies. *Journal of Risk Research, 19*(1), 56 - 78.

Tabachnick, B.G. & Fidell, L.S. (2020). Using Multivariate Statistics (7 Ed.). Pearson, United States of America.

Teshome, D. G. (2021). Project Risk Management Practice of Oromia Roads Construction Enterprise. An Independent Project Addis Ababa, Ethiopia.

Tserng, P., Cheng, C., Chun-Hung, C. & Yu-Fan, L. (2021). Developing a Risk Management Process for Infrastructure Projects Using IDEF0 Hui-3 sustainability Article

Taiwan.

Tyier, A.H. & Frost, D.T. (2021). Implementation o f a construction industry quality assurance system; *International Journal of Quality and Reliability Management, 10*, 9 -18.

Tyrrel, D. (2020). Implementation based routine maintenance of rural roads by maintenance groups. A guide for communications bureaus. Asian Development Bank. Philippines.

Wafula, E. F. (2020). Factors influencing road projects implementation in Kenya: A case of road contractors in Machakos County. MA Project, University of Nairobi.

Watema, J. & Tulirinya, J. (2021). "Project implementation, risk management practices and project success". *East African Journal of Business and Economics, 3*(1), 36 - 50, doi:10.37284/eajbe.3.1.296.

World Vision Kenya, (2020). The myth and reality of Stakeholder participation in rural development in Kenya. World Vision Agency, Kenya.

Yamane, T. (2023). How to calculate a reliable sample size. UniProject Material.

Yesemin, B. & Dan, C. (2020) Social Research Methods by example, application in the modern world. Routledge 711 Third Avenue, New York, NY 10017

Zidane, Y.J.T. & Andersen, B. (2020). "The top 10 universal delay factors in construction projects", *International Journal of Managing Projects in Business, 11*(3), 53-78.

Zultakiyuddin, A.R., Hamimah, A., & Kamaruzaman, J. (2020). "Legal framework on risk management for design works in Malaysia," *Journal of Politics and Law, 1*(2), 26 - 32.