



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

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ABSTRACT

Implementation of Government of Kenya (KeRRA) road construction projects face high levels of risks, but often these risks are not dealt with adequately, which is reflected in low quality of work as well as cost and time overruns. The purpose of this study was to determine the influence of risk acceptance on implementation of KeRRA road construction projects in Migori County. Implementation was measured as a function of project completion within the set time frame and being within budget. This study was anchored on Risk Management theory which offer a foundation for interrogating the influence of the variables under study. The research philosophy was based on pragmatism. Concurrent triangulation research design was used as it factors in the qualitative and quantitative aspects of research study. The target population for the study consisted of 92 contractors, 459 constituency roads committee members (CRCs) and 2 Consultant Engineers. Through a sampling size formula, a total of 39 contractors and 193 CRC members were selected using simple random sampling technique. Primary data was obtained through self-administered questionnaires to contractors and CRC members. Validity of research instruments was obtained through piloting and expert evaluation while reliability was tested using test retest method. Inferential statistics of Multiple Linear Regression was applied to determine the influence of risk management strategies on implementation of KeRRA road construction projects by testing the hypotheses for the study. Statistical significance was assessed at $p < 0.05$. Qualitative data obtained from the interview schedules was analysed using content analysis. The study found out that risk acceptance accounted for 70.0% of change in implementation of KeRRA road construction projects. The study concluded that risk acceptance influenced implementation of KeRRA road construction projects significantly ($p < 0.05$). The study recommends that there is need for effective system for risk based identification, analysis and management needs to be activated and KeRRA should ensure that all manpower and machinery used in road constructions are insured and properly certified in accordance with occupational health and safety standards policies.

Keywords: Implementation, Risk Acceptance, Road Construction

I. INTRODUCTION

Implementing roads inherently involves various risks, making the establishment of a risk management strategy in road construction projects essential (Silva & Ricardo, 2019). According to Tyrrel (2020) risk management strategy is an important discipline in project management especially the road construction industry. A robust risk management strategy can help contractors to lessen their exposure to risks, and enhance the rate of their project implementation success (Tyier & Frost, 2021). Sylwia (2022) term a risk strategy as the trend and scope of an organization to manage uncertainties over the long run, which achieves advantage for the project by its alignment of resources within a perplexing environment, to meet market needs and achieve project objectives.

Tserng et al. (2021) opined that a risk management strategy is the unifying element that brings consistency and course to activities and decisions in projects, they further note that for a strategy to be effective, it has to be simple, steady and of a long term nature (Segal, 2019). With the increase in competition in the road construction industry, firms need to evaluate both their internal and external environment where they operate. It's also critical to appraise the resources accessible as opposed to what is necessary. Effective implementation is critical in all infrastructure development endeavours and it is also the most challenging, yet the most important phase of any strategy (Norazian et al., 2021).

It is generally evident that road construction projects is vital for economic growth and poverty reduction since it plays a key role in enhancing competitiveness, facilitating 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 reductions in highway fatalities by use of risk management strategies at the planning stage of road construction projects. This resulted in improvement in the road grade from D to A in 2019 (Joao & Batista, 2019). However, forty-two per cent of America's planned major urban highways remain unimplemented, costing the economy an estimated 101 billion dollars in wasted time and fuel annually (Fan et al., 2020). While the conditions have improved in the near term especially in the states where risk acceptance, avoidance and reduction has been practiced, hence federal, state, and local capital investments increased to 91 billion dollars annually in those states, that level of investment is near sufficient though, it is still projected to result in a decline in conditions and implementation rate in the long term especially in states yet to embrace risk management strategies in their road project implementation operations (Keller & Shrar, 2021). Currently, the Federal Highway Administration estimates that 170 billion dollars in capital investment could be needed on an annual basis to significantly kick start the unimplemented road projects hence the need to rope in more road construction firms to embrace risk management strategies (Baierlein, 2019).

In China implementation of Roads and Highway Construction industry has been growing rapidly, driven by China's urbanization, increases in automobile ownership, freight and passenger road transportation turnover volumes hence increasing government investment and involvement of risk management strategies (Shubina et al., 2020). In 2020, industry revenue is expected to amount to 263.2 billion dollars, up 12.1% from 2018. Over the past five years, revenue has been growing at an average annualized rate of 17.0%. The rate of road project implementation has increased twofold from 35% to 74%. The total length of road in China increased from 3.7 million kilometres in 2016 to an estimated 4.3 million kilometres in 2020. Meanwhile, the total length of highway in China rose from 60,300 kilometres to about 108,600 kilometres. By 2019, there were 46 industry enterprises operating 423 establishments and employing 739,696 workers with a payroll of 14.1 billion dollars, however the sector is faced by time and cost overruns (Mishra & Adhikari, 2019).

A study that focused on project risk management practice of Oromia roads construction Enterprise in Ethiopia showed that risk acceptance is very crucial in the implementation of the road projects and maintenance of the completed roads in the country (Teshome, 2021). This view is supported by Vukawanadi and Mkandawire (2021) who carried out an investigation into risk management practices on road maintenance projects under roads jurisdiction in Malawi and found out that with an increased emphasis on project risk management systems, specifically risk acceptance most construction firms have been meeting the project targets in terms of budget, time and quality.

A study by Shah (2020) in Tanzania looked at the myth of community participation in development in Shinyanga and affirmed that risk participation of leaders, farmers, traders and civil servants influences the implementation of various development projects. In this study, respondents were drawn from five projects. 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, other tenets of risk management strategies were also studied, 80% of the respondents strongly agreed with the idea that the risk management strategy adopted was very important since they provided a forewarning for the projects, 87% of the respondents said that the risk transfer was very crucial in alleviation of risk impact on the overall project implementation success. Indeed, risk acceptance in road projects implementation is not a new thing in Tanzania and Zanzibar Island (World Bank, 2021). The Tanzanians after independence were motivated by their leader Mwalimu Julius Nyerere to adopt a number of concepts that compelled every community member to participate in one way or the other in bettering their community by engaging themselves in various community development projects implementation, risk acceptance was a common feature of Government policy by then (Shah, 2020).

In Kenya, a PwC research that covered 1,640 road projects in six counties in the lake region in 2020, found that in Kakamega County the rate of implementation and completion of road projects was at 80%, Kisumu County was at 70%, Busia County 74%, Kisii County 71%, Nyamira County 65% Homabay County 49% and Migori County 43%. Only three Counties completed their projects with a 100% on time and within budget success rate (PwC, 2020). In this category Kakamega County again led with 100% success rate while Migori was last with 49% the rest of the Counties either failed to meet the objectives and/or scope or did not meet the deadlines and 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 Kenya Urban Roads Authority (KURA) and Government of Kenya (KeRRA) roads were included in the study. According to the report, approximately 70% of KeRRA roads had suffered at least one project implementation failure within the year of study, on the other hand KURA road projects implemented had posted 98% completion rate (KPMG, 2022). So, the question is, why do the KeRRA road projects fail? Major studies conducted and done based on critical success factors of project management (Fan et al., 2020; Fapohunda and Stephenson, 2019; Dwivedula, 2019) have shown that risk management strategies are an important part of project implementation success.

The current study was anchored on risk management theory. A review of risk management theory brings this study into perspective as it discusses the assumptions of the theory and its relevance to this study. The theory of risk

management is based on three basic concepts: utility, regression and diversification (Ajupov et al., 2019). This approach was initially recommended by Daniel Bernoulli (1738), resulting in the decision making process where individuals had to pay more attention to the magnitude of the success of project implementation. They referred to implementation as a series of steps taken by responsible organizational agents to plan change process in order to bring out compliance needed to install changes. Construction management, as a field of research, has tended to focus on planning and managing the complex array of activities required in delivering a successful implementation of a construction project, such as a road or building (Odeck, 2021). Successful completion of construction projects is therefore dependent on meeting the expectation of Stakeholder. The area of risk management strategies and its relationship with road construction projects implementation have largely been ignored. It is on this backdrop that this study aimed to establish the influence of Risk acceptance on implementation of KeRRA road construction projects in Migori County, Kenya.

1.1 Statement of the Problem

Klynveld Peat Marwick Goerdeler (KPMG) research consultants 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 study report, approximately 75% of KeRRA roads in Migori County had not been completed. Moreover, 70% of KURA roads also stalled. On the other hand, the study reported that 80% of KeRRA roads in Kisii County were completed and KURA road projects implemented had posted 98% completion rate. According to Government of Kenya (GoK, 2022) Ministry of Transport and Infrastructure report on implementation of selected roads in the devolved unit of Migori, road networks in the county is made up of 1,928 kilometres out of which 25% is gravel and 75% is earth. The report estimated that 69.9 % of the roads in Migori County are in poor condition. A recent report by Kenya Roads Board (2021) in Machakos County revealed that when risk acceptance strategies were put in place by the county government, the rate of KeRRA project implementation recorded a growth of 71.8% and that few road construction projects fell behind implementation schedule when risk acceptance strategy was infused in the planning and execution of the projects. There is need to empirically ascertain the most appropriate risk management strategy to steer road construction projects to successful implementation so as to spur economic growth otherwise there would be continued stagnation of overall economic development in the counties.

Studies on risk management strategies done in other countries (Blok, 2021; Teshome, 2021; Vukawanadi, 2021 & Brabhaharan, 2022) indicate that several models have been developed in recent years; but the majority of these models have produced differing results. This dissimilarity is an indication that no consensus has been reached on the essential elements that should constitute a good 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 vis a vis risk acceptance. Further, extant studies (Hemant, 2022; Kieya, 2020; Omondi & Muchelule, 2022) have largely focused on urban roads, hence the constructs of rural roads has not been adequately addressed, and these studies also ignored the contribution of risk acceptance on the dynamics of rural road project construction. It is against this backdrop that the current study wishes to establish the influence of risk acceptance on implementation of KeRRA road construction projects in Migori County, Kenya.

1.2 Research Objective

To determine the influence of risk acceptance on implementation of KeRRA road construction projects in Migori County;

1.3 Research Hypothesis

H_{01} : Risk acceptance has no significant influence on implementation of KeRRA road construction projects in Migori County.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Risk Management Theory

This research study is based on risk management theory, this is because risk management theory attempts to explain the rationale behind organizations putting in place the right level of controls for all material models supporting their project and decision-making processes for successful project implementation (Kirira et al., 2019). Considering this classification, risk is created by the dynamic change in the economic environment and depends on both, the evolution of external variables - the economy, competitors, industry membership and consumers and the decisions taken internally by the organization (Osman and Kimutai, 2019). Nevertheless, dynamic risk could affect a great number of individuals

and they would believe to be less predictable than static risks, because they do not occur with any extent of regularity. Unlike dynamic, static risks are predictable and would occur with some regularity (Perrow, 2020).

Risk management theory is based on three basic concepts: utility, regression and diversification (Ajupov, et al., 2019). This approach was initially recommended in 1738 by Daniel Bernoulli, resulting in the decision making process where individuals had to pay more attention to the magnitude of the effects of different project outcomes. Secondly, use of regression approach began at the end of the 19th century. Later it was proved that the rule of regression operated in a variety of situations ranging from the calculation of the probability of risks, and ending with the prediction of project cycle fluctuations. Mathematical justification of the risk management strategy was introduced by Markowitz (2020). Markowitz showed the intelligent application of risk strategies such as acceptance, transfer, reduction and avoidance minimises the deviation from the expected rate of project implementation. Risk management is the process of adaptation and its implementation is often aimed at reducing the possibility of adverse effects afflicting projects (Maxcy, 2020).

This theory is relevant in this study as it assists in explaining how the contractors and those providing oversight manage risks they come across during implementation of road construction projects. KeRRA road construction projects are prone to many risks and it is the responsibility of the contractors and Constituency Roads Committee members to find ways of assessing the risks, controlling them as well as strategizing on how to mitigate those risks. Risk management strategies help the contractors and project management committee to mitigate the risks hence enhancing the implementation of road projects. According to (El-Sayegh, 2019), risk management theory is inadequate in explaining implementation of risk controls that can involve externally triggered changes to operations, orders, standing operating procedures and external Stakeholders, hence there is need to infuse other theories. However, the theory has strength on static risks that are not dependable on the evaluation of the competitive environment in which the organization operates but would rest merely on the internal factors of the entity. The results of the risk management strategies can be seen in the successful implementation of rural road construction projects which is the main focus of this study.

2.2 Empirical Review

Schumacher et al. (2019) defines risk acceptance as a method of dealing with the consequences if and when the risk event occurs. Kitsios, Chatzidimitriou and Kamariotou (2022) defines it as accepting the risk, especially when no other suitable risk management strategy is available to eliminate the risk. She further states that Acceptance can be passive or active. Passive acceptance requires no other action except to document the risk and leaving the team to deal with the risks as they occur and in an active acceptance approach, a contingency reserve is designed to recover the losses of time money or resources. These definitions agree that Acceptance is one of the alternatives an organization can adopt in deciding how to address risks; however, they have not given the definitions in the context of projects. In view of this shortcoming, the definition of acceptance adopted for this study is derived from Razi and Ramli (2019) who defines it as when a number of risks present in a project are of a relatively minor nature, and due to the likelihood of their occurrence being so small or the consequences of their impacts so minor, they may be judged acceptable and consequently ignored. In this case the decision to 'do nothing' (Accept) is a reasoned calculation, not the result of inattention or incompetence. Jakowski (2019) reinforces this definition in another study which concluded that in many types of road projects, certain risks are simply part of the equation and must be factored in, for example in the drugs manufacturing industry he details the extraordinary lengths that the Pharmaceutical manufacturers must go to and the high percentage of failures they accept in order to get a small percentage of commercially successful drugs in the market place. Hence, a high degree of commercial risk is embedded in the systems themselves and must be accepted in order to operate in certain projects or industries.

In risk acceptance, the management takes advantage of the positive risks as it happens but not actively pursuing it. It is just like an opportunity coming and being accepted without much pre-planning. Risk acceptance is a key component of robust project management framework (Seyed et al., 2020). El-Sayegh & Mansour (2019) did a study of the risks associated with highway construction projects in the United Arab Emirates (UAE). Thirty-three risks were identified through detailed literature review and categorized into six categories; technical, site, commercial, political, environmental and socioeconomic factors. A questionnaire was developed to solicit the opinion of construction professionals as to the probability and impact of those risks in addition to their proper allocation. Fifty-one questionnaires were completed and analyzed. The priority of each risk was calculated by multiplying the probability with the impact for each risk. The relative importance index (RII) for the risk priority was calculated based on all responses for each risk. The most vital risks were quality and integrity of design, inefficient planning, delays in expropriations, unexpected ground utilities and delays in approvals. Internal project risks were identified to be more significant than external risks due to the political, economic and cultural stability in the UAE and their acceptability had to be weighed. In the mainstream research, the relative importance index (RRI) which was used in analysing the risk priorities is inappropriate for use in risk analysis of such magnitude and especially in road projects, in addition the target population used in the study was rather small for accurate empirical results, in view of the above inconsistencies the

current research study to use both qualitative and quantitative approaches in its analysis for accurate results and the target population used was 553 which is representative enough.

Many researchers (Moshesh et al., 2019; Al-Ajmi & Makinde, 2019) believe that few contractors practice formal risk management systems with analytical approaches such as acceptance in mitigating risks. In their study, the 'human problem' was identified as the initial hindrance for risk management. They mainly used qualitative approach in their study. Furthermore, in examining the impact of projects' characteristics on risk mitigation measures in road construction enterprises, Baloyi and Ozumba (2020) in another study stressed that the time commitment is related to many aspects of risk acceptance and analysis, they too used qualitative approach. In the same way, Fernando et al. (2019) concluded that contractors in the road construction industry irregularly practice formal risk management owing to the projects' just-in-time characteristics. Similarly, Renault et al. (2020) found out that Lack of time and indifference by managers were also identified as significant hindrances to adoption of risk acceptance as a strategy. Shabbab et al. (2021) in another study asserted that the development of a risk management framework is a time-consuming process that is, at times, inconsistent with projects' allocated budgets. Recent research within the context of developing economies indicated that lack of experience, inadequate information, and awareness of risk management processes are the most significant challenges which affect the implementation and practice of risk management in the road construction industry (Jaskowski & Biruk, 2019; Rwelamila, 2020; Firmenich, 2020). Omer and Adeleke (2019) found that the low level of familiarity with techniques and the inability to recognize the benefits of the process were the most influential factors which impact the adoption of risk management strategies by most contractors. Teuma (2019) stated that due to the manpower size of most road construction projects, they mostly suffer from inadequacy of facilities to provide training in risk mitigation methods. In view of the above literature review there was need for an empirical study to determine the level of adoption of risk acceptance as a strategy in risk management in the Kenyan road construction industry. These studies however failed to address the actual place of risk acceptance in project implementation which the current study intend to examine. As opposed to qualitative research design which was adopted in these studies, the current study is both qualitative and quantitative in nature, this was intended to bring out a clear picture of what exist in reality through description of the state of affairs as they are on the ground in implementing road projects in Migori County.

A recent review of road construction projects in Machakos County revealed that when risk management strategies were put in place by the county Government few road construction projects fell behind implementation schedule (Wandiri, 2020). According to the budget policy statement, 2018, Machakos County was allocated 10.5 billion shillings from the county revenue allocation fund in the 2017/2018 financial year. The statement notes that in 2016/2017, the county spent 44% on personnel, 29% on operations and maintenance and 37% on development. The development plan for the 2018/19 financial year for Machakos County states that between 2013 and 2017, over 950 km of roads were graded; over 56 km of roads upgraded to bitumen standards; 1,060 metres of drifts (vented and non-vented) constructed; approximately 365 metres of culverts installed and approximately Ksh. 12.5 million allocated annually per ward for road maintenance and development. Most road construction projects were well implemented when measured against the time taken, cost and quality. For instance, in the KeRRA annual report for 2016/2017, the Tala-Donyo Sabuk road was expected to cover 70 kilometres in length and be completed in 2018 and was at 60.29% completion rate and with only 51.3 kilometres of road length done during the launch year which was the 2016/2017 financial year, the project launch year. This became possible after risk mitigation was done at the planning stages (Wandiri, 2020). This is confirmed by Rambo and Okech (2020) in a study on influence of Risk assessment on implementation of SME projects in Machakos County, the study concluded that risk mitigation at the initial stages of the SME projects would in most instances guarantee good implementation in the undertakings. The study further stated that in this loop, project planning accounts for about 8% of the total work scope while risk acceptance accounted for about 85% of the total work scope and therefore these two practices form a big part of the project implementation success. Though the results may seem similar, these studies were conducted in business settings of SME's world which has a complete different set of operational environment from road construction hence deductions from their findings might be misleading. The current study focused on risk acceptance as a risk management strategy and their influence on KeRRA road project implementation.

Within the lake region of Kenya, Ochenge (2021) carried out a research on effects of project management practices on implementation of road infrastructure projects done by local firms, he discovered that efficient implementation of road infrastructure projects is essential for economic growth and development and that implementation of road infrastructure projects in the Lake Basin Region constructed by local firms is poor in terms of completion of the projects within the budgeted cost, time schedule and attaining the desired quality. One of his objectives was to examine the effect of risk acceptance on implementation of road infrastructure projects by local firms in the Lake Basin region in Kenya. Sule (2021) in another study findings in Kisumu East Sub County hold the view that there is more to successful project outcome than just focusing on the triple dimensions time, cost, and quality and tying them to acceptance and the attending risk mitigation strategies as an aspect of risk management strategy; this opens this area for further research. From literature reviewed, previous studies have found an inconclusive relationship between adoption



of risk management strategies and enhanced construction firm project implementation, this is too general and as such, there is need to narrow the scope to determine how risk management strategies influenced implementation of road construction firms in a selected county in Kenya. The findings also revealed that the risk acceptance as a strategy could have led to enhanced implementation of the road construction projects but did not consider highlighting on how this improved implementation time schedule and minimization of cost overruns which was the key focus of the current study.

According to KeRRA (2020) report on routine maintenance of selected roads in Migori County, in total there are eighty box culverts done, fifty one earth roads spread in all the eight Sub-Counties which have been graded and gravelled and seven crucial roads namely Muhuru bay-Kehancha, Rapogi-Ogwedhi, Rongo- Riosiri, Toku bridge and approach roads, Homabay-Ranen and Uriri-rapogi-Oria roads have been earmarked for upgrading to bitumen standards. Out of these, Rongo-Riosiri is complete, Kuja Bridge and approach roads project was abandoned at Kolenya market, Uriri-rapogi-Oria road is still in progress, and the rest have not started. Indeed the completed roads have improved accessibility to market centres resulting in fresh produce reaching market centres and even ease of access to Public Schools and health centres has gone up (Ochenge, 2021). In Migori County Roads falls in the docket of the Department of Roads, Transport and Public Works. According to the Department, road network in the County is made up of 1,928 kilometres out of which 25% is gravel and 75% is earth as at February 2019 (KeRRA, 2020). Apart from the A1 road that traverses the county and joins Kenya to Tanzania via Isebania town which is done by the National Government through its partners to international standards, the county Government has improved to Bitumen, the Posta – Ombo ring road which is about 4.2 kilometres. The County through the World Bank support has also upgraded to Bitumen 3.2 km in Rongo town and 3.6 km in Awendo town (KeRRA, 2020). According to NTA (2019) some of the roads in Migori County meet set quality standards; however, others are below the standards. This study therefore sought to find the answers as to why some of these roads are below standards and what the difference would be if risk acceptance as a mitigation strategy is employed at the initial phase of the projects.

III. METHODOLOGY

3.1 Research Design

A research design is the plan or the overall strategy for conducting a research (Segal, 2020). Based on the pragmatism philosophical foundation of this study and the diversity of the target population, a concurrent triangulation design is adopted. Concurrent triangulation method is where the researcher converges or merges quantitative and qualitative data in order to provide a comprehensive 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. Triangulation of data is where data are collected through multiple sources to include interviews, observations and document analysis; thereafter, results from qualitative data are compared to the outcomes from quantitative data and merged into the text (Creswell, 2023). This can be diagrammatically represented as shown in Figure 1

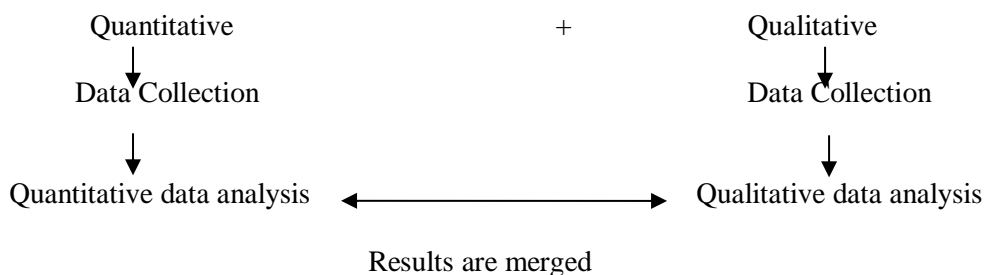


Figure 1

Concurrent Triangulation

Source: Creswell and Creswell (2023)

Data for this study were collected through use of a questionnaire and an interview schedule. These two data sets are then analysed and compared to determine convergence or divergence between the independent and dependent variable and also the moderating role of stakeholder participation on the influence of risk management strategies and implementation of KeRRA road construction projects in Migori County. The results are then merged into the text.

3.2 Target Population

The target population for this study was 551 respondents. Out of this 92 comprised of 51 road contractors and 41 sub-contractors whose construction firms are listed in the Department of Roads, Transport and Public Works register



as having been awarded contracts between 2019 and 2023 in Migori County. Also targeted were sub county roads committee members who normally carry out monitoring of roads projects. There are nine members per project hence, the 51 projects give a total of 459 respondents, and therefore, the accessible target population for the study involved 551 respondents. Most of the road projects targeted for study take between 1 to 5 years to complete hence, the choice of the 5 year period maximum (Republic of Kenya, 2020). According to information obtained from County Public Works Offices in Migori and confirmed from available reports, a total of 300 road contractors were prequalified and registered to perform road works in the county, though only 92 have been awarded contracts within the specified period, 51 of them to work on roads as main contractors and 41 as sub-contractors (CIDP, 2020).

Table 1
Target Population

No	Respondent	No. * Sub Counties	Total
1	Road contractors (companies)	51 Contractors and 41 Subcontractors	92
2	Sub County Roads Committee members	51 projects * 9 members of SBRC	459
	Total		551

3.3 Sample Size and Sampling Procedures

Yesemin and Dan (2020) explain that sampling size is the process of selecting individuals from the target population to act as representatives in a research study. Considering the population of CRC and contractors is high, a sample was selected from the target population; however, consultant engineers were purposively selected to participate in the study. The study employed Yamane (2023) formula for sample size determination. The sample size was calculated based on 5% margin of error/ level of precision and 95% level of confidence. The formula is as follows:

$$n = \frac{N}{1 + N(e^2)}$$

Where,

- n is the desired sample size
 - N is the finite population, which are 551 respondents
 - e is the margin error/ level of precision taken as 0.05
- The formula gives:

$$n = \frac{551}{1 + 551(0.05^2)} = 231.75$$

The breakdown of the sample size per contractors and members of CRC based on their proportion in the population is provided in Table 2 below.

Table 2
Sample Size

No	Respondent	Target	Computations	Sample size
1	Road contractors (companies)	92	92/551*232	39
2	Sub County Roads Committee members	459	459/551*232	193
	Total			232

The respondents were sampled as follows; 39 road contractors, 193 Sub County Road committee members.

3.4 Sampling Procedures

Sampling is the process of choosing a section of the accessible population from which the study is done through use of various techniques (Saunders et al., 2020). The sampling procedure guarantees that the inferences of the study can be generalized to the whole population, which was not selected (Segal, 2020). In selecting respondents for the investigation, probability and non-probability sampling methods were used. Simple random sampling method was applied in selecting Sub County Roads Committee members and KeRRA road contractors. This sampling technique allows each object or element in the sample frame to have an equal chance of being selected based on the proportion of their number in the target population. This design involved identifying a suitable sample frame, deciding on a suitable sample size, choosing the most appropriate sampling method and ensuring that the sample represents the whole population under investigation (Hodges, 2020).

With reference to Table 2, each category was selected. In order to select 39 out of 92 contractors, simple random sampling method was applied to select the respondents through use of lottery technique. This involved writing the contractors codes in sheets of paper (92) and thoroughly mixing the codes after which only 39 selections were made as



representatives of the whole population. The procedure was repeated for CRC members. The advantage of this method is that it allows the researcher to obtain a sample that best represents the entire population under study (Lincoln, 2020). This method ensures that each respondent has equal chance of being selected based on the proportion of their representation in the target population.

IV. FINDINGS & DISCUSSIONS

4.1 Risk Acceptance Practices for KeRRA Roads in Migori County

There are risk acceptance practices that have been acknowledged by respondents and that, their chronic occurrence may have significant impact on road construction projects. Nine statements given on a Likert scale of five were provided to respondents who were expected to indicate how they believed that the risks posed by certain threats have been understood and handled in the construction of KeRRA roads in Migori County. The results are provided in Table 3.

Table 3

Risk Acceptance Practices for KeRRA Road Construction Projects in Migori County

Items	N	Mean	Std. Dev.	Skewness	Kurtosis
We are aware of number of expected risks in this project and measures of controlling them	229	3.9170	1.04173	-1.665	2.472
Sometimes we are aware that a number of risks that may affect the project do happen but we do nothing about them since they are prone to occur with minimal impact	229	2.2140	1.30538	.504	-1.472
We take no action unless the risk is triggered frequently during road construction	229	1.7511	.91482	1.381	1.429
Every party in the contract is fully aware of kinds of risks one is likely to face and are expected to put into consideration insurance for the loses that may occur	229	2.5502	1.38708	-.020	-1.866
KeRRA undertakes some insurance activity (for small risks) to make sure that the road project is properly implemented	229	2.2489	1.02771	.292	-1.065
Appropriate technology is used in monitoring and insurance processes to ensure effective road project construction	229	2.7904	1.44783	.030	-1.508
We are aware of KeRRA recommends use of alternative plans when risks occur in order to ensure proper implementation of road projects	229	3.4803	1.13006	-.880	-.124
We are aware of other alternative ways in which risks are managed	229	3.5371	.98438	-1.468	1.053
We have adequate information on alternative risk identification processes	229	3.1834	1.24305	-.768	-.993
Valid N (Listwise)	229	2.8525	1.1647	-0.2882	-0.2304

Result show that most respondents agreed ($M=3.91$, $SD=1.04$) that they are aware of number of expected risks in roads projects and measures of controlling them. This implies that all road projects being implemented are aware of the risks that they may encounter and put in place appropriate measures to address them in case they occur. However, the respondents disagreed ($M=2.21$, $SD=1.30$) that at times they are aware a number of risks which could affect the roads project but they do not do anything about them because they are likely to occur with minimal impact on the project. This implies that all type of risks are accepted and not considered inconsequential during roads projects implementation.

When asked as to whether they take no action unless the risk is triggered, majority of respondents denied this ($M=1.75$, $SD=0.91$). This suggests that the parties involved in rural roads construction projects take actions on risks that occurs during the implementation process. Findings show that respondents were neutral ($M=2.55$, $SD=1.38$) on the statement that every party in the road contract is fully aware of all types of risks one side is likely to encounter and are expected to put into consideration insurance for the loses that may happen. The standard deviation values are high which suggests that there are areas of the roads contracts that are not clear on the risks the different stakeholders may face when implementing the project and this could result to cost overruns or even delays in the implementation of projects. This means that openness in the contract documents detailing the kinds of risks to be experience during construction is not open to all parties in the contract.

It was also found out that as the implementing agency for rural roads in Migori, respondents disagreed ($M=2.24$, $SD=1.02$) that KeRRA does undertake to cover small risks involved in the projects to ensure that the project is effectively implemented. This means that the burden of risks identified are passed to the contractors who in turn factor it in their contract documents hence increasing the costs of roads projects. Further, study result reveal that respondents

were divided ($M=2.79$, $SD=1.44$) that appropriate technology is used in monitoring and insurance processes to make sure the road project is implemented effectively. This means that technology appears not to have been fully embraced in monitoring of risks associated with rural construction projects in Migori County.

The respondents appeared to agree ($M=3.48$, $SD=1.13$) that they were aware that KeRRA suggests the application of alternative plans when risks happen so as to ensure that roads projects are implemented properly. However, the statistics shows that despite more than half agreeing, there are some who disagree that there are alternative plans that KeRRA recommends to address risks when they occur during road construction projects in Migori County. Further, respondents tended to agree ($M=3.53$, $SD=0.98$) that they are aware of other alternative means in which risks are managed. This means that stakeholders involved in rural construction projects are aware of alternative ways of risk management in KeRRA rural roads projects implementation.

When asked as to whether they had adequate information on alternative risk identification process, respondents appeared neither to agree nor disagree ($M=3.18$, $SD=1.24$). This implies that at least half of the respondents appear to be aware of alternative risks identification process while others do not and may end up suffering the consequences of risks when they occur when implementing road construction projects. On summary, it appears that most respondents appear to show that on average ($M=2.85$, $SD=1.16$), they are aware of the application of risks acceptance aspects in construction of rural roads under KeRRA in Migori County, Kenya. This means that there are risks that are acceptable and therefore not much resources and money are directed to them as a way of managing the risks.

The study discovered that in many KeRRA road projects, CRC and contractors were aware of the number of expected risks and devised methods of controlling them. The understanding of expected risks helped the road project implementers to develop alternative ways of managing them hence improved level of implementation of KeRRA road projects. However, the respondents indicated that rarely took action unless the risk was triggered regularly during road construction. The application of risks acceptance strategies during implementation of road projects was found to be on average ($M=2.85$, $SD=1.16$). Different from the study findings, Mukamwezi (2022) found out that as part of risk acceptance, the following techniques were used in road infrastructure projects; having contingency plans, use of work plans in project implementation, utilisation of regular inspections and implementation of safety systems.

Regression statistics showed that there was no significant relationship ($\beta=0.092$, $t=1.044$, $p=0.298$) which resulted to acceptance of the null hypothesis ($p>0.05$) resulting to the deduction that risk acceptance strategies had no significant relationship with implementation of KeRRA road construction projects in Migori County. This meant that the risks acceptance measures adopted by parties involved in KeRRA road projects do not influence implementation of road projects in the county. In contrast to the study findings, Obade (2019) found out that risks acceptance was associated with probability of timely road projects completion in Nairobi County. Even in Muranga County, Kimani (2017) risks retention strategies influenced performance of construction projects in Murang'a county public secondary schools. However, when stakeholder participation (moderating variable) was introduced in the model, the significant changed ($\beta=0.219$, $t=3.15$, $p=0.02$). This means that stakeholder participation moderates the relationship between risk acceptance strategies and KeRRA road projects implementation in Migori County. Mukamwezi (2022) research in Rwanda also found out that risk retention (acceptance) had significant positive effect on road construction project performance.

These findings are in agreement with Al-Ajmi & Makinde, 2019 conclusion that few contractors practice formal risk management systems with analytical approaches such as acceptance in mitigating risks. In their study, the 'human problem' was identified as the initial hindrance for risk management. Though, Renault et al. (2020) identified lack of time and indifference by managers as significant hindrances to adoption of risk acceptance as a strategy, Shabbab et al. (2021) in another study asserted that the development of a risk management framework is a time-consuming process that is, at times, inconsistent with projects' allocated budgets. Further, a recent research within the context of developing economies indicated that lack of experience, inadequate information, and awareness of risk management processes are the most significant challenges which affect the implementation and practice of risk management in the road construction industry and not risk acceptance (Jaskowski & Biruk, 2019; Rwelamila, 2020; Firmenich, 2019).

This study finding contradicts a recent review of road construction projects in Machakos County which revealed that when risk management strategies like risk acceptance were put in place by the county Government few road construction projects fell behind implementation schedule (Wandiri, 2020). According to the budget policy statement, 2018, Machakos County was allocated 10.5 billion shillings from the county revenue allocation fund in the 2017/2018 financial year. The statement notes that in 2016/2017, the county spent 44% on personnel, 29% on operations and maintenance and 37% on development. The development plan for the 2018/19 financial year for Machakos County states that between 2013 and 2017, over 950 km of roads were graded; over 56 km of roads upgraded to bitumen standards; 1,060 metres of drifts (vented and non-vented) constructed; approximately 365 metres of culverts installed and approximately Ksh. 12.5 million allocated annually per ward for road maintenance and development. Most road construction projects were well implemented when measured against the time taken, cost and quality. For instance, in the KeRRA annual report for 2016/2017, the Tala-Donyo Sabuk road was expected to cover 70 kilometres in length and



be completed in 2018 and was at 60.29% completion rate and with only 51.3 kilometres of road length done during the launch year which was the 2016/2017 financial year, the project launch year. This became possible after risk mitigation was done at the planning stages (Wandiri, 2020). This is confirmed by Rambo and Okech (2020) who also did a study on influence of Risk acceptance on implementation of SME projects in Machakos County, he concluded that risk mitigation at the initial stages of the SME projects would in most instances guarantee good implementation in the undertakings. He further stated that in this loop, project planning accounts for about 8% of the total work scope while risk acceptance accounted for about 85% of the total work scope and therefore these two practices form a big part of the project implementation success.

The study findings are also similar to another one done within the lake region of Kenya by Ocheng (2021) which was carried out on effects of project management practices on implementation of road infrastructure projects done by local firms, he discovered that efficient implementation of road infrastructure projects is essential for economic growth and development and that implementation of road infrastructure projects in the Lake Basin Region constructed by local firms is poor in terms of completion of the projects within the budgeted cost, time schedule and attaining the desired quality, the study concluded that risk acceptance had no significant influence on implementation of road infrastructure projects by local firms in the Lake Basin region in Kenya. Further, Sule (2021) in findings in a research study in Kisumu East Sub County hold the view that there is more to successful project outcome than just focusing on the triple dimensions time, cost, and quality and tying them to acceptance and the attending risk mitigation strategies as an aspect of risk management strategy.

4.2 Hypothesis Testing

The study used multiple regression model to test the hypothesis. The decision to reject or accept the hypotheses was based on model 1 that has the effect of the interaction between the independent variable and the dependent variable Model 1 examined the following:

H₀₁: Risk acceptance has no significant influence on implementation of KeRRA road construction projects in Migori County.

$$\text{Implementation of KeRRA road construction projects} = f(\text{risk acceptance, random error})$$

$$\text{Model 1: } y = \beta_0 + \beta_1 RA + \epsilon_1$$

Table 4

Coefficients^a of RA, and IP

Model		Coefficients		t	Sig.
		β	Std. Error		
1	(Constant)	.052	.034	1.514	.131
	RA	.131	.035	3.784	.000

a. Dependent Variable: IP

The result in Table 4 show that there exist significant relationships between risk acceptance ($\beta=0.131$, $|t|=3.784$, $p=0.001$) and implementation of road construction projects by KeRRA in Migori County. The estimated t-statistic values for risk acceptance (df = 228, $|t| = 3.784$), are higher than the critical t-statistic value ($|t_{05}| = 1.943$). Therefore, the first (H₀₁) null hypothesis is rejected, resulting to the rejection of the null hypothesis hence the conclusion that there is significant relationship between risk acceptance and implementation of KeRRA road projects in Migori County.

Table 5

Coefficients^a of IP and RA

Model		Coefficients		t	Sig.
		β	Std. Error		
1	(Constant)	.052	.034	1.514	.131
	IP*RA	.096	.037	2.584	.010

a. Dependent Variable: IP

With respect to the interaction of the road construction project implementation [IP] and Risk Acceptance [RA] in Table 5, it can be seen that the interaction is significant ($\beta=0.096$, $|t| = 2.584$, $p = 0.010$). The estimated t-statistic value (df = 225, $|t| = 2.584$) is higher than the critical t-statistic values (df = 225, $|t_{05}| = 1.943$). This implies that implementation increases as risk acceptance is employed at the planning stages of road projects. The relationship between risk acceptance strategies and implementation of rural road projects is positively significant.

4.3 Discussion

The study has established that in many KeRRA road construction projects, Constituency Roads Committee members and contractors are aware of the number of expected risks and that they devise methods of controlling them. The understanding of expected risks helps road project implementers to develop alternative ways of managing them so as to achieve improved levels of implementation of KeRRA road projects, and one of the ways of managing the risks is through risk acceptance. Regression statistics show that there is a significant relationship ($\beta=0.131$, $|t|=3.784$, $p=0.001$), which results to rejection of the first (H_{01}) null hypothesis resulting to the deduction that risk acceptance strategy have a significant influence on implementation of KeRRA road construction projects in Migori County. This means that risk acceptance measures adopted by parties involved in KeRRA road projects do positively influence implementation of road construction projects in the County.

This study finding is in conformity with Al-Ajmi and Makinde (2020) conclusion that many road contractors practice formal risk management systems with analytical approaches such as acceptance in mitigating risks. In their study, the 'human problem' was identified as the initial hindrance for implementing risk management in projects. To get the real reason behind this, Renault et al. (2020) in a study identified lack of expertise and indifference by managers as significant hindrances to adoption of risk management strategies in projects, however, the study upheld the core function risk acceptance plays in successful implementation of projects, the study argues that were it not for the inherent assurance and comfort that risk acceptance affords project managers, most of the projects would be prone to time and cost overruns.

Findings by Carr and Tah, (2020) in a study of fuzzy approach to construction project risk assessment and analysis in South Africa is also in agreement with the results of this study. The study discovered that risk acceptance is very important in project management as it allows contractors to concentrate on delivering the project mandate, knowing very well that risks are anticipated and there is a definite way to deal with it if and when it occurs. The study further confirms findings by Rehacek (2020) that established road contractors applying regular use of risk management strategies find it important to understand and employ formal process of risk acceptance in major projects. Diversity in parties' perceptions in a construction project invites undesirable biases in decision making, which makes the process of risk acceptance as a risk management method in road construction projects more appropriate (Naji & Ali, 2020). This lends credence to the views of (El-Sayegh, 2020) which posit that risk management theory is adequate in explaining use of risk acceptance that can involve externally triggered changes to operations, orders and standing operating procedures in road construction projects. Further, the theory has strength on static risks that are not dependent on the evaluation of the competitive environment in which the organization establishing it operates but would rest merely on the internal factors of the entity.

The current study findings also support scholars such as Mukamwezi (2022) in a study in Rwanda argue that as part of risk acceptance, several techniques are used in road infrastructure projects; having contingency plans, use of work plans in project implementation, utilization of regular inspection and implementation of safety systems to ensure successful implementation of road construction projects. The study found risk acceptance a significant determinant and that early infusion of risk acceptance during project planning phase had a significant positive effect on road construction project performance.

According to the budget policy statement, 2022, Machakos County was allocated 10.5 billion shillings from the county revenue allocation fund in the 2019/2020 financial year. The statement notes that in 2019/2020, the county spent 44% on personnel, 29% on operations and maintenance and 37% on development. The development plan for the 2019/2020 financial year for Machakos County states that between 2019 and 2022, over 950 km of roads were graded; over 56 km of roads upgraded to bitumen standards; 1,060 metres of drifts (vented and non-vented) constructed; approximately 365 metres of culverts installed and approximately Ksh. 12.5 million allocated annually per ward for road maintenance and development. Most road construction projects were well implemented when measured against the time taken, cost and quality. For instance, in the KeRRA annual report for 2019/2020, the Tala-Donyo Sabuk road was expected to cover 70 kilometres in length and be completed in 2020 and was at 60.29% completion rate and with only 51.3 kilometres of road length done during the launch year which was the 2018/2019 financial year, the project launch year. When risk management strategies like risk acceptance were put in place by the county government, few road construction projects fell behind implementation schedule (Wandiri, 2020).

This view is supported by Rambo and Okech (2020) in a study on influence of risk acceptance on implementation of Small and Medium Enterprises (SME) projects in Machakos County. The study concluded that risk acceptance at the initial stages of the SME projects would in most instances guarantee successful implementation in the undertakings. The study further stated that in this loop, project planning accounts for about 8% of the total work scope while risk acceptance accounts for about 85% of the total work scope and, therefore, these two practices form a big part of the project implementation success. Similarly, Odimabo (2020) found out that risk acceptance was associated with

probability of timely road projects completion in Nairobi County. Additionally, findings by Kimani (2020) in Muranga County also supported this study when it revealed that risk acceptance strategies influenced successful implementation of construction projects in Murang'a County Public Secondary Schools. Whether risk acceptance is a significant risk management strategy, therefore, no longer remains an empirical question (Amoah, 2020).

On the contrary, Shabbab et al. (2021) in a study asserted that the development of a risk management framework is a time-consuming process that is, at times, inconsistent with projects' allocated budgets, which reveals why risk acceptance is rarely practiced. Further, studies within the context of developing economies indicate that lack of experience, inadequate information, and lack of awareness of risk management processes are the most significant challenges which affect the implementation and practice of risk management in the road construction industry and not risk acceptance. As such risk acceptance is not a core determinant of success of a construction project (Miller et al. 2021).

Other scholars (Jaskowski and Biruk, 2019; Rwelamila, 2020; Firmenich, 2019) also hold contrasting views. In a recent research within the context of developing economies their study indicated that lack of experience, inadequate information, and awareness of risk management processes are the most significant challenges which negatively affect successful implementation of road construction industry in most African countries, even though the sector is emerging as a crucial cog in the wheel of development in recent times. Similarly, Omer and Adeleke (2019) in another study discovered that low level of familiarity with techniques and the inability to recognize the benefits of the process of risk application were the most influential factors which impact the adoption of risk management strategies by most contractors and not solely the technicalities of risk acceptance. In another contradictory study, Teuma (2019) study results revealed that due to the manpower size of most road construction projects, they mostly suffer from inadequacy of facilities to provide adequate training in risk mitigation methods. Those trained, on the other hand are incapacitated by lack of funds and obsolete technology in the road construction industry. These necessitates an empirical study to determine the level of adoption of risk acceptance as a strategy in risk management in the Kenyan road construction projects.

A study done within the lake region of Kenya by Ochenge (2021) carried out on effects of project management practices on implementation of road infrastructure projects done by local firms discovered that efficient implementation of road infrastructure projects is essential for economic growth and development. However, implementation of road infrastructure projects in the Lake Basin region constructed by local firms is poor in terms of completion of the projects within the budgeted cost, time schedule and attaining the desired quality. All in all, the study concluded that risk acceptance has no significant influence on implementation of road infrastructure projects by local firms in the Lake Basin region in Kenya. Further, Sule (2021) in a study of road construction projects in Kisumu East Sub County holds the view that there is more to successful project outcome than just focusing on the triple dimensions; time, cost, and quality and tying them to risk acceptance and the attendant risk mitigation strategies as an aspect of risk management strategy.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

It was found out that there existed a significant influence ($p > 0.05$) of risk acceptance strategies on implementation of KeRRA roads construction projects in Migori County. Considering that it was the least ranked risk management strategy, results suggest that the risk acceptance strategies should be featured more during KeRRA roads construction processes. They agreed that they were aware (accepted) the number of expected risks and measures to counter them in addition to finding alternative means through which such risks can be managed. Despite them acknowledging the existence of various types of risks, they did little even in securing insurance for small risks as way of ensuring that the project was properly implemented. Hence, the first null hypothesis was rejected resulting to the conclusion that there existed significant influence of risk acceptance strategies on implementation of KeRRA road construction project in Migori County.

5.2 Recommendations

In order to ensure that risk acceptance strategies are properly implemented, there is need for all parties in the contract to be made aware of all risks they are likely to encounter and take appropriate insurance policies for the losses that they may occur. There is also need for all stakeholders in the road projects to develop a system of monitoring of risks and identify alternative ways of managing them. All risks whether small or big need to be taken seriously, take action if it happens and insured where possible.

REFERENCES

- Ajupov, A., Sherstobitova, A., Syrotiuk, S., & Karataev, A. (2020). The risk-management theory in modern economic conditions. *E3S Web of Conferences*. <https://doi.org/10.1051/e3sconf/201911002040>
- Al-Ajmi, H.F. & Makinde, E. (2020). Risk Management in Construction Projects. *Journal of Advanced Management Science*, 6 (2), 113-116.
- Amoah, C., & Pretorius, L. (2020). Evaluation of the impact of risk management on project performance in small construction firms in South Africa: The case study of construction causes of road projects' delays. *Journal of Engineering, Design and Technology*, 18(3), 611–634. <https://doi.org/10.1108/JEDT-06-2018-0098>
- Baierlein, J. A. (2019). *Risk management for outdoor programs: A guide to safety in outdoor education, recreation, and adventure*. Viristar. Retrieved from <https://courses.viristar.com/product/textbook/>
- Baloyi, T., & Ozumba, A. (2020). Strategic risk management among small enterprises in the construction industry. *MATEC Web of Conferences*, 312, 02013. <https://doi.org/10.1051/mateconf/202031202013>
- Blok, Z. (2021). An analysis of success factors and benefits of partnering in construction. *International Journal of Project Management*, 18, 423–434.
- Brabhaharan, P. (2022). Natural hazard risk management for road networks: Strategies and implementation. *Opus International Consultants, Wellington, New Zealand*.
- Carr, V., & Tah, J. H. M. (2020). A fuzzy approach to construction project risk assessment and analysis: Construction project risk management system. *Advances in Engineering Software*, 32(10–11), 847–857.
- CIDP (2020). *County Integrated Development Plan 2018–2022*. Retrieved from <https://migori.go.ke/Documents>
- Creswell, J. W. (2023). *Research design: Qualitative, quantitative, and mixed methods approach* (3rd ed.). Thousand Oaks: Sage.
- El-Sayegh, S. M., & Mansour, M. H. (2020). Risk assessment and allocation in highway construction projects in the UAE. *Journal of Management in Engineering*, 31(6), 38, 04015004.
- Fan, S., Brzeska, J., & Shields, G. (2020). Investment priorities for economic growth and poverty reduction. *2020 Focus Brief on the World's Poor and Hungry People*. International Food Policy Research Institute. *Journal of Integrative Agriculture*, 13, 1193–1205. Washington, D.C.
- Fernando, M. D., Leonardo, R., & Stephanía, M. (2020). Financial risk measurement in a model of supply of raw materials. In Yoshizaki, H., Velázquez Martínez, J., & Argueta, C. (Eds.), *Supply Chain Management and Logistics in Latin America*, 13(4), 171–181.
- Firmenich, J. (2020). Customisable framework for project risk management. *Construction Innovation*, 17(1), 68–89. <https://doi.org/10.1108/CI-04-2015-0022>
- GoK. (2022). Ministry of Transport and Infrastructure: Analysed report. Government of Kenya. Retrieved from <http://www.transport.go.ke/Resources.html>
- Hemant, G., Mishra, A. K., & Aithal, P. S. (2022). Risk management practices adopted in road construction projects in Pakistan. *International Journal of Management, Technology, and Social Sciences*, 7(1), 21–36. <https://doi.org/10.5281/zenodo.5885986>
- Jaskowski, P., & Biruk, S. (2019). The conceptual framework for construction project risk assessment. *Theory and Application*, 2, 27–35.
- Joao, R., & Baptista, S. (2019). Risk management in road construction works: Quantitative analysis of cost deviations from a project owner's standpoint. *International Journal of Science - Técnico Lisboa, USA*.
- Keller, G., & Sherar, J. (2021). *Low volume roads engineering: Best management practices field guide*. U.S. Forest Service and Conservation Management Institute of Virginia Polytechnic Institute and State University.
- Kenya Roads Board. (2021). Road constructions annual report. Retrieved from <http://www.krb.go.ke/cem.html>
- KeRRA. (2020). Migori Region/County report on routine maintenance of selected roads (pp. 13–26). Kenya Rural Roads Authority. <https://kerra.go.ke/index.php>
- Kieya, H. O. (2020). Factors influencing stakeholder participation in the implementation of Murram road projects in Nyamira County, Kenya. *Unpublished MA Project Thesis*. The University of Nairobi.
- Kimani, P. M. (2017). Risk management strategies and performance of construction projects in public secondary schools in Murang'a County, Kenya. *MBA Project Thesis*. Kenyatta University, Kenya.
- Kirira, D. K., Owuor, B., Liku, C. N., & Mavole, J. N. (2020). Risk management strategies influence on road construction project performance: Implementer insights of Kenya National Highway Authority (KENHA), Coast Region Projects Kenya. *International Academic Journal of Information Sciences and Project Management*, 3(4), 655–671.

- Kitsios, F., Chatzidimitriou, E., & Kamariotou, M. (2022). Developing a risk analysis strategy framework for impact assessment in information security management systems: A case study in IT consulting industry. *Sustainability*, *14*(3), 1269. <https://doi.org/10.3390/su14031269>
- KPMG. (2020). Global business and infrastructure in the developing countries in the decline. *Management Reports*. Retrieved from <https://kpmg.com/xx/en/media/press-release.html>
- Markowitz, H. M. (2020). Selected works. *World Scientific-Nobel Laureate Series*. New Jersey: Hackensack, World Scientific Journal.
- Maxcy, S. J. (2020). Pragmatic threads in mixed methods research in the social sciences: The search for multiple modes of inquiry and the end of the philosophy of formalism. In Tashakkori, A., & Teddlie, C. (Eds.), *Handbook of Mixed Methods in Social and Behavioral Research* (pp. 51–89). Sage Publications.
- 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. Retrieved from <https://www.researchgate.net/Urban>
- Moshesh, R., Niemann, W., & Kotzé, T. (2020). Enterprise risk management implementation challenges: A case study in a petrochemical supply chain. *South African Journal of Industrial Engineering*, *29*(4), 230–244.
- Mukamwezi, C. (2022). Influence of risk management strategies on road construction performance of the Muhanga–Ngorero road construction project in Rwanda. *Global Scientific Journals*, *10*(12), 508–528.
- Naji, H. I., & Ali, R. H. (2019). Risk response selection in construction projects. *Civil Engineering Journal*, *3*(12), 1208–1221. <https://doi.org/10.28991/cej-030950>
- Norazian, M. Y., Hamimah, A., Ahmand, F. O., & Kamaruzaman, J. (2021). Clients’ perspectives of risk management practices in the 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 by local firms in the Lake Basin Region, Kenya. *Doctoral dissertation*, Kenyatta University.
- Odeck, J. (2021). Cost overruns in road construction: What are their sizes and determinants? *Transport Policy*, *11*(1), 43–53.
- Odimabo, O. O. (2020). Risk management system to guide building construction projects in developing countries: A case study of Nigeria (Doctoral dissertation, University of Wolverhampton).
- Omer, M. S., & Adeleke, A. Q. (2019). Systematic critical review of risk management in Malaysian construction companies. *Journal of Humanities and Social Sciences Studies*, *5*, 60–70.
- Omondi, V. O., & Muchelule, Y. (2022). Project risk management on the performance of Kenya Rural Roads Authority in Siaya County. *International Journal of Social Sciences, Management and Entrepreneurship*, *6*(1), 12–24.
- Osman, M. A., & Kimutai, G. (2020). Critical success factors in the implementation of road projects in Wajir County, Kenya. *International Academic Journal of Information Sciences and Project Management*, *3*, 73–104.
- Perrow, C. (1986). Economic theories of organization. *Theory and Society*, *15*(1), 11–45. <https://doi.org/10.1007/BF00156926>
- PwC Kenya. (2022). Counties outlook: An audit of the state of infrastructure development in counties. Retrieved from <https://www.pwc.com>
- Rambo, C. M., & Oketch, T. (2020). Influence of risk assessment on the implementation of SME projects in Machakos County, Kenya. *European Scientific Journal*, *14*(19), 181–205. <http://dx.doi.org/10.19044/esj.2020.v14n19p181>
- Razi, P. Z., Ali, M. I., & Ramli, N. I. (2019). AHP-based analysis of risk assessment delay: Case study of public road construction projects. *Journal of Engineering Science and Technology*, *14*(2), 875–891.
- Rehacek, P. (2020). Risk management in construction projects. *Journal of Engineering and Applied Sciences*, *12*(20), 5347–5352.
- Renault, B. Y., Agumba, J. N., & Ansary, N. (2020). Correlation analysis between risk measurement and project success of small and medium contractors in Gauteng, South Africa. Retrieved from <https://doi.org/10.15641/jcbm.4.2.884>
- Rwelamila, E. K. (2020). Understanding the risk in South African construction projects: A case of the Western Cape. *Master’s thesis*, University of Cape Town.
- Saunders, M., Lewis, P., & Thornhill, A. (2020). *Research Methods for Business Students* (6th ed.). Pearson Education Limited.
- Schumacher, R., Pitblado, R., & Selmer, O. S. (2020). Next generation risk management. *Process Safety Progress*, *16*(2), 69–71.
- Segal, T. (2020). Common methods of measurement for investment risk management. Retrieved from <https://www.investopedia.com>



- Seyed, M. M. L., Rahim, E., & Naser, H. (2020). Presentation of a conceptual framework for risk management of construction projects based on PMBOK standards. *Middle East Journal of Scientific Research*, 3(2), 14–21.
- Shabbab, A. A., Bassam, A. T., Wesam, S. A., & Tareq, J. S. (2021). Risk management strategies in construction organizations. *The Open Civil Engineering Journal*, 18(9). Retrieved from <https://opencivilengineeringjournal.com>
- Shah, M. K. (2020). *The myth of community: Gender issues in participatory development in Tanzania*. ITG Publishing.
- Shubina, L. Y., Shemyatikhina, M. V., & Evseeva, K. S. (2020). Risk management in social projects of public-private partnerships. *Advances in Economics, Business, and Management Research*, 128, 20–35.
- Silva, J., & Ricardo, B. (2019). *Risk management in road construction works - A quantitative analysis of cost deviations from a project owner's standpoint*. Retrieved from www.ijcab.org/journals. DOI: 13.220991/cej-04095034
- Sule, G. A. O. (2021). Beneficiary monitoring on implementation of devolved road construction projects in Kisumu East Sub County, Kisumu County, Kenya (MA Project, University of Nairobi).
- Sylwia, P. (2022). The evolution of risk management. *The Malopolska School of Economics in Tarnow Research Papers Collection*, 53(1–2), 95–107. DOI: 10.25944/znmwse.2022.01-2.95107
- Teshome, D. G. (2021). *Project risk management practice of Oromia Roads Construction Enterprise*. Independent Project, Addis Ababa, Ethiopia.
- Teuma, J. (2020). *The attitudes and approaches to risk management among Gozitan SMEs within the construction and financial services sectors* (Bachelor's dissertation (Insurance and Risk Management, University of Malta, Malta).
- 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.
- Tyler, A. H., & Frost, D. T. (2021). Implementation of 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
- Vukawanadi, F., & Mkandawire, C. (2021). An investigation into risk management practices on road maintenance projects under roads jurisdiction in Malawi (2014–2020). MSc Dissertation, University of Bolton.
- Wandiri, C. (2020). Management and implementation of rural road construction projects in Machakos County, Kenya. *European Scientific Journal*, 16(19), 457.
- World Bank. (2021). *Rural development indicators handbook* (2nd ed.). Washington, D.C.
- Yamane, T. (2023). *How to calculate a reliable sample size* (3rd ed.). Harper and Row. Retrieved from
- Yesemin, B., & Dan, C. (2019). *Social research methods by example: Application in the modern world*. Routledge.