Strategic Risk Mitigation and It's Influence on Selected Road Construction Projects Delivery in Kenya[1]

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ABSTRACT

To assess the effect of risk mitigation strategies on project delivery, this study focused on three Kenyan roads: the 27 km Nairobi Expressway (A8), the 172 km Isebania-Kisii-Ahero (A1) corridor, and the 219 km Kenol-Isiolo highway (A2). Structured questionnaires were used to collect primary data, supplemented by secondary data from reputable web sources. The analysis employed both descriptive and inferential statistics. Using SPSS version 26, a moderated hierarchical multiple linear regression model was fitted to evaluate how dynamic capabilities influenced the relationship between risk management strategies and road project delivery outcomes. The model showed the predictors accounted for 37.1% of the variance in delivery ($R^2 = .371$, Adj $R^2 = .299$). This was statistically significant, $F(4, 35) = 5.167$, $p < .05$, with the key predictor showing a significant effect ($t = 6.049$, $p < .05$). Key findings revealed that resource risk avoidance, human resource risk reduction and insurance risk transference significantly influenced road construction project delivery. While dynamic capabilities enhanced the relationship between these three strategies and project delivery, they did not moderate the effect of project control. Consequently, the study urges construction firms to deepen their application of resource risk avoidance, human resource risk reduction, and insurance transference, primarily by investing in capacity building for risk and project management.

Keywords: *Resource Risk Avoidance, Human Resource Risk Reduction, Project Control, Insurance Risk Transference, Projects Delivery*

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INTRODUCTION

Background of the Study

Roads make a crucial contribution to economic development and growth and bring important social benefits (Seid, Devadoss, & Fekadu, 2019). According to Ivanova and Masarova (2019), road infrastructure is a key prerequisite for the social and economic development of any country. One of the road projects is the construction of the Nairobi Expressway Road project (A8). The initial budget estimate provided by the Kenya National Highway Authority (KeNHA) was Ksh.65.2 billion, however, the cost rose to Ksh.87.9 billion (Kimuyu, 2022). Another road construction project is the Isebania-Kisii-Ahero (A1) Road Rehabilitation project. Initial cost of the project was Sh8.5 billion but was revised to Sh11 billion after the appraisal.

Kenol-Isiolo Road (A2), the 219 Kilometers highway is another road being built in two segments: Kenol-Marua (84km) and Marua-Isiolo (135km) (Thuita, 2023). The project was initially estimated to be constructed for a period of 5 years (2020-2025) (African Development Bank Group, 2023).

The road construction project is scheduled to be completed by December 2023 ahead of schedule and without compromising on the quality according to African Development Bank president Adenisa Akinwuni (Makena, 2022). There is a need to investigate risk management strategies the companies implemented to mitigate uncertainties during the progress of road construction.

The Problem

Several studies conducted have linked risk management strategies with firm performance (Ondara 2017; Rwelamila, 2017; Akoh, 2018). Research (Githere and Sang, 2021; Mongina and Moronge, 2021) has shown that failure of project managers together with project execution team comprising of the KeNHA Engineers, supervising Consultants, and the key persons of the Contractor to have agreed-upon procedures and framework to manage risk was resulting to cost overrun and delay in completion of road construction projects.

Although extant literature has advanced understanding of risk management in road construction, the quantitative influence of risk management strategies on project delivery outcomes within the Kenyan context remains inadequately explored. This study aims to resolve this specific knowledge gap.

The Objectives

To address the knowledge gap regarding risk management's impact on Kenyan road projects, this study sought to: Determine the effects of resource risk avoidance, human resource risk reduction, and insurance risk transference on project delivery; Analyze the relationship between project

control and project delivery; Assess the moderating role of the sector's dynamic capabilities on the relationship between risk management strategies and road construction project delivery.

LITERATURE REVIEW

Theory and Hypothesis Development

Theory of Constraints

According to Lynge (2019), the major obstacle to Theory of Constraint as an improvement methodology is that the theory methodology addresses management theories as a secondary issue. It does not address the general theory of management or the policies of an organization. TOC can be applied in this study because in road construction projects there are limiting factors or constraints that are liable to become project risks.

Enterprise Risk Management Theory

Enterprise risk management theory is a framework that focuses on adopting a systematic and consistent approach to managing all of the risks confronting the project However, Mcshane, Bromiley, Nair, and Rustambekov (2018) argue that ERM is still in its infancy because little academic research has been published in management Journals concerning ERM. The ERM being the main theory in this study helps to understand how the project contractors and project owners manage risks that arise during project implementation.

Institutional Theory

Institutional theory examines how regulatory policies control industries through formal government frameworks. This study applies the theory to investigate how construction firms' compliance with regulatory best practices moderates the relationship between risk management strategies and road construction project performance in Kenya.

Conceptual Framework

A conceptual framework is a diagram that shows how the independent variables are associated with dependent variables in a study (Kothari, 2010).

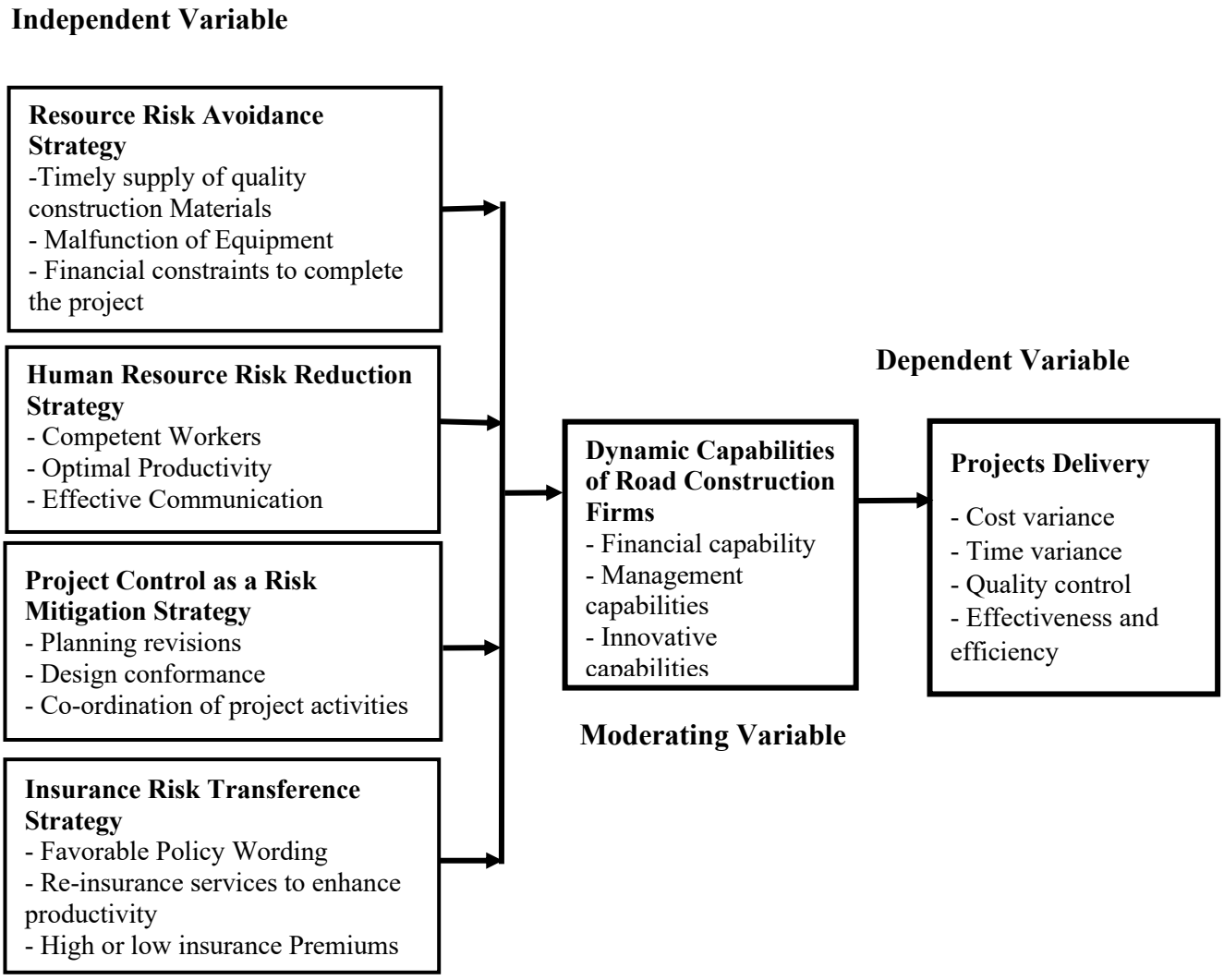

Figure 1: Conceptual framework

Resource Risk Avoidance Strategy and Projects Delivery

Resource Risk refers to the possibility that an organization won't be able to obtain all the materials, tools, or financial backing required to finish a project. Saviom (2021) defines resource-related risks as unexpected events that hurt projects and businesses if they occur.

According to research conducted by Abdi (2020), the implementation of effective resource risk management strategies significantly and positively influences project performance. Some of the indicators of effective resource risk management include sufficient material to run through the

project, having enough equipment for the project, and financial capability to cater for the daily operations of the project (Agumba, Gudda, & Mwaura, 2023).

Hypothesis 1: *Resource risk avoidance Strategy has no significant influence on road construction projects delivery in Kenya.*

Human Resource Risk Reduction Strategy and Projects Delivery

Human Resource Risks refer to threats that may be directed toward a company's employees (Centre for the Protection of National Infrastructure, 2020). According to IOSH, (2020), Human Resource is a company's the most important resource because company's success is based on the expertise and motivation of its employees. The absence of one person may cause delays in deliveries, faults in quality, and other threats to a company's operation. Therefore, employees are a resource from the point of view of risk management (Agumba, Gudda, & Mwaura, Effects of Personnel Risk Management on Road Construction Projects Delivery in Kenya, 2023). The current study used competence, productivity, and communication as indicators of human resource risk reduction strategy.

Hypothesis 2: *Human Resource Risk Reduction Strategy has no significant influence on road construction projects delivery in Kenya.*

Project Control as a Risk Mitigation Strategy and Projects Delivery

Project control Risks are the process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project. According to Carlo (2023) project control involve gathering and analysing current project performance to forecast and manage potential project cost and schedule outcomes.

Hypothesis 3: *Project control as a risk mitigation strategy has no significant influence on road construction projects delivery in Kenya.*

Insurance Risk Transference Strategy and Projects Delivery

Insurance risk is a threat that the insurance company has agreed to insure against in the policy wordings. These types of risks or perils have the potential to cause financial loss such as property damage or bodily injury if they were to occur (Insuranceopedia, 2020).

To determine the effectiveness of insurance risk management strategies a firm takes, there is a need to evaluate critical key indicators. The current study considered policy wording, re-insurance services, and premium as indicators of insurance risk management strategies.

Hypothesis 4: *Insurance risk transference strategy has no significant influence on road construction projects delivery in Kenya.*

Moderating Effect of Dynamic Capabilities of Road Construction Firms and Projects Delivery

Dynamic Capabilities are the firm's ability to integrate, build, and reconfigure internal and external resources or competencies to address and shape rapidly changing business environments (Teece, 2020). The essence of dynamic capabilities is to align firm resources and the competencies of its employees to the business environment for long-term profitability. There are several capabilities of a firm that can be used to measure dynamic capabilities. The current study used financial capability, management capabilities, and innovative capabilities. These capabilities can enable a road construction firm to devise, adopt, and implement effective risk management strategies, which can improve projects delivery.

Hypothesis 5: *Dynamic capabilities of the construction firms have no significant moderating influence on the relationship between risk management strategies and road construction projects delivery in Kenya.*

Projects Delivery

Successful projects delivery can be defined as the comprehensive process of carrying out and completing a building or road construction on time, within the agreed budget and set quality, (also referred to as the 'golden/ iron triangle') (Sibiya, Aigbavboa, & Thwala, 2022). It requires careful planning, design, and construction measures from different actors. The project delivery system requires multiple roles, standards, and a defined set of procedures to proceed (Safety Culture, 2022).

In this study cost variance, time variance, quality control, and effectiveness were used to measure projects delivery. Cost is the degree to which the general conditions promote the completion of a project within the estimated budget. It is the overall cost that a project incurs from inception to completion, including any costs arising from variation, modification during the construction period, and costs created by legal claims such as litigation.

Empirical Review Resource Risk Avoidance Strategy

Seid et al. (2019) examined resource risk avoidance in Ethiopian road projects, identifying site possession delays as the most significant risk factor followed by payment delays and defective designs. However, their study did not quantify the impact of each variable. The current research advances this by using multiple regression and moderated hierarchical regression to measure how and to what extent resource risk avoidance strategy affects road project delivery in Kenya.

Human Resource Risk Reduction Strategy

Das and Mishra (2020) conducted research titled *"Achieving Project Success through Leadership Communication"*. The results showed that employee communication significantly affects project success. To effectively manage a varied workforce, crises, relationships with stakeholders and the integration of the project, leadership communication must be ingrained in the project manager's personality. The study sample size here was too small to be a representation of the whole population; therefore, the study is not fit for generalization. This study employed quantitative analysis, enabling robust statistical generalization due to the large sample size utilized.

Project Control as a Risk Mitigation Strategy

Gain, Mishra, and Aithal (2022) researched "*Risk Management Practices Adopted in Road Construction Projects"*. The result revealed that contractors are averagely aware of risk management and on average practice risk management techniques. This study enables professionals to understand the practices of risk management adopted by Nepalese contractors, however, it cannot be generalized because none of the inferential statistics was used to test hypotheses and show an association of variables. The sample size was also too small to be representative of the target population for reliable data analysis. The current study used both multiple regression analysis and moderated hierarchical regression analysis to show an association of research variables and used a sample that is representative of the target population for reliable data analysis.

Insurance Risk Transference Strategy

Thabo, (2019) in their paper "*Efficiency of insurance as a risk management tool in South Africa construction projects*", aimed at evaluating the effectiveness of insurance plans as a risk management tactic in the South African construction sector. It was revealed that using insurance in the construction sector helps to effectively manage external risks, financial difficulties, and health and safety hazards. The study adds valuable literature on insurance risk; however, it cannot apply to road construction projects in Nairobi due to social dynamic changes and other risk factors since it was conducted in a South African setting. Moreover, data were analyzed descriptively, therefore, does not show the extent to which insurance risk affects the performance of construction projects. This is a contextual gap and methodological gap the current study intended to fill.

Dynamic Capabilities of the Road Construction Firms

Dynamic capabilities are considered a source of competitive advantage because they are critical to a firm's long-term success. It enables a firm to be able to reinvent itself and grow through transformation. Giménez, Madrid-Guijarro, and Duréndez (2019) in their paper "*Competitive Capabilities for the Innovation and Performance of Spanish Construction Companies"*, purposed

to investigate the influence of internal capabilities on the performance and innovation of Spanish construction enterprises during a recession period based on the literature's identification of internal skills as strategic.

The findings showed that performance is promoted by innovation, financial, and human capabilities and that these three factors all contribute to corporate innovation. Future research should focus on determining if the essential skills for performance and creativity remain the same during an upturn in the economy. This is a gap the current study would fill. Moreover, the study was conducted on Spanish construction companies in Spain a different setting.

Projects Delivery

Project delivery can be defined as the comprehensive process of carrying out and completing projects such as a road construction project, or renovation of a facility or building among others.

Sibiya, Aigbavboa, and Thwala (2022) researched on project deliveries as key indicators in the construction industry in South Africa. Findings from the study revealed that the most significant construction projects performance indicators are: construction time, profitability, project management, material ordering, handling and management, risk management, quality assurance, client satisfaction (product), safety, time predictability, productivity, and client satisfaction (service).

METHODOLOGY

Research Design and Data Collection

Adopting an explanatory research design, this study administered questionnaires to participants following approval from the human resource managers of the Nairobi Expressway, Isebania-Kisii-Ahero, and Kenol-Isiolo road projects. Data collection followed a drop-and-pick methodology.

Population and Sample

In this study target population included all the employees in the management of the Nairobi Expressway road project (Musyoka, 2020), Isebania-Kisii-Ahero Road Rehabilitation project, and Kenol-Isiolo Road construction project. The unit of analysis being all the employees in the management level of the Nairobi Expressway road project Isebania-Kisii-Ahero Road Rehabilitation project, and Kenol-Isiolo Road construction project. This included civil engineers, site engineers, contract engineers, quantity surveyors, and project manager.

Data Processing and Analysis

Using SPSS version 26, the study computed response rates and key descriptive statistics—including measures of central tendency (mean, median), dispersion (standard deviation), and proportions (percentages)—to analyze the quantitative data.

RESULTS

Regression Analysis for Resource Risk Avoidance Strategy on Road Construction Projects Delivery

The aggregate impact of resource risk avoidance strategy on project delivery outcomes, as measured by regression coefficients, is summarized in Table 1.

Table 1: Model Summary for Resource Risk Avoidance Strategy

Model	R	R^2	Adj. R^2	S. E
1	0.359[a]	0.129	0.106	0.29009

a. Predictors: (Constant), Resource

The result indicates that the variable explained 12.9% of the variance in road construction projects delivery (R^2= 0.129, Adj R^2 = 0.106), ΔR^2=0.242, F (1, 38) = 5.624, $p < 0.05$. Resource Risk Avoidance Strategy had a significant contribution. There was a positive association between Resource Risk Avoidance Strategy and road construction projects delivery (β=*0*.359, t=2.371).

Regression Analysis for Human Resource Risk Reduction Strategy on Road Construction Projects Delivery

Regression analysis was conducted to determine whether there was a significant relationship between Human Resource Risk Reduction Strategy and projects delivery. Table 2 below presents the regression model on Human Resource Risk Reduction Strategy versus projects delivery.

Table 2: Model Summary of Human Resource Risk Reduction Strategy

Model	R	R^2	Adjusted R^2	S.E
1	0.374[a]	0.140	0.117	0.28824

a. Predictors: (Constant), Human Resource

As detailed in Table 2, the model establishes a statistically significant positive association ($p < 0.01$) between Human Resource Risk Reduction Strategy and project delivery outcomes ($R = 0.374$). The coefficient of determination ($R^2 = 0.140$) indicates this strategy explains 14% of performance variability in Kenyan road construction projects.

Regression Analysis for Project Control as a Risk Mitigation Strategy on Road Construction Projects Delivery

A regression model was constructed to investigate the association between project control as a risk mitigation strategy and project delivery outcomes. The model's statistical parameters are documented in Table 3.

Table 3: Model Summary of Project Control as a Risk Mitigation Strategy

Model	R	R^2	Adj. R^2	S.E
1	0.068[a]	0.005	-0.022	0.31010

a. Predictors: (Constant), Project Control

As detailed in Table 3, the coefficient of determination ($R^2 = 0.005$) indicates project control risk mitigation accounts for merely 0.5% of project delivery variance. The correlation coefficient ($R = 0.068$) confirms a trivial relationship, statistically significant ($p < 0.01$) but practically inconsequential.

Regression Analysis for Insurance Risk Transference Strategy on Road Construction Projects Delivery

A regression model was constructed to investigate the association between insurance risk transference strategy and road construction project delivery outcomes. The model's statistical parameters are documented in Table 4.

Table 4: Model Summary of Insurance Risk Transference Strategy

Model	R	R^2	Adjusted R^2	S.E
1	0.230[a]	0.053	0.028	0.30248

a. Predictors: (Constant), Insurance

In Table 4, while the model confirms a statistically significant ($p < 0.01$) link between risk transference strategies and project delivery ($R = 0.230$), their explanatory power is extremely low ($R^2 = 0.053$). This means risk transference accounts for just 5.3% of the differences in project delivery performance, highlighting that other factors are far more influential.

The Moderating Effect of Dynamic Capabilities of the Construction Firms on Risk Management Strategies and Road Construction Projects Delivery in Kenya

The study sought to establish the moderating effect of dynamic capabilities of the construction firms on risk management strategies and road construction projects delivery in Kenya. The research hypothesis formulated was:

$H_0$5: There is no significant moderating influence of Kenyan construction firms' dynamic capabilities on the relationship between four risk management strategies (resource avoidance, human resource risk reduction, project control mitigation, and insurance risk transference) and the delivery outcomes of road construction projects in Kenya.

This can be broken down as:

$H_0$5a: There is no significant moderating effect of Kenyan construction firms' dynamic capabilities on how resource risk avoidance strategies impact the delivery outcomes of road construction projects in Kenya.

$H_0$5b: There is no significant moderating effect of Kenyan construction firms' dynamic capabilities on how human resource risk reduction strategies influence the delivery outcomes of road construction projects in Kenya.

$H_0$5c: There is no significant moderating effect of Kenyan construction firms' dynamic capabilities on how project control (used as a risk mitigation tactic) influences the delivery outcomes of road construction projects in Kenya.

$H_0$5d: There is no significant moderating effect of Kenyan construction firms' dynamic capabilities on how insurance risk transference strategies impact the delivery outcomes of road construction projects in Kenya.

Table 5 shows results of moderated regression coefficients of the independent and dependent variables.

Table 5: Moderated Hierarchical Regression Coefficients Results of Risk Management Strategies and Road Construction Projects Delivery

Predictors	Model 1	Model 2	Model 3
Risk Management Strategies			
Resource Risk	0.359	0.327***	0.456
Human Resource	0.341	0.056	0.068
Project Control	0.007	-0.012**	-0.019
Insurance Risk	0.252	0.072	0.451
Moderator			
DC		0.063	0.069
Interaction terms			
RRASc*DCc			0.344**
HRRRSc*DCc			0.156*
PCMSc *DCc			-0.017
IRTSc*DCc			0.252*
R^2	0.129	0.140	0.371
F	5.624	6.186	5.167
Adj R^2	0.106	0.117	-0.229
ΔR^2	----	0.011***	0.231**
ΔF	----	0.562	6.011

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; +$p < .1$, ***RRAS-****Resource Risk Avoidance Strategy,* ***HRRRS****-Human Resource Risk Reduction Strategy,* ***PCMSC****-Project Control as a Mitigation Strategy,* ***IRTS****- Insurance Risk Transference Strategy*

Model 1: Direct Effects of Risk Management Strategies

From table 5, the result of model 1 indicates that the variables explained 12.9% of the variance in road construction projects delivery (R^2= 0.129, Adj R^2 = 0.106), F(1,38) = 5.624, $p < 0.05$. Three variables were statistically significant: Resource Risk Avoidance Strategy (β=.359, p=0.019 (p< .05)), human resource risk reduction strategy (β=-0.341, p=0.007, (p<.005)) and Insurance risk transference strategy (β=.252, p=0.019 (p>.05)) thus rejecting null hypotheses **Ho1, Ho2** and **Ho4**.

Conversely, project control as risk mitigation strategy (β=.007, p=0.433 (p > .05), had no statistically significant effect on road construction projects delivery thus not rejecting null hypothesis **Ho3**.

Model 2: Combined Effects of Dynamic Capabilities on the Risk Management Strategies

In model 2, the results of the regression explained 14% of the variance in road construction projects delivery (R^2= 0.140, Adj R^2 =0 .117), ΔR^2=0.011, F(2,37) = 6.186, p=0.001, $p < 0.05$. Resource

risk avoidance strategy (β=.327, p=0.933, p > 0.001), human resource risks reduction strategy (β=.056, p=0.809, p>.05) and Insurance risk transference strategy (β=.072, p=0.924, p>.05) all had positive insignificant effects on road construction projects delivery, thus not rejecting **Ho1, H_o2** and **$H_0$4.** Project control as risk mitigation strategy (β=-.012, p=0.867, p >.01) had a negative insignificant effect on road construction projects delivery, thus not rejecting **Ho3.** Dynamic capability of the construction firm (β= 0.063, p=0.902, p>.05) had positive coefficient, its prediction of the road construction projects delivery was statistically insignificant, thus not rejecting null hypothesis **Ho5**.

Model 3: Interaction Terms

In model 3, the study explored the interactions between risk management strategies and projects delivery. The addition of the interaction terms did not improve the model significantly.
Model 3 improved the predictive power of the risk management strategy variables as well as those of all the interaction terms. Project control as a risk mitigation strategy (β=-0.019, p > .05) was a negative predictor: **H_o3** not rejected, while resource risk avoidance strategy (β=.456, p>.001), Human resource risk reduction strategy (β=0.068, p> .01) and insurance risk transference strategy (β=.451, p> .05) all had positive insignificant effect, hence positive predictors of the road construction projects delivery: **$H_0$1**, **$H_0$2** and **$H_0$4** not rejected.

Furthermore, the interaction between resource risk avoidance strategy (RRAS) and dynamic capabilities of the road construction firms (DC) was significant, RRAS*DC (β=.344, p<.01), thus rejecting the null hypothesis **$H_0$5a**. The interaction between human resource risk reduction strategy (HRRRS) and dynamic capabilities of the construction firms on road construction projects delivery, HRRRS*DC (β=.156, p > .01) had insignificant effect as well as the interaction between Insurance risk transference strategy and the dynamic capabilities of the construction firms IRTS*DC (β=.252, p > .05), thus not rejecting the null hypotheses **$H_0$5b** and **$H_0$5d**. However, the interaction between project control as a risk mitigation strategy and dynamic capabilities of the road construction firms PCMS*DC (β=-0.017, p<.05) had a significant negative coefficient thus, rejecting hypothesis **$H_0$5c**.

The Interaction Graphs (Slope)

Further, slope analysis was presented to better understand the nature of the moderation effects (figure 1, 2, 3 and 4).

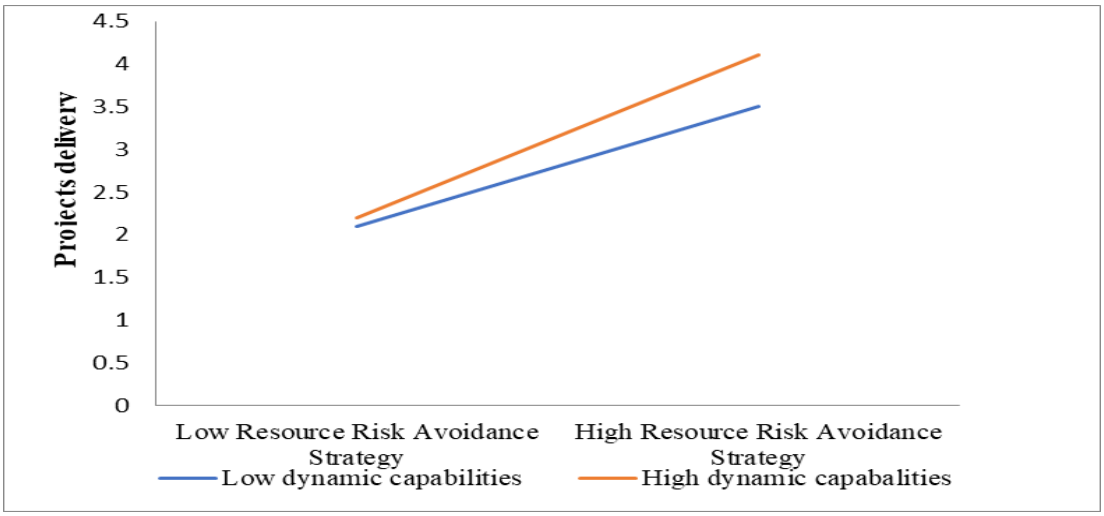

Figure 1: Interaction graph (slope) for Dynamic Capabilities of the firms and Resource Risk Avoidance Strategy

The interaction slope in figure 1 shows that dynamic capabilities of the construction firms strengthen the positive effect of resource risk avoidance strategy and road construction projects delivery. The line is much steeper for high dynamic capabilities; this shows that at high level of dynamic capabilities, the impact of resource risk avoidance strategy on projects delivery is much stronger in comparison to low dynamic capabilities. However, at lower dynamic capabilities of the firm, the line tends to straighten, this shows that at lower dynamic capabilities, the increase in resource risk avoidance strategy does not lead to similar change in the projects delivery. In conclusion, higher dynamic capabilities strengthen the impact of resource risk avoidance strategy on road construction projects delivery.

Figure 2: Interaction graph (slope) for dynamic capabilities of the firms and Human Resource Risk Reduction Strategy

The interaction slope in figure 2 shows that dynamic capabilities of the construction firms strengthen the positive effect of human resource risk reduction strategy and road construction projects delivery. The line is much steeper for high dynamic capabilities; an indication that at high level of dynamic capabilities, the impact of human resource risk reduction strategy on projects delivery is much stronger in comparison to low dynamic capabilities. However, at lower dynamic capabilities, the line tends to flatten, this shows that at lower dynamic capabilities, the increase in human resource risk reduction strategy does not lead to similar change in the projects delivery. In conclusion, higher dynamic capabilities strengthen the impact of human resource risk reduction strategy on road construction projects delivery.

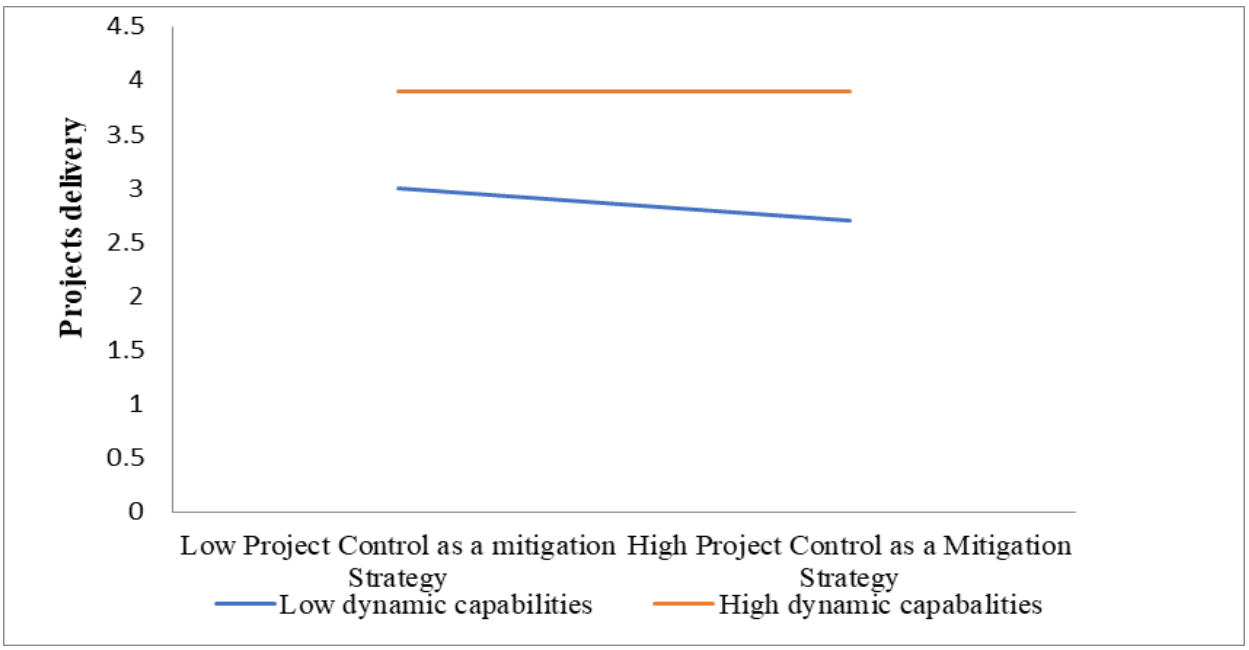

Figure 3: Interaction graph (slope) for dynamic capabilities of the firms and Project Control as a Risk Mitigation Strategy

In figure 3, the line slopes down more for low dynamic capabilities; this shows that at low level of dynamic capabilities, the negative impact of project control as a risk mitigation strategy on projects delivery is much stronger in comparison to high dynamic capabilities. However, at higher dynamic capabilities, the line tends to straighten; this shows that at higher dynamic capabilities, the decrease in project control as a risk mitigation strategy does not lead to similar change in projects delivery. In conclusion, higher dynamic capabilities weaken the negative impact of project control as risk mitigation strategy on projects delivery.

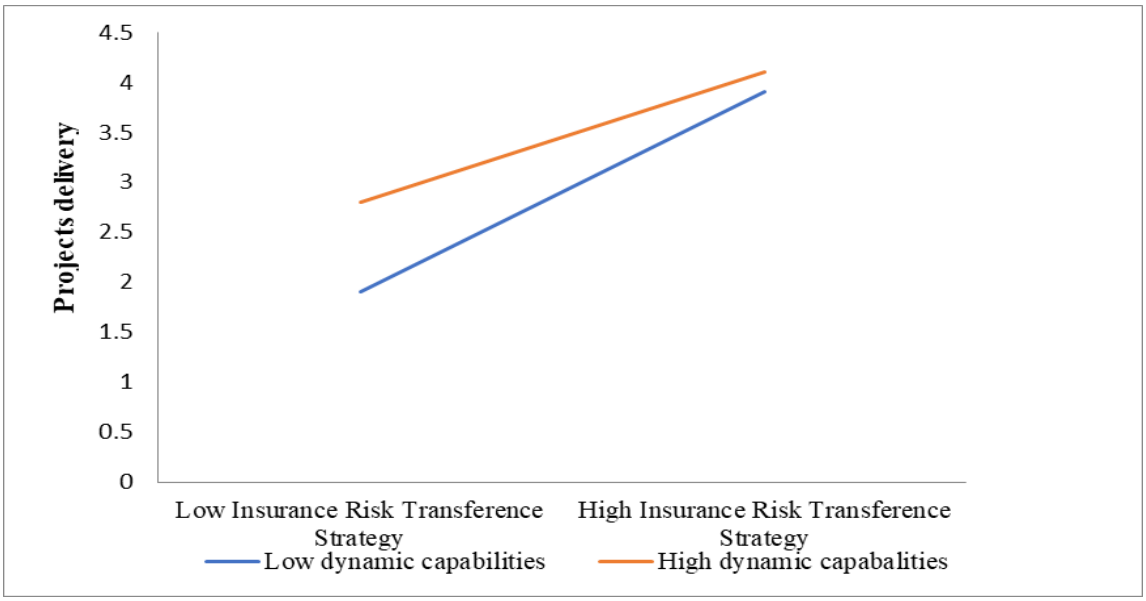

Figure 4: Interaction graph (slope) for dynamic capabilities of the firms and Insurance Risk Transference Strategy

As shown in figure 4, the line is much steeper for low dynamic capabilities; this shows that at low level of dynamic capabilities, the impact of Insurance risk transference strategy on projects delivery is much stronger in comparison to high dynamic capabilities. However, at higher dynamic capabilities, the line tends to straighten, this shows that at higher dynamic capabilities, the increase in insurance risk transference strategy does not lead to similar change in the projects delivery. In conclusion, high level dynamic capabilities strengthen the impact of insurance risk transference strategy on projects delivery.

CONCLUSION AND POLICY RECOMMENDATIONS

The findings indicate that fixing material prices reduces the risk of cost overruns. Ensuring availability of relevant plant and equipment reduces time overruns, ensuring an adequate supply of construction materials, reduces the risk of cost and time overruns, and ensuring good quality of construction materials through an efficient supply chain reduces the risk of quality defects. This therefore improves projects delivery in terms of time and cost.

The results show that: Skilled labor minimizes quality defects in road projects, Clear communication among stakeholders reduces delays and quality failures and effective human resource supervision prevents time overruns and is ranked as the strongest driver of project delivery success.

The findings reveal that forecasting cost/schedule performance to meet time and budget targets has the lowest perceived impact on firm performance. Road construction firms have inadequately adopted project control risk strategies, lacking systematic approaches to gather and analyze performance data for forecasting and managing project costs/outcomes.

High insurance premiums reduced contractors' adoption of insurance coverage, directly lowering firm performance. Concurrently, the lack of reinsurance triggered project time and cost overruns, which ultimately compromised road construction quality. On the other hand, favourable policy wording significantly reduced the projects' cost and time overruns. Using insurance in the construction sector helps to effectively manage external risks, financial difficulties, and health and safety hazards.

Finally, the poor adoption of dynamic capability-building strategies by Kenyan road construction firms directly compromises project delivery performance. This indicates a systemic failure to integrate adaptive management practices.

In conclusion, to resolve persistent issues like delayed materials, malfunctioning vehicles, and absenteeism among skilled workers, companies must embrace resource risk avoidance strategies as a core operational approach. This will enable them to thrive in the delivery of road construction projects. Road construction companies that have invested heavily in the occupational safety of their staff as a way of human resource risk reduction strategy significantly influence road construction projects delivery. Risks and Uncertainty in the Road Construction sector have made many firms adopt an Insurance risk transference strategy; this has helped cushion such firms from high-risk related activities during construction processes.

Road construction firms must strengthen implementation of three key risk strategies: resource risk avoidance, human resource risk reduction, and insurance risk transference. This requires targeted capacity building in risk and project management to equip teams with essential tools. Such efforts would enhance employee safety, retain skilled workers, and ensure equipment reliability through regular maintenance—ultimately preventing delays and accidents.

Areas for Further Research

While this study provides insights into how certain risk management strategies affect selected road construction projects, its findings are constrained by its deliberately narrow scope, which omitted other strategies and diverse project types. Some of the factors investigated in this study were found to have very little and insignificant effects on selected road construction projects delivery. This means other factors contribute to projects delivery. Therefore, academicians and researchers related to this field of study should conduct research on other factors apart from those investigated and also on other roads to determine their level of influence in the success of projects delivery.

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