

INFLUENCE OF PERSONNEL RISK MANAGEMENT STRATEGIES ON ROAD CONSTRUCTION PROJECT DELIVERY IN KENYA

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Abstract: This study sought to assess the influence of personnel risk management strategies on delivery of road construction projects in Kenya, with the main focus on Nairobi Expressway, Kenol-marua and Isebani-Ahero road projects. The aspect of the personnel risk management strategies that were examined were risk avoidance and risk mitigation. To accomplish the objectives explanatory approach research design sufficed, and random stratified sampling aimed at 3 road projects. Civil engineers, site engineers, contract engineers, quantity surveyors, and project managers acted as the key respondents. Quantitative data was analyzed by calculating the response rate with descriptive statistics such as means, median, standard deviation, and percentages using the statistical package for social sciences (SPSS) version 26. The analyzed data was presented by the use of frequency tables. The qualitative data was analyzed using content analysis where common themes were placed together and then subjected to descriptive statistics. The coefficient of determination $R^2 = 0.140$ and $R = 0.374$ at 0.01 significance level. The model indicated that personnel risk management explained 14% of the variation in project delivery ($R^2 = 0.14$). In other words, 14% of the project deliveries were influenced by personnel risk management strategies. In the road construction project investigated, they employed competent workers, supervised efficiently, trained workers, rewarded employees, ensured communication is effective from administration to all the workforce, and promoted highly productive employees. The study recommended that Road Construction Company's management should devise and implement personnel risk management strategies. They should ensure safety of employees is guaranteed and motivates them to maintain competent workers. Furthermore, implementation of the strategies to protect their employees from injuries and avoidance of risk or uncertainties associated with personnel risks should be highly considered.

Keywords: Road Project Construction, Personnel Risk, Project Delivery.

1. INTRODUCTION

Background of the Study

Road infrastructure plays a crucial contribution to the social and economic development of any country. This is particularly true in Kenya where road transport is the most widely used mode of transport. For this reason, there has been an increase in the expansion and upgrade of the road network in Kenya to increase economic performance. Nairobi Expressway Road project, a 27-kilometer four-lane dual carriageway linking Mlolongo town in Machakos County and Jomo Kenyatta International Airport to the Nairobi-Nakuru highway is one of the recently completed road projects that is expected to improve connectivity for the transport of goods, services, and people between Nairobi and the entire northern corridor. Another road construction project is the Isebani-Kisii-Ahero (A1) Road Rehabilitation project. It is 172 kilometers road

traversing four counties; Migori, Kisii, Homa Bay, and Kisumu. The road is expected to facilitate the cross-border movement of passengers and freight, and expand the regional market size. The reason for the rehabilitation of the road was that it had deteriorated over the years due to increased transit traffic on the road. Furthermore, the road is narrow with a width measuring 4-5 meters wide. This has led to an increase in traffic accidents due to narrow and heavily potholed road conditions. Another road construction project still in progress is Kenol-Isiolo Road (A2), the 219 Kilometers highway is being built in two segments: Kenol-Marua (84km) and Marua-Isiolo (135km). Plans for the dual carriageway received a major boost in July 2020 following the start of the Sh16 billion Kenol-Marua segment of the road project.

The Objective

The study objective was to assess the influence of Personnel Risk Management Strategies on delivery of road construction projects in Kenya.

The Hypothesis

H₀₂ Personnel Risk management strategy has no significant effect on Project delivery of the road construction projects in Kenya.

2. LITERATURE REVIEW

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 helped in understanding how the project contractors and project owners manage personnel risks that arise during project implementation.

Personnel Risk Management Strategy and Project Delivery

Personnel risk management is the process of implementing measures to minimize the risks associated with significant hazards by generating alternatives. This is achieved by considering cost effectiveness, and involving management in decision-making processes, especially in the early stages to prevent unexpected costs and time delays (Craig, 2019). 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 personnel risk management strategy. The current study used competence, productivity, and communication as indicators of personnel risk management strategy.

3. METHODOLOGY

Research Design and Data Collection

This study used an explanatory research design that tries to understand a problem that has not been conclusively researched. 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.

Population and Sample

The target population for this study included all the employees in the management of the Nairobi Expressway road project, 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. The sampling frame comprised 45 employees in the management level of the three roads. The study used a purposive sampling technique to select respondents who were in the management.

Data Analysis

Data were analyzed by calculating the response rate with descriptive statistics such as means, median, standard deviation, and percentages using the statistical package for social sciences (SPSS) version 28 software. Coefficients of variation and moderated hierarchical multiple linear regression analysis were used to describe and infer the findings. A correlation coefficient of 0.70 at 95% level of significance was considered suitable for this study (Mugenda, 2010). Coefficient of above 0.7 were used since they indicated that the data were reliable and thus the suitability of the research instruments.

4. DATA ANALYSIS, DISCUSSION AND INTERPRETATION

Response Rate

The study administered 45 questionnaires to foremen, ministry officer, engineers, project auditor, managers, surveyor, and county officer of the three selected road construction road projects. The findings of response rate were presented in Table 1.

Table 1: Response Rate

Questionnaire	Numbers	Percentage
Correctly filled	40	88.89
Not returned	5	11.11
Total	45	100

The results in Table 1 indicate that 40 questionnaires were completely filled, which is 88.89% response rate. According to Fincham (2018) for a small sample size a high response rate of 80% and above is better to reduce nonresponse bias. On the same note, Kothari (2006) contends that a response rate of 70% is appropriate for data analysis. Therefore, the response rate in this study was a sufficient representation of the target population that can be reliable for data analysis.

Reliability Test

The results in Table 2 show cronbach's alpha values.

Table 2: Reliability Analysis

Variable	Number of items	Cronbach alpha
Personnel Risk	10	0.832

The results in Table 2 show that all the items had Cronbach's alpha values above 0.7 implying that the instrument was sufficiently reliable for measurement. Since the variable measured had a cronbach's alpha of above 0.7, it was accepted. The data collected can thus be generalised to reflect the opinion of the respondents in the target population.

Factor Analysis

Factor analysis was conducted to assess the convergent validity of the hypothetical constructs. Rahn, (2023) contends that as a rule of the thumb a study should consider factor loading with atleast 0.4 and above. However, (Yim, 2019) recommend one to select factor loading that are 0.5 or higher with a communality of 0.5.

Factor Loading for Personnel Risk Management

Factor analysis was conducted on the 10 statements on personnel risk management. The result are shown in Table 3.

**Table 3: Factor Loading for Personnel Risk Management Strategy Sub-Variables
(N=40)**

Sub-Variables	Factor loading
Highly competent personnel hired	0.672
Effective supervision.	0.751
In-service training of workers	0.649
The reward system ensures high productivity	0.749
Employees are highly committed to their roles.	0.660
Effective communication within the workforce	0.701
Proper supervision of the workforce.	0.617
Few cases of loss of lives by employees	0.695
Compensation of injuries at work place	0.536
Promotion of highly productive employees.	0.560

Results in Table 3 indicate that the set of sub variable under the personnel risk management all had a value greater than 0.5. This satisfies rule of the thumb by Rahn (2023), which says only factor loading above 0.4 should be considered. Furthermore, they all met the minimum criteria of above 0.5 according to (Yim, 2019) for a factor to be considered. Therefore, they were all retained.

Descriptive Analysis of Personnel Risk Management

The researcher sought to assess the influence of personnel risk management strategies on delivery of road construction projects in Kenya. This was evaluated by 10 statements in a Likert scale, which were coded as Strongly Agree = 5, Agree = 4, Uncertain = 3, Disagree = 2, and Strongly Disagree = 1. Each statement was an indicator of personnel risk management measuring respondent’s level of agreement as presented in Table 4.

Table 4: Descriptive Statistics of Risk Reduction Strategy Sub-Variables

(N=40)

Sub-Variables	SA(%)	A(%)	U(%)	DA(%)	SD(%)	M	STD
Competent staffs hired	0.0	77.5	17.5	5.0	0.0	3.73	0.55
Well defined roles	50.0	47.5	2.5	0.0	0.0	4.48	0.55
In-service training	27.5	65.0	2.5	5.0	0.0	4.15	0.70
Effective reward system	15.0	82.5	2.5	0.0	0.0	4.13	0.40
Employees are committed	10.0	82.5	7.5	0.0	0.0	4.03	0.42
Effective communication	27.5	65.0	7.5	0.0	0.0	4.20	0.56
Supervision of the workforce	40.0	55.0	5.0	0.0	0.0	4.35	0.58
Few cases of loss of lives	27.5	42.5	27.5	2.5	0.0	3.95	0.81
Compensation for the injuries	25.0	67.5	7.5	0.0	0.0	4.18	0.54
Promotion performing staffs	7.5	62.5	30.0	0.0	0.0	3.78	0.57
Aggregate Score						4.09	0.57

From the results in Table 4, several observations can be made regarding the influence of personnel risk management strategies on road construction project delivery. A significant proportion of respondents (50%) expressed their strong agreement that road construction companies have implemented personnel risk management strategies where staffs have well defined roles with a high mean of M=4.48 and STD=0.554. This suggests that the road construction firms ensured that their employees had clear and well defined roles which contributed to clarity, accountability, and efficiency. This further led to improved performance and teamwork hence, improved projects’ performance.

Another key personnel risk management strategy identified was effective communication system, with 65% of the respondents agreeing with the fact that there is effective communication in the three road construction projects (M=4.20, STD=0.56). This suggests that effective communication is a vital risk reduction strategy that backed the success of the road construction projects. Clear communication minimizes ambiguity and reduces the likelihood of errors, rework and conflicts thereby efficient project delivery.

A significant proportion of respondents (82.5%) agreed that the road construction firms have effective reward system with a mean score of M=4.15 and STD=0.70. This finding implied that a well-structured reward system can significantly improve employee morale, productivity and overall road construction project success. This can further lead to increased engagement, reduced turnover and more positive work environment, hence improved project delivery.

The results further indicated that employees in the three road construction projects underwent effective supervision to ensure work was done efficiently within the time allocated with 55% of the respondents agreeing (M=4.35, STD=0.58).

This indicated that most employees were highly committed to their assigned duties. This likely enabled the road construction projects to be completed on schedule thereby impacting the successful road construction projects through reduction of projects time and cost overrun.

Another key strategy identified was the use of effective reward system, with 82.5% of respondents agreeing (4.13, STD=0.40). The findings implied that co-opting reward system into project implementation processes enhanced employee motivation, engagement and performance that led to increased productivity and retention. This further led to improved project performance.

The sub-variable on highly competent staffs being hired by the construction firms received a moderate mean score of $M=3.78$ and $STD=0.55$. This reflected mixed perceptions about the respondents, possibly due to the fact that some staffs in different projects were being hired on short term contracts. Conversely, other sub-variables yielded standard deviation far much below 1 with insignificant responses expressed as percentage. This indicated relatively low variability in responses among participants regarding the strategies applied.

Regression Analysis for Personnel Risk Management Strategy

The study hypothesis was stated as:

H₀₁ Personnel risk management strategies have no significant effect on project delivery of road construction projects in Kenya.

Regression analysis was conducted to determine whether there was a significant relationship between personnel risk management strategy and project delivery. Table 5 presents the regression model on personnel risk management versus project delivery.

Table 5: Model Summary of Personnel Risk Management

Model	R	R ²	R ² _{Adj}	S. E
1	.374 ^a	.140	.117	.28824

- a. Predictors: (Constant), Personnel
- b. Dependent Variable: Project Deliveries

From Table 5, the coefficient of determination $R^2 = 0.140$ and $R = 0.374$ at 0.01 significance level. The model indicates that personnel risk management explains 14% of the variation in project deliveries ($R^2 = 0.14$). In other words, 14% of the project deliveries were influenced by personnel risk management strategies.

This further implies that there exists a positive significant relationship between personnel risk management strategies and employee project delivery of road constructions in Kenya.

The findings in Table 6 further confirm that the regression model is significant for the data ($F=6.186$, $p<0.05$), since p-values was 0.017 which is less than 0.05 the minimum threshold for values to be significant.

Further Analysis of Variance (ANOVA) results were as shown in Table 6.

Table 6: Analysis of Variance (ANOVA) between Personnel Risk Management and Project Deliveries

Model		Sum of Squares	df	Mean Square	F	p
1	Regression	0.514	1	0.514	6.186	.017 ^b
	Residual	3.157	38	0.083		
	Total	3.671	39			

- a. Dependent Variable: Project Deliveries
- b. Predictors: (Constant), Personnel

Table 7 shows the coefficient for personnel risk management strategy. The fitted model from the result is

$$Y = \beta_0 + \beta_2X + \epsilon$$

$$= 5.450 + 0.326X + 0.288$$

Table 7: Regression Coefficient for Personnel Risk Management Strategy

Model		β	S.E	β	t	p
1	(Constant)	5.450	.539		10.120	.000
	Personnel	.326	.131	.374	2.487	.017

The results in Table 7 implied that a unit change in personnel risk management would increase project deliveries by the rate of 0.326.

In terms of significant association between personnel risk management with project deliveries, the null hypothesis “Personnel risk management strategies have no significant effect on delivery of road construction projects in Kenya” was rejected. The accepted alternative hypothesis for the sample investigated is that personnel risk management has a positive significant influence on project delivery of road construction projects in Kenya. The result avers with a study conducted by Chepkemoi (2020) that revealed that personnel risk management skills have a positive and significant influence on the performance of road construction projects.

The study sought to get more information on personnel risk strategies used by the companies investigated. Companies investigated all were implementing strategies to protect employees from injuries or harm during their working hours in the firm. They achieved this through taking the following strategies. The first is promotion of safety-first culture. Second is providing site safety training to ensure that proper site measures are in place. The third is ensuring workers have and use personal protective equipment (PPE). The researcher further tried to find out strategy company use to prevent personnel risk as shown in Table 8.

Table 8: Strategies to Curb Personnel Risk Factors

Risk factors	Strategy company use to prevent occurring or lower its impact
Violence at work	Strict policy that prevents harassment Effective line of communication
Act of damage	Displaying of warning signs around where there is a hazard. Having a general liability insurance cover which is a risk transfer strategy.
Accidents to employees	Having regular inspections of employees Hiring of safety officers to check whether the firm complies to the safety regulation

On the question how, the above strategy contribute to the success of the road construction project three responses were common. The first is that posting of warning signs help in alerting other road users of the danger and prevents damages to the properties and the newly constructed parts of the road.

Second is that general liability insurance helps in transferring the risk without draining the project accounts. The third is that regular checks and maintenance prevents injury and property which reduces the overall cost of running the project.

Implementation of the strategies discussed above is an example of risk reduction strategy (Thomalla, Garschagen, Shaw, & Djalante, 2017). When workers safety is considered through promotion of safety culture, safety training to ensure that proper site measures are in place, and ensuring use personal protective equipment they all minimize the severity of the loss or the likelihood of the loss occurring due to personnel risk (Kotaskova, Belas, & Bilan, 2020).

According to Finati (2020) road construction is associated with risk related to contact with equipment, slips and falls, transportation incidents and exposure to hazardous substance to employees which need to be mitigated by having a workplace safety plan to ensure success of the road construction project.

One of the reasons for delay is inadequate implementation of personnel risk management strategies, which led to issues such as delayed mobilization of equipment by the contractor for one year, pending payment totaling KShs 2 billion, and delayed compensation of the affected residents by the project which was supposed to be done three months before commencement of project (Naitore & Volka, 2022).

However, the road construction company also used active risk acceptance strategy to risk factors that could not be avoided or reduced (Iqbal, 2019). They did this by waiting until the risk occurs

5. CONCLUSION AND POLICY IMPLICATIONS

The objective for this study was to evaluate the influence of personnel risk management strategies on road construction projects delivery in Kenya. The results demonstrated that the presence of skilled personnel did not substantially mitigate the risk of quality non-conformance. Likewise, effective communication among project participants did not substantially mitigate the risks of schedule delays or quality deviations. The effective oversight of project human resources demonstrated no substantial influence on project delivery. Nonetheless, some elements of personnel risk management measures have shown a favorable and considerable impact on road construction project delivery.

Furthermore, leveraging modern technological tools—such as Building Information Modelling (BIM) enhanced risk detection and forecasting capabilities. These tools facilitated early identification of potential personnel risks during the project lifecycle, enabling preemptive action that reduced the likelihood of disruptions and avoided the costs associated with post-risk recovery. This proactive personnel risk management approach also aids in ensuring timely project execution and cost control.

Conversely, road construction companies that heavily invest in occupational safety as a personnel risk management strategy may inadvertently increase operational costs, which can contribute to poor project delivery.

Based on the findings, the study concluded that personnel risk management strategy significantly influences project delivery of road construction project. Construction firms that sort out issues related to violence at work, acts of violence, accidents to employees, regular training, hiring competent employees, and absenteeism of competent workers thrives in delivery of road construction projects.

Policy Implications

Road Construction Company's management should devise and implement personnel risk management strategies. They should ensure competent employees are hired and are motivated. Furthermore, regular training should be carried out to ensure their skills are up to date with the current technology. Secondly, Policy makers should draft laws and policies governing personnel risk management strategies and enforce them to ensure each road construction companies follow them as stipulated. Lastly, fostering customer knowledge of the significance and advantages of risk management strategies is essential for promoting increased adoption and adherence.

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