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Risk Avoidance Strategies and Performance of Building Construction Projects in Nakuru County, Kenya

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Abstract: *The building construction sector in Kenya, especially in Nakuru County, has grown rapidly in the past decade. However, it still faces major challenges, including project delays, cost overruns, safety incidents, and poor quality. These problems largely arise from lack of or partial adherence to risk management framework for construction. Although the Occupational Safety and Health Act 2007 exists, weak enforcement, low awareness, and inadequate safety training continue to compromise site safety standards. This necessitated the current research on effect of risk avoidance strategies on the performance of building construction projects in Nakuru County, Kenya. The research was guided by systems theory. A descriptive research design was employed, and data were collected from project managers and site safety officers engaged in ongoing construction projects within Nakuru Town East Sub-County. A structured questionnaire was used to obtain quantitative data, which were analyzed through descriptive statistics, correlation analysis, and multiple linear regression analysis methods. The findings indicated that risk avoidance strategies showed a strong positive and significant relationship with project performance ($r = 0.702^{**}$, $p = 0.000$), indicating that proactive measures like hazard elimination, safer substitutions, and PPE use greatly enhance project performance. As per the regression analysis, the relationship was statistically significant ($t = 9.141$, $p = 0.000$), confirming that risk avoidance strategies affect the performance of building construction projects. In conclusion, risk avoidance strategies improve building construction project performance by eliminating hazards and promoting safer methods. It is recommended that firms adopt safer alternatives, conduct regular safety training, and enforce safe work practices to reduce risks and enhance project performance.*

Key Words: *Risk Avoidance Strategies, Project Performance, Building Construction Projects*

1. Introduction

Risk management involves proactive measures to minimize negative impacts while maximizing opportunities that improve the undertaking of projects (Singh, 2025). Within the context of building construction projects, risk management plays a critical role in ensuring timely delivery and cost efficiency. The construction environment is inherently complex and dynamic, characterized by multiple stakeholders, evolving site conditions, regulatory demands, and resource constraints, all of which heighten exposure to diverse risks (Sami, Ahmad, & Minhas, 2024). Effective risk management in this sector therefore entails continuous monitoring, structured planning, and integration of preventive strategies such as safety training and compliance with occupational health and safety standards. From the broader framework of risk management, risk avoidance strategies serve as a proactive approach that seeks to eliminate potential threats before they occur. Instead of mitigating or transferring risks, this strategy removes their root causes through careful planning, design modification, and process improvement (Waheeb & Kocins, 2023). In project settings, risk avoidance is achieved by selecting safer operational methods, substituting hazardous materials or technologies with safer alternatives, and redesigning workflows to reduce exposure to danger. It also incorporate the strict compliance with safety standards, the integration of preventive controls at every project phase, and the promotion of a safety culture that discourages unsafe practices (Ebekozien, Aigbavboa, Samsurijan, Ahmed, Akinradewo, & Omoh-Paul, 2024). By emphasizing elimination

rather than reaction, risk avoidance strengthens the overall resilience of the risk management and ensures that projects operate within controlled parameters while achieving their intended objectives with minimal disruption.

Building construction projects play a vital role in urban growth, economic advancement, and public service delivery (Singh, 2025). This sector encompasses diverse activities, including the development of residential buildings, office complexes, schools, and health facilities. Regardless of whether they are publicly or privately financed, these projects often face similar challenges related to safety, quality assurance, and timely completion. In Kenya, the performance of building construction projects has increasingly drawn concern due to persistent risks linked to Occupational Health and Safety (OHS), cost overruns, delays, and weak regulatory compliance (Mwangi & Otieno, 2023). Weak enforcement of safety regulations, insufficient worker training, and limited adoption of structured risk management systems have contributed to frequent accidents, reduced productivity, and diminished stakeholder trust. According to the National Construction Authority (NCA, 2024), the building construction subsector accounted for over 60% of all registered projects in Kenya between 2020 and 2024, underscoring its dominant position in the national construction landscape. However, many sites continue to operate without adequate risk assessments, safety mechanisms, or monitoring frameworks.

In Kenya, construction industry ranks second after transport in occupational danger, with the Directorate of Occupational Safety and Health Services (DOSHS) reporting 390 workplace fatalities in 2023 alone. Between July 2023 and April 2024, DOSHS recorded over 4,300 occupational accidents, most occurring on construction sites due to safety non-compliance (DOSHS, 2024). Despite the existence of the Occupational Safety and Health Act 2007, challenges such as reliance on unskilled labour, lack of structured safety training, and weak enforcement persist (ILO, 2024). A 2022 Risk Know-How analysis found that nearly 90% of construction workers lacked formal safety certification, while most contractors allocated less than 2% of project budgets to safety measures, well below international standards. Data from the Kenya Institute for Public Policy Research and Analysis (KIPPRA) indicate that between 2015 and 2023, the construction sector recorded 9,071 injuries and 64 fatalities, translating to a fatality rate of 64 per 100,000 workers, with only 71 DOSHS inspectors overseeing more than 140,000 workplaces nationwide (KIPPRA, 2021). Although existing research has explored construction risks such as legal and contractual (Githinji & Karani, 2021), financial (Wanyonyi & Mutua, 2023), regulatory (Odhiambo & Karanja, 2022), stakeholder-related (Omoke & Njuguna, 2022), and time-based (Kiprotich & Wambua, 2023) limited attention has been given to Occupational Health and Safety (OHS) risks. This gap is particularly concerning in counties like Nakuru, where rapid urban expansion and informal labour practices have heightened the frequency of safety-related incidents. Therefore, the current research examined the effect of risk avoidance strategies on performance of building construction projects in Nakuru County, Kenya.

2. Objective of the Study

The objective of the study was to assess the effect of risk avoidance strategies on performance of building construction projects in Nakuru County, Kenya.

3. Literature Review

The emergence and growing significance of risk avoidance strategies in the building construction industry arise from the sector's increasing complexity, stricter safety requirements, and stronger focus on sustainable project delivery (Waheeb & Kocins, 2023). As construction activities broaden in scale and intensity, the industry continues to face more workplace accidents, cost escalations, and project delays caused by weak safety planning. These challenges have driven a shift from reactive risk management to proactive approaches that eliminate hazards before they occur. In this context, risk avoidance strategies have become vital elements of Occupational Health and Safety (OHS) management, ensuring that potential risks are controlled at their source to improve efficiency, quality, and timeliness in project performance (Muchiri, 2024). The hazard elimination, which focuses on removing unsafe processes, materials, or activities from the project environment takes center stage. This involve redesigning layouts to minimize high-risk operations, automating physically demanding tasks, or replacing unstable scaffolding with engineered alternatives. Mwangi and Otieno (2023) observed that projects implementing hazard elimination at the design stage achieved improved safety outcomes and operational continuity, while Githinji and Karanja (2022) noted that proactive elimination practices significantly reduced lost-time injuries and compensation costs.

Additionally, the substitution replaces the hazardous methods, materials, or tools with safer alternatives. Examples include using water-based paints instead of toxic solvents, adopting cold joining methods instead of welding, or using prefabricated components to reduce on-site exposure. Njoroge, Kimani, and Waweru (2024) found that substitution practices contributed to fewer safety violations and minimized project delays, while Jiang, Liu, and Zhang (2023) reported similar results in China, where substitution technologies reduced occupational diseases and environmental hazards. Nonetheless, many contractors remain reluctant to adopt substitution due to high initial investment costs and limited

technical capacity. The enforcement of Personal Protective Equipment (PPE) serves as a complementary risk avoidance measure, providing essential protection when elimination and substitution are not practical. PPE, including helmets, gloves, harnesses, and masks, safeguards workers from residual hazards on construction sites.

Consistent PPE use reduced accident rates and improved worker morale. Kiprotich and Barasa (2021) found that strict enforcement decreased work stoppages in residential construction by 35%. Systems theory provides a holistic framework for understanding how the various components of a project interact to determine overall performance outcomes. It emphasizes that a project is not merely a collection of independent tasks but an interconnected system comprising inputs, processes, resources, stakeholders, and outputs working toward a shared objective. Each element is interdependent, meaning that disruptions in one area such as scheduling, budgeting, or communication an cascade and negatively affect the entire project's performance. According to the theory, project success is achieved when all subsystems function cohesively to ensure timely completion, cost efficiency, quality outcomes, and stakeholder satisfaction (Ochieng & Wekesa, 2024). The theory promotes a managerial approach anchored in coordination, feedback, and integrated planning, making it particularly relevant in complex and high-risk environments like construction.

Multiple stakeholders and technical processes intersect, creating potential vulnerabilities that require systematic oversight. Systems Theory thus enables project managers to foresee how non-compliance with safety standards or resource mismanagement can trigger broader disruptions, such as delays, cost escalations, or safety incidents (Ochieng & Wekesa, 2024). It underscores that risk management should be embedded within every phase of the project rather than treated as an isolated function. In the context of building construction projects, this theory supports the integration of risk avoidance strategies such as eliminating hazards, adopting safer construction methods, and ensuring compliance with Occupational Health and Safety (OHS) standards—into all project subsystems to enhance coordination, minimize disruptions, and sustain a desirable performance. The associated between risk avoidance strategies and performance of building construction projects is presented in Figure 1:

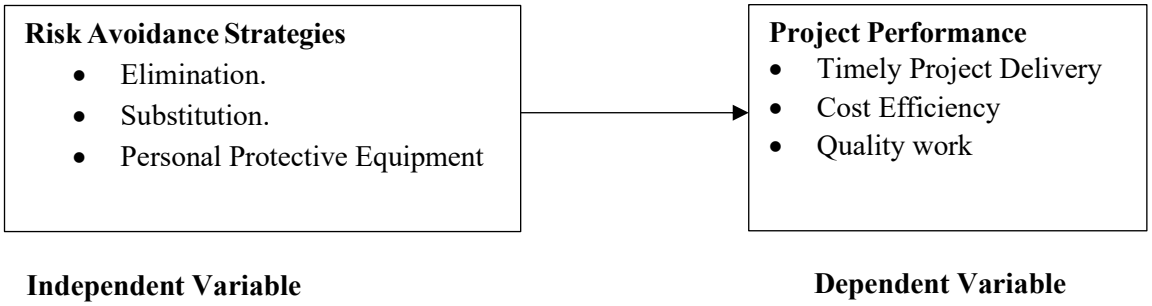

Figure 1: Conceptual Framework

Empirical evidence increasingly demonstrates that the success or failure of construction projects largely depends on how risks are managed across legal, financial, regulatory, and operational dimensions. Although much of this research has centered on non-OHS risk factors, the findings consistently underscore that inadequate risk management strategies have extensive negative implications for project performance. Githinji and Karani (2021) examined the effects of legal and contractual risks on construction projects in Nairobi County and found that unclear contract terms, weak dispute resolution mechanisms, and delayed approvals were key contributors to cost and schedule overruns. Their findings emphasized the need for early integration of legal risk management practices to strengthen contractual compliance and adherence to project timelines, reinforcing that unmanaged risks in any form undermine project outcomes. Similarly, Wanyonyi and Mutua (2023) investigated how cost-related risk management strategies influence budgeting accuracy in government-funded infrastructure projects and found that inflation, poor forecasting, and absence of contingency plans were major causes of budget overruns. Projects that employed value engineering and financial audits exhibited superior financial control, highlighting the critical role of proactive risk planning in enhancing budget performance. However, their research was confined to public sector projects and did not address site-level safety concerns.

Odhiambo and Karanja (2022) explored procurement and regulatory risks in private real estate projects and established that inconsistent code interpretation, licensing delays, and contractor non-compliance significantly affected project delivery. Projects utilizing regulatory controls such as compliance tracking systems and stakeholder consultations

experienced fewer delays and disputes. Musau and Ocharo (2024) assessed operational risk preparedness among mid-sized construction firms in Nairobi and revealed that failure to maintain risk logs or contingency plans often led to cost escalations and uncontrolled scope variations. Firms applying structured risk frameworks achieved superior cost and time performance, though their study excluded Occupational Health and Safety (OHS) considerations. Wanyama and Njoroge (2024) investigated financial risk mitigation in donor-funded housing projects in Kisumu, finding that regular cost audits and risk-based budgeting improved delivery timelines and budget adherence, but on-site risks such as worker safety remained unaddressed. Likewise, Kiprotich and Barasa (2021) examined stakeholder-related risks in infrastructure projects in Eldoret and found that weak stakeholder coordination caused significant delays and resistance from the public. Collectively, these studies reveal that while legal, financial, and regulatory risks are widely studied, limited focus has been placed on risk avoidance strategies related to OHS in building construction projects despite their critical role in ensuring safe, timely, and cost-effective project delivery. From the reviewed studies, it is evident that existing research has predominantly focused on legal, financial, regulatory, and operational risk dimensions, while offering limited insight into how risks can be effectively avoided within the context of building construction projects. Most of these studies examined risk mitigation and control mechanisms after risks had already occurred, rather than emphasizing proactive strategies aimed at eliminating hazards at the planning and design stages. Additionally, the studies did not sufficiently explore occupational health and safety (OHS)-related risks, which are among the most critical challenges in construction environments. They also failed to establish how systematic avoidance of risks through early identification and prevention could enhance safety performance, cost efficiency, and timely project completion. To address these gaps, the current research analyzed the effect of Risk Avoidance Strategies on the performance of building construction projects. Specifically, the study focused on three key indicators of avoidance: Elimination, which involves designing out or removing hazards before construction begins; Substitution, which entails replacing hazardous materials or processes with safer alternatives; and Personal Protective Equipment (PPE), which acts as the final layer of defense when risks cannot be fully avoided. Through this focus, the study provided information on how proactive risk avoidance can enhances safety and performance within the building construction projects.

4. Methodology

The study adopted a descriptive research design, which was appropriate for examining existing conditions, attitudes, and practices within a specific population at a given time. This design enabled the researcher to assess how risk avoidance strategies influence project performance in building construction projects. The target population comprised active building construction projects within Nakuru Town East Sub-County, where a total of 78 projects were listed at the time of the study. The units of observation included project managers and safety officers working at the construction sites thus a total of 156. The sample size was determined using Yamane's (1967) formula, suitable for finite populations:

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

Where:

- n = sample size
- N = population size (156)
- e = margin of error (0.05) n

$= 156 / (1+156(0.05)^2 = 112$

Therefore, a total of 112 respondents were selected to participate in the study. A structured questionnaire was used as the main instrument for primary data collection. Descriptive and inferential statistical analyses were applied. Pearson's product-moment correlation analysis assessed the strength and direction of the relationship between risk avoidance strategies and project performance. Additionally, multiple linear regression analysis determined the predictive effect of risk avoidance strategies on project performance, guided by the following model:

$$Y=\beta_0+\beta_1X_1+ \varepsilon$$

Where;

Y = Performance of Building Construction Projects

β_0 - Constant

β_1 - Beta Coefficient

X_1 - Risk Avoidance Strategies

ε - Error of Margin

5. Results

This section presents the findings and discussions on how risk avoidance strategies influence the performance of building construction projects. It highlights both descriptive and inferential results explaining the effect of risk avoidance strategies on project performance.

5.1 Descriptive Statistics

The study aimed to determine the effect of risk avoidance strategies on the performance of building construction projects. The findings are presented in Table 4.3:

Table 1: Effect of Risk Avoidance Strategies on Performance of Building Construction Projects

	n	SA 5	A 4	N 3	D 2	SD 1	Mean	Std. Dev.
		Percentage (%)						
Hazardous materials or equipment are replaced with safer alternatives where available.	88	40.9	44.3	12.5	2.3	0	4.24	0.758
The project team actively redesigns work procedures to eliminate exposure to high-risk activities.	88	12.5	51.1	26.1	10.2	0	3.66	0.829
Safety training and toolbox talks are conducted regularly.	88	18.2	40.9	26.1	10.2	4.5	3.58	1.047
Workers are provided with appropriate PPEs for all identified site risks.	88	37.5	39.8	17	5.7	0	4.09	0.879
Use of PPEs is consistently enforced across all levels of the construction workforce.	88	14.8	42	23.9	10.2	9.1	3.43	1.143
Standard safety systems of work are implemented throughout the project.	88	47.7	40.9	9.1	1.1	1.1	4.33	0.784

As illustrated in Table 4.3, 40.9% of the respondents strongly agreed and 44.3% also agreed, hence 85.2% at least agreed (Mean=4.24; Std. Dev.=0.758) that hazardous materials or equipment are replaced with safer alternatives where available. This indicates that risk avoidance is effectively achieved through substitution, which reduces direct exposure to hazards and enhances worker safety, ultimately improving project continuity. While, 51.1% of the respondents agreed, 26.1% were neutral (Mean=3.66; Std. Dev.=0.829) on whether the project team actively redesigns work procedures to eliminate exposure to high-risk activities. It demonstrates that although procedural redesign is practiced, inconsistent adoption may limit its overall effectiveness in eliminating hazards, leaving certain risks inadequately managed. Similarly, 26.1% of the respondents were unclear (Mean=3.58; Std. Dev.=1.047) that safety training and toolbox talks are conducted regularly. This suggests that while some firms emphasize training, the lack of uniformity in its application weakens proactive safety culture and may increase vulnerability to accidents. Additionally, it was established that 37.5% of the respondents strongly agreed and 39.8% also agreed, hence 77.3% were in agreement (Mean=4.09; Std. Dev.=0.879) that workers are provided with appropriate PPEs for all identified site risks. As such, provision of protective equipment is widely recognized as a fundamental avoidance strategy, ensuring workers are safeguarded against physical harm and minimizing delays associated with injuries.

However, 23.9% remained indifferent (Mean=3.43; Std. Dev.=1.143) on whether the use of PPEs is consistently enforced across all levels of the construction workforce. This reflects gaps in enforcement mechanisms, implying that inconsistent compliance could weaken safety controls and compromise project outcomes. Moreover, findings reveal that 47.7% of the respondents strongly agreed and 40.9% also agreed, thus 88.6% were in agreement (Mean=4.33; Std. Dev.=0.784) that standard safety systems of work are implemented throughout the project. This demonstrates that adopting structured safety systems establishes a strong preventive framework, reducing the likelihood of accidents and sustaining high performance levels in construction projects.

Table 2: Performance of Building Construction Projects

	n	SA 5	A 4	N 3	D 2	SD 1	Mean	Std. Dev.
		Percentage (%)						
The project adheres to planned timelines and milestones.	88	52.3	35.2	11.4	1.1	0	4.39	0.734
Delays are promptly identified and addressed.	88	35.2	47.7	14.8	2.3	0	4.16	0.756
The project is being implemented within the approved budget.	88	31.8	51.1	9.1	8	0	4.07	0.855
Workmanship meets required quality and safety standards.	88	33	53.4	8	2.3	3.4	4.10	0.898
There have been minimal injuries or health-related incidents on site.	88	27.3	44.3	23.9	3.4	1.1	3.93	0.868
Stakeholders are satisfied with the overall project progress and outcomes.	88	42	42	12.5	1.1	2.3	4.20	0.873

The research findings in Table 4.6 indicate that 52.3% of the respondents strongly agreed and 35.2% also agreed, hence 87.5% in total agreed (Mean=4.39; Std. Dev.=0.734) that the project adheres to planned timelines and milestones. This implies that effective scheduling and control mechanisms are central to project success, as timely completion enhances reliability and stakeholder confidence. 35.2% of the respondents strongly agreed and 47.7% also agreed, giving 82.9% at least agreed (Mean=4.16; Std. Dev.=0.756) that delays are promptly identified and addressed. It shows that early detection and corrective action play a vital role in minimizing disruptions, allowing projects to sustain momentum and meet delivery expectations. 31.8% of the respondents strongly agreed and 51.1% also agreed, thus 82.9% were in agreement (Mean=4.07; Std. Dev.=0.855) that the project is being implemented within the approved budget. As such, cost control measures are actively applied, enabling financial discipline and reducing risks of overruns that could otherwise jeopardize project completion.

According to the findings, 33% of the respondents strongly agreed and 53.4% also agreed, hence 86.4% were in agreement (Mean=4.10; Std. Dev.=0.898) that workmanship meets required quality and safety standards. Therefore, the quality assurance systems are effectively embedded, ensuring durability, compliance, and safety in construction outputs. Although 44.3% of the respondents agreed, 23.9% were neutral (Mean=3.93; Std. Dev.=0.868) that there have been minimal injuries or health-related incidents on site. This shows that while safety outcomes are generally positive, inconsistencies in health and safety practices may still pose occasional risks to workforce welfare. It was revealed that 42% of the respondents strongly agreed and another 42% agreed, making 84% in agreement (Mean=4.20; Std. Dev.=0.873) that stakeholders are satisfied with the overall project progress and outcomes.

5.2 Inferential Analysis Results

Inferential analysis was carried out to examine the relationship between the risk avoidance strategies and performance of building construction projects. The analysis involved the use of both correlation and regression techniques.

5.2.1 Correlation Analysis Results

Correlation analysis was employed to assess the association between the risk avoidance strategies and performance of building construction projects.

Table 3: Correlation between Risk Avoidance Strategies and Project Performance

		Project Performance
Risk Avoidance Strategies	Pearson Correlation	.702**
	Sig. (2-tailed)	.000
	N	88

According to the findings, the relationship between risk avoidance strategies and the performance of building construction projects was strong, positive, and significant (r=0.702**; p=0.000) at 1% significance level. The positive correlation coefficient indicates that increased risk avoidance leads to higher project performance. As such, the elimination of hazards, substitution with safer alternatives, and use of personal protective equipment had a substantial impact on project

performance. The result underscores the vital role of proactive risk avoidance in sustaining the performance of building construction projects.

5.2.2 Regression Analysis Results

A regression analysis was conducted to determine the extent to which the risk avoidance strategies predicts the performance of building construction projects. The results are presented in Tables 4, 5, and 6:

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.702[a]	.493	.487	.29329

a. Predictors: (Constant), Risk Avoidance Strategies

The findings shows that the coefficient of determination was (R^2 = 0.493). It shows that risk avoidance strategies explained 49.3% of the variation in project performance. Therefore, it is evident that the performance of building construction projects is affected by the risk avoidance strategies.

Table 5: ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	7.188	1	7.188	83.561	.000[b]
Residual	7.398	86	.086		
Total	14.586	87			

a. Dependent Variable: Project Performance

b. Predictors: (Constant), Risk Avoidance Strategies

The ANOVA results show an F-value of 83.561 and a p-value of 0.000, indicating that the model is statistically significant at the 95% confidence level. This confirms that risk avoidance strategies have a significant effect on project performance. Therefore, the model is a good fit for explaining the relationship between risk avoidance strategies and project performance of building construction projects.

Table 6: Regression Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.047	.231		8.851	.000
Risk Avoidance Strategies	.539	.059	.702	9.141	.000

a. Dependent Variable: Project Performance

The regression model was expressed as: $Y = 2.047 + 0.539X_1 + \varepsilon$. The results indicate that one unit increase in risk avoidance strategies led to 0.539 unit increase in project performance. The t- value=9.141 was significant (p=0.000) at a 95% confidence level. This means that risk avoidance strategies had a significant effect on project performance. Consequently, it was concluded that risk avoidance strategies significantly affected the performance of building construction projects.

6. Conclusion

In conclusion, risk avoidance strategies affect the building construction projects' performance by eliminating hazards before they interfere with project progress. The substitution of high-risk methods and materials with safer alternatives reflects a proactive approach that minimizes exposure to threats. The redesign of workflows to reduce hazardous tasks further supports project continuity and enhances worker safety. Safety training and strict adherence to safe work systems foster a culture of awareness that prevents avoidable accidents and inefficiencies. In addition, consistent use of protective equipment and structured prevention measures instills discipline in project operations, reinforcing compliance and boosting confidence among stakeholders. These practices demonstrate that effective avoidance not only minimizes disruptions but also promotes long-term performance of construction projects.

7. Recommendation

Based on the conclusions, it was recommended that building construction firms strengthen risk avoidance by adopting safer alternatives in project design, construction methods, and material selection. They should also integrate comprehensive safety training programs to enhance workers' awareness and compliance. In addition, strict enforcement of safe work practices will help minimize exposure to preventable risks and improve overall project performance.

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