Effect of Risk Monitoring on Performance of Water and Sewerage Projects in Kenya: A Case Study of Nairobi City Water and Sewerage Company

Njeru Aloise Njiru & Dr. Juster Nyaga, Phd

Management University of Africa, Management University of Africa

DOI: https://doi.org/10.68050/JAMS.2026.963

Received: 11 November 2026; Accepted: 15 November 2026; Published: 21 November 2026

ABSTRACT

Poor performance of public infrastructure projects has been a key issue for the past decades.
The purpose of the study was to determine the influence of risk monitoring on performance of water and sewerage projects in Nairobi County, Kenya. A correlational research design was used, whereby data were collected through online questionnaires. The study used a target population of 210 participants selected through stratified random sampling from 45 water and sewerage projects. Using the Yamane formula, the population was reduced to 138. Data were then analyzed and interpreted using the Statistical Package for the Social Sciences (SPSS) Version 28 for descriptive and inferential analyses. The multiple regression results indicated that risk monitoring was positively associated with project performance, with a coefficient value for risk monitoring $\beta = 0.381$, $p < 0.01$. The study concludes that continuously tracked projects and review of emerging risks enhance project performance. The study also concludes that risk monitoring enables project leaders to identify deviations and the effectiveness of risk response plans and take corrective action. Based on the findings, the study recommends strengthening risk monitoring practices via reporting mechanisms, clear communication of responsibilities, and periodic risk review to enhance overall performance.

Keywords: risk monitoring, evaluation, audit, periodic review, performance indicators

1.0 INTRODUCTION

1.1 Background to the study

Project management entails applying techniques, special tools, and skills to ensure that project requirements and objectives are met (Amaro & Domingues, 2023). Project management involves planning, execution, and monitoring, as well as risk management practices to ensure successful projects. Every project is susceptible to risks, thus requiring project managers to understand and apply risk management principles. Common internal risks on projects include cost overruns, scope creep, skills gap, poor stakeholder communication, weak project leadership, and technology issues. As for external risks, they include supply chain disruptions, regulatory issues, political interference, legal issues, and economic or market fluctuations. This study addressed the influence of risk monitoring on such unprecedented risks to ensure good project performance in water and sewerage projects in Nairobi County.

Poor performance of public infrastructure projects has been a key issue for the past decades. In India, for example, data shows that only 21% of ambitious water supply pipelines intended to expand sanitation coverage were completed on time in major urban areas such as Gujarat and Tamil Nadu (Chaman, 2025). However, other urban areas like Indore and Bhopal remain vulnerable to water and sanitation struggles, with over 705 water supply systems struggling to meet timelines and scheduled costs (Shah et al., 2011).

In South Africa, cost overruns are a major cause of poor project performance, evident in the case of the Caleb Motshabi and Khotsong water and sewerage project in South Africa (Bandile, 2022). The deadline for the project was mid-2018; however, it was completed in mid-2022. Not only was the project completed past the

estimated timeframe, but it also cost 47% more than the estimated budget, from R196.2 million to R287.9 million (Bandile, 2022). The delay and cost overrun were attributed to poor risk planning and a lack of preparedness, resulting in project managers overlooking or underestimating threats during the planning phase, making the project vulnerable to uncertainties.

Poor project performance is also a growing concern in Kenya's water and sewerage projects. For instance, out of the ten water projects across Nairobi County in 2022, with an estimated budget of Ksh. 6.3 billion, three programs costing Ksh. 2.3 billion had progressed well, whereas seven projects costing Ksh. 4 billion were not fully completed, resulting in an alarming completion rate of 51% (Nyarangi, 2025). In Baringo County, as of 30th June 2020, most water projects, such as the Torokwo Water Project in Sacho ward, Baringo County, remained incomplete, prompting a revision of completion dates to March 2023 (Nyarangi, 2025).

According to Gichohi et al. (2024), poor risk practices are one of the many hidden causes of infrastructure under performance. Specifically, risk monitoring, whereby stakeholders fail to track identified risks and response plans afterward, often results in a predictable chain of incomplete, delayed, or projects that cost more than the desired budget. Risk monitoring can be defined as a systematic process of continuously evaluating risks to determine whether the mitigation strategies are effective (Landoll, 2021). According to Smith and Merritt (2020), risk monitoring entails regularly evaluating the risk mitigation strategies using tracking indicators and proactively adjusting the identified risks. Since risks change as the project progresses, new risks may develop, and anticipated risks may disappear; thus, the process should be ongoing to provide relevant and timely information to determine the best strategies to reduce the risks (Smith & Merritt, 2020). This study addressed the role of risk monitoring in enhancing good project performance for water and sewerage projects, given that unmonitored risks often materialize, causing cost increases, delays, defects, and quality issues.

1.2 Problem Statement

With Kenya's new Constitution, access to quality sanitation is a fundamental human right for all residents. Driven by the need to meet the needs of an increasing population, especially in informal settlements, Nairobi County has made significant progress in the provision of clean water and sewerage projects compared to other devolved units (Advani, 2019). According to the Nairobi City Council, the projects receive substantial financial support from collaborative efforts involving the national and county governments, development partners such as non-governmental organizations, and donors. For example, the Bill and Melinda Gates Foundation recently contributed over $29.8 million to pro-poor urban sanitation projects in Nairobi County, whereas the Water Services Trust Fund, formed in 2002, has contributed over $18.4 million for sewerage and drainage projects (Kori & Pedo, 2024). With such significant contributions from donors and the hefty allocation of financial constraints, water and sanitation projects should be completed, increasing access to clean water and sewerage treatment.

Despite Nairobi County's efforts to develop and implement water and sanitation projects, informal settlements continue to struggle with incomplete water and sewerage infrastructure (Maina & Mungai, 2023). For example, it is estimated that 55% of water and sanitation projects in Nairobi County fail to meet quality standards and that 52% remain incomplete due to financial constraints (Mithika & Moronge, 2017). The Tasia-Fedha sewer line and Mowlem Ward sewer projects remain incomplete to date due to financial constraints, poor planning, corruption, and stakeholder conflicts, thereby increasing the number of incomplete sanitation projects in Nairobi County (Advani, 2019). According to Kori and Pedo (2024), stalled and poor-quality projects within the county are caused by poor risk practices, procurement delays, delayed funding, and poor project monitoring.

Although there are many studies exploring the role of risk management strategies on performance of projects, there are few gaps that this study addressed. Most studies fail to explore the role of risk monitoring on project performance, highlighting an empirical gap in their findings that this study addressed. Additionally, although studies such as Ogutu (2019) and Nyamache (2018) investigate the role of risk management practices in project management, there is a dearth of studies examining their role in projects in the water and sanitation sector, specifically in the East African region and Kenya. This points out a geographical gap that this study

filled by focusing on projects within Nairobi County, Kenya.

1.3 Main Objective of the study

The main objective of the study was to examine the effect of risk monitoring on performance of water and sewerage projects in Nairobi County.

i. What is the effect of risk monitoring on performance of water and sewerage projects in Nairobi County, Kenya?

1.4 Significance of the Study

The study's findings will benefit various project stakeholders, including project managers, team members, and scholars. The study will be impactful to project leaders and team members since the outcomes will recommend the most effective risk monitoring practices tailored to the specific organization; the firm can anticipate significant improvements in project performance. In the academic field, the results will expand the existing knowledge on the role of risk monitoring in project performance. Researchers and scholars will gain novel insights and a critique of the existing literature, thereby expanding the literature on risk management strategies. This research will also lay a foundation for researchers who may wish to further explore this topic by examining other projects or organizations in different areas. Therefore, closing the knowledge gap on how risk management practice can improve project outcomes in Nairobi County, Kenya.

1.5 Scope of the Study

The study explored contingency theory as the anchoring theoretical framework. It also employed a correlational research design, using surveys to collect data and statistical methods to quantify results. The target population comprised 45 water and sewerage projects. The unit of observation was 210 participants, including 45 project managers/engineers, 30 project supervisors or site managers, 25 project committee members, 50 contractors and consultants, and 60 technical staff/project team members. Stratified random sampling helped narrow the project pool, from which participants were selected using simple random sampling. The study sample size was 138, based on the Yamane formula. The study period was from July 2025 to October 2026.

2.0 LITERATURE REVIEW

2.1 Theoretical Literature

First proposed by Fred Fiedler in 1964, the contingency theory offers an alternative framework for anticipating the possibility of risk events and their impacts (Otley, 2016). Contingency theory highlights the uniqueness and complexity involved in identifying and managing risks within a project, rejecting the notion that there is a one-best way or rule of thumb for managing all risks or situations (Shala et al., 2021). The theory focuses on personalizing decisions and actions according to the situation rather than using predefined or standard procedures for risk management (Omazic et al., 2023). Henceforth, contingency theory rejects the notion that there is a one-best way or rule of thumb for managing all risks or situations (Shala et al., 2021). This theory highlights the uniqueness and complexity involved in identifying and managing risks within a project.

The theory informs the principle of risk monitoring by advocating the use of various strategies to monitor and control the effects of risk mitigation measures during implementation (Suharyanto & Lestari, 2020). The theory posits that risk monitoring practices should be tailored to the uniqueness and complexity of a project. For instance, complex or large projects often require a formal, systematic risk-monitoring system that involves both technological and manual resources (Otley, 2016). On the contrary, simple projects may employ informal monitoring techniques like debrief meetings or simple registers. Moreover, long-term projects require frequent reassessments and iterative reviews, whereas short-term projects require only one-time monitoring, since risks change little over time.

2.2 Empirical Literature Review

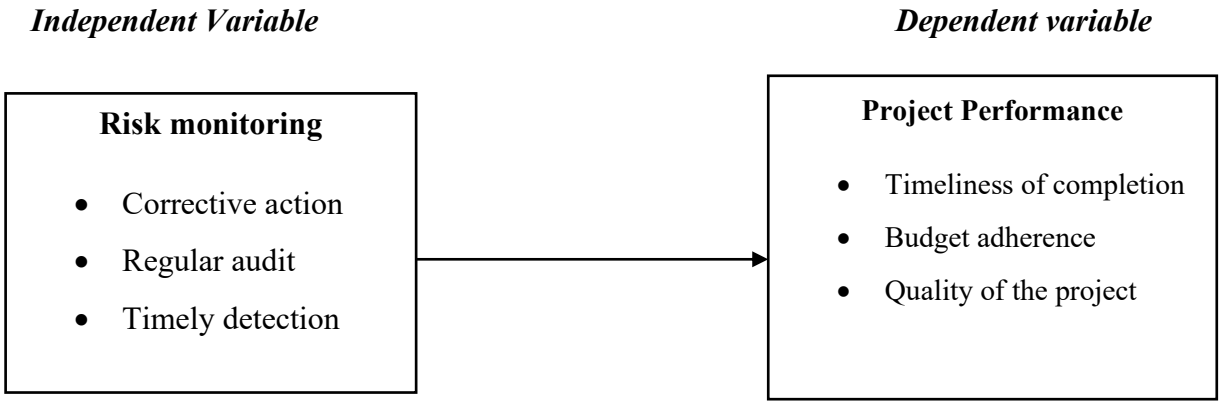
Ouma et al. (2020) assessed the impacts of analyzing risks, especially risk control or monitoring, on the project performance of Kenya Commercial Bank projects in Nairobi County. The study employed a descriptive method to examine forty projects, which were the target population. One hundred and eighty (180) participants were selected for the projects. The study revealed a significant and positive link between risk management practices like risk control and the performance of the banks' projects. According to the authors, poor risk monitoring has a negative impact on bank projects, often resulting in stalled projects. The study explored diverse projects undertaken by Kenya Commercial Banks, which create contextual and geographical gaps.

Miganda (2024) aimed to investigate the most effective framework for risk management that influences the national government construction constituency development funded projects across Nairobi County. The study used a survey research method that evaluated the findings from existing studies, deriving similarities and differences. The study targets two ongoing CDF projects at the time in seventeen constituencies within the five wards of Nairobi County. The study included 118 managers, who were given questionnaires to collect primary data. Using a regression model, the study found that risk monitoring and risk management had a significant positive effect on CDF construction projects across all areas. All independent variables, such as risk planning and risk control, also had a weak but positive influence on project completion rates. However, the authors recommend using updated technology and systems to ensure effective risk monitoring, highlighting a conceptual gap that this research will tackle.

Rehema (2017) investigated the influence of risk management strategies on the performance of construction projects in Pakistan. The study used a descriptive design, which employed qualitative research instruments like questionnaires to retrieve data. The study involved 152 construction projects, and respondents were recruited using a convenience sampling method. The study also employed theories such as contingency theory and agency theory to explain the relationship between risk monitoring and control and construction project performance. The study indicated that risk monitoring and risk control were positively correlated with completed projects, as they ensure the effectiveness of corrective measures. However, the research fails to address the influence of risk planning, which is crucial in construction projects for future forecasting and cost estimation.

2.3 Conceptual Framework

A conceptual framework presents a visual map showing how two or more variables relate to each other. The figure below shows the link between risk identification (predictor) and project performance (outcome).



3.0 METHODOLOGY

The study used a correlational research design to examine the relationship between risk assessment and performance of water and sewerage projects undertaken by the Nairobi City Water and Sewerage Company. This research design was suitable for identifying the association and strength between the two constructs.

The study's target population was 210 participants, selected through random sampling from 45 projects. The

participants included 45 project managers, 30 site managers, 25 project committee members, 50 contractors, and 60 technical staff. The respondents were targeted because they all have responsibilities in ensuring project completion. Participants were randomly selected to ensure representation of all staff with different experience and expertise in the water and sewage projects. The Yamane Taro formula was used to determine the sample size, which was narrowed down from 210 to 138 respondents.

To collect data, the study used structured questionnaires, which were ideal since they allowed collection of both qualitative and quantitative data. The questionnaires were distributed online through Google Forms to reach all project stakeholders in different regions. Before the main study, a pilot study involving 14 respondents was conducted in Mathare Sub-county. These participants were excluded from the main study to minimize bias. A reliability test using Cronbach's alpha was also done, where values above 0.7 were considered to have higher internal consistency and were therefore retained for the study. Content validity was also assessed by incorporating the supervisor's feedback. Construct validity was also assessed using the Kaiser-Meyer-Olkin (KMO) values, with a cutoff of 0.5. This means that items with values above 0.5 were considered valid, whereas those below the threshold were invalid. Both construct validity and reliability tests were done using SPSS software Version 28.

4.0 FINDINGS AND DISCUSSIONS

4.1 Response Rate

Of the 138 questionnaires distributed digitally, only 135 were returned with complete, unambiguous responses. Despite the high response rate of 97.8%, the study may have experienced some limitations. For instance, self-reported data may have introduced response or social desirability bias, while the cross-sectional design limited the ability to establish changes over time or strong causal relationships.

4.2 Reliability Test

The results showed that risk monitoring had a good internal consistency. The Cronbach's Alpha value was 0.818, exceeding the 0.70 threshold. Since the variables scored 0.8 or higher, this indicates a high degree of reliability, suggesting that the questionnaire was well-suited to capture the intended research objective.

4.3 Bio Data Analysis

The study captured respondents' gender to determine the representation of male and female respondents, thus ensuring a balanced view and identifying any potential gender-based variations in responses. The results showed that 61.5% were male and 38.5% were female. This gender composition indicates male dominance in the infrastructure projects, specifically water and sewerage projects in Nairobi County. Nonetheless, the gender composition was balanced enough to create sufficient results.

Respondents' ages were also captured to understand how they influenced the study. 38 participants were between 21 and 30 years, 32 were between 31 and 40 years, 17 were between 41 and 50 years, 20 were between 51 and 60 years, and 28 were over 60 years. The age distribution shows a diverse representation across all age brackets. The roughly equal representation of both young and old participants enhances the reliability of the results by incorporating diverse experiences across career stages.

The study also assessed respondents' education level. The results showed that 36 (26.7%) had a college diploma, 68 (50.4%) had a bachelor's degree, 21 (15.6%) had a master's degree, and 10 (7.4%) had a doctorate. Individuals with a bachelor's degree were the dominant group, suggesting that most participants have a solid academic background and are qualified for technical and operational roles in the projects.

The findings also examined the time spent on the projects for each participant to assess respondents' level of experience and exposure. 8 participants (5.9%) spent less than a year, 20 (14.8%) spent between 1 and 3 years, 59 (43.7%), who were the majority, spent between 4 and 6 years, followed by 48 (35.6%) who spent over 6 years. Given that the majority of participants have remained engaged with the same projects for a longer

period, this slightly suggests that a number of projects were not completed within the scheduled timelines. According to Kabutiei, Nyang'au, and Muchelule (2022), prolonged infrastructure projects often indicate implementation inefficiency, cost overruns, systemic delays, or project cancellation.

4.4 Descriptive Statistics

There was a clear risk evaluation criterion

For the first item in the questionnaire, half of the respondents (42.2%) agreed that clear evaluation procedures were followed throughout the process, with a mean of 3.22 and a standard deviation of 1.32. The results showed that although the majority perceive that evaluation measures exist, they are not consistently applied across all departments and water and sewerage projects. This could be because some projects partially implement monitoring tools, such as review schedules, while others rely on informal tracking. Musyimi and Ondara (2022) suggest that poor supervision, oversight, and inconsistent follow-up procedures are likely to prevent risk monitoring processes from being fully optimized.

Stakeholders had defined roles in risk monitoring

The majority (46,6%) disagreed that all stakeholders had defined roles for risk monitoring, with a mean of 2.96 and a standard deviation of 1.40. The mean suggests this could be a common issue across the projects, given the unanimous perception of a lack of clearly assigned roles for monitoring and reporting risk outcomes. This aligns with findings from Gichohi, Iravo, and Muchelule (2024), who note that weak communication channels, over-centralization of duties, and the lack of a formal role-allocation schedule in a dynamic project often result in poor performance due to unclear roles for stakeholders.

Risks were monitored regularly

For item three, the majority agreed that risks were monitored at predefined, regular intervals, with 69.6% agreeing, a mean of 3.86. The high percentage indicates that most project members believe risks were well monitored across most water and sewerage projects, as reinforced by the relatively low differences in responses. This demonstrates that water and sewage projects in Nairobi City Water and Sewerage Company followed a structured, systematic approach to regulatory checks and risk evaluation, carried out promptly. Nyamwange and Kyule (2023) advocate for formal monitoring tools like Gantt charts and risk registers, especially for infrastructure projects, to ensure scheduled project oversight.

Risk monitoring was treated as an ongoing process

Over half of the respondents (61.5%) agreed that the risk monitoring process was continuous throughout the projects, with a mean of 3.53 and a standard deviation of 1.31. The mean shows strong agreement with the statement and moderate variability in responses, reflecting a common practice across water and sewerage projects. The results show a consistent monitoring practice that helps identify new and evolving risks. The findings reinforce those of Bello (2025), which advocates proactive frameworks such as PMBOK for continuous risk monitoring through project completion, ensuring a tangible reduction in project risks.

Changes in risks were timely detected

Fifty eight point five 58.5% of the respondents also agreed that any changes in identified risks were closely monitored, with a mean of 3.61 and a standard deviation of 1.29. The majority of respondents perceived changes in risks as being actively tracked and re-evaluated, with moderate differences in responses. This suggests that the project managers acknowledged that risks are dynamic and require timely adjustments and adaptations to mitigation strategies to ensure a higher success rate.

Risk responses were regularly evaluated

Over half of the respondents (54.1%) agreed that risk mitigation measures were often weighed to assess their

effectiveness, with a mean of 3.42 and a standard deviation of 1.41. The high level of agreement shows that the practice is consistently applied across all water and sewerage projects undertaken by NCWSC. This supports findings from Ahmed (2017), who states that risk monitoring should include a reliable feedback loop that allows ineffective mitigation measures to be reviewed, replaced, or adjusted.

Risk monitoring enhanced better performance

For the last item, the majority (67.4%) agreed that risk monitoring enhances early detection of effective mitigation strategies, with a mean of 3.67 and a standard deviation of 1.27. The substantial majority believe risk monitoring is vital for proactive risk management, allowing project managers to identify and reinforce effective strategies at an early stage. This improves resource optimization and overall project performance. From the findings, the aggregate mean of 3.27 shows a high level of agreement among participants. This suggests that risk monitoring and evaluation practices are well implemented and consistently applied across water and sewerage projects.

4.5 Correlation Analysis

For risk monitoring, the correlation coefficient was $r = 0.162$ ($p < 0.01$) at the 1% significance level. However, risk monitoring recorded a weak but positive association with project performance, suggesting that improvements in risk monitoring practices slightly improve overall project performance. The p-value shows a statistically significant relationship between the two variables. These results suggest that greater emphasis should be placed on strengthening risk monitoring as well as other risk management practices, especially risk assessment, which has a strong statistical relationship with project performance in water and sewerage projects.

Table 1: Correlation analysis results

		Risk monitoring	Performance
Risk monitoring	Pearson Correlation	1	0.162
	Sig. (2-tailed)		0.061
	N	135	135
Performance	Pearson Correlation	0.162	1
	Sig. (2-tailed)	0.061	
	N	135	135
***. Correlation at 0.001(2-tailed)			

4.6 Regression Analysis

Table 2: Model Summary

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate
1	.690a	0.48	0.47	0.68
a. Predictors: (Constant), risk monitoring.				

Risk monitoring shows a strong positive relationship with project performance, with a correlation coefficient (R=0.690). This implies that improvements in risk monitoring practices are linked to corresponding improvements in project performance. The coefficient of determination (R Square=0.480) indicates that 48.0% of the variation in project performance is attributable to the effectiveness of risk monitoring. On the other hand, 52% indicates variation caused by other factors omitted from the regression model.

Table 3: ANOVA Analysis

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	23.18	1	23.18	49.86	.001[b]

	Residual	25.12	54	0.47		
	Total	48.30	55			
a. Dependent Variable: Project Performance						
b. Predictors: (Constant), Risk monitoring.						

From the ANOVA results above, the regression sum of squares of 23.18 indicates that 23.18 units of the total variation of project performance are attributed to risk monitoring. The model also shows a significant F-statistic, indicating that risk monitoring significantly improves the prediction of project performance. These findings align with those of Miganda (2024), which suggest that projects or firms that continuously evaluate and monitor project risks, track changes in the project environment, and assess the effectiveness of response strategies are likely to achieve better project performance.

Table 4: Regression results

Variable	B	Std. Error	Beta	t	Sig.
Constant	0.85	0.036	0.000	2.036	0.022
Risk monitoring	0.78	0.011	0.690	7.060	0.000
Y= (project performance) =risk monitoring Constant= 0.85 Coefficient=0.78					
$Y= 0.85+0.78X_4 +\epsilon$					

A one-unit increase in risk monitoring is associated with a 0.78-unit increase in project performance, assuming other factors remain constant. This suggests that strengthening risk monitoring practices will likely improve project performance. The findings are consistent with those of Miganda (2024), which emphasize the role of risk monitoring in enhancing decision-making by facilitating timely corrective actions and minimizing cost overruns, making it the strongest predictor among the four variables.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study concluded that risk monitoring has a strong statistical and positive influence on the performance of water and sewerage projects in Nairobi County. The correlation coefficient value of r=0.690 shows a strong positive relationship between risk monitoring and project performance. The descriptive findings further support this conclusion, as they show respondents' agreement on the importance of monitoring risks regularly, continuous tracking of risks, and timely detection of new risks. The results also showed that most water and sewerage projects in Nairobi City Water and Sewerage Companies applied various risk monitoring strategies across the projects. However, the findings revealed some gaps that future studies could explore. For instance, there were gaps indicating inconsistent evaluation procedures and unclear responsibilities in the risk monitoring process. Strengthening the institutional framework for evaluation procedures and team responsibilities would translate into better improvements in project performance.

5.2 Recommendations

For the risk monitoring process, one recommendation is to define clear duties and responsibilities for all stakeholders, which is a significant gap in the study. Nairobi City Water and Sewerage Company project leaders should assign and communicate responsibilities to all team members after deciding on risk mitigation plans to reduce ambiguity and double efforts. This will enhance coordination and teamwork among the stakeholders, ensuring risk monitoring is accomplished systematically and effectively. On the other hand, although risk monitoring was done frequently, its effectiveness was underwhelming. To address this, Ireri and Mungai (2025) recommend using monitoring indicators and metrics to ensure the practices are measurable, relevant, and aligned with the project goals. For instance, the company can leverage real-time risk-monitoring tools, such as dashboards and social media platforms, to enhance responsiveness and monitoring. High-quality performance indicators and key metrics will improve the accuracy of the risk monitoring process, enhancing better project outcomes.

REFERENCES

1. Advani, R. K. (2019). Nairobi Sanitation Project: Implementation Completion and Results Report.
2. Ahmed, R. (2017). Risk mitigation strategies in innovative projects. *Key issues for management of innovative projects*, 83-100.
3. Amaro, F., & Domingues, L. (2023). PMBOK 6th meets 7th: How to link both guides in order to support project tailoring?. *Procedia Computer Science*, *219*, 1877-1884.
4. Bandile, A. (2022, May 3). *Infrastructure for service delivery*. Consolidated general report on national and provincial outcomes | 2021-22. https://pfma-2021-2022.agsareports.co.za/infrastructure-for-service-delivery/
5. Bello, A. B. (2025). Adaptive Project Management Strategies for Complex, Multi-Stakeholder Environments: Balancing Agility, Risk, and Strategic Alignment Effectively.
6. Chaman, V. (2025, February 14). *Most of Gurgaon's 40 worst sewer hotspots fixed, says MCG as key projects remain incomplete | Gurgaon news*. The Times of India. https://timesofindia.indiatimes.com/city/gurgaon/most-of-gurgaons-40-worst-sewer-hotspots-fixed-says-mcg-as-key-projects-remain-incomplete/articleshow/128320322.cms?
7. Gichohi, P. P., Iravo, M., & Muchelule, Y. (2024). Project risk management on the performance of road construction projects in Kenya. *International Journal of Management and Business Research*, *6*(1), 108-130.
8. Ireri, M. W., & Mungai, A. M. W. (2025). Risk Management Practices and Performance of Public Water Projects in Kajiado County, Kenya. *International Journal of Social Sciences Management and Entrepreneurship (IJSSME)*, *9*(1).
9. Izah, S. C., Sylva, L., & Hait, M. (2023). Cronbach's alpha: A cornerstone in ensuring reliability and validity in environmental health assessment. *ES Energy and Environment*, *23*, 1057.
10. Kabutiei, G. J., Nyang'au, P. S., & Muchelule, W. (2022). The relationship between risk identification and the performance of national irrigation authority projects in Kenya. *International Journal of Social Sciences Management and Entrepreneurship (IJSSME)*, *6*(2).
11. Kori, E. W., & Pedo, M. (2024). Project Quality Management Practices and Performance of Tanathi Water Works Development Agency Water Projects, Kenya. *International Journal of Management and Business Research*, *6*(2), 122-136.
12. Landoll, D. (2021). *The security risk assessment handbook: A complete guide for performing security risk assessments*. CRC press.
13. Maina, L. G., & Mungai, A. M. W. (2023). Risk management practices and performance of infrastructural projects in Nakuru County, Kenya. *International Journal of Social Sciences Management and Entrepreneurship (IJSSME)*, *7*(1)
14. Miganda, J. O. (2024). *An Effective Framework for Risk Management in the National Government Constituency Development Funded Construction Projects in Nairobi County* (Doctoral dissertation, JKUAT-SABS).
15. Mithika, L., & Moronge, M. (2017). Determinants of quality management in water and sanitation infrastructure projects in Nairobi City County, Kenya. *The Strategic Journal of Business & Change Management*, *4*(5), 69-90.
16. Musyimi, M. C., & Ondara, A. (2022). Collaborative monitoring and evaluation practices and performance of county funded projects in Uasin Gishu County, Kenya. *International Academic Journal of Information Sciences and Project Management*, *3*(7), 102-119.
17. Musyimi, M. C., & Ondara, A. (2022). Collaborative monitoring and evaluation practices and performance of county funded projects in Uasin Gishu County, Kenya. *International Academic Journal of Information Sciences and Project Management*, *3*(7), 102-119.
18. Nairobi City Council. (2024, April 14). *Nairobi city water and sewerage company engages County leaders to drive forward 2024/2025 budget discussions: Focus on sustainable development goals and improved service delivery*. Nairobi City County. https://nairobi.go.ke/nairobi-city-water-and-sewerage-company-engages-county-leaders-to-drive-forward-2024-2025-budget-discussions
19. Nyamache, T. J. (2018). *The Effects of Solid Waste Dumping on Infrastructures and Human Health: Dandora Dump Site, Nairobi County* (Doctoral dissertation, University of Nairobi).

20. Nyamwange, K. A., & Kyule, A. (2023). PROJECT MITIGATION PLAN AND PERFORMANCE OF AUTOMOTIVE PROJECTS IN NAIROBI COUNTY. *International Journal of Social Sciences Management and Entrepreneurship (IJSSME)*, *7*(1).
21. Ogutu, B. A. (2019). *Influence of donor requirements on implementation of community projects in informal settlements: A case of output based Aid (Oba) funds projects in Kayole Soweto, Nairobi County, Kenya* (Doctoral dissertation, University of Nairobi).
22. Omazić, M. A., Labaš, D., & Uroić, P. (2023). Contingency theory. In *Encyclopedia of Sustainable Management* (pp. 1-9). Cham: Springer International Publishing.
23. Otley, D. (2016). The contingency theory of management accounting and control: 1980–2014. *Management accounting research*, *31*, 45-62.
24. Ouma, F. O. O., Sang, P., & Kinoti, F. (2020). Influence of risk analysis as a risk management practice on project performance in Kenya commercial banks. *International Journal of Economics, Business and Management Research*, *6*(3), 114-132.
25. Shah, T., Krishnan, S., Hemant, P., Verma, S., Chandra, A., & Sudhir, C. (2011). *A case for pipelining water distribution in the Narmada Irrigation System in Gujarat, India* (Vol. 141). IWMI.
26. Shala, B., Prebreza, A., & Ramosaj, B. (2021). The contingency theory of management as a factor of acknowledging the leaders-managers of our time study case: The practice of the contingency theory in the company Avrios. *Open Access Library Journal*, *8*(9), 1-20.
27. Smith, P. G., & Merritt, G. M. (2020). *Proactive risk management: Controlling uncertainty in product development*. productivity press.
28. Suharyanto, A., & Lestari, R. D. (2020, December). The fall and rise of the contingency theory of leadership. In *Iapa Proceedings Conference* (pp. 479-496).