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Impact of Risk Management on Time Performance of Mixed-use Developments During Construction Phase in Nairobi Metropolitan Region, Kenya

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***Abstract*— Mixed-use developments are increasingly shaping Kenya's urban development landscape. In particular, the Nairobi Metropolitan Region has witnessed rapid growth in such projects due to rising land scarcity, urban densification, and shifting real estate demands. However, the construction phase of mixed-use developments presents a complex range of risks that can significantly disrupt timelines and affect overall project success. These risks include political and legal uncertainties, financial instability, and technical challenges. Poor management of any of these risks can result in time overruns, which often cascade into cost escalations, quality compromises, and stakeholder dissatisfaction.**

This study investigated the impact of risk management on the time performance of mixed-use developments during the construction phase within the Nairobi Metropolitan Region. The specific objectives were to analyze the effect of political and legal risk management, financial risk management, and technical risk management on time performance. The study employed a descriptive survey research design and adopted a mixed-methods approach. Quantitative data collected from 297 respondents working across 67 active mixed-use developments spread across Nairobi, Kiambu, Kajiado, Machakos, and Murang'a counties. Structured questionnaires were used to gather data on the three risk management dimensions and their relationship with time performance. Additionally, qualitative data was collected through interviews with 30 key informants drawn from professionals involved in the 67 mixed-use developments to gain deeper insights and gather practical recommendations for enhancing time efficiency.

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 27 because it is well-suited for survey-based studies involving multiple variables, as it allows for efficient management of large datasets and offers a wide range of statistical techniques, including descriptive analysis, correlation, and standard/simultaneous multiple linear regression. Descriptive statistics were used to summarize the data, while standard multiple linear regression was employed to determine the influence of each type of risk management on time performance.

The findings indicated that all three risk management domains had a statistically significant and positive effect on time performance. Financial risk management emerged as the most influential factor, highlighting the importance of budgeting, cost control, and diversified funding in maintaining project timelines. Technical risk management also showed a strong effect, underscoring the need for effective planning, use of technology, and coordination among technical teams. Political and legal risk management had a smaller but still significant impact, with timely regulatory approvals and legal compliance contributing to improved time outcomes.

The study concluded that effective and proactive risk management is vital for enhancing timely project delivery and provided practical recommendations for developers, project managers, policymakers, and other stakeholders. These include improving stakeholder coordination, strengthening financial planning, leveraging technology, streamlining regulatory processes, and investing in technical capacity building.

***Keywords* — risk management, mixed-used developments, time performance**

I. INTRODUCTION

A. Background

The construction industry plays a critical role in global economic development through its contributions to GDP, employment, and infrastructure (Brown et al., 2023). In 2023, the industry was valued at approximately USD 10.7 trillion, representing nearly 13% of global GDP, with China, the United States, and India being key players (The Business Research Company, 2023). The sector is projected to grow from USD 4.2 trillion to USD 13.9 trillion between 2022 and 2037 (Brown et al., 2023). In Africa, the construction industry is also expanding significantly, expected to surpass USD 400 billion by 2025, driven by urbanization, population growth, infrastructure needs, and investments from both local and international stakeholders, especially China (African Development Bank, 2025).

In Kenya, the construction industry contributes approximately 7-10% of GDP and serves as a key employer, supporting 150,000 to 200,000 workers directly (Trading Economics, 2025; National Construction Authority, 2025). The industry's growth is fueled by infrastructure development, urbanization, and

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public-private partnerships. Moreover, the sector stimulates other industries through forward and backward linkages, creating demand for construction materials and professional services while enabling further economic growth (Brown et al., 2023).

A growing trend in Kenya is the rise of mixed-use developments, which combine residential, commercial, office, and institutional spaces (Moos et al., 2018). These projects are complex and prone to various risks, including regulatory hurdles, financial constraints, and operational challenges (Kausar et al., 2024). Such complexity requires robust risk management strategies to mitigate potential delays (Ryckewaert et al., 2021).

Time performance, defined as completing projects within planned schedules, is vital for mixed-use developments due to the involvement of multiple stakeholders and substantial investments (Brown et al., 2023; DiCesare et al., 2021; Geyer, 2024). Delays often lead to increased costs, strained relationships, and missed opportunities (Alshihre et al., 2022; Bibri et al., 2020; Ingle & Mahesh, 2022). Effective risk management in political/legal, financial, and technical domains is crucial. Political/legal risks include regulatory changes and disputes (Geyer, 2024; Chatterjee et al., 2018), financial risks involve funding and cost challenges (Fagerlid et al., 2021; Bibri et al., 2020), and technical risks relate to design and construction processes (Siraj & Fayek, 2019; Kusumastuti & Nicholson, 2018). This study examines how these risks affect the time performance of mixed-use developments in Nairobi Metropolitan Region.

B. Research Problem

Urbanization is driving increased demand for efficient land use, particularly in densely populated areas where land scarcity and high costs are prevalent (Bibri et al., 2020; Green, 2020; Mualam et al., 2019). In response, mixed-use developments have emerged as a viable solution, integrating residential, commercial, office, and institutional functions within compact urban spaces. These developments aim to address urban sprawl, promote sustainability, and enhance economic opportunities while optimizing limited land resources in Kenya and other parts of Africa. However, despite their benefits, mixed-use developments face numerous risks during the construction phase, including financial, regulatory, constructional, operational, and stakeholder-related challenges (Kusumastuti & Nicholson, 2018; Mualam et al., 2019).

A persistent issue in Kenya's mixed-use developments is poor time performance, with many projects failing to adhere to planned schedules (Ese & Ese, 2020; Runsewe, 2021). High-profile cases include Garden City Mall and Residences, delayed from 2015 to 2018 due to construction and logistical setbacks; Tatu City, experiencing slow progress due to regulatory and financial challenges; and Upper Hill Square, delayed beyond its 2017 target due to financing and construction issues (Ese & Ese, 2020; Runsewe, 2021). Other examples such as Two Rivers Mall, The Hub Karen, Britam Tower, Pinnacle Towers, and Avic International Africa Headquarters have similarly faced delays linked to financing, regulatory approvals, design complexities, and construction challenges.

In light of these challenges, this study sought to examine how technical, financial, and political/legal risk management influence time performance in Kenya's mixed-use developments. The study aimed to contribute to the limited body of knowledge on how risk management practices affect project timelines in the context of developing countries.

C. Research Objectives

The main objective of this study was to investigate the impact of risk management on the time performance of mixed-use developments during the construction phase in the Nairobi Metropolitan Region. Specifically, the study aimed to analyze the effect of political and legal risk management, financial risk management, and technical risk management on the time performance of these developments, and provide practical recommendations to improve the time performance.

D. Study Significance

This study holds significance for practice, policy, research, and the construction industry in Kenya. For practitioners, particularly project managers and construction firms, the findings provide insights into effective risk management practices that can enhance the time performance of mixed-use developments. For policymakers, the study offers evidence on risk management within Kenya's unique regulatory and economic context, which can inform local construction policies and regulations. In terms of academic contribution, the study helps bridge the literature gap by offering insights specific to developing countries, addressing an area often overlooked in favor of developed nations' contexts. Lastly, for Kenya's construction industry, the study identifies specific risk factors affecting time performance and offers practical guidance for reducing delays and improving project efficiency. These insights can support better project planning and scheduling, ensuring risks such as regulatory, financial, and technical challenges are anticipated and mitigated early in the project lifecycle.

II. LITERATURE REVIEW

A. Risks in Mixed-Used Developments

Mixed-use developments present a wide range of risks due to their inherent complexity, as they aim to integrate residential, commercial, office, and other uses within a single project to promote sustainable urban living. These risks include financial, regulatory, design and construction, operational, market, sustainability, and legal risks. Financial risks arise from high capital requirements, funding challenges, and cost overruns linked to unforeseen construction issues and market fluctuations (Molaei et al., 2019; Kausar et al., 2024). Regulatory risks involve navigating complex zoning laws, securing permits, and adhering to building codes, all of which can delay project timelines and increase costs (Kausar et al., 2024; Shibani et al., 2022). Design and construction risks include integration challenges across diverse building functions, potential design flaws, construction delays, and quality control issues that can disrupt project delivery (Fagerlid et al., 2021).

Operational risks relate to the post-completion management of these developments, including property maintenance, tenant coordination, and higher operating costs due to managing varied spaces (Molaei et al., 2019). Market risks stem from fluctuations in demand, consumer preferences, and competition, which can

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affect occupancy rates and profitability (Kausar et al., 2024). Sustainability risks focus on environmental impact, energy efficiency, and social integration, emphasizing the importance of green building practices and fostering community cohesion (Kausar et al., 2024; Molaei et al., 2019). Legal and contractual risks arise from disputes over contracts and regulatory non-compliance, requiring clear agreements and robust legal frameworks to mitigate potential conflicts (Pesämaa et al., 2018; Ryckewaert et al., 2021). Ultimately, effective risk management is essential for the success of mixed-use developments, requiring careful planning, stakeholder engagement, and adherence to best practices to achieve sustainable and timely project outcomes.

B. Risk Management Process

The risk management process for mixed-use developments involves identifying, assessing, mitigating, and monitoring risks throughout the project lifecycle. Risk identification is the first step, focusing on recognizing potential risks from the integration of various project components, such as financial uncertainties, regulatory challenges, construction complexities, and market fluctuations (Kausar et al., 2024; Ryckewaert et al., 2021). Common tools used include SWOT analysis and stakeholder brainstorming sessions, which help uncover a wide range of risks early on (Shibani et al., 2022; Pesämaa et al., 2018). Following identification, risk assessment evaluates the likelihood and potential impact of each risk through qualitative and quantitative methods like risk matrices, Monte Carlo simulations, and sensitivity analysis (Shibani et al., 2022). These methods help prioritize risks based on severity, which is crucial in complex projects such as mixed-use developments where multiple uncertainties overlap.

Risk mitigation strategies aim to reduce the likelihood and impact of identified risks. These strategies vary depending on the nature of the risks and include detailed financial planning, proactive regulatory engagement, thorough design processes, and quality control measures (Kausar et al., 2024). Risk monitoring and control involve continuous oversight through project management tools like Building Information Modeling (BIM), audits, and inspections to ensure risks are managed effectively throughout the project (Pesämaa et al., 2018). Integrating risk management into overall project management ensures it is embedded at every stage rather than treated separately. Case studies like Hudson Yards and King's Cross demonstrate the value of these approaches (Molaei et al., 2019; Ciaramella & Dall'Orso, 2021). Furthermore, stakeholder engagement and advanced technologies such as drones and IoT sensors enhance real-time risk tracking and management (Yang, 2022; Molaei et al., 2019). Environmental sustainability also adds layers of risk requiring compliance with green standards and thorough impact assessments (Siraj & Fayek, 2019; Ryckewaert et al., 2021).

C. Risk Management and Time Performance

1) Political and Legal Risk Management:

Political and legal risk management is a critical aspect of ensuring the successful and timely execution of mixed-use developments. These projects face significant challenges due to complex zoning laws, regulatory compliance requirements, environmental standards, and stakeholder interests. Effective risk management begins with early engagement with local authorities and legal experts to understand and navigate regulatory frameworks, which helps avoid delays, penalties, or project termination (Nguyen et al., 2018; Yang, 2022). Zoning regulations often require variances or special permits, and delays in approvals can disrupt project schedules. Proactively working with zoning boards and using legal counsel can expedite this process (Ryckewaert et al., 2021; Brown et al., 2023). Stakeholder engagement is also essential, as mixed-use developments involve governments, communities, investors, and residents. Involving stakeholders early promotes transparency, reduces opposition, and fosters support, which lowers the risk of legal or political challenges (Green, 2020).

Moreover, public opposition related to environmental impact, traffic congestion, or social displacement can stall projects through protests or lawsuits. Developers can manage these risks by offering community benefits, conducting public consultations, and demonstrating positive socioeconomic outcomes (Kausar et al., 2024). Legal risks are further managed through robust dispute resolution mechanisms. Incorporating mediation and arbitration clauses in contracts helps resolve issues quickly without derailing timelines (Yang, 2022; Kimotho et al., 2023). Environmental compliance is another key area; thorough environmental impact assessments (EIAs) and adherence to regulations prevent delays due to non-compliance. Case studies such as KL Eco City in Malaysia, Marina Bay Sands in Singapore, and Raffles City Chongqing in China illustrate how proactive political and legal risk management, including stakeholder engagement, legal preparedness, and environmental due diligence, can enhance time performance. These international examples highlight best practices that can be replicated in similar contexts to ensure timely project delivery.

2) Financial Risk Management

Mixed-use developments are exposed to significant financial risks stemming from market fluctuations, cost overruns, funding challenges, and revenue uncertainties. Effective financial risk management (FRM) is essential to safeguard project viability and time performance. Accurate market analysis and demand forecasting are fundamental for identifying potential risks early in the project lifecycle (Nguyen et al., 2019; Brown et al., 2023; Chatterjee et al., 2018). Financial risk assessment methods, such as Monte Carlo simulations and sensitivity analyses, help developers evaluate the potential impacts of risks and prepare appropriate mitigation strategies (Siraj & Fayek, 2019; Thiong'o & Muchelule, 2019). Mitigating financial risks requires robust strategies, including diversification of income streams, hedging, contingency planning, and sound financial structuring (Green, 2020). Securing diverse funding sources, through a mix of debt, equity, and public-private partnerships, helps ensure stability throughout the project lifecycle (Shibani et al., 2022; Green, 2020). Maintaining healthy cash flow and establishing contingency funds further strengthens resilience against unforeseen financial challenges.

Effective FRM is directly linked to time performance, as financial uncertainties often lead to project delays through interruptions in funding or escalating costs (Leonidov et al., 2020). Case studies like Eko Atlantic City in Nigeria and Menlyn Maine in South Africa demonstrate that strategies such

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as phased development, green financing, insurance, and strong governance frameworks help mitigate financial risks and uphold project timelines (Ryckewaert et al., 2021; Molaei et al., 2019; Kausar et al., 2024).

Stakeholder engagement, transparency, and sustainability measures further enhance financial resilience and mitigate delays (Green, 2020). Sustainable practices not only attract investors but also reduce operational costs, thereby supporting project schedules and financial performance (Nguyen et al., 2019; Thiong'o & Muchelule, 2019).

3) Technical Risk Management

Technical risk management (TRM) is essential for the successful execution and timely completion of mixed-use developments, given their inherent complexity. These projects require the integration of diverse functions, residential, commercial, and recreational, within a single space, presenting risks related to design, construction coordination, technology, and maintenance (Maina & Mungai, 2023; Molaei et al., 2019). Early-phase design integration is crucial, with tools like Building Information Modeling (BIM) enabling collaboration and early detection of potential conflicts, thereby reducing delays (Kausar et al., 2024). BIM and Integrated Project Delivery (IPD) systems enhance construction coordination through real-time progress monitoring and improved communication among stakeholders (Ryckewaert et al., 2021; Siraj & Fayek, 2019).

Technological advancements, such as prefabrication, modular construction, and IoT-enabled sensors, improve construction speed and quality while reducing weather-related risks (Ciaramella & Dall'Orso, 2021; Nurwin Fozia, 2022). These technologies support proactive issue identification, minimizing delays and enhancing time performance (Green, 2020). Furthermore, effective operational maintenance strategies utilizing predictive analytics reduce downtime post-construction, ensuring sustained performance (Molaei et al., 2019).

Regulatory compliance also plays a pivotal role; early engagement with regulatory bodies helps avoid legal delays (Nguyen et al., 2019). Incorporating sustainable design through frameworks like LEED mitigates risks associated with energy efficiency and environmental standards (Nguyen et al., 2019; Brown et al., 2023). Risk assessment frameworks, such as FMEA, offer systematic approaches to identifying and mitigating technical risks (Maina & Mungai, 2023). Lastly, active stakeholder engagement ensures diverse perspectives inform risk mitigation strategies, reducing delays and enhancing time performance (Nurwin Fozia, 2022).

D. Theoretical Framework

This study is anchored on two key theories: Risk and Uncertainty Bearing Theory and Contingency Theory, both of which provide a robust framework for understanding risk management and its impact on the time performance of mixed-use developments. The Risk and Uncertainty Bearing Theory, developed by Knight (1921) and expanded by Keynes (1936), distinguishes between risk, which can be measured and managed through strategies like diversification, hedging, and insurance, and uncertainty, which requires flexibility, judgment, and scenario planning (Nurwin Fozia, 2022). In the construction sector, risks are often quantifiable, such as cost overruns, delays, or labor shortages, and are typically addressed through comprehensive risk identification, assessment, and mitigation using industry-standard tools like ISO 31000 and project management software (Kamarkor et al., 2024). Conversely, uncertainties arise from unpredictable factors such as regulatory changes or technological shifts and require adaptive strategies, including scenario planning and real options theory to enhance resilience (Scholz & Tietje, 2002; Trigeorgis & Reuer, 2017). Tools like BIM and IoT further strengthen risk management through real-time monitoring and better visualization. By applying this theory, construction firms can effectively manage both measurable risks and unforeseen uncertainties, improving project outcomes and sustainability.

The Contingency Theory posits that there is no universal approach to management; optimal strategies depend on the specific circumstances of a project or organization (Comu et al., 2021; Green, 2020). Originating from the works of Lawrence and Lorsch (1967) and Fiedler (1967), the theory emphasizes the alignment between organizational structure, environment, and leadership style. In construction, this theory supports flexible management strategies tailored to the complexity and uncertainty of individual projects (Chatterjee et al., 2018). Adaptive leadership, as suggested by Fiedler's model, is crucial in navigating unpredictable environments (Kamarkor et al., 2024). Organizational structures that allow flexibility help firms respond efficiently to market demands and regulatory shifts (Oyieyo et al., 2019). Moreover, contingency theory enhances the effectiveness of risk management by aligning strategies with a project's specific risk profile and supporting sustainable practices influenced by regulatory and organizational factors (Ryckewaert et al., 2021). Overall, these theories guide construction firms in developing adaptive strategies to improve project performance and resilience.

E. Conceptual Framework

Figure 1 shows the conceptual framework for this study, which presents the independent variables (risk management) and the dependent variable (time performance of Mixed-use developments. It also shows the expected relationships between the independent variables and the dependent variable. From the conceptual framework, it was hypothesized that risk management (technical risk management, financial risk management, political and legal risk management) can lead to improvements in the time performance of Mixed-use developments.

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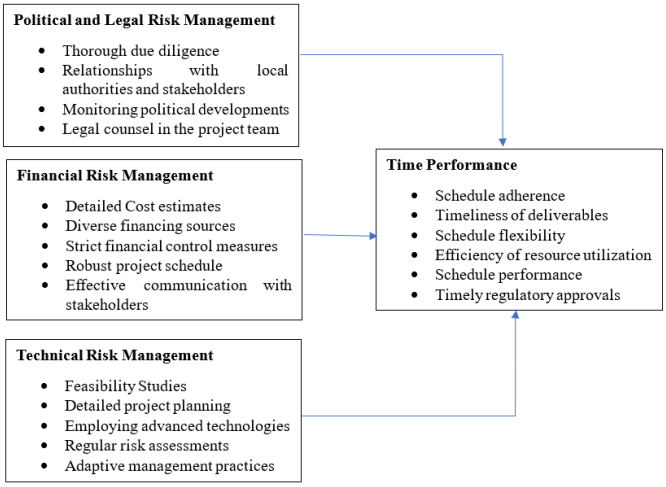

Figure 1: Conceptual Framework
Source: Author, 2025

The model was evaluated in this study is:

$$TP = \beta_0 + \beta_1 \text{TRM} + \beta_2 FRM + \beta_3 \text{PLRM} + \in \quad (1)$$

Where

B_0 – Constant
TP – Time Performance of Mixed-use developments
TRM – Technical Risk Management
FRM – Financial Risk Management
PLM – Political and Legal Risk Management

III. METHODOLOGY

A. Research Design

This study adopted a descriptive survey design to investigate the impact of risk management on the time performance of mixed-use developments. The design was appropriate as it enabled the collection of standardized, objective, and quantifiable data from a large pool of respondents, facilitating generalization to mixed-use developments in Kenya. The approach minimized researcher influence and ensured consistency in data collection. Additionally, the descriptive survey design allowed for efficient gathering of detailed data within a flexible and cost-effective framework, making it suitable for achieving the study's objectives (Bougie & Sekaran, 2019; Bell et al., 2022).

B. Location of the Study

This study focused on the Nairobi Metropolitan Region, comprising Nairobi, Kiambu, Kajiado, Machakos, and Murang'a counties, selected for their rapid urbanization and growth in mixed-use developments. These developments integrate residential, commercial, and recreational spaces, offering sustainable urban solutions and reducing reliance on commuting. Prominent examples include Two Rivers Mall, Garden City, and Tatu City. Despite their benefits, projects like Upper Hill Square and Hazina Towers have faced significant delays due to financing, regulatory, and logistical challenges. These examples highlight the relevance of studying risk management and time performance within Nairobi's dynamic urban development context (Ese & Ese, 2020; Runsewe, 2021).

C. Population and Sampling

The study targeted mixed-use developments within the Nairobi Metropolitan Region, covering Nairobi, Kiambu, Kajiado, Machakos, and Murang'a counties. A total of 67 approved mixed-use projects were identified through county government records, forming the study's population. Respondents included key stakeholders such as project managers, engineers, architects, quantity surveyors, and contractors, selected due to their involvement in risk management and time performance. A census approach was adopted, targeting five respondents per project, yielding a target sample size of 335. Additionally, stratified random sampling was used to ensure representation across construction companies, developers, engineering, architectural firms, and contractors for more precise and reliable results. Table 1 shows the respondents' information.

Table 1: Demographic Data of Respondents

		Frequency	Percent
Age Category	18-29	44	15%
	30-39	44	15%
	40-49	141	47%
	50-59	45	15%
	60+	23	8%
	Total	297	100%
highest level of education	Diploma	33	11%
	Bachelor's Degree	126	42%
	Master's Degree	100	34%
	PhD	38	13%
	Total	297	100%
Gender	Female	82	28%
	Male	215	72%
	Total	297	100%
Position/Role in Project	Project manager	18	6%
	Construction Engineer	31	10%
	Architect	36	12%
	Financial Analyst	53	18%
	Legal Advisor	43	14%
	Environmental engineer	28	9%
	Structural engineer	19	6%
	Materials engineer	37	12%
	Quantity surveyor	32	11%
	Total	297	100%
years of Experience in Construction Project	Less than 5 years	53	18%
	5-10 years	95	32%
	11-15 years	111	37%
	More than 15 years	38	13%
	Total	297	100%

Source: Author, 2025

D. Data Collection

Data for this study were collected using structured questionnaires administered to 297 respondents from 67 mixed-use developments across Nairobi, Kiambu, Kajiado, Machakos, and Murang'a counties. The questionnaires focused on four core areas: political and legal, financial, and technical risk management, and time performance, with responses measured on a 5-point Likert scale. The questionnaires were distributed digitally via Google Forms, with research assistants following up to ensure completeness. Additionally, qualitative data were collected through semi-structured interviews with 30 purposively selected professionals to gain deeper insights into improving time performance in mixed-use developments.

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E. Data Validity and Reliability

To ensure validity, a pilot study involving 30 respondents from the construction sector was conducted to assess the clarity and relevance of the questionnaire, leading to minor adjustments for improved wording and flow. Additionally, expert reviews enhanced content validity. An adequate sample size was also used to ensure external validity. The study engaged a total of 297 respondents drawn from various professional backgrounds involved in mixed-use development projects within the Nairobi Metropolitan Region. For reliability, Cronbach's alpha was calculated after data collection to measure internal consistency, with a threshold of 0.7 deemed acceptable. Table 2 shows the Cronbach's alpha for the variables.

Table 2: Cronbach's alpha for variables

Variable	Number of Items	Cronbach's alpha
Political and Legal Risk Management	10	0.879
Financial Risk Management	10	0.921
Technical Risk Management	10	0.845
Time Performance	10	0.897

Source: Author, 2025

F. Data Analysis

Data was analyzed using SPSS version 27. Descriptive statistics, including frequencies, means, and standard deviations, summarized the data. Standard multiple linear regression was applied to assess the effects of political/legal, financial, and technical risk management on the time performance of mixed-use developments. The model tested assumptions of linearity, independence, and normality, with results presented through charts and tables. The regression output included model summaries, ANOVA, and coefficients. Qualitative interview data underwent thematic analysis, identifying recurring patterns. Findings from both methods were integrated to provide comprehensive insights and support the study objectives through a mixed-methods approach.

IV. FINDINGS

A. Political and Legal Risk Management

The descriptive statistics on political and legal risk management provide insights into how these risks are perceived and managed during the construction of mixed-use developments in Nairobi Metropolitan Region. Using a five-point Likert scale, the overall mean score was 3.46 (SD = 1.08), indicating a moderately positive perception of risk management effectiveness. Key strengths identified included timely acquisition of permits (M = 3.63, SD = 1.404) and strong relationships with local authorities (M = 3.63, SD = 1.423). Additionally, public sector engagement and understanding of zoning laws were viewed favorably. However, lower mean scores were reported for considering political stability prior to project initiation (M = 3.20, SD = 1.042) and involving legal counsel early (M = 3.35, SD = 1.211), suggesting gaps in pre-construction planning and legal risk foresight. The findings highlight that while some aspects of political and legal risk management are well-prioritized, inconsistencies remain across projects. Table 2 shows these findings.

Table 2: Descriptive Statistics for Political and Legal Risk Management

	Mean	SD
The project team conducted thorough due diligence regarding local regulations before beginning construction.	3.51	1.381
All necessary permits and approvals were obtained in a timely manner.	3.63	1.404
The project had strong relationships with local authorities, facilitating smoother operations.	3.63	1.423
Political developments were closely monitored, and adjustments were made as necessary.	3.49	1.326
Legal counsel was involved in the project from the start, ensuring compliance with regulations.	3.35	1.211
Legal risks were managed effectively, minimizing delays in project implementation.	3.35	1.211
Political stability in the project's location was considered before starting the project.	3.20	1.042
The project team had a clear understanding of zoning laws, which minimized legal complications.	3.45	.829
Local government support for the project was strong and helped in overcoming legal challenges.	3.58	.976
Changes in government policies during the project were anticipated and managed effectively.	3.45	.829
Overall score for political and legal risk management	3.4640	1.08242
Valid N (listwise)		

Source: Author, 2025

B. Financial Risk Management

The descriptive statistics for financial risk management in mixed-use developments within Nairobi Metropolitan Region indicate a generally positive but inconsistent implementation across projects. The overall mean score was 3.51 (SD = 1.17), reflecting moderate agreement on the effective management of financial risks. The highest-rated practices included strict cost control (M = 3.63, SD = 1.22) and clear communication with stakeholders (M = 3.63, SD = 1.22), highlighting the importance of financial discipline and transparency. Robust project scheduling (M = 3.58, SD = 1.26) and comprehensive risk assessments (M = 3.54, SD = 1.24) were also noted as key strengths. However, lower mean scores for financial forecasting (M = 3.39, SD = 1.30), avoidance of penalties (M = 3.35, SD = 1.29), and contingency planning (M = 3.43, SD = 1.10) suggest these practices are less consistently applied. Variability in securing diverse funding sources (M = 3.51, SD = 1.41) further points to differences in project approaches. Overall, while financial risk management practices show strength in certain areas, inconsistencies remain, indicating the need for more standardized and comprehensive financial governance frameworks to ensure resilience across all projects. Table 3 shows these findings.

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Table 3: Descriptive Statistics for Financial Risk Management

	Mean	SD
Detailed cost estimates and budgeting were conducted at the beginning of the project.	3.49	1.405
The project secured diverse sources of funding, ensuring adequate capital throughout.	3.51	1.414
Strict cost control measures were implemented to monitor and prevent budget deviations.	3.63	1.224
The project schedule was robust enough to avoid costly delays.	3.58	1.263
Communication with investors and stakeholders was clear and timely, ensuring financial risks were minimized.	3.63	1.224
Financial performance was regularly monitored throughout the project.	3.49	1.133
The project had contingency plans in place to manage unexpected financial challenges.	3.43	1.101
Financial forecasting was conducted regularly to ensure the project stayed within budget.	3.39	1.298
The project avoided financial penalties related to contract breaches or delays.	3.35	1.286
All financial risks were assessed and appropriately mitigated throughout the project lifecycle.	3.54	1.244
Overall score for financial risk management	3.5081	1.16865
Valid N (listwise)		

Source: Author, 2025

C. Technical Risk Management

The descriptive statistics for technical risk management in mixed-use developments within Nairobi Metropolitan Region indicate a moderate level of implementation, with variability across projects. The overall mean score was 3.31 (SD = 1.169), suggesting that while technical risk management is acknowledged, its application is inconsistent. The highest-rated item was technical training of project teams (M = 3.48, SD = 1.219), highlighting the recognition of human capital development in managing technical risks. Projects generally maintained schedules despite technical challenges (M = 3.45, SD = 1.262), indicating some resilience through planning and adaptability. Other well-rated practices included regular risk assessments (M = 3.39), adaptive management (M = 3.36), and innovative construction techniques (M = 3.35), reflecting proactive risk mitigation efforts. However, lower scores were observed for the use of advanced technologies like BIM (M = 3.20), feasibility studies (M = 3.21), and technical competence of contractors (M = 3.22), suggesting gaps in technological adoption and expertise assurance. The lowest score was for coordination between design and engineering teams (M = 3.09), indicating persistent challenges in interdisciplinary collaboration. Table 4 shows these findings.

Table 4: Descriptive Statistics for Technical Risk Management

	Mean	SD
A comprehensive feasibility study was conducted before project initiation.	3.21	1.341
Advanced technologies such as Building Information Modeling (BIM) were employed to foresee potential technical issues	3.20	1.316
The project was planned in detail, reducing the likelihood of technical challenges.	3.33	1.368
Regular risk assessments were conducted to identify and mitigate technical issues.	3.39	1.220
Adaptive management practices were used to address unforeseen technical challenges effectively.	3.36	1.197
The project remained on schedule despite technical difficulties encountered during construction.	3.45	1.262
The project employed innovative construction techniques to manage technical complexities.	3.35	1.199
Coordination between design and engineering teams helped minimize technical delays.	3.09	1.006
Contractors and subcontractors had the necessary technical expertise to complete the project successfully.	3.22	1.047
Technical training was provided to ensure project teams could effectively handle any technological or engineering challenges.	3.48	1.219
Overall score for technical risk management	3.3077	1.16893
Valid N (listwise)		

Source: Author, 2025

D. Time Performance

The descriptive statistics on time performance of mixed-use developments in the Nairobi Metropolitan Region reveal generally positive, though moderate, perceptions of schedule management, adaptability, and efficiency. The overall mean score was 3.62 (SD = 1.27) on a 5-point Likert scale, indicating satisfactory but improvable performance. The highest-rated aspect was maintaining project schedules without additional budgetary resources (M = 3.79, SD = 1.53), reflecting perceived cost efficiency despite construction uncertainties. Efficient resource utilization (M = 3.71) and adaptability to scope changes (M = 3.66) were also rated positively, highlighting flexibility and planning strength. Other areas, such as timely deliverables (M = 3.64) and obtaining regulatory approvals on schedule (M = 3.64), showed similarly favorable outcomes. Communication and project monitoring scored moderately well (M = 3.62 and M = 3.55, respectively). However, the lowest-rated item was responsiveness to delays (M = 3.45), indicating room for improvement in agility and contingency planning. Overall, findings suggest reasonable time performance but highlight opportunities to strengthen rapid response strategies. These findings are shown in Table 5.

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Table 5: Descriptive Statistics for Time Performance

	M	SD
The project adhered to its original schedule.	3.51	1.414
Deliverables were completed on time throughout the project lifecycle.	3.64	1.496
The project was able to adapt to changes in scope or unforeseen circumstances without significant schedule delays.	3.66	1.462
Resources were utilized efficiently to meet project deadlines.	3.71	1.490
The project maintained its schedule without requiring additional budgetary resources.	3.79	1.532
Regulatory approvals were obtained within the scheduled timeline.	3.64	1.450
Communication between the project team and stakeholders helped ensure the timely completion of the project.	3.62	1.315
The timeline was clearly defined and realistic from the onset of the project.	3.62	1.270
There was effective tracking and monitoring of the project's schedule throughout its lifecycle.	3.55	1.302
The project team responded swiftly to delays or bottlenecks, preventing schedule disruptions.	3.45	.829
Overall score for Time Performance	3.6182	1.2693
Valid N (listwise)		

Source: Author, 2025

E. Impact of Risk Management on Time Performance

The study employed multiple linear regression to examine how political and legal, financial, and technical risk management affect time performance in mixed-use developments within the Nairobi Metropolitan Region. The model revealed a strong positive relationship ($R = 0.856$) with 73.4% of the variance in time performance explained by the three predictors ($R^2 = 0.734$). The ANOVA results showed the model was statistically significant ($F = 1371.555$, $p < 0.001$), confirming that these risk management practices significantly influence project timelines. Financial risk management had the greatest impact ($\beta = 0.735$, $p < 0.001$), indicating that effective financial strategies, including budgeting and cost control, are critical for timely project delivery. Technical risk management also had a significant, though moderate, influence ($\beta = 0.329$, $p < 0.001$), reflecting the importance of managing design, technology, and construction methods. Political and legal risk management showed the smallest effect ($\beta = 0.274$, $p < 0.001$), suggesting its role, while significant, is less pronounced.

The regression equation derived was:

$$TP = 0.053 + 0.274(PLRM) + 0.735(FRM) + 0.329(TRM) + \varepsilon$$

Where TP is Time Performance, PLRM is Political and Legal Risk Management, FRM is Financial Risk Management, TRM is Technical Risk Management.

The findings highlight that financial risk management is the most critical determinant of time performance, followed by technical and political/legal factors. This underscores the importance of prioritizing financial and technical strategies to mitigate delays and enhance project timelines in Nairobi's mixed-use developments. Table 6 shows these findings.

Table 6: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.053	.065		0.816	.042
	PLRM	0.274	.049	0.202	0.022	.000
	FRM	0.735	.048	0.677	15.254	.000
	TRM	0.329	.051	0.303	6.397	.000

Source: Author (2025)

F. Recommendations to Improve Time Performance

The qualitative findings highlighted several strategies to improve time performance in mixed-use developments within the Nairobi Metropolitan Region. A key recommendation was the need for early and structured stakeholder engagement to minimize delays caused by poor communication and conflicting priorities among developers, financiers, contractors, and regulators. Regular meetings and centralized decision-making platforms were cited as effective in aligning interests and ensuring accountability. Participants also emphasized the need for regulatory reforms to address approval bottlenecks by streamlining processes through integrated digital platforms, setting clear timelines for permit approvals, and enhancing coordination among regulatory bodies.

Additionally, the study underscored the importance of strengthening risk management, project planning, technology adoption, and resource coordination. Proactive risk assessments, scenario planning, and risk registers were recommended to anticipate disruptions. Robust planning tools such as Critical Path Method (CPM), Work Breakdown Structures (WBS), and Earned Value Management (EVM) were endorsed for more accurate scheduling. Embracing technologies like Building Information Modeling (BIM), drones for monitoring, and digital project management platforms were seen as crucial to improving oversight and accountability. Participants further recommended better resource management through timely procurement and buffer stocks for critical materials, alongside institutionalizing post-project reviews, professional training, and continuous learning to build industry capacity.

V. CONCLUSION

This study established that political and legal risk management has a significant yet moderate positive impact on the time performance of mixed-use developments within the Nairobi Metropolitan Region. Projects that proactively undertook early due diligence, secured permits promptly, maintained relationships with regulatory bodies, and engaged legal counsel early in the project cycle were less likely to experience time delays. Though this area of risk management had the smallest influence among the three domains studied, it remained statistically significant. These findings align with existing literature, which underscores the importance of regulatory compliance, stakeholder engagement, and legal preparedness in ensuring timely project completion (Yang, 2022; Green, 2020). Best practices identified included early involvement of communities, investors, and regulatory consultants to mitigate potential political and legal hurdles (Kausar et al., 2024; Shibani et al., 2022). The study's conclusions reinforce Risk and Uncertainty Bearing Theory (Knight, 1921) and Contingency Theory (Comu et al., 2021), highlighting the need for proactive,

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context-specific strategies to navigate the political and legal complexities inherent in construction projects.

Financial risk management emerged as the most significant predictor of time performance in mixed-use developments within Nairobi. Projects that prioritized strong financial planning, secured diverse funding streams, maintained consistent financial oversight, and established contingency reserves were more likely to stay on schedule. These findings are in line with previous research emphasizing the disruptive effects of poor funding, delayed payments, and weak financial controls on construction timelines (Odoyo et al., 2022). The study highlighted the value of financial forecasting, cash flow monitoring, and regular audits in minimizing delays. Effective communication with key stakeholders was also noted as essential in avoiding disputes that could lead to time overruns. The findings support both Risk and Uncertainty Bearing Theory and Contingency Theory, reaffirming that proactive, context-specific financial strategies significantly enhance project resilience. Technical risk management also had a significant positive effect, although less impactful than financial risks. Practices such as detailed feasibility studies, early identification of risks, the use of Building Information Modeling (BIM), and cross-functional coordination were critical in avoiding delays. Consistent with literature (Ali & Nsairat, 2020; Nguyen et al., 2018), poor technical planning and communication often led to rework and delays. Barriers such as limited access to advanced technologies and fragmented team structures were noted, suggesting a need for further investment in digital tools, collaboration, and capacity building.

Based on these findings, the study provides practical recommendations for key stakeholders involved in mixed-use developments. Developers should integrate comprehensive risk management strategies from project inception, with thorough feasibility studies assessing political, legal, financial, and technical risks. Early engagement with legal, regulatory, and community stakeholders is vital to prevent delays, while diversified funding models and contingency reserves enhance financial stability (Valero, 2024). Developers and project managers are encouraged to adopt digital project management platforms for real-time tracking of schedules, resource allocation, and compliance status to ensure greater transparency and timely decision-making. Project managers should employ advanced planning tools such as Gantt charts, CPM, and BIM while embedding technical risk management through regular site audits and fostering effective communication among architects, engineers, and contractors (Shibani et al., 2022; Kabirifar & Mojtahedi, 2019). Additionally, policymakers are urged to digitize and streamline approval processes, offer incentives for timely completion, and enhance regulatory oversight to reduce bureaucratic inefficiencies (Pesämaa et al., 2018; Oyieyo et al., 2019).

Another implication of the findings is that financial institutions and investors should adopt risk-informed evaluation frameworks and require robust risk management before funding projects. Structured financing models tied to milestones, performance bonds, and escrow accounts are recommended to safeguard investments and minimize delays (Valero, 2024; Pesämaa et al., 2018). Professional bodies and academic institutions should champion ongoing training in financial planning, legal compliance, and digital tools, alongside promoting knowledge-sharing platforms. Encouraging a culture of collaboration, transparency, and continuous learning through joint planning sessions and after-action reviews can help identify and address emerging risks effectively (Oyieyo et al., 2019). For future research, scholars are encouraged to expand studies beyond Nairobi to other urban centers, conduct longitudinal analyses, and investigate organizational culture's role in risk management. Further exploration of digital technologies, performance metrics, and policy interventions will provide deeper insights into enhancing time performance in complex construction projects.

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