

Journal of Entrepreneurship & Project Management

ISSN Online: 2616-8464



Stratford
Peer Reviewed Journals & books

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ISSN: 2616-8464

Quality Assurance and Performance of High-Rise Building Projects in Kiambu County

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How to cite this article: Ngugi, S. & Ngatia, P. (2026). Quality Assurance and Performance of High-Rise Building Projects in Kiambu County. *Journal of Entrepreneurship & Project Management*, 10(1), 11-21. <https://doi.org/10.53819/81018102t3165>

Abstract

The rapid expansion of high-rise building construction in Kiambu County has raised growing concerns about the quality and safety of these developments, with over 65% of inspected buildings exhibiting quality-related deficiencies between 2018 and 2023. Against this backdrop, this study examined the impact of quality assurance practices on the performance of high-rise building construction projects in Kiambu County, Kenya. Using a descriptive survey design, data were collected from 198 respondents drawn from a target population of 620 project stakeholders, including construction firms, project managers, engineers, architects, real estate developers, and county government officials. The findings revealed that quality assurance was a significant and strong predictor of project performance, with systematic audits, compliance frameworks, and regulatory enforcement playing a central role in shaping construction outcomes. However, training and awareness initiatives around building regulations were perceived less favorably, pointing to capacity-building gaps that limit the full potential of existing assurance mechanisms. The study recommends institutionalizing quality assurance through regular independent audits, strengthening contractor-regulatory authority collaboration, and dynamically updating regulatory frameworks to align with contemporary construction standards. These measures are essential for ensuring safety, compliance, and sustainability in Kiambu County's growing high-rise construction sector.

Keywords: *Quality Assurance, Performance, High-Rise Building, Projects, Kiambu County*

1.0 Background of The Study

<https://doi.org/10.53819/81018102t3165>

The construction sector is crucial in the economic development of a country due to the infrastructure, jobs, and economy it fosters. In the case of Kenya, building construction helps in the achievement of Vision 2030 through infrastructure expansion to promote urbanization, housing, and industrialization. (Ouma & Omwenga, 2022). However, the sector is impacted by some issues such as project delays, excessive expenditures, and low-quality standards, which compromise the performance and sustainability of construction works as a whole (Murugi, 2022). Quality management in construction involves implementing systematic processes to ensure that projects meet specified standards and client expectations. It includes quality planning, assurance, control, and improvement. Effective quality management practices enhance project performance by minimizing defects, reducing costs, ensuring compliance with regulations, and improving customer satisfaction (Gachingwa, 2022). An integral part of project management, project quality management ensures that the project results meet the identified quality targets and criteria, through activities and processes of planning, assurance, control, and improvement (Malinawan & Shick, 2024). It enhances customer satisfaction, lowers costs, and enhances project success. Audits, control charts, checklists, metrics, and fostering a habit of improvement are key phases. Challenges like changing requirements, resource constraints, and resistance to quality processes. Adapting leading practices through continuous improvement and training will help to maintain success in the end. The primary objective is to fulfil on schedule, cost, and quality (PMI, 2021).

According to the Kenya Building Code and the National Construction Authority (NCA), a high-rise building in Kenya is commonly described as one that is more than 15 meters (about five floors) in height. International classifications, however, frequently classify structures that are higher than 35 meters (12 floors) as high-rise. In dealing with the housing agenda, the government plans to redevelop old estates and replace them with high-rise buildings. However, industry players cite that the middle-income earners may not be able to afford the management services; thus, the government needs to do a cross-subsidy model to avoid future impediments. The building of high-rise buildings is costly due to issues such as power for lifts, lift maintenance, water and sewer systems, standby generators, and the cost of servicing the houses. Thus, the various stakeholders must address these issues before embarking on these projects (Architectural Association of Kenya, 2018). In China, a study on the impact of quality defect management on construction projects by Yu and Wang (2019) found that the usage of precast components with quality flaws, inadequate construction worker operations, and ineffective quality inspection and testing during onsite assembly and construction were the most significant factors influencing quality defect control.

Moreover, contractors were also found to have the greatest influence on the occurrence of quality faults. In Nigeria, Oni et al (2019) found that lack of adequate sanction by the standard assurance organization, and non-implementation of the National Building Code were among the topmost factors affecting quality management on construction sites in Oyo State. It was concluded that the government, professionals, quality organization agencies construction workers, and other stakeholders in the construction industry generated most of the factors affecting effective project quality management in Oyo State. The study recommended adequate sanctioning on non-compliance of quality by the standard assurance organization. In Nairobi County, a study by Gachigwa (2022) found that employees were not concerned about product quality and quality-related concepts and skills. It was found that fact-based decision-making, customer focus, total employee commitment, and mutual supplier relations significantly influence the performance of commercial building construction projects in Nairobi County.

1.1 Statement of the Problem

Kiambu County has seen a swift rise in high-rise construction projects, yet there are ongoing concerns regarding the quality and performance of these developments. However, this growth has been accompanied by a concerning rise in building collapses, raising questions about the effectiveness of quality management practices in these projects (Murugi, 2022). Recent evaluations by the National Construction Authority (NCA) reveal that more than 65% of buildings inspected from 2018 to 2023 exhibited quality-related problems, such as issues with structural integrity and adherence to the Building Code of Kenya (NCA, 2023). In addition, over 130 high-rise buildings were erected without complete compliance with the approved structural and quality standards between 2020 and 2022, highlighting weak enforcement of quality assurance protocols (KERB, 2022). According to the Kiambu County Physical Planning & Housing Department, the situation is compounded by a 27% increase in construction-related complaints noted from 2019 to 2023, primarily due to poor craftsmanship and insufficient quality control measures (County Government of Kiambu, 2023). These patterns emphasize the critical necessity to assess and enhance project quality management practices to guarantee safety, compliance, and sustainability within Kiambu's high-rise construction industry. This study thus sought to examine how quality assurance affect performance of high-rise building projects in Kiambu County.

1.2 Objective of The Study

The main objective of the study was to evaluate the impact of quality assurance practices on the performance of high-rise building construction projects in Kiambu County.

1.3 Research Question

To what extent do quality assurance practices influence the on performance of high-rise building construction projects in Kiambu County?

2.0 Literature Review

The section presents and overview of the theoretical review and empirical review and the conceptual framework.

2.1 Theoretical Review

Jensen and Meckling (1976) developed the agency theory, which focuses on the relationship between principals and agents, ensuring alignment through contracts and performance monitoring (Jensen & Meckling, 1976). It is applied in quality assurance, establishing clear quality requirements, ensuring accountability through inspections and performance reviews, using third-party auditors, and minimizing moral hazard and conflicts of interest. A fundamental feature of this theory is dealing with potential conflicts of interest, or "agency problems," that develop when the agent's goals differ from the principal's goals, notably in terms of cost, time, and quality. In the context of building quality assurance, agency theory provides a framework for analyzing and minimizing risks associated with trust, accountability, and performance monitoring (Eisenhardt, 1989). The principal expects the agent to achieve specific quality requirements, and methods are required to assure compliance.

Contracts serve as binding agreements with clear quality requirements, such as technical specifications, performance standards, and building code compliance. These benchmarks evaluate an agent's performance, such as requiring structural concrete to meet standards, which can lead to penalties or corrective measures. According to Love et al (2000), regular inspections and performance reviews are crucial for accountability in construction projects. Quality assurance teams or supervisors ensure work aligns with agreed standards, while milestone-based reviews assess compliance at critical stages. Performance monitoring detects deviations early, minimizing rework costs and impact. Third-party auditors or quality control specialists

provide unbiased evaluations of contractor's work, ensuring they meet industry standards. This is particularly useful in certifying construction materials' strength and durability (Chan, Scott, & Lam, 2004). Implementing transparent reporting systems, regular audits, and clear communication protocols can reduce moral hazard and conflicts of interest in construction projects. Digital quality assurance platforms like Building Information Modeling (BIM) can help reduce information asymmetry (Turner & Simister, 2001). The theory was useful in linking the variable of quality assurance in construction projects and its effect on performance.

2.2 Quality Assurance

Project quality assurance is a crucial aspect of project management that ensures project deliverables meet predefined quality standards through processes, policies, and methodologies (Chauhan, et al, 2023). Construction quality assurance is a crucial process in the construction industry, involving proactive measures and systematic processes to ensure projects meet or exceed predefined standards (SreeMathy, 2023). Key considerations include comprehensive planning, proactive risk management, clear communication, quality training, documented processes, regular audits and inspections, digital integration, continuous improvement, supplier and material quality control, and client involvement (Stewart, 2024). These practices ensure a comprehensive, phased approach, effective risk management, clear communication, continuous learning, and a culture of continuous improvement (Chen, 2024).

Problem identification in construction quality assurance is an important process that involves identifying potential issues that could affect project quality. This process involves conducting thorough risk assessments, conducting regular inspections and audits, and implementing proactive measures to mitigate identified risks (Caldeira, 2023). A robust defect management system is implemented to identify, document, and resolve defects promptly. Open communication among stakeholders is encouraged to address quality concerns early, and a culture of transparency and collaboration is fostered (PlanRadar, 2022). Continuous improvement is also necessary, with regular reviews of quality assurance processes to identify areas for improvement and refine quality management strategies (Kasymov, 2024). This process ensures that projects meet client expectations, industry standards, and regulatory requirements, ensuring smooth project progress (Malinawan & Shick, 2024).

According to PMI (2021), project quality audits are systematic examinations of a construction project to assess compliance with quality standards, regulations, and best practices. They are crucial for identifying areas of improvement, ensuring quality control, and mitigating risks (Malinawan & Shick, 2024). Key aspects of audits include compliance with legal and regulatory requirements, risk management, cost control, and client compliance. Types of audits include prequalification audits, third-party audits, internal audits, and client audits (Malsam, 2022). The audit process includes regular scheduling, conducting audits, and reporting findings. Benefits of audits include continuous improvement, building stakeholder confidence, maintaining quality standards, meeting client expectations and industry norms (Stewart, 2024). They also help control costs and adhere to schedules by identifying potential issues early.

2.3 Performance of High-Rise Building Projects

The benchmark for measuring the project performance is the implementation stage as gives guidelines on how the project activities and the project participants focus only on the project goal (PMI, 2021). This means opinion difference among project stakeholders can lead to project failure. Performance includes factors such as time, cost, quality, and production efficiency. There are four main components to performance management, which entail strategy goal, performance index, duty, and performance goal (PMI, 2021). Kerzner (2022) further adds that four dimensions for project performance include factors such as time, cost, quality, and production efficiency. The performance index is about the criteria for successful evaluation of

a project goal where there is development of quantitative measures for the project (Rahman & Rashid, 2018). Quality deals with the features of a product or service requested to meet the desired need.

2.4 Empirical Review

Mohamed (2023) investigated the influence of quality management practices on the performance of road infrastructure projects in Wajir County. The study specifically sought to establish the influence of quality auditing, quality training, continuous improvement, and benchmarking on the performance of road projects in Wajir County. The study was guided by the TQM theory, adopting a descriptive research design. A total of 148 employees of Wajir County government and a sample of 108 was used. The study found quality auditing ($B = 0.755$, $\text{sig} = 0.000$), quality training ($B = 0.803$, $\text{sig} = .000$) and continuous improvement positively influenced road construction projects' performance. While benchmarking and quality training had a positive insignificant influence on the performance of road construction projects. Quality auditing also had a moderately strong correlation ($r = 0.465$) and explained a 20.8% variation in the performance of road infrastructure projects in Wajir County. The joint variables of quality management practices had a strong correlation ($r = 0.879$) with the performance of infrastructure projects in Wajir County and explained 78.9% of project performance (Mohamed, 2023).

Kinyumu and Mungai (2022) examined the project quality and the performance of housing programs financed by Banks in the Nairobi Metropolitan and found that quality assurance had a strong positive correlation with project performance ($r = 0.858$, $\text{sig} = 0.001$). The study also found that quality assurance had a positive significant association with project performance ($B = 0.486$, $\text{sig} = 0.000$). The study concluded that quality assurance significantly affects the performance of bank-financed housing programs in Nairobi Metropolitan Area through quality metrics, audits, and change requests. Similarly, Atamba and Kwasira (2023) in their study on quality management practices and successful completion of building projects in Nakuru County found that quality assurance practices had a positive significant association ($B = 0.310$, $\text{sig} = 0.027$) and had 29.1% influence on the successful completion of construction projects in Nakuru County. To improve their quality assurance procedures, businesses must also fund initiatives that strengthen supplier relationships and capabilities. To strengthen their dedication to quality objectives, they should also make sure that lower-level staff members actively participate in the creation of the quality plan.

2.5 Conceptual Framework

In this study, the independent variable was quality assurance while the dependent variable was performance of high-rise building projects in Kiambu County, Kenya. Figure 1 shows the conceptual framework.

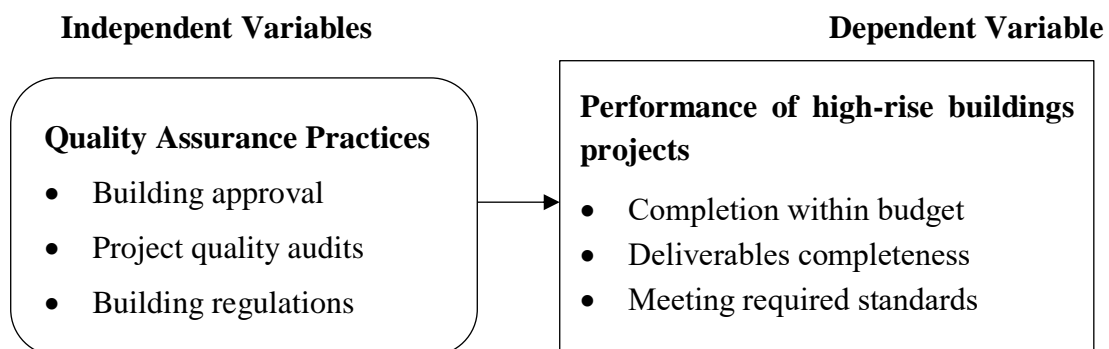


Figure 1: Conceptual Framework

3.0 Research Methodology

This study employed a descriptive survey research design is used in exploratory and preliminary studies to allow the researchers to collect data, analyze, summarize, present, and give an interpretation for clarification. The target population comprised high-rise building projects and their key stakeholders, including construction firms, project managers and consultants, engineers and architects, end users, real estate developers, and county government officials. A total of 135 projects, encompassing both private and government-funded initiatives in Kiambu County, were included and formed the unit of analysis. The unit of observation was the individual project stakeholders who provided the primary data for the study who in total were 620 individuals. A sample of 243 was used as obtained through Yamane (1967) formula. The study used stratified sampling to categorize the respondents based on the strata of project managers, registered construction firms, engineers & surveyors, project owners, and regulatory agencies. Primary data was collected by administering open and closed-ended questionnaires to the respondents. Descriptive and inferential statistics was adopted for the study. Statistical Package for Social Sciences (SPSS) was used for analysis.

4.0 Research Findings

The questionnaire was distributed to a sample size of 243 respondents in the Kiambu County for the final study. About 198 questionnaires were returned; hence, the response rate was 81.5%. This indicates a high level of participation and data quality in the survey or data collection process.

4.1 Descriptive Statistics

This section presents the descriptive findings on quality assurance practices and the performance of high-rise building construction projects in Kiambu County. Data were analysed using means and standard deviations derived from a five-point Likert scale, where higher mean values reflect stronger agreement among respondents.

Table 1: Descriptive Statistics for Quality Assurance

Quality Assurance Items	SD%	D%	N%	A%	SA%	MN	SDV
Regular process reviews are conducted to ensure adherence to quality management standards.	10.1	18.7	15.7	27.8	27.8	3.44	1.238
Training and awareness on building regulations contribute to improved project quality management.	10.6	26.8	19.7	29.3	13.6	3.09	1.237
Compliance with approval requirements contributes to the long-term sustainability of high-rise buildings.	4.5	17.7	25.8	30.3	21.7	3.47	1.147
The approval process incorporates thorough scrutiny of architectural and structural plans.	22.7	13.6	7.6	22.2	33.8	3.31	1.193
Quality audits enhance compliance with safety and performance standards in high-rise construction.	9.6	5.6	13.6	29.8	41.4	3.88	1.277
Regular quality audits improve the overall performance of high-rise building projects.	9.1	5.1	20.7	27.8	37.4	3.79	1.251
Regulatory authorities effectively enforce building standards in high-rise projects.	8.1	15.7	17.7	26.8	31.8	3.59	1.298
Regular updates to building regulations positively impact construction quality.	2.0	18.7	20.2	34.8	24.2	3.61	1.107
Average Quality Assurance						3.52	.791

The results in Table 1 reveal a generally positive perception of quality assurance practices, with an overall mean of 3.52 (SD = 0.791), reflecting moderately strong agreement and consistent responses across respondents. Quality audits emerged as the strongest indicators, with 71.2% of respondents agreeing or strongly agreeing that audits enhance compliance with safety and performance standards (M = 3.88, SD = 1.277), and 65.2% affirming that regular audits improve overall project performance (M = 3.79, SD = 1.251). Compliance-related items also performed well, as 59% of respondents agreed that regulatory authorities effectively enforce building standards (M = 3.59, SD = 1.298), and an equal proportion agreed that regular regulatory updates positively influence construction quality (M = 3.61, SD = 1.107). Process review and approval scrutiny items yielded moderate agreement, with 55.6% and 56% respectively affirming their contribution to quality adherence. The weakest item was training and awareness of building regulations, where only 42.9% agreed it contributed to improved project quality (M = 3.09, SD = 1.237), with 37.4% expressing disagreement. This points to a notable capacity-building gap that constrains the full realization of quality assurance benefits in high-rise construction projects. These findings are consistent with Els and Meyer (2025) and Lima et al. (2025), who noted that even within robust audit and regulatory frameworks, inadequate training can undermine quality implementation at the operational level.

Table 2: Descriptive Statistics for Performance

Project Performance Items	SD%	D%	N%	A%	SA%	MN	SDV
Effective quality management practices ensured the project was completed within the allocated budget.	7.6	22.2	18.7	27.3	24.2	3.38	1.276
Unexpected costs were minimized through proper quality management practices.	4.5	16.7	18.2	33.8	26.8	3.62	1.177
All project deliverables were completed in accordance with the initial project scope.	1.5	10.6	19.7	32.3	35.9	3.90	1.055
The final construction output met all functional and structural requirements.	3.0	15.7	20.2	34.3	26.8	3.66	1.123
Project stakeholders were satisfied with the outcome.	7.1	23.2	20.7	26.3	22.7	3.34	1.256
Stakeholder feedback was considered throughout the project execution phase.	8.6	22.2	14.1	27.3	27.8	3.43	1.330
Industry best practices and safety standards were followed during construction.	6.6	23.2	19.7	33.3	17.2	3.31	1.193
Independent quality assessments confirmed compliance with required standards.	3.5	22.2	25.3	27.3	21.7	3.41	1.158
Average Project Performance						3.51	.718

The results in Table 2 indicate a moderately positive perception of project performance, with an overall mean of 3.51 (SD = 0.718), reflecting reasonable agreement and relatively consistent views among respondents. The strongest performing item was the completion of project deliverables within the initial scope, where 68.2% of respondents agreed or strongly agreed (M = 3.90, SD = 1.055), suggesting that scope management was a notable strength in these projects. The final construction output meeting functional and structural requirements also scored highly, with 61.1% in agreement (M = 3.66, SD = 1.123), as did the minimization of unexpected costs through quality management practices, affirmed by 60.6% of respondents (M = 3.62, SD = 1.177). These findings underscore the effectiveness of quality controls in supporting both

technical delivery and cost management, consistent with Alu et al. (2024) and Soon (2021), who associated efficient cost control with improved financial performance in high-rise projects. In contrast, stakeholder-related dimensions were comparatively weaker. Only 49% of respondents agreed that stakeholders were satisfied with project outcomes ($M = 3.34$, $SD = 1.256$), and the higher standard deviations on stakeholder items reflect greater divergence in opinion. Compliance-related indicators also yielded moderate agreement, with adherence to industry best practices rated at $M = 3.31$ ($SD = 1.193$) and independent compliance confirmation at $M = 3.41$ ($SD = 1.158$). Overall, while technical and financial performance dimensions were well-perceived, stakeholder engagement and regulatory compliance aspects remain areas requiring deliberate attention in future high-rise construction projects, a finding echoed by Welege et al. (2022) and Luvai and Mungai (2023).

4.2 Correlation Analysis

The study employed Pearson correlation to assess the strength of the relationship between the independent and dependent variables. The relationship was considered significant at a p-value of <0.05 . Quality Assurance ($r = .517$, $p < .001$) demonstrated the strongest positive correlation among the four predictors, suggesting that systematic assurance measures (audits, compliance, standards adherence) are highly associated with improved project performance.

Table 4: Correlation Coefficients

		Quality Assurance
Performance of High-Rise building projects	Pearson Correlation	.517**
	Sig. (2-tailed)	.000
	N	198

4.3 Regression Analysis

This study applied a regression model to identify the relationship between quality assurance and the performance of high-rise building projects in Kiambu County, Kenya. The study checked for the direction of the relation, significance of the relationship and the extent of influence.

Table 5: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.650	.238		6.923	.000
Quality assurance	.379	.059	.417	6.398	.000

The regression results presented in Table 5 reveal that quality assurance was a statistically significant predictor of high-rise building project performance ($B = 0.379$, $\beta = 0.417$, $t = 6.398$, $p < .05$), indicating that a one-unit increase in quality assurance practices corresponds to a 0.379-unit improvement in project performance, with the standardized coefficient ($\beta = 0.417$) reflecting a substantively large effect. This underscores the central role that systematic audits, regulatory compliance, and enforcement mechanisms play in shaping construction outcomes, a position reinforced by the descriptive findings where strong agreement was recorded on the contribution of audits and regulatory frameworks to project quality and safety. Process reviews and approval scrutiny further reinforced this effect, while the comparatively weaker ratings on

training and awareness point to a capacity-building gap that constrains the full realization of quality assurance benefits. These findings align with Enyinna et al. (2024) and Gathu and Nyang'au (2025), who similarly confirmed that robust quality assurance mechanisms, including systematic audits and adherence to regulatory standards, directly reduce defects, rework, and delays, thereby improving overall project efficiency and stakeholder satisfaction. The fitted regression model is expressed as:

$$\gamma = 1.650 + 0.379X_1.$$

5.0 Conclusion

The objective of the study was to evaluate the impact of quality assurance practices on the performance of high-rise building construction projects in Kiambu County. Specifically, quality assurance emerged as the most critical determinant, highlighting the importance of compliance, audits, and adherence to construction standards. The findings revealed that quality assurance is the strongest predictor of project performance. Regular audits, compliance checks, and regulatory oversight are crucial for ensuring project deliverables meet required standards. The findings suggest that without consistent assurance practices, performance outcomes are significantly compromised.

6.0 Recommendation

Quality assurance practices should be institutionalized through regular independent audits and closer collaboration between contractors and regulatory authorities to ensure consistent compliance. Updating regulatory frameworks dynamically to align with modern construction standards is equally critical.

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