

Project Management Practices and Performance of Weighbridge Projects in Kenya

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Abstract Despite the significant role of weighbridge projects in enforcing axle load regulations, concerns about inefficiencies, delays, and inadequate stakeholder engagement persist. These obstacles prompt inquiries regarding managerial practices that facilitate or obstruct the attainment of these initiatives. This study examined the effect of project management approaches on the performance of weighbridge projects in Kenya to fill the existing research gap. The investigation sought to evaluate the effect of technology adoption, resource allocation, compliance to regulatory frameworks and stakeholder engagement on performance of weighbridge projects in Kenya. A descriptive approach to research was utilized. The study targeted the 5 weighbridge projects in Kenya with a population of 157 members of the management team of the weighbridge projects in the country. The study used a sample of 113 participants obtained by Yamane's formula. To gather first-hand information, semi-structured questionnaires were used. Analysis was conducted using SPSS. The analysis included descriptive statistics and inferential statistical methods of correlation and regression analysis. The findings revealed that technology adoption, resource allocation, compliance to regulatory frameworks and stakeholder engagement had a favorable and notable impact on Kenyan weighbridge operations' performance. Based on these findings, it is recommended that weighbridge projects prioritize the adoption of advanced technologies to enhance operational efficiency. Additionally, adequate resource allocation, especially in terms of finances and skilled personnel, should be ensured to support smooth operations. Project managers should also maintain strict compliance with regulatory frameworks to ensure safety, legal adherence, and sustainability. Furthermore, stakeholder engagement should be actively fostered through transparent communication and involvement in decision-making processes.

Keywords: compliance to regulatory frameworks, performance of weighbridge projects, resource allocation, stakeholder engagement, technology adoption

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1. Introduction

Weighbridge projects constitute critical infrastructure interventions designed to enforce axle-load regulations, safeguard road networks from premature deterioration, and promote road safety across transportation corridors. By systematically weighing heavy vehicles at strategic checkpoints, these facilities prevent overloading, which accounts for up to 40 % of road damage in many developing economies [1,2]. Effective weighbridge operations therefore contribute directly to reduced maintenance costs, enhanced fair trade, and lower accident rates linked to overloaded trucks [3]. In Kenya, where the road transport sector carries over 90% of freight and passengers, the performance of weighbridge projects directly influences national economic competitiveness and the longevity of multi-billion-shilling road investments under the Kenya National Highways Authority (KeNHA).

Project performance in this context is conceptualised as the degree to which weighbridge initiatives achieve their intended outcomes within defined constraints of time, cost, quality, and scope [4]. [5] operationalises performance through three core indicators: operational efficiency (timely throughput and minimal delays), stakeholder satisfaction, and measurable contribution to road safety. These metrics are especially salient for weighbridge projects because they operate at the intersection of enforcement, technology, and public service delivery.

Project management practices constitute the structured application of knowledge, skills, tools, and techniques to meet project requirements [5]. Contemporary scholarship identifies four interrelated practices (technology adoption, resource allocation, compliance with regulatory frameworks, and stakeholder engagement) as pivotal determinants of infrastructure project success [6,7]. Technology adoption encompasses the integration of automated Weigh-in-Motion (WIM) systems, real-time data analytics, and digital monitoring platforms that

reduce human error and processing time. Resource allocation involves the strategic distribution of financial, human, and material assets to ensure uninterrupted operations. Compliance with regulatory frameworks refers to adherence to the Kenya Traffic Act (CAP 403), environmental standards, and occupational safety requirements. Stakeholder engagement entails transparent communication and participatory decision-making with transporters, local communities, KeNHA, and regulatory agencies [8,9].

Internationally, countries that have institutionalised these practices report superior weighbridge performance. In the United States and Germany, widespread deployment of high-speed WIM technology, coupled with robust resource planning and multi-agency coordination, has produced compliance rates exceeding 95 % and significant reductions in road maintenance expenditure [10]. Conversely, emerging economies such as Uganda and Tanzania continue to experience variable outcomes owing to fragmented technology uptake, resource constraints, and limited stakeholder involvement, resulting in persistent overloading and frequent station downtime [11,12].

In Kenya, KeNHA assumed responsibility for weighbridge management following the Kenya Roads Act (2007) and fully privatised operations in March 2012 after endemic corruption under direct civil-service administration. Five cyclical three-year concession projects now oversee eleven static weighbridge stations clustered across the country: Mariakani–Mtwapa–Dongo Kundu, Athi River–Juja–Isinya, Gilgil–Mai Mahiu, Webuye, and Busia–Rongo [13]. Despite this structural reform, performance gaps persist. KeNHA reports recurrent axle-load violations, prolonged vehicle queues, equipment breakdowns, and inconsistent enforcement that undermine road safety and inflate rehabilitation costs [13,14]. Although the Northern Corridor Transport Improvement Project demonstrated gains through partial automation, broader challenges of corruption, funding shortfalls, and weak inter-stakeholder coordination continue to erode outcomes [15,16].

2. Statement of the Problem

Several inefficiencies have undermined the effectiveness of weighbridge projects in Kenya such as long vehicle throughput times, long queue lengths at weighbridge stations and delays in inspection turnaround times. Such performance gaps have significant effect on the ability of weighbridge stations to enforce regulations effectively and ensure road safety [14]. A key aspect here is the effectiveness of the venture oversight strategies in these weighbridge operations that might be used to deal with these issues. But current management practices appear to be insufficient to achieve satisfactory performance.

While prior studies have examined isolated aspects of road infrastructure management in Kenya [17,18,19], none have systematically investigated how the combined effect of technology adoption, resource allocation, regulatory compliance, and stakeholder engagement influences weighbridge project performance within the unique

contractual and regulatory environment of KeNHA concessions. This knowledge gap is particularly acute given the impending expiry of current three-year cycles and the government's commitment to scale weighbridge modernization under the Big Four Agenda and Vision 2030. The present study therefore addresses this gap by empirically examining the relationship between these four project management practices and the performance of weighbridge projects in Kenya, thereby providing evidence-based guidance for policy makers, concessionaires, and regulators seeking to optimize future contract cycles and enhance national road asset sustainability. The study was guided by the following specific objectives:

- i. To assess the effect of technology adoption on performance of weighbridge projects in Kenya.
- ii. To examine the effect of resource allocation of weighbridge projects performance in Kenya.
- iii. To establish the effect of compliance to regulatory frameworks on performance of weighbridge projects in Kenya.
- iv. To determine the effect of stakeholder engagement on weighbridge projects performance in Kenya.

3. Theoretical Review

The research is based on four theories: Resource-Based View of the Firm, Institutional Theory, Theory of Diffusion of Innovations and the Stakeholder Theory.

3.1. Theory of Diffusion of Innovations

The Theory of Diffusion of Innovations, originally proposed by [20] and refined in subsequent editions [21], describes how new ideas, technologies, or practices spread within a social system over time. Diffusion is defined as “the process in which an innovation is communicated through certain channels over time among the members of a social system” [21]. The theory identifies four main elements: the innovation itself, communication channels, time, and the social system. Innovations are adopted through a five-stage process (knowledge, persuasion, decision, implementation, and confirmation) while adopter categories range from innovators to laggards based on innovativeness.

Key attributes influencing adoption rates include relative advantage, compatibility, complexity, trialability, and observability [21]. The theory has been widely applied in technology adoption studies, including project management contexts where innovations such as automated systems enhance efficiency [22,23]. In weighbridge projects, DOI theory supports the variable of technology adoption by explaining how automated Weigh-in-Motion (WIM) systems, data analytics, and real-time monitoring diffuse among project teams and operators. Successful diffusion reduces uncertainty, accelerates implementation, and improves operational precision, ultimately contributing to better project performance in terms of efficiency and compliance [24,25].

Despite its strengths, the theory has limitations, including assumptions of adopter homogeneity and a linear model that may overlook recursive adaptation or

contextual barriers in developing economies like Kenya, such as infrastructure deficits or regulatory support [26]. Nonetheless, DOI provides a robust framework for understanding technology integration in weighbridge operations.

3.2. Resource-Based View Theory

The Resource-Based View (RBV) theory, pioneered by [27] and formalized by [28], posits that firms achieve sustained competitive advantage through unique, valuable, rare, inimitable, and non-substitutable (VRIN) resources. [28] emphasized that internal resources are more critical for performance than external market factors. Resources must meet VRIN criteria to generate superior outcomes, with [29] adding heterogeneity and immobility as prerequisites for sustained advantage.

In project management, RBV underscores efficient resource allocation as a driver of performance by optimizing financial, human, and physical assets [30]. For weighbridge projects in Kenya, RBV explains how strategic deployment of budgets, skilled personnel, and reliable equipment enables operational continuity, rapid response to challenges, and enhanced enforcement capabilities. Effective allocation mitigates delays and cost overruns, fostering competitive edge in regulatory compliance and road safety outcomes.

Critiques of RBV include its tautological nature and limited predictive power in dynamic environments [32,33]. However, the theory remains valuable for weighbridge contexts where resource constraints are prevalent, guiding managers to prioritize VRIN assets for project success.

3.3. Institutional Theory

Institutional Theory, rooted in [33] and advanced by [34] and [36], explains how organizations conform to institutional environments to gain legitimacy, stability, and survival. [34] introduced isomorphism: coercive (regulatory pressures), mimetic (imitation under uncertainty), and normative (professionalization) mechanisms drive organizational similarity.

In regulated sectors, the theory elucidates compliance with frameworks as a legitimacy-seeking behavior [35]. For weighbridge projects, Institutional Theory supports the variable of compliance with regulatory frameworks by highlighting how adherence to the Kenya Traffic Act, environmental laws, and safety standards secures public trust, avoids penalties, and standardizes operations across stations. Coercive pressures from KeNHA and normative influences from professional bodies promote uniform practices, enhancing sustainability and performance [36].

Critics note its deterministic view and under emphasis on agency or resistance [37,38]. In Kenya's context, however, the theory effectively frames how regulatory alignment mitigates risks and fosters operational credibility.

3.4. Stakeholder Theory

Stakeholder Theory, introduced by [39], asserts that organizations must manage relationships with all entities affecting or affected by their activities, including internal

(employees) and external (communities, regulators, transporters) stakeholders. Freeman emphasized ethical management and balancing interests to enhance value creation and long-term success [40]. Effective engagement fosters cooperation, reduces conflicts, and aligns project goals with stakeholder expectations [41].

In infrastructure projects, the theory highlights participatory decision-making and transparent communication. For Kenyan weighbridge projects, Stakeholder Theory underpins engagement by explaining how involving transporters, local communities, and agencies improves compliance, reduces resistance and boosts satisfaction. Active participation ensures mutual benefits, such as fair enforcement and community support, directly enhancing performance metrics like stakeholder satisfaction and road safety.

The theory supports the view that prioritizing stakeholder interests leads to superior outcomes, though it requires careful management of power imbalances.

4. Empirical Literature Review

This gives the overview of the link connecting the investigation's variables as found by previous researchers in their studies. Thereafter, the research gaps inherent are identified which are to be closed by this research.

4.1. Technology Adoption and Project Performance

[24] examined the effect of technology integration on the performance of 150 manufacturing firms in Egypt using a survey approach. The study found that technology adoption improved efficiency, accuracy, and cost savings. However, its focus on manufacturing firms in one country limits the generalizability of the findings to other sectors and geographical contexts.

[25] examined the influence of project management practices, including technology adoption, on the implementation of 128 Machakos County government projects. Using a descriptive research design, the study established that technology significantly influenced project implementation. However, reliance on self-reported data from project managers and the focus on a single county limited the wider applicability of the findings.

4.2. Resource Allocation and Project Performance

[42] investigated the effect of resource allocation on government-funded projects in Ghana using surveys and interviews with project managers and stakeholders. Effective resource allocation was associated with timely project completion and improved project outputs. However, reliance on self-reported information created a potential risk of respondent bias.

[43] examined the relationship between resource allocation and performance among 50 SMEs in Pakistan. The findings indicated that effective financial resource allocation enhanced financial and operational performance. However, the small sample size limited the

generalizability of the findings to larger and more diverse organizations.

4.3. Compliance to Regulatory Frameworks and Project Performance

[44] examined the relationship between regulatory frameworks and the performance of 50 agricultural cooperatives using a quantitative approach. The findings showed that effective regulatory frameworks improved operational efficiency and profitability. However, the relatively small sample and focus on agricultural cooperatives limited the applicability of the findings to other sectors.

[45] investigated the effect of regulatory frameworks on 30 African telecommunications companies over five years. The study found that clear and supportive regulatory frameworks were associated with improved financial performance and customer satisfaction. However, the study gave limited attention to other performance dimensions, such as innovation and technological advancement.

4.4. Stakeholder Engagement and Project Performance

[46] examined stakeholder engagement in Public-Private Partnership (PPP) projects in Sub-Saharan Africa. The study found that early stakeholder involvement improved adherence to project schedules and budgets. However, reliance on self-reported information increased the possibility of respondent bias.

[42] examined stakeholder engagement and construction project performance in Ghana using a mixed-methods approach. The findings showed that effective communication, consultation, and stakeholder participation reduced conflicts and improved project efficiency. However, the study's focus on construction projects limits its applicability to projects in other sectors.

[47] examined stakeholder engagement in large-scale infrastructure projects in China using a survey approach. The study established that information sharing and stakeholder participation improved project quality and stakeholder satisfaction. However, reliance mainly on responses from project executives may have excluded the perspectives of other important stakeholder groups.

4.5. Research Gaps

The empirical review reveals consistent positive links between project management practices and performance across contexts.

Technology adoption enhances efficiency, accuracy, and outcomes in manufacturing [24] and Kenyan public projects [25]. Resource allocation drives timely delivery and superior results in government-funded initiatives [42] and SMEs (Ali & Anwar, 2022). Regulatory compliance improves operational efficiency, profitability, and financial performance when frameworks are supportive [44,45]. Stakeholder engagement reduces conflicts, improves adherence to schedules/budgets, and boosts

quality and satisfaction in PPPs, construction, and infrastructure projects [42,46,47].

Key gaps include sector-specific focus (manufacturing/retail), geographical limitations (Egypt, Vietnam, Ghana), reliance on self-reported data with bias risks, small/narrow samples, and absence of integrated multi-variable studies on weighbridge projects in Kenya's unique privatized concession model. This research addresses these by examining all four practices simultaneously within Kenya's national weighbridge operations using a broader, stratified sample and robust quantitative analysis.

4.6. Conceptual Framework

In this study, the framework adopted (Figure 1) shows the connection between management practices categorized into four specific independent variables (technology adoption, resource allocation, compliance to regulatory frameworks, and involvement with stakeholders), and the success of weighbridge operations in Kenya.

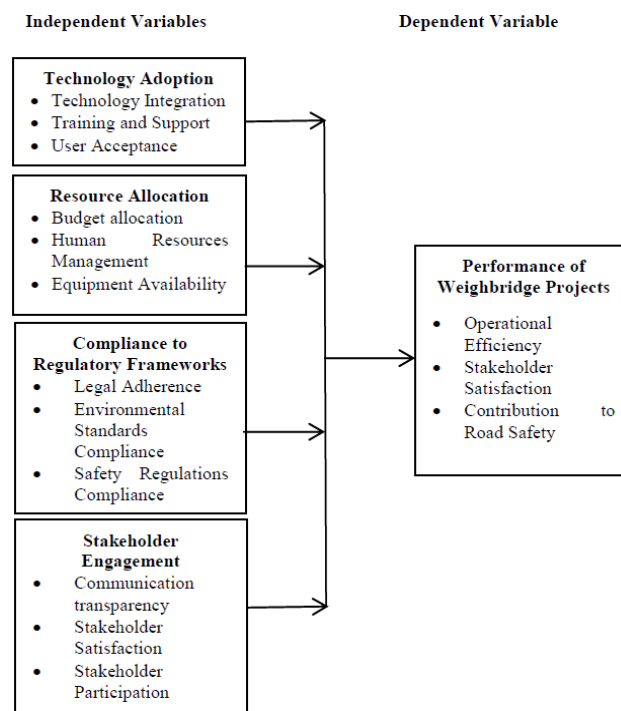


Figure 1. Conceptual Framework

5. Research Methodology

This study adopted a descriptive research design. The target population comprised all management team members working directly on the five active weighbridge concession projects managed under the Kenya National Highways Authority (KeNHA). These projects cover eleven static weighbridge stations clustered across five geographic clusters: Mariakani–Mtwapa–Dongo Kundu, Athi River–Juja–Isinya, Gilgil–Mai Mahiu, Webuye, and Busia–Rongo. Official KeNHA records indicated a total of 157 management personnel (project managers, operations supervisors, technical officers, compliance officers, and

finance/administration staff) actively involved in the planning, execution, monitoring, and reporting of weighbridge operations during the 2025 contract cycle.

A sample size of 113 respondents was determined using [48] formula. A stratified random sampling was employed to ensure proportional representation from each of the five concession clusters. Primary data were collected using a structured, self-administered questionnaire containing both closed-ended Likert-scale items (1 = Strongly Disagree to 5 = Strongly Agree) and limited open-ended questions for qualitative insights. Data collection occurred between June and August 2025 after obtaining NACOSTI research clearance, institutional ethical approval from Kenyatta University, and written permission from KeNHA. Questionnaires were distributed physically and electronically (via secure links) with clear instructions and assurance of anonymity and confidentiality. Data were analysed using SPSS version 27. Descriptive statistics (means, standard deviations, frequencies) summarised respondent profiles and variable perceptions. Inferential statistics included Pearson correlation to examine bivariate relationships and multiple linear regression to test the combined and individual effects of the independent variables on performance. Ethical considerations included voluntary participation, informed consent, data confidentiality, and non-disclosure of individual identities throughout the research process.

6. Research Findings and Discussions

6.1. Response Rate

As shown in Table 1, 87.6% of the 113 surveys that were issued were filled out and returned, with 99 of those forms being returned. Half of the people who take part in a descriptive study should respond, according to [49,50]. The attained response rate of 87.6% exceeds the minimal tolerable standard, signifying a substantial level of engagement.

Table 1. Response Rate

Response	Frequency	Percent
Returned	99	87.6%
Unreturned	14	12.4%
Total	113	100%

6.2. Descriptive Statistics

This section provides a descriptive analysis of the study variables; technology adoption, resource allocation, compliance to regulatory frameworks, stakeholder engagement and performance. The descriptive statistics summarize the features of the study variables, expressed by the mean and standard deviation.

The results on technology adoption in weighbridge projects indicate a generally positive reception of technological advancements. The average rating for every assertion was 4.01, with a SD of 1.153, signifying a predominantly elevated level of agreement among respondents regarding the adoption of technology in weighbridge projects, although there was some variability

in individual responses.

Table 2. Descriptives

Variable	Overall Mean	Overall Std. Dev
Technology Adoption	4.01	1.153
Resource Allocation	4.04	1.137
Compliance to Regulatory Frameworks	4.07	1.011
Stakeholder Engagement	4.11	1.006
Performance of Weighbridge Projects	3.82	1.135

The results on resource allocation revealed generally positive perceptions from the respondents. The average score for allocation of resources was 4.04, with an SD of 1.137, signifying that participants largely concurred with the claims regarding the allocation of resources, although there was moderate variation in responses.

The findings reveal a generally positive adherence to legal, environmental, and safety requirements within the weighbridge projects. The overall mean score for compliance with regulatory frameworks was 4.07, with a SD of 1.011, demonstrating that responders predominantly concurred with the remarks pertaining to regulatory compliance, although there was some variation in responses.

The outcomes reveal generally high levels of agreement among the respondents regarding stakeholder engagement in weighbridge projects. Overall, the mean score across all stakeholder engagement statements was 4.11, with a SD of 1.006, indicating that respondents generally agreed with the stakeholder engagement statements, while showing some variation in responses.

Overall, the mean performance score was 3.82, with a SD of 1.135, demonstrating that participants predominantly concurred with the comments assessing the efficacy of weighbridge initiatives, although there was some variation in responses across the different performance indicators.

6.3. Correlation Analysis

The research study aimed to establish the association between project management approaches and the performance of weighbridge projects. The findings of the correlation analysis are displayed in Table 3.

The correlation analysis revealed strong positive relationships between project management practices and the performance of weighbridge projects in Kenya (all $p < 0.001$).

Technology adoption showed the strongest association with performance ($r = 0.818$), indicating that greater integration of automated systems, data analytics, and real-time monitoring significantly enhances operational efficiency and overall project effectiveness. This aligns with prior studies by [24,25], which linked technology integration to improved efficiency and outcomes.

Resource allocation exhibited a substantial positive correlation with performance ($r = 0.713$), suggesting that effective distribution of financial, human, and material resources directly contributes to better project results. These findings are consistent with [30], who highlighted the critical role of proper resource management in project success.

Table 3. Correlation Analysis

		Technology Adoption	Resource Allocation	Compliance to Regulatory Frameworks	Stakeholder Engagement	Performance
Technology Adoption	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	99				
Resource Allocation	Pearson Correlation	.775**	1			
	Sig. (2-tailed)	0.000				
	N	99	99			
Compliance to Regulatory Frameworks	Pearson Correlation	.711**	.593**	1		
	Sig. (2-tailed)	0.000	0.000			
	N	99	99	99		
Stakeholder Engagement	Pearson Correlation	.793**	.624**	.625**	1	
	Sig. (2-tailed)	0.000	0.000	0.000		
	N	99	99	99	99	
Performance	Pearson Correlation	.818**	.713**	.698**	.758**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	99	99	99	99	99

** Correlation is significant at the 0.01 level (2-tailed).

Compliance with regulatory frameworks demonstrated a strong positive correlation with performance ($r = 0.698$), underscoring that adherence to legal, safety, and environmental standards supports operational effectiveness and risk mitigation. This result echoes [3,11].

Stakeholder engagement recorded a high positive correlation with performance ($r = 0.758$), confirming that proactive communication, involvement, and collaboration with key stakeholders (transporters, communities, regulators) markedly improve project performance by reducing conflicts and aligning expectations. These observations are supported by [51].

6.4. Regression Analysis

A regression analysis was performed to investigate the relationships between the independent variables (technology adoption, resource allocation, compliance with regulatory frameworks, and stakeholder engagement) and the performance of weighbridge projects. A multiple linear regression model was applied to assess the combined effect of these project management practices on project performance. The analysis generated regression coefficients, standard errors, p-values, the coefficient of determination (R^2), and the F-statistic to evaluate the explanatory power and overall significance of the model.

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.856 ^a	0.733	0.721	0.52282 ^b

a Predictors: (Constant), Stakeholder Engagement, Resource Allocation, Compliance to Regulatory Frameworks, Technology Adoption

b Dependent Variable: Performance

The results indicated an adjusted R^2 of 0.721 which implied that project management practices (technology adoption, resource allocation, compliance to regulatory frameworks, and stakeholder engagement) explained 72.1% of the total variation in performance. This also

implied that 27.9% of the variation in performance was explained by other factors other than project management practices.

Table 5. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	70.389	4	17.597	64.377	.000 ^b
	Residual	25.694	94	0.273		
	Total	96.083	98			

a Dependent Variable: Performance

b Predictors: (Constant), Stakeholder Engagement, Resource Allocation, Compliance to Regulatory Frameworks, Technology Adoption

The ANOVA results indicate that the overall regression model is highly significant ($F(4, 94) = 64.377, p < 0.001$). This confirms that the four project management practices collectively explain a statistically significant portion of the variance in weighbridge project performance, rejecting the null hypothesis that the model has no explanatory power.

The regression results confirmed that all four project management practices significantly and positively predict the performance of weighbridge projects in Kenya ($p < 0.05$ for all).

Technology adoption had a positive and statistically significant effect on project performance ($\beta = 0.412, p = 0.003$). This indicates that increased technology adoption was associated with improved project performance, while holding the other variables constant. The finding demonstrates the importance of automated systems, data analytics, and real-time monitoring in enhancing operational efficiency, reducing errors, and supporting informed decision-making. This finding is consistent with [24,25], who established a positive relationship between technology adoption and organizational or project performance. In the context of weighbridge projects, technologies such as Weigh-in-Motion systems can facilitate efficient monitoring, reduce delays and violations, and contribute to improved road safety and stakeholder satisfaction.

Table 6. Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.290	0.367		-3.514	0.001
	Technology Adoption	0.412	0.137	0.347	3.007	0.003
	Resource Allocation	0.203	0.100	0.172	2.029	0.045
	Compliance to Regulatory Frameworks	0.263	0.108	0.188	2.438	0.017
	Stakeholder Engagement	0.380	0.131	0.258	2.912	0.004

a Dependent Variable: Performance

Stakeholder engagement also had a positive and statistically significant effect on project performance ($\beta = 0.380$, $p = 0.004$). This implies that greater stakeholder engagement was associated with improved project performance, while holding the other variables constant. Effective involvement, communication, and collaboration with transporters, communities, regulators, and other relevant stakeholders can enhance transparency, reduce resistance, and promote alignment of expectations. The finding is consistent with [51], who emphasized the importance of stakeholder participation and communication in successful project implementation.

Compliance with regulatory frameworks had a positive and statistically significant effect on project performance ($\beta = 0.263$, $p = 0.017$). This suggests that improved compliance with relevant regulatory requirements was associated with improved project performance, while holding the other variables constant. Compliance with applicable traffic, environmental, and safety requirements can strengthen project legitimacy, reduce regulatory and operational risks, and promote effective implementation. The finding is consistent with [11], who demonstrated the importance of regulatory compliance in supporting organizational and project performance.

Resource allocation similarly had a positive and statistically significant effect on project performance ($\beta = 0.203$, $p = 0.045$). This indicates that improvements in resource allocation were associated with improved project performance, while holding the other variables constant. Effective allocation and management of financial, human, and physical resources can support timely implementation, efficient operations, and achievement of project objectives. This finding is consistent with [30], who highlighted the importance of adequate and effective resource allocation in enhancing project performance.

Overall, these findings suggest that joint effect of project management practices significantly and positively influence performance.

Hence the resultant overall regression model;

Performance = $-1.290 + 0.412$ Technology Adoption + 0.203 Resource Allocation + 0.263 Compliance to Regulatory Frameworks + 0.380 Stakeholder Engagement

7. Conclusions

The study concludes that effective project management practices significantly enhance the performance of weighbridge projects in Kenya.

Technology adoption substantially improves operational efficiency, decision-making, and overall

facility effectiveness through automated systems and data collection tools, underscoring its critical role in consistent project success. Resource allocation directly influences project outcomes, with adequate financial resources, skilled staffing, and high-quality materials enabling smooth operations, timely responses to challenges, and optimized performance.

Compliance with regulatory frameworks (legal, environmental, and safety standards) is essential for smooth execution, sustainability, risk mitigation, and legitimacy, making it a top priority for project managers. Stakeholder engagement, through proactive communication and collaboration with transporters, communities, and government entities, fosters cooperation, addresses concerns, reduces resistance, and markedly improves project efficacy and outcomes.

8. Recommendations for Policy and Practice

Recommendations include:

1. Accelerating deployment of high-speed Weigh-in-Motion systems, real-time monitoring, reliable sensors, and enhanced CCTV to reduce human intervention and improve accuracy.
2. Strengthening resource management through disciplined budgeting, proactive maintenance, audits, and ongoing training in technology and anti-corruption.
3. Enhancing regulatory compliance via better inter-agency coordination, regular audits, updated training, and stricter penalties.

Deepening stakeholder engagement through transparent platforms, regular consultations, and responsive feedback to foster cooperation and shared responsibility.

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