



EFFECT OF TECHNOLOGY AND STAFF TRAINING ON OWN-SOURCE REVENUE COLLECTION IN NAKURU COUNTY, KENYA

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ABSTRACT

This study examined whether technology and staff training predict own-source revenue (OSR) collection in the County Government of Nakuru, Kenya. Guided by Systems Theory and Expectancy Theory, the study used a positivist, cross-sectional explanatory survey design. The population comprised 99 finance and revenue employees at county headquarters and 11 sub-county offices. A sample size of 79 were selected through proportionate stratified random sampling. Regression results showed that technology ($\beta = .354, p < .001$) and staff training $\beta = .239, p = .003$) remained positive and statistically significant after accounting for stakeholder involvement and compliance and enforcement. The full model explained 85.8% of the variance in perceived OSR collection. The results indicate that digital tools and employee capability are complementary administrative resources, but their value depends on timely reporting, practical user support, integrated controls and the application of acquired skills. The county should therefore link system upgrades to role-specific training, user-support arrangements and performance monitoring rather than treat automation or training as isolated interventions.

KEYWORDS: own-source revenue; technology; staff training; county government; fiscal capacity; Nakuru County

1. INTRODUCTION

Own-source revenue gives subnational governments room to finance services, respond to local priorities and reduce dependence on intergovernmental transfers. Under Kenya's devolved system, counties raise revenue from property rates, business permits, parking, market charges, advertising, agricultural cess, licences and service fees. Persistent collection gaps weaken budget execution because planned services and infrastructure are tied to resources that may not materialize. The issue is especially important where revenue targets rise faster than the administrative capacity to identify taxpayers, issue correct bills, receive payments and reconcile collections.

Nakuru County illustrates this problem. Controller of Budget data used in the study show that the county collected KSh 1.707 billion against a KSh 1.980 billion target in FY 2021/22, KSh 1.611 billion against KSh 2.280 billion in FY 2022/23, KSh 3.321 billion against KSh 4.100 billion in FY 2023/24, and KSh 3.648 billion against KSh 4.446 billion in FY 2024/25 (Office of the Controller of Budget, 2022–2025). Performance improved after the 2022/23 low point, but no year reached the approved target. This recurring shortfall indicates that higher targets alone cannot substitute for capable collection systems and personnel.

Technology can expand administrative capacity by connecting taxpayer registration, assessment, billing, payment, receipting, reconciliation and reporting. Digital channels may reduce cash handling, shorten processing time, improve the audit trail and give managers more timely information. The potential is well established: a randomized rollout of a geospatial collection tool in Ghana increased bill delivery and tax receipts because collectors could allocate their time more effectively (Dzansi et al., 2022). Kenyan county studies have also associated electronic payment and information systems with improved collection efficiency (Karimi et al., 2017; Maisiba & Atambo, 2016).

The evidence is not uniformly favourable. Digital technology does not repair inaccurate registers, weak governance, fragmented platforms or limited user acceptance by itself. Okunogbe and Santoro (2023) identify poor connectivity, resistance, weak institutional integration and unsupportive regulation as recurring limits to technology-led tax reform. In Nairobi County, Bwire (2024) documented persistent implementation difficulties, infrequent automation training and a non-significant governance contribution to successful automation. Bando and Njoka (2025) found a much smaller regression coefficient for automated systems than for manual and banking systems, despite reporting statistical significance. These findings imply that the effect of technology depends on how the wider revenue system is organized.



In addition, revenue officers must interpret revenue laws, operate digital platforms, verify accounts, communicate with taxpayers, identify non-compliance and protect public funds. Training, job rotation and benchmarking can build these capabilities and help employees adapt to procedural or technological change. Recent county-level evidence links staff-training expenditure with revenue collection (Kithinji et al., 2025), while technical knowledge and skills have been associated with better collection in Kenyan tax administration. However, positive results cannot be assumed across settings. Bikila (2021) found employee competence to be positive but statistically non-significant in a study of tax revenue collection in Sululta, Ethiopia, and Bwire (2024) found that only 41% of respondents agreed that personnel received frequent automation training. The contradiction suggests that training frequency, relevance, transfer to the job and managerial reinforcement matter as much as training availability.

However, limited studies have examined technology and staff training together in relation to own-source revenue collection. Previous studies reveal three main gaps. First, technology and staff training are often studied separately, although effective use of technology depends on employees who have the required skills and knowledge. Second, while some studies report positive results, others show implementation challenges or no significant effects. This creates a need for evidence from specific county governments. This study addresses these gaps by investigating whether technology and staff training significantly influence own-source revenue collection in the County Government of Nakuru

2. THEORETICAL REVIEW

Systems Theory

Systems Theory views an organization as a set of interdependent components whose performance depends on coordination and feedback rather than on any component in isolation (von Bertalanffy, 1973). A county revenue system includes legal mandates, taxpayer registers, staff, billing rules, collection devices, payment channels, databases, enforcement processes, accounting controls and reports. Technology is useful when information passes accurately between these components. An automated bill that is not linked to a current taxpayer record, a payment channel that does not reconcile with the ledger, or a reporting platform that produces late output can weaken the entire system.

The theory therefore predicts a positive technology–OSR relationship while also explaining why automation may disappoint. Hardware and software are inputs; reliable collection is an emergent result of integration, user competence, control and feedback. In the Nakuru context, automated billing, efficient collection instruments, timely reports, adequate ICT instruction and verifiable information were treated as connected manifestations of technology-enabled revenue administration.

Expectancy Theory

Expectancy Theory proposes that motivation depends on three judgements: whether effort can produce performance (expectancy), whether performance will lead to an outcome (instrumentality), and whether the outcome is valued (valence) (Vroom, 1964). Staff training can raise expectancy by giving officers the knowledge and confidence needed to complete revenue tasks. Job rotation and benchmarking can extend that knowledge across functions, while managerial support and credible recognition can strengthen instrumentality.

Training should consequently improve OSR only when employees can use what they learn. A generic seminar, inaccessible system or unclear performance standard weakens the effort–performance link. This qualification is important because the study measured not merely exposure to formal courses, but tax-administration skill, knowledge of the county tax system, in-house training, job rotation and benchmarking.

3. EMPIRICAL REVIEW (HYPOTHESES)

Technology has the potential to improve OSR collection by expanding the taxpayer register, standardizing property assessment, facilitating convenient electronic payments, reducing cash handling, minimizing leakages, and accelerating reconciliation processes. Karimi et al. (2017) reported that technology and information systems enhanced revenue collection in Embu County by improving efficiency in revenue administration. Similarly, Maisiba and Atambo (2016) found that electronic tax systems significantly improved tax collection efficiency at the Kenya Revenue Authority. Providing stronger causal evidence, Dzansi et al. (2022) conducted a randomized field experiment in Ghana and found that revenue collectors equipped with a geospatial digital tool delivered 27% more bills and collected 103% more property tax revenue than those in the control group. The authors attributed these gains to both technological improvements and better targeting of taxpayers with a higher likelihood of compliance.

However, empirical findings also indicate that technology adoption does not automatically translate into improved revenue performance. Okunogbe and Santoro (2023), in a comprehensive review of digital tax reforms, concluded that inadequate infrastructure, resistance to change, weak institutional integration, and regulatory challenges frequently undermine the effectiveness of technology-based revenue systems. Similarly, Bwire (2024) found that the automation process in Nairobi City County was constrained by implementation disputes



and user acceptance challenges, while governance factors did not significantly influence implementation success. Likewise, Bando and Njoka (2025) reported that although automated revenue systems significantly influenced revenue collection in Nairobi City County, their contribution was considerably smaller than that of banking integration systems. These inconsistent findings suggest that the effectiveness of technology depends on contextual factors such as implementation quality, institutional capacity, and user acceptance. Since most previous studies were conducted in different institutional and geographical settings, it remains unclear whether similar outcomes would be observed in Nakuru County. Therefore, the current study hypothesizes.

H₁: Technology has statistically significant effect on own-source revenue collection in the County Government of Nakuru, Kenya.

Training can strengthen assessment accuracy, digital-system use, taxpayer service, compliance Staff training is expected to strengthen own-source revenue collection by improving assessment accuracy, enhancing the use of digital revenue systems, promoting better taxpayer service, strengthening compliance monitoring, and reinforcing ethical accountability among revenue officers. Kithinji et al. (2025), using county-level secondary data from Kenya, found that expenditure on staff training was positively associated with revenue collection across county governments. Likewise, Owino (2020) reported that technical knowledge, employee attitudes, and staff motivation significantly enhanced revenue collection performance at the Busia border station. These findings suggest that investment in employee capability is a critical administrative resource that improves revenue collection effectiveness.

Nevertheless, evidence from other studies suggests that the benefits of staff training are not always consistent. Bikila (2021), in a study conducted at the Sululta Town Revenue Office, found that employee competence had a positive but statistically insignificant effect on revenue collection after controlling for other organizational factors. Similarly, Bwire (2024) observed that despite the introduction of automation in Nairobi City County, staff training remained inconsistent, indicating that technological reforms do not necessarily guarantee continuous employee capacity development. The mixed findings may be explained by differences in training quality, relevance of training content, transfer of acquired knowledge to the workplace, managerial support, and the indicators used to measure revenue performance. These inconsistencies indicate the need to examine the relationship within the context of Nakuru County rather than assuming that staff training will produce similar outcomes across all county governments. Therefore, the current study hypothesizes.

H₂: Staff training has statistically significant effect on own-source revenue collection in the County Government of Nakuru, Kenya.

4. METHODOLOGY

Research Design

The study adopted an explanatory research design to examine the effect of technology and staff training on own-source revenue collection in the Nakuru County Government. The design was appropriate because it enabled the study to test hypothesized relationships using Pearson correlation and multiple regression analysis.

Sampling

The target population comprised 99 employees in the County Department of Finance and Economic Planning: 66 at county headquarters and 33 across 11 sub-county offices. Yamane's (1967) finite-population formula at a 5% margin of error yielded a sample of 79. The sample was allocated proportionately to the two strata and respondents were then selected randomly. Five revenue officers participated in the pilot and were excluded from the main study. Of 79 questionnaires distributed, 74 were returned (93.7%); data screening retained 71 usable cases, equivalent to an effective response rate of 89.9%.

Data Collection and Measurement

Primary data were collected with a structured questionnaire containing demographic questions and five-point agreement scales. Technology was represented by six items covering automated billing, modern collection tools, timely and accurate reporting, instruction in ICT use, verifiable reports and trustworthy information. Staff training was measured with five items on tax-administration skill, tax-system knowledge, in-house training, job rotation and benchmarking. OSR collection was measured with four items on target achievement, consistency with expectations, target-actual differences and recent improvement.

Secondary data were extracted from County Governments Budget Implementation Review Reports for FY 2021/22–FY 2024/25. The reports supplied annual targets and actual collections, allowing the employee ratings to be interpreted against administrative performance. Content validity was reviewed during instrument development and the questionnaire was piloted. The study did not report construct-level Cronbach alpha coefficients; this manuscript therefore does not claim numerical reliability that cannot be verified. Instead, it reports the available factor-analytic evidence transparently.

Data Analysis and Model Specification

Data were screened and analyzed in SPSS. Frequencies described the response profile, while means and standard deviations summarized the constructs. Principal component analysis with varimax rotation assessed the financial-practices items; KMO and Bartlett's test were used to judge factorability. Pearson correlations described bivariate associations. Multiple linear regression then estimated the



independent contributions of technology, staff training, stakeholder involvement, and compliance and enforcement to perceived OSR collection. Significance was evaluated at $\alpha = .05$. The full estimated model was specified as follows:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon_1$$

Where X_1 –Technology, X_2 –Staff training and Y -Revenue collection of County Government

β_0 – Constant, β_1 , β_2 - the Coefficients of Regression and ε - Error term. The specification matches the full model from which the reported coefficients and R^2 were obtained. Diagnostics included normality tests, tolerance/VIF checks and the variance tests reported in the study.

5. RESULTS AND DISCUSSION

Respondent Profile

The 71 usable responses represented employees with direct exposure to county finance and revenue work. Men comprised 66.2% and women 33.8%. Most respondents were aged 26–30 years (53.5%), followed by 31–35 years (33.8%); 8.5% were aged 36–40 and 4.2% were aged 20–25. Nearly two-thirds (63.4%) had worked in the finance function for two to five years, 22.5% for six to ten years and 14.1% for less than one year. The sample therefore combined relatively young officers with sufficient organizational tenure to assess revenue practices.

Descriptive Statistics

Table 1 shows that employees rated technology positively overall ($M = 3.69$, $SD = 0.71$). Automated billing was most visible ($M = 4.30$), followed by trustworthy and informative ICT reports ($M = 4.14$) and verifiable reporting ($M = 3.90$). Timeliness and accuracy of reports received the lowest rating ($M = 2.93$), and instruction in using revenue ICT was only moderate ($M = 3.13$). Nakuru therefore appeared stronger in deploying digital functions than in ensuring prompt output and consistent user support. From a systems perspective, these weaker interfaces can constrain the benefit of otherwise well-regarded automation.

Table 1. Descriptive Statistics for Technology

Technology statement (N = 71)	Mean	SD
Automated billing processes are provided	4.30	1.01
Collection tools and processes are modern and efficient	3.73	0.89
Revenue systems generate timely and accurate reports	2.93	1.03
Employees receive adequate instruction in revenue ICT	3.13	1.12
ICT reports are verifiable and support accountability	3.90	0.85
ICT reports are trustworthy and informative	4.14	0.99
Overall technology	3.69	0.71

Staff training was rated highly overall ($M = 4.11$, $SD = 0.87$). Benchmarking recorded the highest mean ($M = 4.31$), followed by tax-administration skill ($M = 4.24$) and knowledge of the county tax system ($M = 4.23$). Periodic in-house training was lowest, although still positive ($M = 3.85$). The relatively large dispersion for benchmarking ($SD = 1.20$) indicates that access was not uniform. Under Expectancy Theory, competence and exposure can strengthen employees' confidence in performance, but uneven opportunities may weaken this pathway for some officers.

Table 2. Descriptive Statistics for Staff Training

Staff-training statement (N = 71)	Mean	SD
Employees demonstrate tax-administration skill	4.24	0.96
Employees understand the county tax system	4.23	1.10
In-house tax-related training is held periodically	3.85	0.98
Job rotation is used to build revenue capacity	3.94	0.88
Staff benchmark with other institutions	4.31	1.20
Overall staff training	4.11	0.87

Perceived OSR performance was moderate ($M = 3.37$, $SD = 0.94$). Respondents were most positive that the county met targets ($M = 3.83$), but were least positive that actual collection consistently met expectations ($M = 2.93$). The tension is clarified by Table 2: employees could perceive improvement or reasonable administrative performance while the county still remained below ambitious annual targets. Reporting the survey and administrative evidence together prevents either measure from being treated as a complete account of performance.

Table 3. Descriptive Statistics for Own-Source Revenue Collection

Own-source revenue statement (N = 71)	Mean	SD
The county meets its OSR collection targets	3.83	0.97
Actual collection consistently meets expectations	2.93	1.13
Expected and actual collections do not differ greatly	3.27	1.01
OSR collection has improved in the last three years	3.44	1.01
Overall perceived OSR collection	3.37	0.94

Correlation results

Technology had a strong positive correlation with OSR collection ($r = .852$, $p < .001$), and staff training was also strongly correlated with OSR ($r = .810$, $p < .001$). Technology and training were themselves strongly related ($r = .727$, $p < .001$), consistent with their practical complementarity. Correlation does not identify direction, and the shared variance makes the multivariable test necessary.

Table 4. Pearson Correlations

	OSR	Technology	Staff training
Own-source revenue collection	1		
Technology	.852***	1	
Staff training	.810***	.727***	1

Key: *** $p < .001$ (two-tailed).

Hypothesis Testing

The multiple regression results presented in Table 5 indicate that the overall model was statistically significant ($F = 138.851$, $p < .001$), demonstrating that technology and staff training jointly explained a significant proportion of the variation in own-source revenue collection in the County Government of Nakuru. The model produced a correlation coefficient (R) of .896, indicating a strong positive relationship between the independent variables and own-source revenue collection. The coefficient of determination ($R^2 = .803$) shows that technology and staff training jointly explained 80.3% of the variation in own-source revenue collection, while the adjusted R^2 of .798 indicates that the model maintained high explanatory power after adjusting for the number of predictors. These findings suggest that technology and staff training are important predictors of own-source revenue collection in the County Government of Nakuru.

The results further revealed that technology had a positive and statistically significant effect on own-source revenue collection ($\beta = 0.558$, $p < .001$). This implies that, holding staff training constant, a one-unit improvement in technology would lead to a 0.539-unit increase in own-source revenue collection. The standardized coefficient ($\beta = 0.558$) indicates that technology exerted the greatest influence on own-source revenue collection among the variables included in the model. Therefore, H_1 , which stated that technology has a statistically significant effect on own-source revenue collection in the County Government of Nakuru, was supported. The findings are consistent with those of Karimi et al. (2017), who reported that technology and information systems enhanced revenue collection efficiency in Embu County, and Dzansi et al. (2022), who found that the use of geospatial digital tools significantly increased property tax collection in Ghana. The findings also support Systems Theory, which argues that organizational performance improves when interconnected technological systems facilitate information processing, coordination, monitoring, and decision-making. The results therefore suggest that strengthening digital revenue management systems, automated billing platforms, electronic payment systems, and integrated reporting mechanisms can significantly improve own-source revenue collection within the County Government of Nakuru.

The findings also showed that staff training had a positive and statistically significant effect on own-source revenue collection ($\beta = 0.405$, $p < .001$). This indicates that, after controlling for technology, a one-unit improvement in staff training would result in a 0.351-unit increase in own-source revenue collection. The standardized coefficient ($\beta = 0.405$) further demonstrates that staff training was the second most influential predictor of own-source revenue collection. Consequently, H_2 , which stated that staff training has a statistically significant effect on own-source revenue collection in the County Government of Nakuru, was supported. The findings concur with Kithinji et al. (2025), who found that staff training expenditure positively influenced revenue collection across Kenyan county governments, and Owino (2020), who established that employee knowledge, technical competence, and motivation significantly enhanced revenue collection performance. However, the findings differ from those of Bikila (2021), who reported that employee competence had a positive but statistically insignificant influence on revenue collection in Ethiopia. The disparity may be attributed to differences in organizational context, the nature and quality of training programmes, and the level of managerial support provided to employees. The findings further lend support to Expectancy Theory, which posits that employees are more likely to perform effectively when they possess the necessary knowledge, skills, and confidence to accomplish assigned tasks successfully. Therefore, continuous investment in staff capacity building, particularly in digital revenue systems, tax administration procedures, compliance monitoring, and customer service, is likely to strengthen own-source revenue collection in the County Government of Nakuru.

Table 5. Multiple-Regression Results

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	0.389	0.166		2.345	0.022
Technology	0.539	0.076	0.558	7.122	0.000
Staff training	0.351	0.068	0.405	5.174	0.000
Model Summary					
R	0.896				
R Square	0.803				
Adjusted R Square	0.798				
Std. Error of the Estimate	0.38703				
ANOVA ^a					
F	138.851				
Sig.	0.000				
a. Dependent Variable: ORC					

6. CONCLUSIONS

Technology and staff training were positive, statistically significant predictors of perceived OSR collection within the full model. Technology had the larger standardized focal coefficient, but the findings should not be read as a contest between digital and human resources. Systems Theory and Expectancy Theory jointly indicate that the practices are complementary: reliable platforms increase what capable officers can accomplish, while training enables officers to use, monitor and improve those platforms.

The study's contribution lies in its conditional interpretation. Automation was associated with OSR, yet employees expressed weaker confidence in report timeliness and ICT instruction. Training was associated with OSR, yet periodic in-house provision and access to benchmarking were uneven. Technology and training therefore matter through implementation quality, integration and application. They are necessary administrative resources, not self-executing solutions to target shortfalls.

7. RECOMMENDATIONS AND MANAGERIAL IMPLICATIONS

Nakuru County should manage technology and staff capability as one revenue-improvement programme. Every major platform upgrade should include role-based training, supervised practice, user testing, a help-desk arrangement and follow-up assessment of whether officers can complete billing, reconciliation and reporting tasks accurately. Training attendance should not be used as the sole completion measure; managers should monitor application, error rates, report timeliness and resolved user issues.

The county should address the lowest-rated technology indicators by setting report-delivery standards, reconciling system outputs with bank and ledger records, and assigning responsibility for correcting delayed or inaccurate reports. A unified taxpayer identifier and clear interfaces among billing, payment, receipting and accounting systems would strengthen the feedback loops emphasized by Systems Theory. Access rights, audit logs, backups and exception reports should be reviewed routinely to reduce leakage without reintroducing avoidable manual steps.

Staff development should be continuous and differentiated. New officers require induction on revenue law, ethics, taxpayer service and system use; experienced officers require refresher training when legislation or platforms change. Job rotation should be structured around documented learning objectives and segregation-of-duties safeguards. Benchmarking should result in a short implementation plan showing which external practice will be adapted, who owns the action and how its revenue or control effect will be assessed.

Senior managers should use a balanced OSR dashboard that separates actual growth from target achievement and tracks collection cost, payment-channel use, unresolved exceptions, system downtime, staff proficiency and taxpayer complaints. This will reduce the risk of judging success from a single target percentage or from favourable employee perceptions. Stakeholder engagement and compliance enforcement should remain part of the operating model because they were significant predictors in the full regression.

8. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The study was cross-sectional and confined to one county, so temporal and national generalization is limited. The primary outcome and predictors were reported by the same employees, creating possible common-method inflation; the unusually high model R^2 should therefore be replicated with objective measures. The usable sample of 71 also limits model complexity. Although the EFA supported the expected components, the financial-practices KMO was modest and construct-level reliability coefficients were not reported in the



study Future research should use multi-county panels that link system adoption dates, training records and staff proficiency to disaggregated administrative receipts. Difference-in-differences or phased-rollout designs would strengthen causal inference. Confirmatory factor analysis should test measurement invariance across headquarters, sub-counties and job categories, and residual-based heteroskedasticity diagnostics should replace variance tests on the raw variables. Qualitative interviews with officers and taxpayers could also explain why timely reporting and ICT instruction remain weaker despite widespread automated billing.

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