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Original Research Paper

Evaluating the Contribution of Technology to Revenue Collection and Financial Management at Kanye District Municipal Council, Botswana

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ABSTRACT
Local government authorities in developing nations face mounting pressure to improve revenue collection efficiency while delivering quality public services. This study examines how digital technology adoption influences revenue collection efficiency and financial performance at Kanye District Municipal Council in Botswana. Drawing on the Technology Acceptance Model and recent empirical evidence from African local governments, this research employed a mixed-methods approach, combining quantitative surveys of 156 council employees with analysis of financial records spanning 2018-2024. Results indicate that perceived usefulness and ease of use significantly predict technology adoption rates, with digitized payment systems showing a 34% improvement in collection efficiency compared to manual processes. However, infrastructure constraints, digital literacy gaps, and organizational resistance temper these gains. The study reveals that councils with integrated electronic invoicing and mobile payment platforms achieve 27% higher revenue-to-target ratios than those relying on traditional methods. These findings advance understanding of technology-mediated financial management in resource-constrained municipal contexts and offer evidence-based recommendations for policymakers pursuing digital transformation agendas across Sub-Saharan Africa.
Keywords: technology adoption, revenue collection, local government, financial performance, Botswana, digital transformation

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1. INTRODUCTION

Municipal revenue collection constitutes a critical determinant of local government capacity to deliver essential services and infrastructure to citizens across developing economies (Mabhena & Chibomba, 2025). In Botswana, district councils operate within a complex fiscal architecture where own-source revenues supplement central government transfers, creating both opportunities and challenges for financial sustainability. The Southern District, administered through Kanye District Council, exemplifies these dynamics as it serves approximately 197,767 residents across urban and rural areas while managing diverse revenue streams including property taxes, business licenses, and service charges. Digital transformation initiatives have emerged as potential solutions to persistent revenue leakages, administrative inefficiencies, and compliance gaps that undermine local fiscal capacity across Sub-Saharan Africa (Manga, 2023; Santoro et al., 2022).

Botswana's government has committed substantial resources to digital transformation, allocating P1.83 billion in the 2024 budget specifically for technology modernization initiatives. The Botswana Unified Revenue Service successfully implemented electronic filing systems starting in 2014, followed by comprehensive tax management platforms by 2020, demonstrating national commitment to technological modernization in public financial management. However, implementation at the district council level has progressed unevenly, with municipal authorities facing distinct challenges related to infrastructure, capacity, and stakeholder readiness that differ substantially from national revenue agencies.

Recent scholarship demonstrates mixed results regarding technology's impact on public sector financial performance. Studies from Tanzania reveal that electronic payment systems significantly improve municipal revenue collection by reducing financial leakages and enhancing taxpayer compliance (Mvanga, 2023; Said, 2023). Conversely, research from Zambia indicates that ICT adoption alone does not guarantee improved revenue outcomes without complementary investments in human capital, organizational processes, and governance mechanisms (Sinjwala, 2024; Mwiinde, 2024). This divergence underscores the need for context-specific research that examines how technology adoption interacts with local institutional conditions to shape financial performance outcomes.

Despite Botswana's relatively advanced telecommunications infrastructure and high mobile penetration rates compared to regional peers, district councils encounter distinct obstacles in digitalizing revenue operations. Research examining e-service delivery in Botswana's public sector identifies persistent constraints including outdated information systems, inadequate technical support, limited digital literacy among both staff and ratepayers, and resistance to process changes (Mbae et al., 2025). These findings suggest that technology deployment requires careful attention to organizational readiness and user acceptance factors beyond technical specifications alone.

The existing literature exhibits three notable gaps that this research addresses. First, while studies examine technology adoption in national revenue agencies extensively, systematic investigation of municipal-level implementation remains limited, particularly in middle-income African contexts like Botswana. Second, theoretical applications of technology acceptance frameworks to local government revenue collection lack sufficient empirical grounding from southern African cases. Third, comparative analysis of financial performance metrics before and after technology deployment rarely extends beyond descriptive statistics to rigorous causal inference.

This study therefore investigates three interconnected research questions: How does technology adoption influence revenue collection efficiency at Kanye District Council? What factors facilitate or constrain digital transformation in municipal financial management? What lessons can inform policy and practice for other local authorities pursuing similar reforms? By addressing these questions through mixed-methods inquiry grounded in the Technology Acceptance Model, this research contributes empirical evidence and theoretical insights relevant to scholars, practitioners, and policymakers engaged with digital governance and public financial management reforms across developing regions.

2. LITERATURE REVIEW

2.1 Digitalization and Revenue Collection Performance

Contemporary research demonstrates increasingly robust evidence that digital technologies can transform public sector revenue collection when implemented strategically. Cross-national analyses reveal strong associations between digitalization of tax administration and improved revenue outcomes, with effects mediated by legislative reforms, institutional capacity, and implementation quality (Amaglobeli et al., 2023; Nose & Mengistu, 2023). Country-specific studies document significant gains from adopting specific digital tools including electronic filing systems, which reduce compliance costs and processing times by 40-60% (Santoro et al., 2022), e-invoicing platforms that enhance transparency and reduce tax evasion (Bellon et al., 2022; Fan et al., 2020), and electronic fiscal devices that improve audit capacity and deterrence (Mascagni et al., 2022).

Research from Sub-Saharan African local governments reveals parallel patterns with notable contextual variations. A recent IMF working paper examining digitalization across multiple jurisdictions finds that countries with higher levels of business digital adoption

demonstrate substantially larger tax-to-GDP ratios, with firms utilizing more ICT inputs for production showing increased tax payment compliance (IMF, 2025). This relationship appears strongest where government technology infrastructure parallels private sector digitalization, suggesting important complementarities between firm-level and state-level technological capabilities.

Mabhena and Chibomba (2025) evaluation of Choma Municipal Council in Zambia provides particularly relevant insights for understanding technology's effects in similar southern African contexts. Their findings indicate that while electronic revenue systems improved collection rates by approximately 28%, success depended critically on addressing infrastructure deficits, training staff adequately, and ensuring political support from council leadership. Mwakapola and Joseph (2024) assessment of Dar es Salaam Water and Sewerage Authority demonstrates that ICT development contributes positively to revenue performance, with automated billing and mobile payment options reducing revenue cycle times from 45 to 12 days on average.

However, technology adoption does not guarantee improved outcomes. Sinjwala (2024) examination of Chilanga District Council in Zambia reveals that despite substantial investments in new information systems, revenue collection improvements remained marginal due to inadequate change management, insufficient technical support, and continued reliance on manual processes for critical functions. This research emphasizes that technological solutions must address organizational and behavioral dimensions alongside technical specifications to achieve desired performance improvements.

Studies focused on East African municipalities further illuminate implementation challenges. Mvanga (2023) research across multiple Tanzanian local government authorities documents significant variation in digital technology effectiveness based on factors including internet connectivity quality, electricity reliability, staff digital literacy levels, and integration between new systems and existing workflows. Councils in urban areas with superior infrastructure demonstrated 47% better collection efficiency gains compared to rural counterparts implementing identical technology platforms.

An emerging body of work examines specific mechanisms through which digitalization influences revenue outcomes. First, automation reduces opportunities for corruption and discretion by creating digital audit trails and standardizing processes (Manga, 2023). Second, taxpayer convenience improves when digital channels enable 24/7 access, mobile payments, and reduced travel requirements (ElMassah & Mohieldin, 2020). Third, real-time data analytics support evidence-based enforcement targeting and resource allocation decisions (Bob & Bob, 2025). Fourth, integration across government systems enables better taxpayer identification and assessment accuracy (Bob, 2025).

2.2 Technology Acceptance in Public Sector Contexts

The Technology Acceptance Model, originally formulated by Davis (1989), provides a foundational framework for understanding individual-level technology adoption decisions. TAM posits that two primary beliefs perceived usefulness and perceived ease of use drive behavioral intentions to adopt new technologies, which subsequently predict actual usage behavior. Perceived usefulness reflects the degree to which individuals believe a technology will enhance their job performance or task effectiveness. Perceived ease of use captures beliefs about the effort required to learn and operate a system. Extensive meta-analytic research confirms TAM's predictive validity across diverse technologies, contexts, and user populations (Marikyan et al., 2023).

Public sector applications of TAM reveal important contextual adaptations. Recent research on regional financial application integration in Indonesia demonstrates that perceived usefulness, perceived ease of use, and perceived risk each significantly influence public financial management system effectiveness, with ease of use exerting the strongest effect (Lestari, 2023). Interestingly, this study found that risk awareness positively influenced responsible system usage rather than deterring adoption, suggesting that acknowledging risks can promote more careful implementation when properly managed.

Extended TAM frameworks incorporate additional constructs reflecting public sector specificities. Institutional theory suggests that organizations adopt digital practices under regulatory, normative, and cognitive pressures beyond individual user perceptions (Scott, 1995). In digital governance contexts, this manifests through policy mandates, professional norms among public administrators, and cognitive models about modern public management. Agency theory perspectives highlight how digitalization can mitigate principal-agent problems by reducing information asymmetries between elected officials and bureaucratic agents responsible for revenue collection (Jensen & Meckling, 1976).

Public choice theory offers complementary insights by examining how individual public servants' interests shape technology adoption outcomes. Officials accustomed to manual processes may resist digitalization due to concerns about job displacement, loss of discretionary authority, or inadequate digital skills (Tavares & da Cruz, 2020). This resistance manifests through foot dragging during implementation, maintaining parallel manual systems, or minimal compliance that undermines intended benefits. Successful adoption therefore requires addressing these behavioral dimensions through training programs, change management initiatives, and incentive

realignment.

Research on local government digital strategy adoption identifies critical success factors spanning people, process, and technology dimensions (Letchmunan et al., 2023). People-related strategies include building stakeholder participation platforms, developing employee digital skills systematically, and securing decision-maker commitment. Process strategies emphasize establishing clear policies, maintaining data quality standards, and ensuring privacy protection. Technology strategies focus on infrastructure adequacy, system integration capabilities, and user interface design quality.

2.3 Botswana's Digital Transformation Context

Botswana occupies a distinctive position in Sub-Saharan Africa's digital transformation landscape. The country maintains investment-grade credit ratings (BBB+ from Standard & Poor's, A3 from Moody's) reflecting strong governance institutions, political stability, and prudent fiscal management. However, the economy's heavy dependence on diamond revenues creates fiscal vulnerabilities, particularly given recent market downturns affecting export earnings and government revenues. This context intensifies pressures on local authorities to maximize own-source revenue collection efficiency.

National digital transformation initiatives demonstrate significant momentum. The Botswana Unified Revenue Service's electronic filing system implementation, completed in phases from 2014 to 2020, achieved remarkable results including reducing taxpayer compliance time from full-day office visits to five-minute online submissions (Nortal, 2020). This success established proof-of-concept for broader digitalization efforts while highlighting implementation challenges including COVID-19 disruptions that extended timelines and necessitated remote deployment support.

Recent policy developments signal accelerating digital transformation priorities. The 2025/2026 national budget allocates P1.47 billion specifically for digital transformation initiatives, with revenue-related projects including VAT on digital trade implementation (targeted September 2025), electronic VAT invoicing solutions for real-time transaction tracking, track-and-trace systems for excisable goods, and modernized online tax filing systems (Government of Botswana, 2025). These initiatives aim to broaden the tax base, minimize system inefficiencies, and capture previously untaxed revenue streams including digital economy transactions.

The Botswana government plans implementing mandatory e-invoicing by March 2026, following a three-year pilot program that concluded in March 2025. Officials estimate current VAT revenue losses up to 60% due to fraud and underreporting, highlighting both the problem's magnitude and digital solutions' potential impact. Implementation faces substantial challenges including ensuring adequate connectivity infrastructure across rural areas and providing technical support during the two-year national rollout period.

Local government authorities operate within this broader digital transformation context while facing distinct challenges. Research on Botswana's Ministry of Agriculture reveals that despite substantial telecommunications infrastructure development, actual e-service delivery remains minimal due to outdated information systems, legacy applications, and insufficient integration (Mbae et al., 2025). These findings likely extend to district councils, suggesting that digital transformation at subnational levels lags considerably behind national agencies' progress.

3. THEORETICAL FRAMEWORK

This study employs the Technology Acceptance Model as its primary theoretical lens, supplemented by institutional theory perspectives to contextualize organizational adoption dynamics. TAM offers explanatory power for understanding how individual users' perceptions shape technology adoption behaviors while institutional theory illuminates how organizational and environmental factors influence technology implementation success.

The Technology Acceptance Model proposes that actual system usage results from behavioral intentions, which are determined by attitudes toward using the technology. These attitudes form based on two key beliefs: perceived usefulness and perceived ease of use. Perceived usefulness represents the degree to which individuals believe using a particular system will enhance their work performance. In the revenue collection context, this manifests as beliefs that digital systems will improve collection efficiency, reduce errors, enable better tracking, or facilitate taxpayer interactions. Perceived ease of use reflects beliefs about whether using the system requires minimal effort and can be accomplished without extensive training or technical difficulties.

TAM further posits that perceived ease of use influences perceived usefulness—systems that are easier to use are also perceived as more useful because they reduce the effort required to achieve performance gains. Both constructs directly influence behavioral intentions, though perceived usefulness typically exerts stronger effects. External variables including system design characteristics, organizational support, training quality, and individual differences shape these core perceptions.

For this research, TAM provides a framework to examine how Kanye District Council employees' perceptions of digital revenue collection systems influence adoption behaviors and, consequently, system effectiveness. Specifically, the model enables investigation of whether council staff perceive digital platforms as useful for improving revenue collection outcomes and whether they find these systems acceptably easy to use given their technical skills and organizational support levels.

Institutional theory extends TAM's individual-level focus by examining organizational and environmental factors that shape technology adoption. Scott's (1995) framework identifies three institutional pillars: regulative (formal rules and enforcement mechanisms), normative (values and professional norms), and cognitive (shared understandings and mental models). Applied to digital transformation in local government, regulative pressures include national policy mandates, legislative requirements, and oversight mechanisms that compel or incentivize technology adoption. Normative pressures encompass professional standards among public administrators, peer influences from other councils' practices, and societal expectations regarding modern governance. Cognitive pressures reflect shared beliefs about what constitutes legitimate and effective public management in the digital era.

The integrated framework guiding this research therefore examines technology adoption through multiple lenses: individual user perceptions and intentions (TAM), organizational and policy pressures (institutional theory), and individual incentive structures (public choice theory). This multi-level approach recognizes that successful technology implementation in local government revenue collection requires alignment across individual attitudes, organizational processes, and institutional environments.

4. METHODOLOGY

4.1 Research Design and Approach

This study employed a convergent mixed-methods design combining quantitative survey data with qualitative document analysis and key informant interviews. The mixed-methods approach enables triangulation of findings, provides richer contextual understanding than single-method designs, and allows investigation of both measurable outcomes and underlying mechanisms. Quantitative components assessed technology adoption patterns, perceptions, and revenue performance metrics while qualitative elements explored implementation experiences, organizational dynamics, and contextual factors shaping outcomes.

The research received ethics approval from the University of Botswana Research Ethics Committee and obtained authorization from Kanye District Council to access staff, documents, and financial records. All participants provided informed consent after receiving clear information about research purposes, procedures, confidentiality protections, and voluntary participation rights.

4.2 Study Setting and Population

Kanye serves as the administrative center of Botswana's Southern District, located 83 kilometers southwest of Gaborone. The town functions as an urban village with a population of 48,028 as of the 2022 census, serving as the traditional capital of the Ngwaketse tribe. The Southern District encompasses approximately 197,767 residents across urban and rural areas. Kanye District Council employs approximately 380 staff across various departments including finance, administration, technical services, health, and social services.

The council's revenue streams include property rates, business licensing fees, service charges for water and sanitation, market stall rentals, and development application fees. Annual revenue targets typically range between P45-60 million, with actual collection rates varying substantially across revenue categories and years. The council adopted digital payment options beginning in 2019, initially for selected services, with gradual expansion to additional revenue streams through 2023.

4.3 Sampling and Participants

The study employed stratified random sampling to select 156 council employees from relevant departments. Stratification ensured representation across departments (finance, administration, customer service, enforcement), job levels (senior management, middle management, frontline staff), and service duration. Inclusion criteria required participants to have direct involvement with revenue collection processes or digital systems implementation. The sample size was determined through power analysis targeting 80% power to detect medium effect sizes at $\alpha=0.05$ significance level, with 15% oversampling to accommodate potential non-response.

Among the 156 participants, 64% worked in departments directly handling revenue collection (finance, customer service, licensing), while 36% represented support functions involved in digital system deployment or management. Gender distribution was 58% female and 42% male. Age ranges spanned from 23 to 58 years, with mean age of 37.4 years. Educational qualifications included 42% holding diploma-level credentials, 51% possessing bachelor's degrees, and 7% having postgraduate qualifications. Employment tenure averaged 8.6 years.

Additionally, twelve key informants participated in semi-structured interviews including the Council Secretary, Director of Finance, IT Manager, three senior revenue officers, two enforcement officers, three frontline customer service staff, and one elected councilor serving on the finance committee. These participants provided rich contextual insights into implementation experiences, organizational dynamics, and leadership perspectives.

4.4 Data Collection Instruments and Procedures

4.4.1 Quantitative Survey Instrument

A structured questionnaire adapted from validated TAM scales measured key constructs. Perceived usefulness was assessed through seven items examining beliefs about whether digital systems improve revenue collection efficiency, accuracy, monitoring capability, and overall job performance (sample item: "Using digital revenue systems improves my effectiveness in collecting payments"). Perceived ease of use employed

six items measuring beliefs about learning requirements, operation simplicity, and mental effort (sample item: "I find digital revenue systems easy to use"). Behavioral intention included four items assessing plans to continue using digital systems. Actual system usage was measured through self-reported frequency and breadth of digital tool utilization.

Additional sections gathered demographic information, assessed infrastructure and support conditions, and captured perceptions about implementation processes. All items used seven-point Likert scales ranging from strongly disagree (1) to strongly agree (7) for attitudinal measures, or never (1) to always (7) for behavioral frequency items.

The questionnaire underwent rigorous development including expert review by three public administration scholars, cognitive interviews with five council employees to assess item clarity, and pilot testing with 25 employees from a comparable district council. Pilot results indicated satisfactory reliability (Cronbach's $\alpha > 0.80$ for all constructs) and face validity. Minor wording adjustments improved clarity before final administration.

Data collection occurred over six weeks during August-September 2024. Trained research assistants administered surveys during scheduled staff meetings to maximize response rates and ensure adequate understanding. Participants completed surveys independently and returned them in sealed envelopes to maintain confidentiality. Response rate reached 87%, with 156 of 180 invited participants returning usable questionnaires.

4.4.2 Financial Performance Data

Historical revenue collection data spanning 2018-2024 were extracted from council financial records with permission. Data included monthly collection amounts by revenue category, annual targets, collection rates, outstanding balances, and enforcement actions. This timeframe captured pre-digitalization baselines (2018-2019), initial implementation (2020-2021), and mature operation periods (2022-2024). COVID-19 impacts during 2020-2021 required careful interpretation, with sensitivity analyses excluding pandemic-affected quarters to isolate technology effects from external shocks.

4.4.3 Qualitative Data Collection

Semi-structured interviews with twelve key informants lasted 45-75 minutes each, following protocols that allowed flexible exploration while ensuring coverage of key themes. Interview guides addressed topics including technology implementation experiences, perceived benefits and challenges, organizational change processes, staff reactions, leadership roles, and lessons learned. Interviews were audio-recorded with permission and transcribed verbatim.

Document analysis examined council reports, policy documents, financial statements, staff training materials, and system documentation to contextualize findings and triangulate evidence. Documents provided objective records of implementation timelines, investment costs, training activities, and official rationales complementing interview accounts.

4.5 Data Analysis

4.5.1 Quantitative Analysis

Survey data underwent thorough cleaning and screening including univariate and multivariate outlier detection, missing data pattern analysis, and normality assessment. Cronbach's alpha coefficients assessed internal consistency reliability for multi-item scales. Confirmatory factor analysis verified measurement model adequacy including construct validity through convergent validity (average variance extracted > 0.50) and discriminant validity (inter-construct correlations below square root of AVE).

Structural equation modeling using AMOS 26.0 tested hypothesized relationships in the TAM framework. Model fit was evaluated through multiple indices including Chi-square/df ratio, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Path coefficients indicated relationships between constructs, with significance tested at $\alpha=0.05$ level.

Financial performance analysis employed difference-in-differences approaches comparing pre- and post-implementation periods while controlling for time trends, seasonal patterns, and external shocks. Segmented regression models estimated immediate level changes and slope changes following technology adoption. Robustness checks included placebo tests, alternative time period definitions, and sensitivity analyses excluding COVID-affected observations.

4.5.2 Qualitative Analysis

Interview transcripts underwent thematic analysis following Braun and Clarke's six-phase approach. Initial familiarization involved reading transcripts multiple times while noting preliminary patterns. Systematic coding identified meaning units relevant to research questions. Codes were organized into candidate themes capturing patterned meanings across the dataset. Theme refinement ensured internal coherence and distinctive boundaries between themes. Final themes were defined and named to capture their essence clearly. Throughout analysis, attention to divergent cases and contradictions enhanced interpretation rigor.

NVivo 12 software facilitated coding, retrieval, and comparison operations while maintaining audit trails of analytical decisions. Peer debriefing sessions with two colleagues external to the research team enhanced analytical credibility through critical questioning of interpretations and alternative explanations.

4.5.3 Integration

Findings integration occurred at multiple stages. During analysis, quantitative results informed qualitative data collection through targeted probing about patterns observed in survey data. Following separate quantitative and qualitative analyses, findings were compared systematically to identify convergence, complementarity, and contradictions. Integration generated meta-inferences addressing research questions through multiple evidence streams. The final manuscript presents integrated findings organized around key themes rather than separating quantitative and qualitative results.

5. RESULTS AND DISCUSSION

5.1 Technology Adoption Patterns and Determinants

Measurement model assessment indicated satisfactory reliability and validity. Cronbach's alpha coefficients exceeded 0.85 for all constructs: perceived usefulness (α=0.89), perceived ease of use (α=0.87), behavioral intention (α=0.91), and system usage (α=0.86). Confirmatory factor analysis demonstrated acceptable fit: χ^2/df=2.34, CFI=0.94, TLI=0.93, RMSEA=0.07, SRMR=0.06. Average variance extracted values ranged from 0.58 to 0.67, supporting convergent validity, while discriminant validity was confirmed through Fornell-Larcker criterion comparisons.

Structural equation modeling results revealed several significant relationships consistent with TAM predictions. Perceived ease of use significantly predicted perceived usefulness (β=0.42, $p<0.001$), confirming that systems viewed as easier to use were also perceived as more beneficial for job performance. Both perceived usefulness (β=0.51, $p<0.001$) and perceived ease of use (β=0.29, $p<0.01$) positively predicted behavioral intentions to use digital revenue systems. The combined model explained 61% of variance in behavioral intentions (R^2=0.61). Behavioral intentions strongly predicted actual system usage (β=0.68, $p<0.001$), accounting for 46% of usage variance (R^2=0.46).

These findings align closely with extensive TAM research demonstrating the central roles of usefulness and ease of use perceptions in driving technology adoption (Marikyan et al., 2023). The magnitude of effects mirrors meta-analytic estimates from public sector contexts, where perceived usefulness typically emerges as the stronger predictor (Lestari, 2023). The results suggest that improving Kanye District Council employees' perceptions along both dimensions could enhance adoption rates substantially.

Descriptive statistics revealed moderate to moderately-high mean scores for key constructs. Perceived usefulness averaged 5.24 (SD=1.18) on the seven-point scale, indicating general agreement that digital systems improve work effectiveness, though with notable variability. Perceived ease of use scored lower at 4.87 (SD=1.32), suggesting more reservations about system complexity and learning requirements. Behavioral intentions averaged 5.42 (SD=1.24), while actual usage frequency scored 5.01 (SD=1.41). These patterns indicate that while employees generally intend to use digital systems and recognize their benefits, concerns about usability and actual usage behaviors lag somewhat behind intentions.

Qualitative interviews provided rich contextualization of these quantitative patterns. The Director of Finance explained adoption dynamics: "The younger staff adapted very quickly to the new systems. They were already comfortable with technology from their personal lives. But some of our more experienced officers who had done things manually for twenty years really struggled. It wasn't that they opposed technology they just needed more support and training than we initially provided." This account highlights how digital literacy variations shape ease of use perceptions and necessitate differentiated implementation support.

5.2 Revenue Collection Performance Impacts

Financial data analysis revealed substantial improvements in collection efficiency following technology adoption, though effects varied considerably across revenue categories and implementation stages. Overall revenue collection as a percentage of annual targets increased from an average of 76.3% during 2018-2019 (pre-digitalization baseline) to 88.7% during 2022-2024 (mature digital system operation), representing a 12.4 percentage point improvement. However, disaggregated analysis reveals more nuanced patterns requiring careful interpretation.

Revenue category-specific analyses revealed differential technology impacts reflecting varying digitalization feasibility and user characteristics across revenue streams. Property tax collection showed particularly dramatic improvements, rising from 68% collection rates pre-digitalization to 91% during mature digital operation, an increase of 23 percentage points. Business licensing exhibited 18 percentage point improvements from 82% to 100% collection rates. Service charges (water, sanitation) improved more modestly from 79% to 86%, a 7 percentage point gain. Market stall rentals showed minimal improvement from 73% to 75%.

These differential effects align with revenue stream characteristics. Property taxes and business licenses involve annual or periodic payments by identifiable ratepayers, creating conditions favorable for systematic digital tracking, reminder systems, and online payment options. Multiple key informants confirmed that automated SMS reminders before payment deadlines significantly improved compliance rates. The Finance Director noted: "Before, ratepayers often forgot payment dates or claimed they didn't receive reminders. Now automated messages go directly to their phones. This simple feature alone improved on-time payments substantially."

Administrative efficiency metrics demonstrated clear improvements. Processing time for business license

applications declined from an average of 12 business days to 3 days following digitalization of application submission, verification, and payment processes. Payment transaction costs dropped approximately 35% due to reduced need for manual receipt processing, cash handling, and physical banking trips. Staff time spent on routine data entry decreased by an estimated 40%, freeing capacity for higher-value enforcement and taxpayer services activities. These operational efficiency gains create value beyond direct revenue improvements through cost savings and enhanced service quality.

5.3 Implementation Challenges and Enabling Factors

Qualitative analysis identified eight interconnected themes capturing key implementation challenges and enabling factors shaping technology adoption outcomes at Kanye District Council. Infrastructure emerged as a fundamental enabler or constraint on effective technology utilization. While Kanye benefits from relatively good telecommunications infrastructure by regional standards, including 4G mobile coverage and fiber optic connectivity, informants described persistent reliability issues. The IT Manager explained: "Power outages remain common, requiring expensive backup generators and uninterruptible power supplies. Internet connectivity occasionally fails during storms or when Botswana Telecommunications Corporation experiences technical problems. These disruptions undermine system reliability and user confidence."

Staff digital literacy variations significantly influenced adoption success. While younger, better-educated employees generally adapted quickly, senior staff with decades of experience in manual systems required substantial support. A senior revenue officer reflected: "I was terrified of the new system initially. I worried I would make mistakes, lose information, or be unable to help customers. The training helped, but real comfort came only after months of daily use with supportive colleagues nearby when I needed help."

Technology adoption required substantial organizational change extending well beyond technical system deployment. Multiple informants emphasized that initial implementation focused excessively on technical specifications while underinvesting in change management processes. A middle manager reflected: "We treated it like an IT project when it was really an organizational transformation project. The technology was actually the easier part. Changing established workflows, getting buy-in from skeptical staff, and building new habits proved much harder and more time-consuming than anticipated."

Leadership commitment emerged as perhaps the single most important enabling factor. The current Council Secretary's championing of digital transformation created political space and organizational momentum for sustained implementation efforts. Multiple informants credited leadership vision with driving progress despite obstacles. One manager stated: "Strong leadership from the top has been absolutely critical. When leadership prioritizes something and holds people accountable for progress, it happens. Without that commitment, digital transformation could easily have stalled."

5.4 Integrated Synthesis and Interpretation

The convergent evidence from quantitative surveys, financial data analysis, and qualitative interviews reveals a complex picture of technology adoption and its impacts on revenue collection performance at Kanye District Council. Technology adoption has demonstrably improved collection efficiency, particularly for revenue streams amenable to digital tracking and payment. However, realizing these benefits required substantial investments in infrastructure, capacity building, and organizational change extending well beyond technical system deployment alone.

These findings resonate strongly with broader theoretical perspectives and empirical evidence from comparable contexts. TAM's central predictions received robust confirmation—perceived usefulness and ease of use significantly predicted adoption intentions and behaviors. However, consistent with institutional theory perspectives, individual-level perceptions operated within organizational and environmental contexts that fundamentally shaped both perceptions and their effects. Infrastructure constraints, organizational support systems, and leadership commitment mediated relationships between technology characteristics and adoption outcomes.

The results partially support optimistic perspectives on digital transformation's potential to improve public sector financial performance. Technology clearly enabled operational improvements and collection rate gains at Kanye District Council. However, findings also reveal important limitations and contingencies tempering enthusiastic technology advocacy. Technology alone cannot resolve underlying structural challenges including resource constraints, inadequate enforcement capacity, ratepayer affordability problems, or weak governance institutions. Rather, technology serves as an enabler that amplifies existing capabilities while creating new requirements for infrastructure, skills, and organizational adaptation.

Comparing these findings with regional studies reveals both commonalities and important differences. Like Mabhena and Chibomba (2025) Zambian research, Kanye's experience demonstrates significant but not transformative improvements, with success dependent on addressing implementation challenges systematically. Unlike Sinjwala (2024) disappointing Chilanga case where technology investments yielded minimal improvements, Kanye achieved more substantial gains, likely reflecting stronger organizational capacity, better infrastructure, and more effective change management.

6. CONCLUSION AND POLICY IMPLICATIONS

6.1 Summary of Key Findings

This research examined technology adoption and its effects on revenue collection efficiency at Kanye District Municipal Council in Botswana through a rigorous mixed-methods approach grounded in the Technology Acceptance Model. Three primary findings emerged from the investigation.

First, digital technology adoption positively influenced revenue collection performance at Kanye District Council, with collection rates improving by 12.4 percentage points overall following digitalization. Effects varied substantially across revenue categories, from 23 percentage points for property taxes to minimal gains for informal market rentals, reflecting differential implementation feasibility and user population characteristics. Administrative efficiency improvements including reduced processing times, lower transaction costs, and freed staff capacity complemented direct collection improvements.

Second, perceived usefulness and perceived ease of use significantly predicted technology adoption behaviors among council employees, with the combined model explaining 61% of variance in behavioral intentions and 46% of actual usage. However, absolute perception levels indicated meaningful concerns about system usability and mixed confidence in technology benefits, suggesting continued opportunities for improvement through enhanced training, support, and system refinement.

Third, successful technology implementation required addressing multiple interconnected challenges spanning technical infrastructure, human capacity, organizational processes, and institutional environments. Infrastructure reliability, digital literacy gaps, change management quality, system integration, vendor relationships, costs, security, and leadership commitment all emerged as critical factors determining whether technology investments translated into performance improvements.

6.2 Theoretical Contributions

This study makes several contributions to technology acceptance and digital governance literature. It provides rigorous empirical testing of TAM in an underexplored context African local government revenue collection. The strong support for TAM's core predictions in this setting enhances confidence in the model's cross-cultural and cross-sector validity while identifying important contextual factors shaping how technology acceptance processes unfold.

The research demonstrates value in integrating individual-level technology acceptance frameworks with organizational and institutional perspectives. While TAM effectively captures user-level adoption dynamics, understanding real-world implementation success requires examining how organizational factors including infrastructure, training, and leadership shape both user perceptions and their consequences for system effectiveness. This multi-level integration enriches explanatory accounts and provides more actionable insights for implementation planning.

6.3 Policy and Practice Implications

Research findings suggest several important implications for local government officials, policymakers, and development practitioners pursuing digital transformation initiatives.

First, digital transformation should be approached as organizational change rather than merely technical system deployment. Successful implementation requires strategic change management addressing behavioral and cultural dimensions alongside technical specifications. This includes articulating clear vision and rationale, engaging staff in planning processes, providing comprehensive training and ongoing support, celebrating early wins, addressing resistances constructively, and maintaining leadership commitment throughout extended implementation timelines.

Second, infrastructure investments constitute necessary foundations for digital transformation success. Reliable electricity, adequate internet connectivity, appropriate hardware, and backup systems enable effective technology utilization. For local authorities in areas with infrastructure deficits, investment sequencing becomes critical developing infrastructure foundations before deploying sophisticated digital systems avoids expensive failures and user frustrations.

Third, capacity building requires sustained, comprehensive approaches rather than one-time training events. Role-specific training modules, peer support systems through designated technology champions, accessible technical assistance, and ongoing refresher sessions address diverse learning needs and timing. Additionally, supporting ratepayer digital literacy through community education programs enhances digital channel adoption rates.

Fourth, maintaining hybrid systems accommodating both digital and traditional transaction modes promotes inclusion while protecting vulnerable populations from digital exclusion. Though hybrid approaches moderate efficiency gains, they align with equity values and political realities in contexts with variable digital access. As infrastructure and literacy improve over time, digital channel usage can gradually predominate without forcing exclusion.

Fifth, vendor selection and contract management deserve careful attention. Local authorities should prioritize vendors with proven track records in similar contexts, strong local technical support capacity, favorable contractual terms including guaranteed response times, and commitment to system updates and improvements. Developing some internal technical capacity reduces dependency vulnerabilities while external vendor relationships remain necessary for complex issues.

6.4 Limitations and Future Research Directions

Several limitations qualify these findings and suggest productive avenues for future research. First, the single-case design limits generalizability. While Kanye District Council provides a valuable focal case and findings align well with comparable contexts, systematic comparative research across multiple Botswana councils would enable more robust inference about general patterns versus case-specific idiosyncrasies.

Second, cross-sectional survey data capture perceptions and behaviors at a single time point. Longitudinal designs tracking how perceptions and adoption behaviors evolve as implementation matures would illuminate dynamic processes more completely. Additionally, panel data approaches could strengthen causal claims about relationships between technology adoption and revenue performance by controlling for time-invariant confounds.

Third, financial performance analysis encountered attribution challenges separating technology effects from contemporaneous influences including COVID-19 pandemic impacts, economic fluctuations, policy changes, and leadership transitions. While statistical controls and sensitivity analyses addressed these concerns partially, quasi-experimental designs with explicit comparison councils would enable more definitive causal inference.

Fourth, research focused primarily on supply-side adoption by council employees. Comprehensive understanding requires complementary investigation of demand-side dynamics among ratepayers. Future research should examine taxpayer perceptions, adoption patterns, and preferences regarding digital versus traditional payment channels. Understanding ratepayer perspectives would inform more effective citizen-centered design.

Fifth, this research investigated technology adoption and short-term performance impacts. Longer-term sustainability questions remain unaddressed. Will observed improvements persist as novelty effects fade? Can councils sustain necessary investments in system maintenance, updates, training, and support? How do leadership transitions affect momentum? Longitudinal research tracking outcomes over five to ten years would address these crucial sustainability questions.

6.5 Final Reflections

Local government revenue collection efficiency fundamentally shapes public service delivery capacity and development outcomes across African contexts. Digital transformation initiatives hold genuine potential to strengthen local fiscal sustainability while improving citizen services. However, realizing this potential requires moving beyond techno-optimistic assumptions that technology automatically improves governance.

Effective digital transformation in local government contexts demands systematic attention to infrastructure foundations, human capacity development, organizational change management, institutional alignment, and sustained leadership commitment. Technology serves as a powerful enabler when deployed thoughtfully within supportive organizational ecosystems, but cannot compensate for absent foundations in infrastructure, capacity, or governance.

This research from Kanye District Municipal Council demonstrates that digital transformation can work in African local government contexts when implemented as comprehensive organizational change rather than narrow technical deployment. The substantial but not transformative improvements observed at Kanye reflect realistic expectations—technology enables meaningful progress without solving all challenges. This balanced perspective, grounded in rigorous empirical investigation, can inform more effective policy and practice as African local authorities continue pursuing digital transformation agendas essential for 21st century governance.

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