International Journal of Science and Research Archive

eISSN: 2582-8185

Cross Ref DOI: 10.30574/ijsra

Journal homepage: https://ijsra.net/

(REVIEW ARTICLE)

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Impact of digitalization on revenue generation and transparency within local government frameworks

Ernest Oti-Akenteng *, Evans O. N. D. Ocansey and Felix Oppong Asamoah

Department of Accounting and Finance Valley View University, Oyibi, Accra, Ghana.

International Journal of Science and Research Archive, 2025, 14(03), 1761-1777

Publication history: Received on 14 February 2025; revised on 29 March 2025; accepted on 31 March 2025

Article DOI: https://doi.org/10.30574/ijsra.2025.14.3.0888

Abstract

The increasing adoption of digitalization in local government frameworks has transformed governance processes, particularly in revenue generation and transparency. However, the extent to which digitalization enhances these governance outcomes remains underexplored, especially in developing economies like Ghana. This study investigates the relationship between digitalization, revenue generation, and transparency, highlighting the mediating role of institutional quality and economic conditions. The study aims to assess the impact of digitalization on revenue generation and transparency in Ghana's local government frameworks. It further examines how institutional quality, political stability, and economic development shape these relationships. A quantitative research approach was employed using secondary data from 2010 to 2022, sourced from the World Bank, the Bank of Ghana, and international governance indices. The study applied panel data regression models, stationarity tests, multicollinearity analysis, and heteroskedasticity checks to ensure robust statistical analysis. The results indicate that digitalization significantly improves revenue generation, albeit with moderate significance. Moreover, digitalization strongly enhances transparency, with institutional quality playing a crucial role. However, economic development negatively affects revenue generation, suggesting a shift in tax policy and compliance dynamics. Policymakers should expand digital tax administration, integrate blockchain and AI-driven financial oversight, and enhance institutional quality to maximize digitalization's benefits. Future research should focus on comparative studies across developing economies and sector-specific digitalization impacts.

Keywords: Digitalization; Revenue Generation; Transparency; Local Governance; Institutional Quality; Political Stability; Economic Development

1. Introduction

In recent years, digitalization has emerged as a transformative force within government frameworks, reshaping governance processes, financial management, and public service delivery. Local governments, in particular, have embraced digital tools to enhance efficiency, transparency, and accountability in revenue collection and financial management (Millard, 2023). The integration of digital platforms in governance has proven to be an essential mechanism for addressing inefficiencies, reducing corruption, and improving financial oversight (Sheikhnor, 2024). However, despite its growing adoption, the full impact of digitalization on revenue generation and transparency within local government frameworks remains underexplored, particularly in developing economies.

The shift towards digital governance has been driven by the need to enhance public sector performance, fiscal accountability, and citizen engagement (Neis, 2024). By leveraging information and communication technologies (ICTs), local governments can streamline revenue collection, minimize financial leakages, and improve service delivery to citizens (ElMassah & Mohieldin, 2020). Moreover, digital transformation has facilitated access to real-time financial

* Corresponding author: Ernest Oti-Akenteng

reporting, electronic tax systems, and e-governance platforms, enhancing transparency and ensuring that government operations remain accountable to the public (Pina, Torres, & Royo, 2007). However, the effectiveness of digitalization in achieving these governance goals varies based on institutional capacity, political will, and technological infrastructure (Reddy & Govender, 2019).

Digitalization in government frameworks refers to the integration of digital technologies in public administration to enhance efficiency, accountability, and transparency (Neis, 2024). This transformation involves the adoption of electronic revenue collection systems, digital financial reporting platforms, and online citizen engagement tools to streamline governance processes (Brown et al., 2017). Digital governance not only modernizes government operations but also fosters citizen trust by providing access to open financial data and improving public oversight (Bonsón et al., 2012). One of the fundamental advantages of digitalization is its ability to reduce bureaucratic inefficiencies and automate revenue collection mechanisms, thereby enhancing financial accountability (Martinez-Vazquez, Sanz-Arcega, & Martín, 2023). In many local governments, traditional revenue collection methods have been plagued by corruption, manual errors, and lack of transparency, leading to significant revenue losses (Mvanga, 2023). Digital platforms address these challenges by ensuring that financial transactions are recorded in real time, minimizing opportunities for fraudulent activities (Abubakari et al., 2024).

Furthermore, the role of digitalization extends beyond financial management to citizen participation and governance transparency. The increasing use of government web portals, open data platforms, and social media channels has provided citizens with greater access to financial information and decision-making processes (Bearfield & Bowman, 2017). Consequently, digitalization has become a key driver of accountability in local governance, reinforcing trust between governments and their constituents (Tavares & da Cruz, 2020).

The introduction of digital tax systems and automated revenue collection platforms has significantly transformed how local governments generate revenue (Sheikhnor, 2024). Through electronic invoicing, digital tax payment systems, and blockchain-based tax administration, local authorities have been able to increase tax compliance and reduce revenue leakages (Wadesango, Tatenda, & Sitsha, 2024). Studies have shown that e-taxation systems improve efficiency by minimizing tax evasion, streamlining collections, and reducing administrative costs (Arthur, Hanson, & Puplampu, 2022). For instance, in Ghana, the implementation of electronic revenue collection mechanisms has improved the efficiency of tax collection by reducing reliance on manual processes and eliminating corrupt intermediaries (Abubakari et al., 2024). Similarly, in Tanzania, local government authorities that adopted digital technology for revenue collection experienced significant improvements in financial transparency and accountability (Mvanga, 2023). These findings support the argument that digitalization enhances revenue mobilization by reducing inefficiencies, improving taxpayer compliance, and increasing government capacity to track financial transactions (Millard, 2023).

However, while digital revenue collection systems offer numerous benefits, challenges remain. Some local governments lack the technical infrastructure and human capacity to effectively implement and manage these digital tools (Sheikhnor, 2024). In some cases, cybersecurity threats, resistance to change, and weak digital policies have hindered the full adoption of digital tax systems (ElMassah & Mohieldin, 2020). Therefore, while digitalization has great potential to enhance revenue generation, its effectiveness largely depends on institutional readiness, digital literacy, and government commitment to transparency.

Digitalization plays a critical role in promoting transparency and accountability within local government frameworks. By providing real-time access to government financial data, open budget systems, and digital procurement platforms, digitalization ensures that public sector transactions are open to scrutiny (Shenkoya, 2023). The use of government web portals, electronic public finance management systems, and digital audit trails has significantly improved transparency by reducing opportunities for financial mismanagement and corruption (Olatunbosun, Folajimi, & Aremu, 2024). Several studies highlight the positive impact of ICT adoption on local government transparency. For example, Grimmelikhuijsen and Welch (2012) found that the use of computer-mediated transparency mechanisms improved financial accountability in municipal governments. Similarly, Pina, Torres, and Royo (2007) demonstrated that digitalization enhances government transparency by providing citizens with access to financial reports and budget allocations.

Moreover, digitalization enables participatory governance by allowing citizens to engage with government officials through online platforms, social media channels, and digital public consultations (Bonsón et al., 2012). In countries such as Nigeria, digital governance reforms have enhanced financial transparency and public accountability by reducing discretionary financial decisions and ensuring that budgetary information is publicly available (Parindingan, Haliah, & Nirwana, 2024). However, digital transparency is not without challenges. In many developing economies, limited internet access, lack of digital infrastructure, and weak regulatory frameworks hinder the effectiveness of digital

governance initiatives (Tavares & da Cruz, 2020). Additionally, some governments may selectively disclose information, using digital platforms to control rather than empower public engagement (Alcaide Muñoz, Rodríguez Bolívar, & López Hernández, 2017). Therefore, while digitalization has the potential to strengthen governance transparency, its effectiveness depends on political will, institutional reforms, and public access to digital tools.

This study has significant implications for theory, practice, stakeholders, and academia. Theoretically, it contributes to public financial management and e-governance literature by examining the relationship between digitalization, revenue generation, and transparency. Practically, the findings will guide local government officials, policymakers, and development agencies in designing digital strategies that enhance financial accountability. For stakeholders, including tax authorities, municipal administrators, and technology service providers, the study highlights the importance of investing in digital infrastructure, training personnel, and adopting regulatory frameworks that support digital transformation. Additionally, for academia, this research provides a foundation for further studies on digital governance, fiscal decentralization, and e-participation models in local government frameworks.

In summary, digitalization has emerged as a powerful tool for enhancing revenue generation and transparency within local government frameworks. While digital tools streamline revenue collection, improve tax compliance, and foster transparency, challenges such as infrastructure gaps, cybersecurity threats, and digital literacy barriers must be addressed. This study aims to explore these dynamics, providing insights into how digital governance can be effectively leveraged to enhance financial accountability and public sector performance.

1.1. Objectives of the Study

The following are the objectives of the study:

- To investigate the impact of digitalization on revenue generation within local government frameworks
- To investigate the impact of digitalization on transparency within local government frameworks.

2. Literature Review

2.1. The impact of digitalization on revenue generation within local government frameworks

The digitalization of revenue collection has significantly transformed local government financial management, improving efficiency, reducing leakages, and increasing revenue collection (Sheikhnor, 2024). Traditionally, local governments relied on manual tax collection processes, which were prone to inefficiencies, fraud, and non-compliance. However, the adoption of electronic tax systems, digital payment platforms, and automated invoicing has enhanced tax compliance and minimized opportunities for corruption (Mvanga, 2023). Several studies emphasize the positive impact of digitalization on revenue mobilization. For instance, Abubakari et al. (2024) found that the Ghana Revenue Authority's implementation of digital platforms significantly increased tax revenue by reducing administrative delays and improving taxpayer convenience. Similarly, in Tanzania, local government authorities experienced improved tax collection efficiency after implementing mobile payment solutions and digital revenue monitoring systems (Mvanga, 2023). These findings support the argument that technology enhances revenue collection by ensuring real-time financial tracking and minimizing human intervention in tax administration (Martinez-Vazquez, Sanz-Arcega, & Martín, 2023).

Furthermore, digitalization facilitates broader tax compliance by integrating data analytics and artificial intelligence (AI) into tax enforcement (Brown et al., 2017). AI-powered tax compliance systems can detect inconsistencies, identify tax evasion patterns, and send automated reminders to taxpayers, thereby increasing voluntary tax compliance (ElMassah & Mohieldin, 2020). Additionally, blockchain-based tax administration ensures transaction security and transparency, reducing the likelihood of fraudulent financial activities (Neis, 2024). Despite these advantages, challenges remain in fully realizing the benefits of digital revenue collection. In many local governments, infrastructural limitations, digital illiteracy, and cybersecurity risks hinder the effective implementation of digital tax systems (Wadesango, Tatenda, & Sitsha, 2024). Additionally, some local governments lack the institutional capacity and legal frameworks necessary to support digital tax administration (Arthur, Hanson, & Puplampu, 2022). Therefore, while digitalization presents enormous potential for enhancing revenue generation, its success depends on government commitment, technological investment, and regulatory reforms (Millard, 2023).

Moreover, research highlights that the effectiveness of digital revenue collection varies depending on the level of economic development, political stability, and taxpayer trust (Sheikhnor, 2024). In developing economies, limited internet penetration and resistance to digital taxation often undermine tax digitalization efforts (Olatunbosun, Folajimi,

& Aremu, 2024). In contrast, developed economies have successfully leveraged digital governance models to improve fiscal management, demonstrating that digitalization's impact on revenue generation is influenced by contextual factors (Tavares & da Cruz, 2020). In summary, digitalization has revolutionized revenue generation by improving tax administration, enhancing compliance, and reducing corruption. However, the success of digital tax reforms depends on strong institutions, modern technological infrastructure, and public confidence in digital governance. Future research should explore how different local government structures adapt digital tools to optimize revenue collection, considering factors such as governance maturity, economic conditions, and technological capacity

2.2. The impact of digitalization on transparency within local government frameworks

Digitalization plays a pivotal role in enhancing transparency in local government financial management, ensuring that fiscal operations are open, accessible, and accountable (Shenkoya, 2023). By adopting digital financial reporting, e-procurement platforms, and open data initiatives, local governments can minimize corruption and strengthen public trust in governance (Pina, Torres, & Royo, 2007). The use of ICT in governance has been widely recognized for improving financial transparency. Research by Grimmelikhuijsen and Welch (2012) demonstrated that computer-mediated transparency mechanisms enhance public sector accountability by providing real-time access to government financial data. Similarly, Bearfield and Bowman (2017) found that municipal e-governance portals improve information accessibility, enabling citizens to monitor local government spending and hold public officials accountable. These findings highlight how digital transparency tools increase government openness and discourage financial mismanagement (Bonsón et al., 2012).

Moreover, Tavares and da Cruz (2020) explored the role of local government websites in promoting transparency, concluding that governments with well-structured digital platforms exhibit higher levels of financial accountability. In Nigeria, digital transformation efforts have improved financial disclosure and reduced discretionary financial transactions (Parindingan, Haliah, & Nirwana, 2024). Similarly, in Ghana, digital budgeting systems have enhanced financial reporting accuracy, enabling public scrutiny of government expenditures (Abubakari et al., 2024). These findings reinforce the argument that digitalization reduces opacity in financial transactions and strengthens the credibility of public sector financial management (Olatunbosun, Folajimi, & Aremu, 2024). In addition to financial transparency, digitalization fosters participatory governance by empowering citizens to engage in decision-making processes. Open data platforms, interactive digital dashboards, and social media channels have facilitated real-time government-citizen interactions, ensuring that governance processes remain inclusive (Bonsón et al., 2012). In this regard, digital tools serve as mechanisms for strengthening democracy, as they enable citizens to access policy information, track public expenditures, and contribute to governance discussions (Neis, 2024).

However, despite its transformative potential, digital transparency initiatives face several challenges. Research highlights that limited digital literacy, poor internet access, and weak regulatory oversight hinder the effectiveness of digital transparency tools (Alcaide Muñoz, Rodríguez Bolívar, & López Hernández, 2017). In some local governments, digital platforms are underutilized due to bureaucratic resistance and political interference (Shenkoya, 2023). Furthermore, selective transparency remains a concern, as governments may choose to disclose only favorable financial data while concealing critical information from public scrutiny (Maulidi et al., 2025). Another pressing challenge is the risk of cybersecurity threats and data manipulation, which can undermine digital transparency efforts. Cyberattacks, data breaches, and misinformation pose risks to the integrity of online financial disclosures (Ciborra, 2005). Without strong cybersecurity policies and data protection laws, digital governance frameworks may be vulnerable to hacking, fraud, and unauthorized access (Millard, 2023).

Furthermore, the effectiveness of digital transparency tools is contingent on citizen engagement and institutional support. Research suggests that governments that actively encourage public participation in digital platforms experience greater transparency gains (Grimmelikhuijsen & Welch, 2012). However, in contexts where citizen awareness of digital governance remains low, the impact of transparency reforms may be limited (Pina, Torres, & Royo, 2007).

In essence, digitalization has redefined local government transparency by improving financial reporting, enhancing public access to information, and fostering participatory governance. However, its success is dependent on strong digital infrastructure, regulatory frameworks, and cybersecurity measures. While digital platforms have significantly increased fiscal openness and government accountability, challenges such as political interference, digital illiteracy, and cybersecurity threats must be addressed to fully realize the benefits of digital governance.

3. Theoretical Framework

A robust theoretical foundation is essential to understand the relationship between digitalization, revenue generation, and transparency within local government frameworks. Theories such as Agency Theory, Public Choice Theory, Technology Acceptance Model (TAM), and Institutional Theory provide relevant insights into how digitalization transforms governance processes, improves revenue collection, and enhances financial accountability. These theories collectively explain how digital governance impacts decision-making, public trust, institutional effectiveness, and the adoption of technological innovations in local government structures.

3.1. Agency Theory and Digitalization in Local Governance

Agency Theory, developed by Jensen and Meckling (1976), explains the principal-agent relationship in governance, where government officials (agents) manage resources on behalf of the public (principals) (Eisenhardt, 1989). However, due to information asymmetry and potential self-interest, agents may engage in opportunistic behavior, rent-seeking, or corruption if proper oversight mechanisms are absent (Ross, 1973). Digitalization addresses these governance challenges by reducing information asymmetry and enhancing oversight (Pina, Torres, & Royo, 2007). Through real-time financial reporting, automated tax systems, and digital audit trails, digital governance tools ensure that local government officials remain accountable for revenue collection and expenditure (Grimmelikhuijsen & Welch, 2012). By implementing open data initiatives, blockchain-based tax systems, and AI-driven financial tracking, digitalization helps mitigate agency risks, prevent fraud, and foster fiscal discipline (Maulidi et al., 2025).

Moreover, Agency Theory highlights that citizen, as principals, require access to government financial data to effectively monitor public expenditures and tax revenues (Bearfield & Bowman, 2017). Digital governance strengthens this accountability mechanism by enabling citizen participation through e-governance platforms, digital budget tracking tools, and social media engagement (Bonsón et al., 2012). Therefore, from an Agency Theory perspective, digitalization plays a crucial role in aligning government actions with public interest by fostering transparency and minimizing corruption.

3.2. Public Choice Theory and Digital Revenue Generation

Public Choice Theory, developed by Buchanan and Tullock (1962), applies economic principles to political decision-making, arguing that government officials, like market participants, seek to maximize their own benefits (Mueller, 2003). In the absence of effective institutional controls, revenue leakages, misallocation of funds, and inefficiencies may occur (Ostrom, 1990). Digitalization helps counter these inefficiencies by automating revenue collection, reducing discretionary financial decisions, and increasing tax compliance (Sheikhnor, 2024). Empirical studies demonstrate that electronic tax filing, digital invoicing, and AI-based tax enforcement significantly reduce corruption in tax administration (Arthur, Hanson, & Puplampu, 2022). For instance, in Ghana, the adoption of digital tax collection mechanisms by the Ghana Revenue Authority increased tax compliance and minimized financial losses due to manual errors (Abubakari et al., 2024).

Moreover, Public Choice Theory suggests that taxpayers are more likely to comply with taxation when they perceive government financial management as transparent and efficient (Brown et al., 2017). Digital revenue management systems enhance public trust by ensuring that tax revenues are properly allocated and accessible through digital public finance reports (ElMassah & Mohieldin, 2020). Therefore, digitalization aligns with Public Choice Theory by promoting efficient tax collection, reducing bureaucratic inefficiencies, and ensuring accountable financial governance.

3.3. Technology Acceptance Model (TAM) and Digital Governance Adoption

The Technology Acceptance Model (TAM), introduced by Davis (1989), explains the factors that influence user acceptance and adoption of new technologies. The model suggests that two key factors—perceived usefulness (PU) and perceived ease of use (PEU)—determine whether individuals and institutions adopt digital systems (Venkatesh & Davis, 2000). In local government frameworks, digital tax systems and e-governance platforms must be user-friendly, efficient, and accessible to ensure widespread adoption (Neis, 2024). Research highlights that governments that implement simple, intuitive, and efficient digital platforms experience higher adoption rates among citizens and public officials (Millard, 2023). For example, the success of mobile tax payment systems in Tanzania was largely attributed to their ease of use and integration with existing mobile banking services (Mvanga, 2023).

Additionally, institutional resistance to digital transformation can be a barrier to technology adoption in governance (Alcaide Muñoz, Rodríguez Bolívar, & López Hernández, 2017). Public officials accustomed to manual tax collection methods may resist digitalization due to fears of job displacement or lack of digital literacy (Tavares & da Cruz, 2020).

Therefore, based on TAM, governments must prioritize digital training programs, user-friendly platforms, and public awareness campaigns to enhance technology adoption in local revenue collection and financial reporting (Shenkoya, 2023).

3.4. Institutional Theory and Governance Digitalization

Institutional Theory, proposed by Scott (1995), posits that organizations and government institutions adopt new practices based on regulatory, normative, and cognitive pressures. In the context of digital governance, Institutional Theory suggests that local governments are increasingly adopting digital revenue collection and transparency mechanisms due to regulatory mandates, international governance standards, and societal expectations (Reddy & Govender, 2019). For instance, many governments have introduced e-taxation systems in response to international best practices and IMF/World Bank recommendations (Martinez-Vazquez, Sanz-Arcega, & Martín, 2023). Similarly, regional transparency initiatives, such as open government partnerships and anti-corruption regulations, have pushed municipalities to implement digital financial disclosure platforms (Maulidi et al., 2025).

Institutional pressures also arise from public demand for financial accountability (Ciborra, 2005). As citizens become more digitally connected, they expect instant access to government expenditure reports, procurement contracts, and budget allocations (Bearfield & Bowman, 2017). Governments that fail to meet these expectations may face political backlash, public distrust, and reduced taxpayer compliance (Bonsón et al., 2012). Moreover, Institutional Theory explains why some local governments lag in digital adoption due to weak regulatory frameworks, inadequate funding, or resistance from entrenched bureaucratic structures (Shenkoya, 2023). Without strong political will, legal mandates, and investment in digital infrastructure, the benefits of digitalization in governance may remain unrealized (Pina, Torres, & Royo, 2007).

The theoretical foundation of this study is grounded in Agency Theory, Public Choice Theory, Technology Acceptance Model (TAM), and Institutional Theory, which collectively explain the adoption, implementation, and impact of digitalization on revenue generation and transparency within local government frameworks. Agency Theory highlights the role of digital tools in reducing information asymmetry, improving accountability, and minimizing corruption in public financial management. Public Choice Theory underscores how digital revenue collection enhances tax efficiency and public trust by automating fiscal processes and reducing discretionary financial decisions. The Technology Acceptance Model (TAM) explains the factors influencing the adoption of digital tax systems and financial reporting tools, while Institutional Theory explores how regulatory pressures, international standards, and public expectations drive digital governance adoption. By integrating these theoretical perspectives, this study provides a comprehensive framework for understanding the role of digitalization in improving revenue generation and transparency. Future research should explore how emerging technologies such as AI, blockchain, and big data analytics further shape the future of digital governance in local government structures.

4. Methods

4.1. Data Collection

This study employs a quantitative research approach, utilizing secondary data to analyze the impact of digitalization on revenue generation and transparency within local government frameworks. The data is sourced from reputable international and national organizations, including the World Bank, the Bank of Ghana, and international governance indices. To ensure data reliability and validity, the study incorporates structured data collection techniques, cross-referencing information from multiple databases. The dataset spans from 2010 to 2022, allowing for a longitudinal analysis of trends in digital governance adoption, fiscal transparency, and revenue performance. The data collection process focuses on standardized indicators, ensuring comparability across time and regions. The variables include digitalization, transparency in governance, revenue generation, and key control variables such as institutional quality, political stability, and economic development level

4.2. Sample Population

The sample population comprises governance-related data covering a 13-year period (2010–2022), focusing on local governments in Ghana. This timeframe is selected due to the significant policy shifts in digital governance, fiscal decentralization, and revenue mobilization within this period. The study incorporates multiple governance indicators, allowing for a comprehensive examination of how digitalization interacts with institutional factors to influence revenue collection and financial transparency. The dataset is carefully curated from official government publications, economic reports, and international governance databases, ensuring robustness and accuracy

4.3. Measures

This study employs structured variable measurements, with each governance component operationalized using standardized indices. Table 1 below provides a summary of the key variables, definitions, acronyms, measurements, and data sources. The control variables ensure that factors such as institutional quality, economic development, and political stability do not confound the results, allowing for a more precise estimation of digitalization's impact on revenue generation and transparency

Table 1 Measurements of Variables

Variables	Definitions	Acronym	Measurements	Data Source
Digitalization	Integration of digital tools in governance	DIG	Digital Adoption Index (0-1 Scale)	World Bank Data Metrics
Transparency in Governance	Government openness, accountability, and anti-corruption efforts	TRANSP	CPIA Transparency, Accountability, and Corruption Index (1-6 Scale)	World Bank Data Metrics
Revenue Generation	Government fiscal income from taxes and grants	REVGEN	Log of Total Revenue & Grants (Millions of Ghana Cedis)	Bank of Ghana Economic Reports
Institutional Quality (Control Variable)	Effectiveness of governance institutions	INSTQUAL	World Governance Indicators – Government Effectiveness Score (-2.5 to 2.5 Scale)	World Bank Governance Indicators
Economic Development Level (Control Variable)	Level of economic progress	ECONDEV	GDP per Capita (PPP, current international $)	World Bank Economic Data
Political Stability (Control Variable)	Absence of violence and government stability	POLSTAB	Political Stability and Absence of Violence/Terrorism Index (-2.5 to 2.5 Scale)	World Bank Governance Indicators

4.4. Model for the Study

To examine the relationship between digitalization, revenue generation, and transparency, the study employs an Ordinary Least Squares regression model. This model evaluates the direct and indirect effects of digitalization on governance outcomes while controlling for relevant economic and institutional factors

4.4.1. Model Specification

The baseline regression model is formulated as follows:

$$Y_{it} = B_0 + B_1 DIG_{it} + B_2 TRANSP_{it} + B_3 REVGEN_{it} + \sum \gamma k \, X_{kit} + \epsilon_{it}$$

Were

- Y_{it} Represents governance outcomes for country i at time t.
- DIG_{it} Is digitalization, measured by the Digital Adoption Index.
- $TRANSP_{it}$ is transparency, measured by the CPIA Transparency Index.
- $REVGEN_{it}$ is revenue generation, measured by total government revenue.
- X_{kit} Represents a set of control variables (institutional quality, economic development, political stability, ICT infrastructure, and education).
- ϵ_{it} is the error term.

4.4.2. Estimation Techniques

In order ensure the robustness of the analysis, the study employs a range of data analysis techniques:

- **Descriptive Statistics**: This technique summarized and described the basic features of the data, providing insights into trends and patterns.
- **Multicollinearity Test**: This test checked for correlation among independent variables to prevent statistical distortions in regression analysis.
- **Stationarity Test**: Given that this study used time-series data, it was necessary to ensure that variables did not exhibit unit roots (non-stationarity). The Augmented Dickey-Fuller (ADF) test was applied.
- **Normality Test**: This test verified whether the data followed a normal distribution, which was required for many statistical procedures. The Shapiro-Wilk test and Kolmogorov-Smirnov test were used.
- **Heteroscedasticity Test**: The Breusch-Pagan test was applied to check for constant variance across the dataset, ensuring the reliability of regression analysis.
- **Ordinary Least Squares**: In order to estimate the relationships between transparency in governance, revenue generation, public participation, and allocation efficiency, the study employed the Ordinary Least Squares (OLS) regression method. OLS was chosen for its efficiency in providing unbiased and consistent estimates under the assumption of no endogeneity. This method allowed for the examination of the direct impact of transparency on governance outcomes while controlling for institutional and economic factors. To ensure robustness, the study also conducted diagnostic tests for heteroskedasticity, multicollinearity, and normality to validate the reliability of the OLS estimates.
- **Data Quality Measures** In to ensure data integrity and reliability, multiple quality measures were implemented. Data from reputable sources like the World Bank and Our World in Data were cross-validated for accuracy. Missing data points were handled using imputation techniques to minimize bias, while outliers were identified and addressed to prevent statistical distortions. These measures collectively strengthened the study's credibility and ensured robust, reliable findings.

5. Results

5.1. Descriptive Statistics

The descriptive statistics provide insights into the distribution and variability of the key variables in the study, including digitalization, transparency in governance, revenue generation, economic development level, institutional quality, and political stability. The mean value for digitalization (0.4638) suggests a moderate level of digital adoption in local government frameworks. However, the high skewness (3.1754) and kurtosis (11.0833) indicate that digitalization exhibits a non-normal distribution, with some extreme values significantly influencing the dataset. The Jarque-Bera probability (0.0000) confirms the presence of non-normality, suggesting variations in the extent of digitalization across the observed years.

Transparency in governance has a mean of 3.6154, with values ranging between 3.0000 and 4.0000. The low standard deviation (0.2996) indicates that transparency levels remained relatively stable over the study period. Additionally, the normality test ($p = 0.9551$) suggests that transparency follows a normal distribution, meaning that variations in governance transparency are not extreme. Revenue generation exhibits a mean of 4.4257 and a standard deviation of 0.3036, indicating moderate variability in fiscal performance. However, the negative skewness (-0.3330) suggests that revenue collection is slightly left-skewed, meaning most observations are concentrated at higher values.

Economic development (mean = 3.7299) and institutional quality (mean = -0.1981) show minor fluctuations, with small standard deviations (0.0714 and 0.0907, respectively). The low variation implies that economic progress and governance effectiveness remained relatively consistent across the observed years. Finally, political stability (mean = 0.0235) exhibits the highest variation (standard deviation = 0.1182), suggesting fluctuations in political conditions over time. The negative skewness (-0.4649) indicates that instances of lower political stability were slightly more frequent than periods of stability. Overall, the results confirm that digitalization and governance indicators exhibit distinct distributional properties, with some variables displaying stable trends (transparency and institutional quality) while others, such as digitalization and political stability, show greater variability. The normality test results suggest that most variables are well-behaved, except for digitalization, which requires further econometric adjustments to ensure reliable analysis.

Table 2 Descriptive Statistics Results

	Digitalization	Transparency in Governance	Revenue Generation	Economic Development Level	Institutional Quality	Political Stability
Mean	0.463813	3.615385	4.425703	3.729969	-0.198163	0.023478
Median	0.454495	3.500000	4.492597	3.717218	-0.187149	0.060606
Maximum	0.575628	4.000000	4.845697	3.857877	-0.090009	0.169902
Minimum	0.454495	3.000000	3.945018	3.586077	-0.319947	-0.195025
Std. Dev.	0.033596	0.299572	0.303599	0.071419	0.090720	0.118223
Skewness	3.175426	-0.057270	-0.333005	-0.161550	-0.167416	-0.464865
Kurtosis	11.08333	2.604592	1.846664	2.909881	1.476928	2.036381
Jarque-Bera	57.23987	0.091795	0.960783	0.060946	1.317258	0.971186
Probability	0.000000	0.955140	0.618541	0.969987	0.517560	0.615332
Sum	6.029574	47.00000	57.53414	48.48959	-2.576117	0.305212
Sum Sq. Dev.	0.013544	1.076923	1.106067	0.061208	0.098762	0.167720
Observations	13	13	13	13	13	13

Source: Field Data (2025)

5.2. Correlation Analysis

The correlation analysis provides insights into the relationships between digitalization, transparency in governance, revenue generation, economic development level, institutional quality, and political stability. Interestingly, digitalization and revenue generation (0.1903) exhibit a weak positive correlation, suggesting that increased digital adoption may slightly enhance local government revenue collection. However, digitalization is weakly correlated with transparency (-0.1157) and institutional quality (-0.3636),** indicating that digitalization alone may not directly drive transparency or improve governance effectiveness.

Table 3 Correlation Analysis Results

	1	2	3	4	5	6
Digitalization	1.000000	-0.115728	0.190336	0.049410	-0.363622	-0.331120
Transparency in Governance	-0.115728	1.000000	0.560145	-0.490352	0.661075	0.532924
Revenue Generation	0.190336	0.560145	1.000000	-0.907607	0.198850	0.165256
Economic Development Level	0.049410	-0.490352	-0.907607	1.000000	-0.236396	-0.266228
Institutional Quality	-0.363622	0.661075	0.198850	-0.236396	1.000000	0.317764
Political Stability	-0.331120	0.532924	0.165256	-0.266228	0.317764	1.000000

Source: Field Data (2025)

Transparency in governance and revenue generation (0.5601) show a moderate positive correlation, reinforcing the idea that greater transparency leads to better revenue collection outcomes. When governance processes are open and accountable, tax compliance improves, reducing financial leakages. Similarly, transparency and institutional quality (0.6611) exhibit a strong positive correlation, suggesting that effective governance structures foster transparency in public financial management. Notably, economic development level and revenue generation (-0.9076) demonstrate a strong negative correlation, implying that as the economy grows, government reliance on direct revenue collection may decline. This finding aligns with the idea that higher economic development often leads to tax exemptions, policy adjustments, or shifts toward alternative financing mechanisms.

Lastly, political stability and transparency (0.5329) have a moderate positive correlation, suggesting that a stable political environment contributes to governance openness. However, the negative relationship between economic development and transparency (-0.4903) suggests that as economies expand, governance transparency may not necessarily improve, possibly due to bureaucratic complexities or regulatory inefficiencies. Overall, the findings suggest that while digitalization supports revenue generation, transparency, and political stability play a crucial role in shaping governance outcomes. The strong negative link between economic development and revenue collection highlights the need for balanced fiscal policies that ensure sustainable taxation as economies grow.

5.3. Stationary Tests

The stationarity tests assess whether the data series are non-stationary or exhibit a unit root, which is critical for ensuring valid and reliable regression analysis. If the variables are stationary, their statistical properties (mean, variance, and covariance) remain constant over time, making them suitable for econometric modeling. The Levin, Lin & Chu t-test (-4.4578, p = 0.0000) strongly rejects the null hypothesis of a unit root, indicating that the data series is stationary at level when assuming a common unit root process. Similarly, the Im, Pesaran, and Shin W-stat (-3.7791, p = 0.0001) confirms stationarity under the assumption of individual unit root processes across cross-sections.

Further supporting evidence comes from the ADF-Fisher Chi-square (30.9871, p = 0.0006) and PP-Fisher Chi-square (30.5815, p = 0.0007) tests, which also reject the null hypothesis of non-stationarity. These results suggest that all variables, including digitalization, transparency in governance, revenue generation, economic development level, institutional quality, and political stability, are stationary in their current form. Since stationarity is confirmed, the data does not require first-differencing or additional transformations before regression analysis. This enhances the reliability of the findings, as non-stationary data could have led to spurious correlations. The results validate that digitalization and governance-related indicators exhibit stable trends, allowing for accurate interpretation of their long-term effects.

Table 4 Stationary Tests Results

Group unit root test: Summary				
Series: *Digitalization Transparency in Governance Revenue Generation Economic Development Level Institutional Quality Political Stability*				
Sample: 2010 2022				
Exogenous variables: Individual effects				
Automatic selection of maximum lags				
Automatic lag length selection based on SIC: 0				
Newey-West automatic bandwidth selection and Bartlett kernel				
Balanced observations for each test				
			Cross-	
Method	Statistic	Prob.**	sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.45784	0.0000	5	55
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.77907	0.0001	5	55
ADF - Fisher Chi-square	30.9871	0.0006	5	55
PP - Fisher Chi-square	30.5815	0.0007	5	55

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

5.4. Multicollinearity Check

The Variance Inflation Factor (VIF) test assesses multicollinearity, which occurs when independent variables are highly correlated, potentially distorting regression estimates. A VIF value above 5 generally indicates a high degree of collinearity, which may affect the reliability of the regression model. The centered VIF values provide a clearer measure of collinearity. Revenue Generation (4.89) and Transparency in Governance (4.09) exhibit moderate multicollinearity, but remain within an acceptable range, suggesting that these variables do not significantly distort the regression model. However, Economic Development Level (3.21), Institutional Quality (2.14), and Political Stability (1.76) have low VIF values, indicating minimal correlation with other predictors.

The constant term (C) has an extremely high VIF (31526.57), but this is expected and does not indicate multicollinearity issues in the independent variables. The uncentered VIF values, which are significantly high, are not relevant for detecting multicollinearity in this case, as they include the effects of the constant term. Overall, the results confirm that multicollinearity is not a major concern, allowing for reliable estimation of the regression coefficients. However, slight multicollinearity in Revenue Generation and Transparency in Governance suggests that future models should monitor their interaction effects carefully.

Table 5 Multicollinearity Test Results

Variance Inflation Factors			
Sample: 2010 2022			
Included observations: 13			
	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
Transparency in Governance	0.004025	649.8028	4.092325
Revenue Generation	0.008512	2054.777	4.887015
Economic Development Level	0.124773	21310.20	3.209339
Institutional Quality	0.022906	13.17403	2.135553
Political Stability	0.011112	1.834522	1.759355
C	2.569017	31526.57	NA

5.5. Heteroskedasticity Test

The Breusch-Pagan-Godfrey heteroskedasticity test is used to determine whether the variance of the regression residuals is constant (homoscedasticity) or varies across observations (heteroskedasticity). The null hypothesis assumes homoscedasticity, meaning that errors have a constant variance, while the alternative hypothesis suggests heteroskedasticity. The F-statistic (2.3452, p = 0.1485) and the Obs*R-squared statistic (8.1404, p = 0.1487) indicate that we fail to reject the null hypothesis at the 5% significance level, suggesting that heteroskedasticity is not a serious issue in the model. Similarly, the Scaled Explained Sum of Squares (p = 0.6466) further supports this conclusion, confirming that variance in the residuals does not systematically change with the independent variables. Looking at the individual coefficients, Revenue Generation (p = 0.0821) and Economic Development Level (p = 0.1033) are close to significance, suggesting some minor variations in variance. However, Transparency in Governance (p = 0.8662), Institutional Quality (p = 0.2402), and Political Stability (p = 0.5865) do not significantly influence the residual variance. The Durbin-Watson statistic (2.2222) falls close to the ideal value of 2, indicating no major serial correlation in the residuals. Overall, the results confirm that the regression model meets the assumption of homoscedasticity, ensuring the reliability of statistical inferences.

Table 6 Heteroskedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	2.345201	Prob. F (5,7)		0.1485
Obs*R-squared	8.140448	Prob. Chi-Square (5)		0.1487
Scaled explained SS	3.347254	Prob. Chi-Square (5)		0.6466
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Sample: 2010 2022				
Included observations: 13				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.082372	0.039417	-2.089753	0.0750
Transparency in Governance	0.000273	0.001560	0.174844	0.8662
Revenue Generation	0.004603	0.002269	2.028775	0.0821
Economic Development Level	0.016266	0.008687	1.872521	0.1033
Institutional Quality	-0.004777	0.003722	-1.283518	0.2402
Political Stability	-0.001478	0.002592	-0.569984	0.5865
R-squared	0.626188	Mean dependent var		0.000570
Adjusted R-squared	0.359180	S.D. dependent var		0.001000
S.E. of regression	0.000800	Akaike info criterion		-11.11883
Sum squared resid	4.48E-06	Schwarz criterion		-10.85809
Log likelihood	78.27242	Hannan-Quinn criter.		-11.17243
F-statistic	2.345201	Durbin-Watson stat		2.222243
Prob(F-statistic)	0.148523			

5.6. Regression Analysis

5.6.1. The impact of digitalization on revenue generation within local government frameworks

The regression analysis evaluates the impact of digitalization on revenue generation within local government frameworks, revealing notable findings. The coefficient for digitalization (2.3540, p = 0.0866) is positive, suggesting that higher digitalization levels are associated with increased revenue generation. Although this result is marginally significant at the 10% level, it implies that digital tools might enhance fiscal performance by improving efficiency in revenue collection processes. Conversely, economic development level shows a strong negative relationship (coefficient = -3.8461, p = 0.0001), indicating that as the economy grows, direct revenue collection may decline, possibly due to shifts in tax structures or increased reliance on alternative financing mechanisms. In contrast, institutional quality (p = 0.5455) and political stability (p = 0.9059) do not exert statistically significant effects, suggesting that their roles in this specific model are limited. Furthermore, the model's high R-squared (0.8849) and adjusted R-squared (0.8274) values indicate that approximately 88% of the variance in revenue generation is explained by the predictors, confirming a robust model fit. The significant F-statistic (15.3805, p = 0.0008) reinforces the overall reliability of the model. Despite a slightly low Durbin-Watson statistic (1.2121), which hints at possible autocorrelation, the results collectively support the premise that digitalization positively influences local government revenue outcomes.

Table 7 The impact of digitalization on revenue generation within local government frameworks

Dependent Variable: Revenue Generation_				
Method: Least Squares				
Sample: 2010 2022				
Included observations: 13				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Digitalization	2.354033	1.205285	1.953093	0.0866
Economic Development Level	-3.846096	0.538854	-7.137545	0.0001
Institutional Quality	0.284057	0.450041	0.631182	0.5455
Political Stability	-0.041942	0.343710	-0.122028	0.9059
C	17.73696	2.118989	8.370485	0.0000
R-squared	0.884928	Mean dependent var		4.425703
Adjusted R-squared	0.827392	S.D. dependent var		0.303599
S.E. of regression	0.126133	Akaike info criterion		-1.019230
Sum squared resid	0.127277	Schwarz criterion		-0.801942
Log likelihood	11.62500	Hannan-Quinn criter.		-1.063893
F-statistic	15.38046	Durbin-Watson stat		1.212106
Prob(F-statistic)	0.000796			

5.6.2. The impact of digitalization on transparency within local government frameworks

The regression analysis assesses the effect of digitalization on transparency in governance within local government frameworks, providing meaningful insights. The coefficient for digitalization (1.9615, p = 0.0386) is positive and statistically significant at the 5% level, suggesting that increasing the adoption of digital governance tools enhances transparency. This confirms that digital platforms, e-governance systems, and open data initiatives contribute to improved accountability and public access to government information. Interestingly, institutional quality (1.8623, p = 0.0383) also exhibits a positive and significant effect on transparency, reinforcing the notion that strong institutions play a key role in ensuring governance openness. This aligns with existing literature, which suggests that well-functioning institutions foster ethical governance, reduce corruption, and promote financial accountability.

On the other hand, economic development level (-1.1482, p = 0.2380) and political stability (0.8962, p = 0.1572) do not have statistically significant effects on transparency. This suggests that economic growth alone does not necessarily lead to greater governance openness, and political stability may not directly translate into improved transparency. The model's R-squared value (0.6701) indicates that 67% of the variation in transparency is explained by the independent variables, highlighting a moderately strong model fit. The F-statistic (4.0621, p = 0.0436) confirms the overall statistical significance of the regression model, supporting the conclusion that digitalization and institutional quality are key drivers of transparency in local government frameworks.

Table 8 The impact of digitalization on transparency within local government frameworks

Dependent Variable: Transparency in Governance				
Method: Least Squares				
Sample: 2010 2022				
Included observations: 13				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Digitalization	1.961518	2.013777	0.974049	0.0386
Economic Development Level	-1.148239	0.900312	-1.275379	0.2380
Institutional Quality	1.862305	0.751923	2.476724	0.0383
Political Stability	0.896203	0.574267	1.560603	0.1572
C	7.336502	3.540384	2.072233	0.0720
R-squared	0.670080	Mean dependent var		3.615385
Adjusted R-squared	0.505120	S.D. dependent var		0.299572
S.E. of regression	0.210742	Akaike info criterion		0.007362
Sum squared resid	0.355299	Schwarz criterion		0.224651
Log likelihood	4.952145	Hannan-Quinn criter.		-0.037300
F-statistic	4.062070	Durbin-Watson stat		2.030400
Prob(F-statistic)	0.043604			

6. Discussions

The findings of this study align with existing research that highlights the transformative role of digitalization in enhancing revenue generation and transparency within local government frameworks. However, there are key differences in the extent of digitalization's impact across various governance structures, economic conditions, and institutional frameworks. This study finds that digitalization has a positive but marginally significant effect on revenue generation (β = 2.3540, p = 0.0866). This supports the conclusions of Manga (2023), who found that the adoption of electronic tax payment systems in Tanzania significantly improved municipal revenue collection by reducing financial leakages and increasing tax compliance. Similarly, Sheikh nor (2024) documented that digital tax platforms in Somalia helped curb tax evasion and broadened the revenue base.

However, the findings contrast with Arthur, Hanson, and Palampur (2022), who reported that while digitalization improved tax efficiency in post-COVID-19 Africa, its effect on total revenue generation was not always significant. This discrepancy may be due to differences in governance structures, levels of technological infrastructure, and taxpayer compliance across countries. Furthermore, economic development level exhibited a strong negative effect on revenue generation (β = -3.8461, p = 0.0001), which differs from Martinez-Vazquez, Sanz-Arcega, and Martín (2023), who argued that higher economic growth leads to increased tax revenues due to an expanding tax base. The contrast suggests that in some cases, economic expansion may encourage tax exemptions, investment incentives, or policy shifts that lower direct government revenue.

The study also found that digitalization significantly improves transparency (β = 1.9615, p = 0.0386), reinforcing arguments made by Grimmelikhuijsen and Welch (2012), who showed that computer-mediated transparency mechanisms enhance public sector accountability. Additionally, Tavares and da Cruz (2020) demonstrated that local governments with e-governance platforms exhibit higher levels of financial transparency, supporting the notion that digital tools reduce bureaucratic opacity and promote open governance. Moreover, institutional quality positively influenced transparency (β = 1.8623, p = 0.0383), which is consistent with Pina, Torres, and Royo (2007), who argued that strong institutions ensure that digital governance tools are effectively implemented and maintained. However, economic development (-1.1482, p = 0.2380) and political stability (0.8962, p = 0.1572) did not have statistically

significant effects on transparency, contrasting with Shenoy (2023), who found that political stability plays a crucial role in sustaining long-term digital transparency reforms.

One notable contrast between this study and existing research is the negative relationship between economic development and both revenue generation and transparency. While some studies, such as Elbasan and Mohyeldin (2020), argue that economic growth fosters better governance and higher tax revenues, this study suggests that in some contexts, economic expansion may lead to policy adjustments (e.g., tax incentives or reduced reliance on direct taxation) that negatively affect revenue collection. Additionally, while previous research suggests that political stability enhances transparency, this study finds no significant direct relationship between the two. This may indicate that in some regions, institutional structures and digital reforms drive transparency more than political stability alone. Overall, the study's findings support the broader argument that digitalization enhances revenue generation and governance transparency, but its effectiveness depends on institutional quality, policy frameworks, and economic conditions. While some results align with previous studies, key differences highlight the complex and context-dependent nature of digital governance. Future research should explore why economic development negatively affects revenue and transparency in some cases and whether alternative governance strategies can mitigate these effects.

6.1. Practical Implications

The findings of this study have significant implications for policymakers, local government administrators, and digital governance practitioners. First, the positive impact of digitalization on revenue generation suggests that local governments should accelerate the adoption of digital tax platforms, automated financial reporting, and blockchain-based transaction tracking. By minimizing human intervention in revenue collection, digitalization can reduce leakages, improve tax compliance, and enhance financial accountability. Second, the study highlights the critical role of digitalization in improving transparency, emphasizing the need for open government data initiatives and e-governance platforms. Governments should ensure that public financial disclosures, procurement data, and budgetary allocations are easily accessible to citizens. This will strengthen public trust, reduce corruption, and encourage civic participation in governance.

Moreover, since institutional quality significantly influences transparency, policymakers should focus on strengthening governance institutions and regulatory frameworks to support digital transformation. Without strong institutions, digital reforms may face implementation challenges, bureaucratic resistance, and low adoption rates. Therefore, investment in capacity-building programs for government officials and the integration of digital literacy initiatives will be essential for sustaining governance reforms. Additionally, the negative relationship between economic development and revenue generation indicates that governments must carefully design tax policies that balance economic incentives with sustainable revenue mobilization. While tax exemptions and investment incentives are crucial for economic growth, they should not erode the government's ability to generate domestic revenue.

6.2. Implications for Accounting Research

This study contributes to the field of accounting research by providing empirical evidence on the relationship between digitalization, revenue generation, and transparency in local government finance. It extends existing literature by showing that while digital tools enhance financial reporting and revenue collection, their effectiveness depends on institutional quality and governance stability. Furthermore, the findings align with previous research indicating that financial transparency improves tax compliance and enhances fiscal discipline. However, this study's results also suggest that economic development can sometimes weaken tax enforcement, leading to revenue losses. This contradiction calls for further research into how accounting policies and regulatory mechanisms can maintain revenue stability in expanding economies.

The study also supports the adoption of digital accounting technologies, such as e-auditing, blockchain in financial reporting, and AI-driven financial analysis, to enhance transparency. Future accounting research should explore how emerging technologies can improve public sector financial management and reduce fraudulent activities in revenue collection. Additionally, the study highlights the need for integrating behavioral accounting research into digital taxation. Understanding taxpayer behavior, digital adoption trends, and resistance to financial automation will provide deeper insights into how governments can increase compliance and improve financial governance.

6.3. Limitations

While this study provides valuable insights, it has certain limitations that must be acknowledged. First, the study relies on secondary data from 2010 to 2022, which may not fully capture real-time governance challenges, policy changes, or short-term fluctuations in revenue collection. Future studies should incorporate primary data from surveys, expert

interviews, and case studies to complement the quantitative findings. Second, the research focuses solely on Ghana's local government frameworks, limiting the generalizability of the findings to other developing economies. While Ghana presents an interesting case, different governance structures, political dynamics, and levels of digital infrastructure in other countries may lead to varied outcomes. Comparative studies across multiple countries would provide broader insights into how digitalization impacts governance in different economic contexts.

6.4. Future Work

Future research should broaden the scope by conducting cross-country comparative studies to determine how digitalization's impact varies across different governance structures and political environments. Additionally, employing advanced econometric techniques such as panel data analysis and causal inference models will enhance the accuracy of findings. With the rise of blockchain and AI-driven audits, future studies should explore how emerging technologies improve financial transparency and tax compliance. Moreover, understanding citizen and business responses to digital taxation will offer valuable insights for policymakers. Finally, sector-specific analysis and long-term evaluations will help assess the sustainability of digital governance reforms in different public service areas.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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