

Impact of adopting digital forensic accounting tools in monitoring local government council expenditure: Evidence from three local governments in Bauchi State

Zakari Bio Usman¹; Mohammed Yakubu² & Nathaniel Saleh Magit³

¹Department of Accounting Education, Kwara State University of Education, Ilorin Kwara State, Nigeria; usman.zb@kwasued.edu.ng; +234 8136593091

²Department of Accounting, Federal University of Kashare, Gombe State, Nigeria; mohayak98@gmail.com; +234 8133450957

³Department of Accounting, University of Jos, Jos Plateau State, Nigeria; salahnathaniel@gmail.com; +234 8138303410

Corresponding author: usman.zb@kwasued.edu.ng

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Abstract

Fraud remains a persistent global challenge with serious implications for economic stability, particularly in developing countries such as Nigeria where its impact is more pronounced. Prior studies emphasize the importance of forensic accounting in preventing, detecting, and investigating fraud. This study therefore examines the effect of Digital Forensic Accounting Tools (DFATs) on expenditure monitoring in Local Government Areas (LGAs) in Bauchi State, Nigeria, addressing issues of financial mismanagement, weak accountability, and limitations of traditional auditing.

A survey design was adopted, with primary data collected from 120 accounting and finance personnel across selected LGAs. Data were analyzed using descriptive statistics and regression techniques. Findings indicate that DFAT adoption significantly improves transparency and strengthens financial oversight.

The study recommends integrating DFATs through staff training, digitalization of financial records, and deployment of advanced fraud detection systems. It further stresses the need for standardized policies and effective monitoring frameworks to curb irregularities, concluding that DFATs enhance accountability while future research should examine cost-effectiveness and implementation challenges.

Keywords: Digital Forensic Accounting Tools, Local Government Areas, Expenditure Monitoring, Fraud Detection, Accountability

Introduction

Fraud is widely recognized as an ancient and persistent phenomenon that predates modern accounting systems. It emerged as early as the inception of trade and has continued to evolve alongside economic activities. Scholars argue that fraud has existed for as long as record-keeping itself, suggesting that the development of accounting was partly motivated by the need to control deception and misappropriation (John, 2013). In contemporary times, fraud and financial mismanagement remain critical challenges in Nigeria's public sector, particularly at the local government level, where internal control mechanisms are often weak. The increasing sophistication of financial crimes has rendered traditional auditing methods inadequate for effective monitoring of public expenditure (Afrogha et al., 2025).

Local Government Areas (LGAs) in Nigeria have repeatedly experienced issues such as misappropriation of funds, weak internal controls, and unauthorized expenditures, raising serious concerns about transparency and accountability (Okafor, Odogu, & Zibaghafa, 2025; JISEM, 2025). Traditional auditing methods, which are largely manual and paper-based, are increasingly ineffective in detecting modern financial irregularities involving electronic transactions, digital records, and complex payment systems (Okoye & Gbegi, 2025).

In response to these challenges, Digital Forensic Accounting Tools (DFATs), or more broadly, forensic accounting techniques enhanced by digital analytics, have become indispensable for analyzing financial data, detecting anomalies, and assessing the integrity of electronic financial records (Afrogha, Onmonya, & Bukola, 2025; FJPAM, 2025). Forensic accounting integrates accounting, auditing, and investigative skills, often utilizing data analytics software, computer forensic techniques, and anomaly detection algorithms to uncover fraud, embezzlement, and financial misreporting (Okafor et al., 2025; JISEM, 2025).

Empirical evidence supports the effectiveness of forensic accounting in enhancing fraud detection and prevention within Nigeria's public sector (Okafor et al., 2025; RSIS International, 2025). For instance, Afrogha et al. (2025) found that reinforcing internal control systems with forensic tools, including computer forensics, significantly improves the detection of digital financial crimes. Similarly, survey-based research across key government institutions—such as Ministries of Finance, Treasury Departments, Procurement Units, Internal Audit Units, and Offices of the Auditor-General—revealed that forensic accounting techniques substantially reduce fraudulent practices compared to reliance on traditional auditing methods (RSIS International, 2025).

The local government system in Nigeria is characterized by widespread governance and performance deficiencies. Evidence from the Nigerian Local Government Integrity Index (NLGII), produced by the Centre for Fiscal Transparency and Public Integrity, indicates that 751 out of 774 LGAs exhibit weak fiscal transparency and accountability, while approximately 85% fall within “very high” or “critical” corruption-risk categories (CeFTPI, 2025). This structural weakness underscores the urgent need for innovative financial monitoring mechanisms, such as DFATs, at the grassroots level.

Despite the recognized benefits, the adoption of DFATs (and forensic accounting techniques more broadly) remains low across many Nigerian LGAs, particularly in northern states such as Bauchi State. The implementation of digital auditing systems is constrained by several factors, including limited skilled manpower, inadequate forensic infrastructure, resistance to transparency by entrenched interests, and weak institutional frameworks (JISEM, 2025; Okoye & Gbegi, 2025).

In Bauchi State, the integration of DFATs into local government financial systems has the potential to significantly enhance expenditure monitoring. Such integration can facilitate the detection of anomalous transactions, prevent the misappropriation of funds, provide reliable audit trails for electronic payments, and ultimately improve accountability and public trust at the grassroots level (FJPAM, 2025; Okafor et al., 2025).

Local Government Areas (LGAs) in Nigeria play a critical role in grassroots development and public financial management; however, they continue to face persistent challenges, including fund misappropriation, weak internal control systems, and lack of transparency (Okafor, Odogu, & Zibaghafa, 2025; JISEM, 2025). In Bauchi State, issues such as financial leakages, irregularities, and poor audit trails persist despite statutory allocations, largely due to the limitations of manual and traditional auditing methods, which are ineffective in detecting complex, technology-driven financial crimes (Okoye & Gbegi, 2025).

Digital Forensic Accounting Tools (DFATs) and related forensic accounting techniques have demonstrated effectiveness in detecting and preventing fraud through digital analytics, investigative algorithms, and data-driven auditing approaches. Empirical studies indicate that strengthening internal control systems with DFATs significantly enhances the detection of financial anomalies and reduces fraudulent activities (Afrogha, Onmonya, & Bukola, 2025; RSIS International, 2025).

Notwithstanding ongoing financial reforms aimed at improving local government autonomy, financial mismanagement persists in Bauchi State, undermining accountability, public trust, and service delivery. Reform initiatives have advocated for constitutional and legal adjustments to enable direct financial transfers to local governments, thereby restoring fiscal autonomy and reducing state-level interference (Aliyu et al., 2025). However, misappropriation of funds continues to occur even in the presence of traditional auditing systems, which have proven inadequate in identifying complex fraud schemes and producing reliable audit reports.

Against this backdrop, this study examines the impact of adopting Digital Forensic Accounting Tools as a mechanism for monitoring government expenditure in Local Government Areas in Bauchi State, Nigeria. The study specifically seeks to examine the impact of DFAT adoption in Local Government Areas in Bauchi State, assess its effect on the monitoring of Local Government expenditure, and provide policy recommendations for improving expenditure monitoring. In line with these objectives, the study addresses the following questions: What is the impact of adopting Digital Forensic Accounting Tools in Local Government Areas in Bauchi State? What is the effect of DFAT adoption on the monitoring of Local Government expenditure in Bauchi State? How does the adoption of Digital Forensic Accounting Tools enhance transparency and accountability in Local Government expenditure?

Literature Review

Digital forensic accounting involves the acquisition, analysis, preservation, and interpretation of digital financial data for investigative and audit purposes (Smith & Jones, 2019). Digital Forensic Accounting Tools (DFATs) include applications such as ACL, IDEA, EnCase, FTK, and other data mining tools designed to analyze complete datasets, detect anomalies, and enhance audit trails. Compared to traditional auditing approaches, these tools enable full-population testing, real-time analytics, and more robust fraud detection mechanisms, thereby improving the reliability and integrity of financial reporting systems.

The conceptual foundation of this study is based on the relationship between DFAT adoption and expenditure monitoring effectiveness in Local Government Areas (LGAs). DFAT adoption is treated as the independent variable, while expenditure monitoring effectiveness constitutes the dependent variable (Okafor, Odogu, & Zibaghafa, 2025; JISEM, 2025). Operationally, DFAT adoption encompasses the utilization of computer-assisted audit techniques (CAATs), spreadsheet-based analytics, data mining applications, and advanced forensic

software such as IDEA and EnCase. These tools facilitate comprehensive financial data analysis, anomaly detection, audit trail reconstruction, and improved fraud investigation processes.

The framework incorporates ICT infrastructure and staff technical capacity as moderating variables. ICT infrastructure includes access to functional computer systems, reliable internet connectivity, digital payment platforms, and licensed forensic software, while staff technical capacity comprises digital literacy, forensic accounting expertise, professional training, and experience. These moderating variables influence both the extent of DFAT adoption and its effectiveness in monitoring public expenditure (Okafor et al., 2025; TheStar, 2025). Consequently, DFAT adoption is expected to exert a positive and significant effect on expenditure monitoring effectiveness, while ICT infrastructure and staff capacity strengthen this relationship. Expenditure monitoring effectiveness is reflected in enhanced accuracy, timeliness, transparency, compliance, and fraud detection, thereby reducing financial leakages and improving accountability in local government financial management.

Theoretically, this study integrates the Fraud Triangle Theory, Agency Theory, and Institutional Theory to provide a comprehensive explanation of fraud control and financial accountability in the public sector. The Fraud Triangle Theory posits that fraud occurs when pressure, opportunity, and rationalization coexist (Cressey, 1953, as cited in Al-Natour et al., 2023; Tobin, 2023). Within this context, DFATs function as control mechanisms that reduce opportunities for fraud by strengthening detection capabilities and increasing the likelihood of exposure.

Agency Theory further explains the relationship between public officials (agents) and citizens (principals), emphasizing information asymmetry and moral hazard as key drivers of financial mismanagement. In the absence of effective monitoring systems, agents may engage in opportunistic behavior that undermines accountability. DFATs reduce information asymmetry by improving transparency, enhancing audit quality, and enabling real-time monitoring of financial transactions, thereby aligning the interests of agents with those of principals.

Institutional Theory complements this perspective by emphasizing the role of organizational structures, norms, and regulatory frameworks in shaping the adoption of innovations such as DFATs. According to this theory, the adoption of

digital forensic accounting practices is influenced by coercive pressures (regulatory requirements), normative pressures (professional standards), and mimetic pressures (benchmarking against best practices). In the context of Nigerian LGAs, weak institutional frameworks and resistance to change may hinder the adoption of DFATs, despite their proven benefits.

Empirical literature provides substantial evidence supporting the effectiveness of digital forensic accounting in improving fraud detection and accountability in the public sector. Musa and Garba (2022) found that Computer-Assisted Audit Techniques (CAATs) significantly enhance fraud detection and reduce audit delays in Northern Nigeria using survey data and regression analysis. Ibrahim and Abdullahi (2023) further demonstrated that DFAT adoption strengthens internal control systems, particularly in organizations with adequate ICT infrastructure. Similarly, Oyeniyi and Salihu (2023) reported that LGAs with higher digital capacity exhibit better compliance with financial regulations, highlighting the importance of technological readiness.

Recent empirical studies (2024–2025) reinforce these findings. Vutumu et al. (2025) established that forensic accounting, when integrated with strong internal control systems, significantly improves fraud prevention in Nigeria's public sector, although challenges related to risk assessment and communication persist. Ezejiofor and Okonkwo (2025) also found a significant relationship between forensic accounting adoption and the reduction of fraudulent activities, emphasizing the importance of institutionalizing forensic accounting practices.

Afrogha, Onmonya, and Bukola (2025) demonstrated that forensic accounting practices—including computer forensics, investigative accounting, and litigation support—play a critical role in fraud detection and prevention. Supporting this, Ogalluzor and Neekabolu (2025) reported a strong positive relationship between forensic accounting and fraud mitigation in Nigerian public sector organizations, while Eguono and Yusuf (2025) confirmed that litigation support services enhance the detection of corruption.

Global evidence further strengthens the argument for DFAT adoption. Guellim et al. (2024) highlighted the increasing relevance of forensic accounting in promoting transparency, strengthening governance, and supporting regulatory enforcement across both public and private sectors. In addition, Ibrahim and Adem (2025) found that integrating artificial intelligence into digital forensic accounting significantly enhances analytical capabilities and improves fraud detection efficiency in complex financial environments.

Other empirical contributions remain consistent with these findings. Inuwa et al. (2025) found that real-time forensic analytics significantly improve financial crime detection, while Kabara and Aliyu (2025) demonstrated that big data analytics enhances fraud detection accuracy and reduces financial irregularities. Chika et al. (2026), using a mixed-methods approach, confirmed that digital forensic technologies significantly improve transparency and accountability in government institutions.

At the local government level, Bala and Mohammed (2024) observed that DFATs are increasingly essential for monitoring local council expenditures, although their effectiveness is constrained by limited financial and infrastructural capacity. Danjuma and Yusuf (2025) further reported that digital analytics tools significantly improve the accuracy of budget monitoring and forensic investigations, thereby enhancing the reliability of financial reporting.

Overall, the empirical literature indicates that while awareness and adoption of DFATs are increasing among Nigerian LGAs, their effectiveness depends largely on ICT infrastructure availability, staff technical competence, and institutional commitment. The reviewed studies consistently demonstrate that DFAT adoption enhances fraud detection, strengthens internal control systems, and improves financial transparency. However, significant gaps remain in the level of adoption and contextual application at the grassroots level, particularly in states such as Bauchi. These gaps provide a strong justification for further empirical investigation into the impact of Digital Forensic Accounting Tools on expenditure monitoring in Local Government Areas in Bauchi State, Nigeria.

Methodology

Research Design

This study adopts a survey research design to examine the impact of Digital Forensic Accounting Tools (DFATs) on expenditure monitoring in selected Local Government Areas (LGAs) in Bauchi State, Nigeria. The survey design is appropriate because it enables the collection of both quantitative and qualitative data from financial officers, thereby supporting a comprehensive and robust analysis of relationships among the study variables (Creswell, 2023).

Population and Sampling

The population comprises accounting officers, internal auditors, and treasury staff across Dass, Toro, and Ganjuwa LGAs. A purposive sampling technique was employed to select 120 respondents with direct responsibilities for financial

management and reporting. This approach ensures that respondents possess adequate knowledge and practical experience relevant to DFAT adoption and expenditure monitoring, thereby enhancing the reliability and validity of the study.

Data Collection Instruments

Data were collected using both quantitative and qualitative instruments. A structured questionnaire based on a 5-point Likert scale was used to measure DFAT adoption, fraud detection effectiveness, accountability mechanisms, and expenditure monitoring. In addition, semi-structured key informant interviews were conducted with treasurers, auditors, and budget officers to obtain in-depth insights into DFAT implementation, effectiveness, and operational challenges.

Variables and Measurement

The variables in this study are operationalized to reflect the multidimensional nature of financial management systems. The independent variable is Digital Forensic Accounting Tools (DFAT) adoption, which is measured by the availability, frequency of use, and extent of application of tools such as Audit Command Language (ACL), Computer-Assisted Audit Techniques (CAATs), and data mining software. The dependent variable is expenditure monitoring (EXP_MON), measured using indicators such as timeliness, accuracy, transparency, and fraud detection rate. Fraud detection effectiveness (FD) and accountability mechanisms (ACC) are included as mediating variables to capture the indirect pathways through which DFAT adoption influences expenditure monitoring.

Validity and Reliability of Instruments

To ensure the accuracy and consistency of the measurement instruments, both reliability and validity tests were conducted. Internal consistency was assessed using Cronbach's alpha coefficient, with a threshold of 0.70 considered acceptable (Hair et al., 2019). Construct validity was evaluated using Confirmatory Factor Analysis (CFA), where factor loadings of 0.50 and above were deemed satisfactory. Convergent validity was assessed using Average Variance Extracted (AVE), with values of 0.50 or higher indicating adequacy, and Composite Reliability (CR), with a minimum acceptable value of 0.70. Discriminant validity was established where the square root of AVE for each construct exceeded its correlations with other constructs, in line with the Fornell and Larcker (1981) criterion.

Data Analysis Techniques

Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. The analysis involved descriptive statistics, including means and standard deviations, Pearson correlation analysis, and multiple regression analysis to test the relationships among variables. To ensure

the robustness of the regression results, several diagnostic tests were conducted. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with values below 10 indicating no serious multicollinearity concerns. Heteroskedasticity was examined using the Breusch–Pagan test, while normality was evaluated using skewness and kurtosis statistics. Linearity and independence of errors were assessed using residual plots and the Durbin–Watson statistic, respectively.

Qualitative data obtained from interviews were analyzed using thematic analysis to identify recurring patterns and contextual insights that complement the quantitative findings. The conceptual model (Figure 1) illustrates the hypothesized relationships among the variables. DFAT adoption is expected to exert a direct effect on expenditure monitoring, while fraud detection effectiveness and accountability mechanisms serve as mediating variables. The framework highlights a synergistic interaction among technological tools, internal control systems, and governance mechanisms in enhancing financial management efficiency and effectiveness in LGAs.

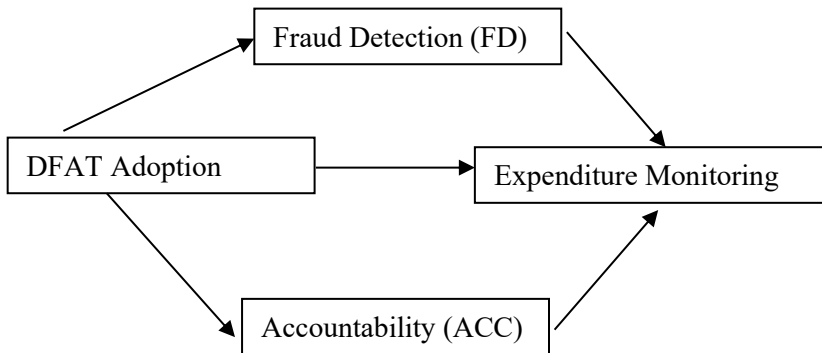


Figure 1: Conceptual Model of the Study

Source: Authors Computation (2025)

Mediation Analysis

The mediating roles of fraud detection effectiveness (FD) and accountability mechanisms (ACC) were examined using a bootstrapping approach in line with the procedure recommended by Preacher and Hayes (2008). This method allows for the estimation of indirect effects and their statistical significance. The analysis involved estimating the direct effect of DFAT on expenditure monitoring as well as the indirect effects transmitted through FD and ACC. Mediation is considered significant when the bias-corrected confidence interval for the indirect effect does not include zero.

| Variable | Mean | Std. Dev. | Min | Max | Cronbach's α |
|----------------------------------|------|-----------|------|------|---------------------|
| DFAT Adoption | 3.90 | 0.68 | 2.00 | 5.00 | 0.82 |
| Fraud Detection (FD) | 3.50 | 0.72 | 2.00 | 5.00 | 0.79 |
| Accountability (ACC) | 3.70 | 0.65 | 2.00 | 5.00 | 0.78 |
| Expenditure Monitoring (EXP_MON) | 4.10 | 0.60 | 2.50 | 5.00 | 0.81 |

Correlation Analysis

The Pearson correlation matrix in Table 2 indicates that DFAT adoption is positively and significantly associated with expenditure monitoring ($r = 0.62$, $p < .01$), fraud detection ($r = 0.58$, $p < .01$), and accountability ($r = 0.55$, $p < .01$). In addition, fraud detection and accountability are positively correlated with expenditure monitoring ($r = 0.60$ and $r = 0.57$, respectively, $p < .01$).

These results suggest strong linear relationships among the variables and provide preliminary empirical support for the hypothesized associations, including the likelihood of mediation effects.

Table 2:
Pearson Correlation Matrix

| Variable | DFAT | FD | ACC | EXP_MON |
|----------|--------|--------|--------|---------|
| DFAT | 1.00 | 0.58** | 0.55** | 0.62** |
| FD | 0.58** | 1.00 | 0.52** | 0.60** |
| ACC | 0.55** | 0.52** | 1.00 | 0.57** |
| EXP_MON | 0.62** | 0.60** | 0.57** | 1.00 |

*Note: * $p < .01$. Source: Author's computation (2026).

Regression Results and Hypotheses Testing

The regression model summary presented in Table 3 shows that the model explains a substantial proportion of the variance in expenditure monitoring, with $R^2 = 0.62$ and adjusted $R^2 = 0.60$. The model is statistically significant, $F(3, 116) = 63.42$, $p < .001$, indicating that the explanatory variables jointly predict expenditure monitoring.

Table 3
Model Summary for Expenditure Monitoring

| Model | R | R² | Adjusted R² | Std. Error |
|-----------------|----------|----------------------|-------------------------------|-------------------|
| DFAT + FD + ACC | 0.79 | 0.62 | 0.60 | 0.38 |

Source: Author's computation (2026).

The regression coefficients reported in Table 4 reveal that DFAT adoption has a positive and statistically significant effect on expenditure monitoring ($\beta = 0.41$, $t = 5.12$, $p < .01$). Fraud detection also exerts a positive and significant influence ($\beta = 0.35$, $t = 3.89$, $p < .05$), while accountability similarly demonstrates a positive and significant effect ($\beta = 0.30$, $t = 3.00$, $p < .05$).

Table 4:

Regression Coefficients for Expenditure Monitoring

| Predictor | B | Std. Error | β | T | P |
|----------------------|----------|-------------------|---------------------------|----------|----------|
| Constant | 1.02 | 0.30 | — | 3.40 | < .01 |
| DFAT Adoption | 0.41 | 0.08 | 0.45 | 5.12 | < .01 |
| Fraud Detection (FD) | 0.35 | 0.09 | 0.38 | 3.89 | < .05 |
| Accountability (ACC) | 0.30 | 0.10 | 0.32 | 3.00 | < .05 |

Source: Author's computation (2026).

The hypothesis testing results indicate that DFAT adoption significantly influences expenditure monitoring, thereby supporting the first hypothesis. The positive and significant correlations between DFAT adoption and both fraud detection and accountability provide support for the second and third hypotheses. Furthermore, the regression results confirm that fraud detection and accountability significantly influence expenditure monitoring, supporting the fourth and fifth hypotheses. The inclusion of fraud detection and accountability in the regression model reduces the direct effect of DFAT adoption, indicating partial mediation and supporting the sixth hypothesis.

Discussion of Findings

The findings of this study demonstrate that the adoption of Digital Forensic Accounting Tools significantly enhances expenditure monitoring in Local Government Areas in Bauchi State. This result is consistent with prior empirical studies (Musa & Garba, 2022; Ibrahim & Abdullahi, 2023), which emphasize the role of digital audit tools such as Audit Command Language, Computer-Assisted Audit Techniques, and data mining technologies in improving financial transparency, accuracy, and timeliness.

The strong positive relationship between DFAT adoption and expenditure monitoring confirms that technological innovations play a critical role in strengthening public sector financial management. These tools enable efficient data analysis, improve audit processes, and reduce opportunities for financial irregularities.

The results further reveal that fraud detection and accountability mechanisms partially mediate the relationship between DFAT adoption and expenditure monitoring. This finding suggests that the effectiveness of DFATs is enhanced when complemented by strong internal control systems and governance frameworks. This supports the argument that technological adoption alone is insufficient without institutional support structures.

The regression model explains 62 percent of the variation in expenditure monitoring, indicating strong explanatory power. However, the remaining unexplained variance suggests that additional factors such as organizational culture, staff competence, and technological infrastructure may also influence financial monitoring outcomes.

Finally, the observed variability across LGAs highlights the importance of contextual factors such as training, management support, and resource availability. These findings imply that policymakers and local government administrators should adopt a comprehensive approach that combines investment in digital forensic tools with capacity development and institutional strengthening to achieve optimal results.

Conclusion and Recommendations

Conclusion

This study investigated the effect of Digital Forensic Accounting Tools (DFATs) on expenditure monitoring within selected Local Government Areas (LGAs) in Bauchi State, Nigeria. The empirical evidence indicates that the adoption of DFATs plays a critical role in strengthening expenditure monitoring by improving the accuracy, timeliness, and transparency of financial oversight processes.

The findings further reveal that fraud detection effectiveness and accountability mechanisms act as significant transmission channels through which DFATs influence expenditure monitoring. Although DFAT adoption exerts a direct positive effect, its overall impact is considerably enhanced when embedded within strong internal control systems and governance frameworks. This

underscores the need for an integrated approach that combines technological innovation with institutional strengthening.

In addition, the explanatory power of the regression model highlights the combined importance of digital tools, fraud detection systems, and accountability structures in improving financial management practices in the public sector. By providing empirical evidence from a developing economy, the study advances existing knowledge on digital transformation and forensic accounting in government institutions.

Policy Implications and Recommendations

The results of this study offer several practical implications for policymakers and public sector administrators. There is a clear justification for expanding investment in DFATs across LGAs. Priority should be given to the deployment of advanced audit technologies such as Audit Command Language (ACL), Computer-Assisted Audit Techniques (CAATs), and data analytics platforms to improve financial monitoring capabilities.

Equally important is the reinforcement of institutional mechanisms that support fraud detection and accountability. Strengthening internal audit systems, improving financial reporting transparency, and ensuring strict compliance with regulatory standards will enhance the effectiveness of DFAT implementation. The findings suggest that technological tools yield optimal outcomes when supported by robust governance structures.

Capacity development also remains essential. Continuous professional training should be provided to accounting personnel, auditors, and treasury staff to enhance their proficiency in the use of digital forensic tools. Furthermore, promoting transparency through regular audits, performance assessments, and digital governance initiatives will contribute to improved public financial management.

At the strategic level, state governments should establish standardized frameworks for DFAT implementation across LGAs and introduce monitoring and evaluation mechanisms to assess performance and ensure accountability. Strengthening collaboration among government institutions, professional bodies, and technology providers will further facilitate the adoption of innovative financial management practices.

Limitations and Future Research Directions

While this study makes important contributions, certain limitations should be acknowledged. The focus on selected LGAs in Bauchi State may limit the generalizability of the findings beyond the study area. Future research could extend the analysis to other states or adopt a comparative approach across different regions or countries.

Another limitation relates to the use of self-reported data obtained through questionnaires and interviews, which may introduce response bias. Subsequent studies could incorporate objective financial records or adopt mixed-method approaches to enhance data validity.

Although the model explains a considerable proportion of the variation in expenditure monitoring, other potentially relevant factors—such as organizational culture, political influence, technological infrastructure, and workforce competence—were not explicitly included. Future studies should consider these variables to achieve a more comprehensive understanding of financial management effectiveness.

The cross-sectional design of the study also constrains the ability to draw causal inferences. Longitudinal research designs would provide deeper insights into the dynamic effects of DFAT adoption over time.

Finally, future research may employ more advanced analytical techniques, such as Structural Equation Modeling (SEM), to validate the mediating relationships identified and to explore more complex interactions among variables.

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