International Journal of Spectrum Research in Social & Management Sciences (IJSRSMS)
2(1), January-March, 2026, Pages 60-70

© Noble City Publishers ISSN: 3092-9547

https://doi.org/10.5281/zenodo.18604214

Effect of Forensic Accounting Techniques on Payroll Fraud Detection in Nigerian Federal Ministry of Finance and Agency

Dogo Emmanuel Luka[1] & Benjamin Uyagu Ph.D[2]

[1]Department of Auditing and Forensic Accounting, ANAN University Kwall, Plateau State
[2]Department of Auditing and Forensic Accounting, ANAN University Kwall, Plateau State,, **benmekus91@gmail.com**

ABSTRACT

This study examined the effect of forensic accounting techniques on payroll fraud detection in the Nigerian Federal Ministry of Finance and its agencies. A population of 173 staff was studied, and multiple regression analysis assessed the influence of five techniques data mining, document authentication, interview technique, ratio analysis, and payroll reconciliation on fraud detection. Findings showed that data mining had a positive but insignificant effect, indicating that its current use and technological advancement were insufficient for a statistically meaningful impact. Document authentication had a positive and significant effect, demonstrating that verifying employee records and payroll entries enhanced detection of ghost workers and unauthorized alterations. The interview technique also had a positive and significant effect, highlighting the value of structured investigative interviews in uncovering payroll irregularities. Ratio analysis exhibited a positive but insignificant effect, suggesting that analytical reviews alone were not strong enough to significantly influence fraud detection. Payroll reconciliation had a positive and significant effect, confirming that systematically comparing payroll records with personnel files and bank statements effectively identified duplicate payments and salary manipulations. The study recommended investing in advanced data mining tools, enhancing document authentication through biometric verification and centralized systems, providing regular training in interview techniques, integrating ratio analysis into automated dashboards, and institutionalizing automated payroll reconciliation supported by adequate staffing and technology to strengthen payroll integrity and minimize fraud across government agencies.

Keywords: Forensic Accounting Techniques, Payroll Fraud Detection, Data Mining, Document Authentication, Payroll Reconciliation, Public Sector Fraud

INTRODUCTION

Payroll fraud detection had become a critical pillar of accountability and transparency in public finance, targeting ghost workers, inflated salaries, duplicate payments, and unauthorized allowances that undermined fiscal stability and public trust (OECD, 2023). Governments had adopted measures such as biometric verification, automated payroll reconciliation, and cross-departmental audits to ensure salaries were paid only to legitimate employees (World Bank, 2023; ACFE, 2022). Evidence from Rwanda and the Philippines showed that robust payroll fraud detection strengthened fiscal discipline, governance, and supported sustainable development goals (IMF, 2022). Effective payroll control mechanisms were therefore essential to reduce financial leakages and promote integrity in resource allocation.

Across Africa, payroll fraud represented one of the most pervasive governance challenges, with ghost workers and unauthorized payments straining public finances (AfDB, 2023). Inflated payrolls reduced resources for essential services, but interventions such as biometric payroll audits in Kenya and Nigeria had eliminated fictitious employees and improved budget credibility (World Bank, 2023). These reforms enhanced transparency, increased administrative efficiency, and reinforced wage integrity, making payroll fraud detection a central part of anti-corruption and governance reforms (OECD, 2023; IMF, 2022).

In Nigeria, payroll fraud had historically weakened public sector credibility, with ghost workers and inflated salaries draining billions from government coffers (ICPC, 2023). To address these challenges, the Federal Government implemented the Integrated Payroll and Personnel Information System (IPPIS) to authenticate employees and eliminate fraudulent payments (BudgIT, 2022). The system had successfully removed tens

of thousands of ghost workers, resulting in significant savings and improved payroll accountability (Okoye & Ezejiofor, 2022). By ensuring only verified employees received remuneration, payroll fraud detection supported operational efficiency, reduced financial leakages, and reinforced anti-corruption efforts (EFCC, 2023).

Forensic accounting techniques played a key role in effective payroll fraud detection. Digital audits, data mining, ratio analysis, document authentication, payroll reconciliation, and financial statement analysis helped uncover irregularities in public fund management (ACFE, 2022; Owojori & Asaolu, 2023). These tools enabled the tracing of embezzlement, procurement fraud, and misappropriation while strengthening internal controls and supporting prosecutions (Omar et al., 2022; EFCC, 2023). By producing legally admissible audit trails and reports, forensic accounting enhanced transparency and accountability within payroll systems.

Among these techniques, data mining was particularly effective in detecting duplicate entries, salary anomalies, and ghost workers through clustering, classification, and predictive modeling (Omar et al., 2022). Document authentication verified appointment letters and identification documents, preventing fraudulent entries (Owojori & Asaolu, 2023). Ratio analysis allowed cost-effective benchmarking of payroll trends, while payroll reconciliation cross-checked HR, bank, and biometric data to identify unauthorized payments (EFCC, 2023). Together, these techniques provided an integrated framework for oversight, improving audit efficiency and preventing financial leakages.

Institutional actors were central to payroll fraud prevention in Nigeria. The Federal Ministry of Finance (FMF) formulated policies and coordinated budgets, while the Office of the Accountant-General of the Federation (OAGF) managed payroll systems and oversaw IPPIS implementation (Federal Ministry of Finance, 2023). Collaboration with anti-corruption agencies such as the EFCC and ICPC, which provided investigative and prosecutorial support, underscored the interdependence of policy, technology, and institutional oversight in reducing payroll irregularities (BudgIT, 2022; ICPC, 2023; EFCC, 2023).

Nigeria's legal and policy frameworks supported these efforts. The Fiscal Responsibility Act of 2007 promoted prudent fiscal management and medium-term budget alignment (Okorie & Agu, 2021; Adebisi & Gbegi, 2019), while the EFCC Act of 2004 empowered the EFCC to investigate and prosecute financial crimes, including payroll fraud (Adegbite & Nwankwo, 2020). Despite challenges such as institutional weaknesses and political interference (Eze & Onwuka, 2022), these frameworks remained central to accountability. Within this context, the study examined the effect of forensic accounting techniques on payroll fraud detection in the Federal Ministry of Finance, aiming to strengthen transparency, fiscal discipline, and governance.

Statement of the Problem

Payroll fraud had long affected Nigeria's Federal Ministry of Finance (FMF), with audits revealing systemic irregularities in salary administration. In 2011, over 45,000 ghost workers were identified, resulting in billions of naira in fraudulent wage claims (BudgIT, 2022), while the Auditor-General reported widespread duplicate payments and salary padding in 2016 (ICPC, 2023). More recent EFCC investigations showed that officials had manipulated the Integrated Payroll and Personnel Information System (IPPIS) to insert fictitious employees and divert salaries for personal gain (Okoye & Ezejiofor, 2022). These incidents demonstrated that despite payroll reforms, loopholes persisted, undermining fiscal responsibility and public accountability.

Such fraudulent activities had caused significant financial losses, reduced fiscal discipline, and weakened public trust. Globally, forensic accounting had proven effective in detecting and preventing financial crimes. However, its application specifically to payroll fraud within Nigeria's federal financial institutions remained underexplored. Prior studies (Okoye & Ezejiofor, 2022; Owojori & Asaolu, 2023) examined forensic accounting broadly in public institutions but did not focus on payroll fraud or isolate federal ministries, leaving a gap in understanding the practical impact of techniques such as data mining, document authentication, forensic interviews, ratio analysis, and payroll reconciliation.

Methodological limitations further weakened existing research. Many studies relied on descriptive surveys, small or non-representative samples, and limited analytical techniques, failing to measure actual fraud reduction outcomes (Omar et al., 2022; Emeji & Okoye, 2021). Theoretical frameworks, such as the fraud triangle or pentagon theory, were rarely applied, limiting explanatory power. Moreover, forensic accounting was often treated as a single construct, obscuring the distinct effects of individual techniques

(Ogbu & Okezie, 2020). Most research focused on broader public sectors or sub-national entities, neglecting federal institutions like the FMF, where bureaucratic complexity and technology-driven payroll systems such as IPPIS or TSA required specific analysis.

Given these gaps, this study examined the effect of individual forensic accounting techniques data mining, document authentication, forensic interviews, ratio analysis, and payroll reconciliation on payroll fraud detection in the FMF and its agencies, aiming to provide evidence-based recommendations for improving payroll governance, transparency, and fiscal accountability.

Based on the independent variables data mining, document authentication, forensic interview, ratio analysis, and payroll reconciliation and the dependent variable payroll fraud detection, the following null hypotheses were stated in null forms:

i. H_{01}: Data mining has no significant effect on payroll fraud detection in Nigerian Federal Ministry of Finance and its agency.
ii. H_{02}: Document authentication has no significant effect on payroll fraud detection in Nigerian Federal Ministry of Finance and its agency.
iii. H_{03}: Forensic interview techniques have no significant effect on payroll fraud detection in Nigerian Federal Ministry of Finance and its agency.
iv. H_{04}: Ratio analysis has no significant effect on payroll fraud detection in Nigerian Federal Ministry of Finance and its agency.
v. H_{05}: Payroll reconciliation has no significant effect on payroll fraud detection in Nigerian Federal Ministry of Finance and its agency.

LITERATURE REVIEW

This study reviewed key concepts central to understanding payroll fraud detection and the forensic accounting techniques employed to mitigate it, including data mining, document authentication, forensic interviews, ratio analysis, and payroll reconciliation. These concepts are interrelated and collectively form an integrated framework for identifying, preventing, and addressing payroll irregularities in public sector institutions. By examining these concepts in depth, the study highlights the practical and theoretical underpinnings of effective payroll fraud management, demonstrating how each component contributes to transparency, accountability, and fiscal discipline within government operations.

Payroll Fraud Detection has been defined as the systematic use of auditing, forensic analysis, and data analytics to uncover anomalies such as ghost workers, inflated salaries, duplicate payments, and unauthorized adjustments (Omar, Johari, & Azam, 2022). Within public sector organizations, this process ensures that salaries are disbursed only to legitimate employees, minimizes financial leakages, and strengthens accountability through mechanisms such as biometric verification, payroll reconciliation, and employee validation checks. Effective implementation not only promotes transparency but also supports broader financial reforms, although entrenched interests and bureaucratic inertia may resist such changes. Complementing this perspective, Okoye and Ezejiofor (2022) emphasized that payroll fraud detection involves systematically identifying deceptive practices in employee compensation through careful analysis of payroll records for inconsistencies. Early detection is crucial, as it prevents systemic fraud, enhances financial control, and reduces misappropriation risks. Both manual and automated verification processes improve operational efficiency and build trust in payroll systems, though poor integration between HR and finance systems may limit effectiveness. Together, these perspectives underscore the necessity of multi-layered and coordinated approaches to detecting and preventing payroll fraud.

Forensic Accounting Techniques serve as essential tools for addressing payroll fraud, providing both investigative and preventive capabilities. Okonkwo and Musa (2023) described these techniques as investigative procedures that integrate auditing, accounting, and legal skills to detect and reconstruct financial irregularities. Techniques such as data mining, ratio analysis, and forensic interviews are especially useful in government payroll systems, enabling early identification of irregularities and providing legally admissible evidence. Although technology enhances efficiency, the application of these techniques can be resource-intensive, particularly in developing countries where institutional capacity may be limited. Similarly, Owojori and Asaolu (2023) emphasized that forensic accounting techniques improve transparency, strengthen audits, support legal proceedings, and promote staff accountability. The effectiveness of these techniques depends on organizational cooperation, digital literacy, and the proper

integration of technologies such as biometric systems, digital recordkeeping, and automated payroll platforms, which collectively reinforce a culture of compliance and fiscal responsibility.

Data Mining complements forensic accounting techniques by extracting meaningful patterns from large datasets using statistical, machine learning, and artificial intelligence methods (Han, Pei, & Kamber, 2022). In the context of payroll fraud detection, data mining identifies irregular payment patterns through clustering, classification, and anomaly detection models. Witten, Frank, Hall, and Pal (2023) highlighted its predictive role, noting that it enables early detection of anomalous payroll transactions and supports proactive interventions. However, effective application requires domain expertise and skilled analysts capable of interpreting complex patterns, illustrating the need for targeted training and technological capacity-building within public institutions.

Document Authentication further strengthens payroll oversight by verifying the legitimacy of documents such as identity cards, salary slips, and employment letters. Omar, Johari, and Azam (2022) noted that techniques such as watermark detection, signature verification, and digital certification enhance confidence in payroll audits, support legal investigations, and reinforce internal controls. Okoye and Ezejiofor (2022) added that document authentication ensures only eligible personnel receive salaries and prevents insider fraud. Nevertheless, challenges such as inconsistent document standards, procedural loopholes, and human error may limit its effectiveness, emphasizing the importance of standardization and digitization of personnel records.

Forensic Interviews provide an additional investigative layer. According to Omar, Johari, and Azam (2022), these interviews involve structured, psychologically informed questioning to gather critical information from individuals involved in payroll processes, uncovering collusion, ghost workers, and unauthorized approvals. Okoye and Ezejiofor (2022) further highlighted that analyzing behavioral and non-verbal cues during interviews reveals intent, exposes procedural weaknesses, and guides deeper forensic audits. However, the effectiveness of forensic interviews depends on the honesty and cooperation of respondents, necessitating complementary use of other forensic techniques to ensure robust fraud detection.

Ratio Analysis allows investigators to quantitatively assess payroll trends and detect anomalies. Omar, Johari, and Azam (2022) explained that ratio analysis identifies overpayments, duplicate salaries, and unjustified payroll growth, providing actionable insights for management. Okoye and Ezejiofor (2022) noted that ratios such as payroll-to-total expenses or payroll-to-staff ratios support policy decisions, highlight gradual fraud, and inform strategic interventions. The reliability of ratio analysis depends on accurate historical data and proper contextual interpretation, emphasizing its role as a diagnostic, rather than stand-alone, tool within a broader forensic framework.

Finally, Payroll Reconciliation ensures alignment of payroll records with bank transfers, ledgers, and personnel databases, detecting unauthorized changes and confirming that active staff are appropriately compensated (Okoye & Ezejiofor, 2022). The ICPC (2023) emphasized its preventive role in controlling wage bill inflation, identifying ghost workers, and strengthening institutional checks. Although manual reconciliation remains a common practice, it is less efficient and may delay anomaly detection, highlighting the need for automation, integration with HR systems, and continuous monitoring to optimize outcomes.

Together, these concepts form a cohesive and integrated framework, demonstrating how forensic accounting techniques combine with payroll management practices to prevent, detect, and mitigate financial irregularities in public institutions. By linking analytical, technological, and procedural tools, public agencies can strengthen accountability, promote transparency, and ensure efficient utilization of government resources.

Empirical Reviews

Several empirical studies have investigated the effect of forensic accounting techniques on payroll fraud detection across public sector agencies. These studies collectively highlight the problem addressed, the methodology adopted, key findings, and recommendations for each independent variable, offering insights into effective fraud prevention strategies.

Data mining has been extensively examined as a tool for detecting payroll fraud. Adewale and Musa (2022) focused on payroll anomalies such as ghost workers and salary inflation within the Federal Ministry of Finance. Using a descriptive survey of 350 staff and multiple regression with cluster analysis,

they found that classification and clustering techniques effectively identified payroll outliers. The study recommended institutionalizing data mining but acknowledged limitations, including the exclusion of real-time fraud scenarios and integration with complementary techniques such as document authentication and payroll reconciliation. Building on this, Eze and Salami (2023) investigated predictive data mining over a 12-month quasi-experimental study involving 300 staff. They found significant reductions in payroll fraud where predictive tools were applied and highlighted the need for staff training in analytics. However, the study did not assess cost-effectiveness or combine predictive tools with ratio analysis or reconciliation processes, indicating gaps in comprehensive fraud detection strategies.

Document authentication has also been identified as critical for payroll integrity. Adegoke (2022) examined electronic document authentication among 380 payroll staff, finding significant reductions in ghost workers and salary duplication through biometric verification. Yet, the study relied solely on self-reported data and did not integrate complementary techniques like data mining or payroll reconciliation. Similarly, Ibrahim and Eze (2021) analyzed automated document verification with 300 staff using correlation and regression, reporting substantial fraud reduction and recommending full digitization. Nonetheless, the lack of qualitative triangulation and exclusion of forensic interviews or ratio analysis limited the study's insights into collusion and salary manipulation.

Forensic interviews have been emphasized as another key technique. Adeyemi and Hassan (2022) reported significant improvements in detecting ghost workers and unauthorized salary approvals through structured quarterly interviews with 300 staff. However, reliance on self-reported data and lack of integration with other techniques constrained the comprehensiveness of the findings. Okonkwo and Musa (2023) extended this perspective through a case study of 50 forensic audit cases across five departments, demonstrating that interviews revealed falsified records and salary duplications. While embedding interviews in audit protocols was recommended, the study's small sample and narrow scope limited generalizability across the Ministry.

Payroll reconciliation further complements these techniques in detecting irregular payments. Adegbite and Musa (2022) examined reconciliation processes among 300 staff, showing that automated cross-checking of payroll registers with HR databases effectively identified ghost workers and irregular salaries. They recommended adopting automated tools but noted the study did not assess long-term sustainability. Okon and Ibrahim (2023) highlighted the importance of regular reconciliation, finding that monthly reconciliations among 280 staff reduced duplicate payments more effectively than quarterly checks. They recommended institutionalizing monthly reconciliation, though the study lacked qualitative insights into operational challenges and staff resistance.

Collectively, these studies underscore that while individual forensic accounting techniques are effective, integrating data mining, document authentication, forensic interviews, ratio analysis, and payroll reconciliation offers a more robust and comprehensive framework for payroll fraud detection in federal institutions.

Theoretical Reviews

This study is anchored on the Fraud Pentagon Theory, which extends the traditional Fraud Triangle and Diamond models by incorporating two additional elements: arrogance and competence (Crowe LLP, 2011). The theory posits that fraud occurs when all five conditions pressure, opportunity, rationalization, competence, and arrogance are present, highlighting the interplay between individual traits and organizational vulnerabilities. In Nigerian federal institutions, fragmented payroll systems create conditions where these elements can converge, facilitating fraudulent activities.

The theory provides a practical framework for applying forensic accounting techniques. Data mining addresses opportunity and competence by exposing manipulations such as ghost employees or falsified salaries. Document authentication counters opportunity and arrogance by verifying records and detecting forgeries. Forensic interviews target rationalization and arrogance, revealing justifications and attitudes that enable fraud. Ratio analysis identifies anomalies linked to pressure and competence, such as unusual payroll-to-staff ratios. Finally, payroll reconciliation mitigates opportunity and limits competence by cross-checking payroll entries with HR and bank records.

Overall, the Fraud Pentagon Theory offers a holistic approach to understanding payroll fraud, demonstrating how internal motivations, organizational weaknesses, and individual traits interact. Integrating this theoretical framework with forensic accounting techniques enables institutions such as the

Federal Ministry of Finance to enhance both detection and prevention of payroll fraud. However, reliance on behavioral assumptions and the difficulty of quantifying factors such as arrogance and rationalization remain limitations, particularly in complex bureaucratic settings where multiple actors and technologies interact.

RESEARCH METHOD

The study adopted a survey research design and the population of the study comprised one hundred and seventy-three (173) accountants and auditors working in the Federal Ministry of Finance and the Office of the Accountant General of the Federation (OAGF), Nigeria. The choice of these institutions is based on the nature of the study which focuses on payroll fraud detection, as these ministries and agencies are primarily responsible for payroll administration, financial reporting, and public sector financial control.

Table 3.1 Population of the Study

S/NO	Federal Ministry/Agency	Total
1	Federal Ministry of Finance	91
2	Office of the Accountant General	82
	Total	173

Source: Administration Units of Federal Ministry of Finance and OAGF, 2025.

The population of the study was 173 and the study adopted a census approach where the entire population also served as the sample size. A structured questionnaire of 27 items (covering forensic accounting techniques and payroll fraud detection) was used to collect data. The reliability test results of the independent and dependent variables using Cronbach's Alpha were all above the benchmark of 0.70, indicating that the instrument was reliable.

A modified five-point Likert scale of *Strongly Disagree, Disagree, Undecided, Agree and Strongly Agree* was used and awarded scores ranging from 1 to 5 respectively. The data collected were analyzed using different statistical procedures. The null hypotheses were tested using multiple regression analysis with the aid of SPSS (Version 23) to determine the strength of the relationship between payroll fraud detection as the dependent variable and forensic accounting techniques as the independent variables of the study. The functional relationship is stated as:

PAFD = DTMI + DCAU+ INTQ +RATA +PARR + U,……..(1)

The econometric model is specified as:

$PAFDi_t=\beta0 + \beta1DTMIi_t + \beta2DCAUi_t + \beta3INTQi_t + \beta4RATAi_t + \beta5PARRi_t + Ui_t$,…….(2)

Where,

PAFD=Payroll fraud detection
DTMI= Data mining
DCAU= Document authentication
INTQ = Interview technique
RATA = Ratio analysis
PARR = Payroll Reconciliation

βo is the intercept while β1-5 is the coefficient of the independent variables while U=error term.

RESULTS AND DISCUSSION

This section presented the results and analysis of the study based on the 159 copies of questionnaire that were returned out of the 173 copies administered.

Descriptive Statistics

The descriptive results indicate that payroll fraud detection practices are perceived as generally effective within the ministry, as reflected by a high mean score (4.13) and relatively low variability in responses, suggesting broad agreement among respondents. Similarly, data mining recorded a high mean (3.96) with low dispersion, implying that it is widely recognized as a commonly used and effective technique for identifying payroll irregularities. In the same vein, document authentication also showed a high mean (3.96) and low standard deviation, indicating that respondents consistently acknowledge the importance of verifying employment records, vouchers, and attendance registers in detecting payroll discrepancies.

Table 4.1 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Payroll fraud detection	159	2.00	5.00	4.1258	.64260
Data mining	159	2.60	5.00	3.9623	.54525
Document authentication	159	2.60	5.00	3.9648	.57260
Interview technique	159	2.00	5.00	3.8881	.81243
Ratio analysis	159	2.40	5.00	4.1912	.61597
Payroll Reconciliation	159	2.80	5.00	4.4025	.39618

Source: SPSS 23 (2026)

Furthermore, interview techniques recorded a moderately high mean (3.89), suggesting that respondents generally agree on their usefulness in uncovering payroll fraud; however, the higher variability in responses reflects differences in experience and application of interview methods across departments. In contrast, ratio analysis recorded a higher mean (4.19) with fairly consistent responses, showing strong agreement that analytical reviews and financial ratios are valuable tools for identifying payroll anomalies. Notably, payroll reconciliation recorded the highest mean (4.40) and the lowest standard deviation, indicating overwhelming consensus that reconciling payroll records with attendance data, bank schedules, and personnel files is the most effective and consistently applied technique for detecting payroll fraud within the ministry.

Multi-collinearity Test Results

Table 4.2 presents the results of the multi-collinearity test conducted on the independent variables in the study. Multi-collinearity occurs when two or more independent variables are highly correlated, which can distort the results of regression analysis and reduce the reliability of the estimates. In this study, data mining recorded a Variance Inflation Factor (VIF) of 0.982 and a tolerance value of 1.019, indicating no significant correlation with the other variables. Document

Table 4.2 *Multi-collinearity Test Results*

VARIABLES	VIF	1/VIF
Data mining	.982	1.019
Document authentication	.558	1.791
Interview technique	.669	1.494
Ratio analysis	.612	1.635
Payroll Reconciliation	.752	1.330
MEAN	0.7146	1.4538

Source: SPSS 23 Outputs (2026)

Authentication had a VIF of 0.558 and a tolerance of 1.791, confirming that it is statistically independent and does not overlap with other predictors. Similarly, interview technique showed a VIF of 0.669 with a tolerance of 1.494, ratio analysis had a VIF of 0.612 and tolerance of 1.635, and payroll reconciliation recorded a VIF of 0.752 and tolerance of 1.330. The mean VIF of 0.715 and mean tolerance of 1.454 across all variables further reinforce the absence of multi-collinearity. These findings indicate that all the independent variables are distinct and contribute uniquely to explaining variations in payroll fraud detection, thereby supporting the validity and reliability of the subsequent regression analysis.

Pearson Correlation Analysis

Table 4.3 presented the Pearson correlation matrix showing the relationships between forensic accounting techniques and payroll fraud detection in the Nigerian Federal Ministry of Finance and its agencies. Payroll fraud detection, as the dependent variable, had a self-correlation of 1.000, while interpretation focused on its relationships with the independent variables. The results indicated varying degrees of association between each technique and payroll fraud detection, reflecting their relative contributions to identifying payroll-related fraud within the institutions.

Table 4.3 ***Pearson Correlation Matrix of Independent variables***

	Payroll fraud detection	Data mining	Document authentication	Interview technique	Ratio analysis	Payroll Reconciliation
Payroll fraud detection	1.000					
Data mining	.021	1.000				
Document authentication	.636**	.043	1.000			
Interview technique	.440**	.037	.441**	1.000		
Ratio analysis	.434**	.020	.561**	.463**	1.000	
Payroll Reconciliation	.598**	.101	.526**	.298**	.273**	1.000

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

Data mining showed a very weak positive correlation with payroll fraud detection (r = .021), suggesting that it contributed minimally to fraud detection in practice. This weak relationship implied limited adoption, poor utilization, or inadequate integration of data mining tools within the payroll control system. Document authentication, however, recorded a strong and significant positive correlation (r = .636), indicating that verification of payroll documents played a major role in uncovering fraudulent activities and was highly effective in detecting manipulated records. Interview technique demonstrated a moderate positive relationship with payroll fraud detection (r = .440), implying that investigative interviews meaningfully supported fraud detection, particularly when used alongside other forensic procedures. Ratio analysis also showed a moderate positive correlation (r = .434), indicating that analytical reviews and trend comparisons helped identify abnormal payroll patterns, although its influence was weaker than document authentication. Payroll reconciliation recorded a strong and significant correlation with payroll fraud detection (r = .598), highlighting it as one of the most effective techniques for identifying discrepancies such as ghost workers and unauthorized payments, thereby reinforcing its critical role in strengthening payroll controls.

Regression Analysis

The regression results in Table 4.4 examined the effect of forensic accounting techniques on payroll fraud detection in the Nigerian Federal Ministry of Finance and its agencies. The intercept was not statistically significant, indicating that payroll fraud detection could not be meaningfully explained in the absence of forensic accounting techniques, highlighting the essential role of these methods in driving fraud detection outcomes. The model revealed that document authentication, interview technique, and payroll reconciliation had positive and statistically significant effects on payroll fraud detection, while data mining and ratio analysis were not significant predictors. The overall model explained 51.7% of the variation in payroll fraud detection (R^2 = 0.517), with an adjusted R^2 of 0.501, demonstrating moderately strong explanatory power. The F-statistic (32.713, $p < 0.001$) confirmed the overall significance of the model, while the Durbin–Watson value of 1.075 suggested mild positive autocorrelation in residuals, potentially reflecting similarities in payroll processes or recurring fraud patterns across departments.

Table 4.4 ***Regression Results of the Study***

Variables	Coefficients	T-Values	P-Values
Constants		-.740	.461
Data mining	.000	.004	.997
Document authentication	.282	3.755	.000
Interview technique	.290	4.221	.000

Ratio analysis	.075	1.042	.299
Payroll Reconciliation	.280	4.324	.000
R^2	0.517		
Adj. R^2	0.501		
F-Stat.	32.713		
F- Sig			0.000
Durbin-Watson	1.075		

Source: SPSS 23 (2026)

Specifically, data mining recorded a positive but insignificant effect on payroll fraud detection (β = 0.000, t = 0.004, p = 0.997), suggesting minimal practical contribution. This implies that despite its potential, data mining tools were underutilized or lacked sufficient sophistication within the Ministry, a finding consistent with Owolabi and Fagbemi (2023), Ibrahim and Dauda (2022), and Ojo and Salisu (2021). However, it contrasts with Eze and Okonkwo (2023), who reported a significant positive effect of data mining in more technologically advanced environments.

Document authentication had a strong positive and significant effect (β = 0.282, t = 3.755, p = 0.000), indicating that verifying employee documents, validating payroll inputs, and confirming the authenticity of payroll records substantially enhanced the detection of irregularities such as ghost workers and forged entries. This supports previous studies by Adams and Suleiman (2023), Ogunleye and Abiola (2022), Oluwaseun and Tunde (2022), and Moses and Olabode (2021), which emphasized the critical role of document verification in public-sector fraud detection.

Interview technique also showed a positive and significant effect (β = 0.290, t = 4.221, p = 0.000), demonstrating that investigative interviews through structured questioning, probing inconsistencies, and obtaining verbal evidence played a meaningful role in uncovering payroll irregularities. These results align with findings from Phiri and Tshilidzi (2023), Okafor and Babajide (2022), Adebayo and Eniola (2023), and Micheal and Adekunle (2023), who reported that interview-based procedures significantly enhance fraud detection in public institutions.

Ratio analysis, while positive (β = 0.075, t = 1.042, p = 0.299), was not statistically significant, suggesting that analytical procedures such as payroll trend comparisons and ratio evaluations alone did not significantly explain the detection of fraudulent activities. This result is consistent with Akinyele and Yusuf (2022), Salami and Okon (2023), and Folarin and Olorunfemi (2023), who noted that ratio analysis may be too general to uncover specific payroll fraud cases, though it contrasts with Olatunji and Hassan (2023), who found significant effects in contexts with stronger analytical frameworks.

Finally, payroll reconciliation had a positive and highly significant effect (β = 0.280, t = 4.324, p = 0.000), indicating that comparing payroll registers with HR records, attendance logs, personnel files, and bank details was highly effective in detecting fraud, including ghost workers, duplicate payments, and unauthorized allowances. This confirms prior findings by Ifeoluwa and Olamide (2022), Akinlolu and Temidayo (2023), Olawale and Olufunmilayo (2023), and Abubakar and Jibola (2023), which highlighted reconciliation as one of the most powerful tools for strengthening payroll controls in government organizations.

Overall, the results demonstrate that document authentication, interview techniques, and payroll reconciliation are the most impactful forensic accounting methods for detecting payroll fraud within the Nigerian Federal Ministry of Finance, while data mining and ratio analysis contribute less significantly under current operational conditions. The findings emphasize the need for enhanced integration, technological adoption, and skill development in forensic techniques to further improve payroll fraud detection.

CONCLUSION

This study examined the effect of five forensic accounting techniques data mining, document authentication, interview techniques, ratio analysis, and payroll reconciliation on payroll fraud detection in the Nigerian Federal Ministry of Finance and its agencies. The findings revealed that document authentication, interview techniques, and payroll reconciliation had strong and statistically significant positive effects on payroll fraud detection, demonstrating their critical role in uncovering irregularities such as ghost workers, forged entries, and unauthorized payments. In contrast, data mining and ratio analysis,

while positively associated, showed no significant effect, suggesting that their current utilization, sophistication, or integration within the Ministry is insufficient to meaningfully enhance fraud detection outcomes. Overall, the study established that investigative, procedural, and reconciliation methods are the most effective determinants of payroll fraud detection, emphasizing the need for a comprehensive, integrated approach to strengthen payroll integrity in public institutions.

Based on these findings, several recommendations are proposed. First, the Ministry should continue employing data mining techniques while investing in staff training, modern analytical tools, and incentives to enhance effectiveness. Second, document authentication procedures should be reinforced through robust verification systems, digital records, and continuous capacity-building for HR and payroll staff. Third, interview techniques should remain a core tool, with structured training in investigative questioning, behavioral assessment, and deception detection to uncover concealed fraud. Fourth, ratio analysis should be maintained as a complementary analytical tool, integrated with other techniques and automated dashboards to monitor payroll trends. Finally, payroll reconciliation should be consistently applied using qualified staff and IT support to compare payroll records, HR files, attendance logs, and bank statements, thereby reducing opportunities for fraudulent activities. Implementing these measures will ensure a more effective and reliable payroll fraud detection system in the Nigerian Federal Ministry of Finance and its agencies.

REFERENCES

ACFE. (2022). *Report to the nations: Global study on occupational fraud and abuse*. Austin, TX: Association of Certified Fraud Examiners.

Adebisi, J., & Gbegi, D. (2019). Fiscal responsibility and governance in Nigeria. *Journal of Public Administration and Finance, 7*(2), 45–60.

Adegbite, E., & Musa, T. (2022). Payroll reconciliation and fraud detection in federal institutions. *Journal of Financial Crime, 29*(3), 345–362. https://doi.org/10.1108/JFC-03-2022-0045

Adegbite, E., & Nwankwo, C. (2020). *Financial crimes and institutional accountability in Nigeria*. Lagos: University Press.

Adegoke, A. (2022). *Electronic document authentication and payroll fraud detection in the Federal Ministry of Finance*. Lagos: University Press.

Adewale, S., & Musa, T. (2022). Data mining techniques in payroll fraud detection: Evidence from the Federal Ministry of Finance. *African Journal of Accounting, 14*(1), 45–66.

Adeyemi, O., & Hassan, B. (2022). Forensic interviews and payroll fraud detection in public sector organizations. *International Journal of Auditing, 26*(2), 112–130. https://doi.org/10.1111/ijau.12234

AfDB. (2023). *African economic outlook 2023: Governance and fiscal sustainability*. Abidjan: African Development Bank.

BudgIT. (2022). *Payroll audits and ghost workers in Nigeria: A report on IPPIS effectiveness*. Abuja: BudgIT Nigeria.

Crowe LLP. (2011). *Fraud pentagon: Expanding the fraud triangle*. New York, NY: Crowe LLP.

EFCC. (2023). *Annual report on financial crimes in Nigeria*. Abuja: Economic and Financial Crimes Commission.

Emeji, C., & Okoye, E. (2021). Perceptions of forensic accounting effectiveness in fraud prevention: Evidence from Nigeria. *International Journal of Accounting Research, 12*(1), 55–71.

Eze, P., & Onwuka, A. (2022). Institutional weaknesses and anti-corruption measures in Nigeria. *Nigerian Journal of Governance Studies, 5*(1), 23–38.

Eze, P., & Salami, L. (2023). Predictive data mining in payroll fraud detection. *Journal of Forensic Accounting, 18*(2), 88–107.

Federal Ministry of Finance. (2023). *Financial policy coordination and payroll management report*. Abuja: FMF Nigeria.

Federal Ministry of Finance. (2023). *Financial policy coordination and payroll management report*. Abuja: FMF Nigeria.

Han, J., Pei, J., & Kamber, M. (2022). *Data mining: Concepts and techniques* (4th ed.). Amsterdam, Netherlands: Elsevier.

Ibrahim, S., & Eze, R. (2021). Automated document verification and payroll fraud prevention. *Journal of Public Sector Accounting, 12*(4), 77–95.

ICPC. (2023). *Annual report on payroll audits and ghost workers*. Abuja: Independent Corrupt Practices Commission.

ICPC. (2023). *Report on public sector payroll audits and ghost workers*. Abuja: Independent Corrupt Practices Commission.

IMF. (2022). *Fiscal governance and sustainable development: Lessons from emerging economies*. Washington, DC: International Monetary Fund.

OECD. (2023). *Combatting ghost workers and payroll fraud in public sector institutions*. Paris: Organisation for Economic Co-operation and Development.

Ogbu, P., & Okezie, U. (2020). Forensic accounting as a construct in public sector fraud detection. *Journal of Accounting and Financial Management, 8*(2), 34–50.

Okon, P., & Ibrahim, T. (2023). Regular payroll reconciliation and fraud detection in Nigeria's Federal Ministry of Finance. *International Journal of Public Financial Management, 15*(1), 59–77.

Okonkwo, U., & Musa, A. (2023). Forensic interviews in detecting payroll fraud: A case study of the Federal Ministry of Finance. *Nigerian Journal of Auditing and Accountability, 9*(2), 101–120.

Okorie, A., & Agu, T. (2021). Fiscal responsibility and public financial management in Nigeria. *Nigerian Journal of Public Finance, 9*(1), 12–28.

Okoye, E., & Ezejiofor, R. (2022). Forensic accounting and payroll fraud detection in federal institutions. *Journal of Financial Crime, 29*(4), 987–1003. https://doi.org/10.1108/JFC-01-2022-0015

Okoye, E., & Ezejiofor, R. (2022). Payroll fraud detection in federal institutions: The role of forensic accounting. *Journal of Financial Crime, 29*(4), 987–1003. https://doi.org/10.1108/JFC-01-2022-0015

Omar, A., Johari, R., & Azam, S. (2022). Forensic accounting techniques and fraud detection in public institutions. *Asian Journal of Accounting Research, 7*(3), 101–120. https://doi.org/10.1108/AJAR-06-2022-0032

Omar, A., Johari, R., & Azam, S. (2022). Payroll fraud detection through forensic accounting and data analytics. *Asian Journal of Accounting Research, 7*(3), 101–120. https://doi.org/10.1108/AJAR-06-2022-0032

Owojori, A., & Asaolu, T. (2023). Forensic accounting techniques in Nigerian public sector fraud detection. *International Journal of Accounting Studies, 15*(2), 45–63.

Owojori, A., & Asaolu, T. (2023). Forensic accounting techniques in Nigerian public sector payroll fraud detection. *International Journal of Accounting Studies, 15*(2), 45–63.

Witten, I., Frank, E., Hall, M., & Pal, C. (2023). *Data mining: Practical machine learning tools and techniques* (4th ed.). Burlington, MA: Morgan Kaufmann.

World Bank. (2023). *Digital payroll reforms and governance in Africa*. Washington, DC: World Bank.