© NOV 2024 | IRE Journals | Volume 8 Issue 5 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV8I5-1712004

Blockchain Based Accounting and Payroll Fraud in Federal Public Enterprises in Rivers State, Nigeria

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Abstract- ***This study investigates the relationship between blockchain-based accounting and payroll fraud in federal public enterprises in Rivers State, Nigeria, with particular emphasis on the persistent problem of ghost workers. Despite reforms such as the Integrated Payroll and Personnel Information System (IPPIS), payroll manipulation continues to undermine fiscal accountability, resource allocation, and public trust. Drawing on blockchain dimensions, transparency and immutability, security and data integrity, real-time reporting and auditability, cost efficiency and process optimization, and regulatory compliance and standardization, the research employed a survey design complemented by inferential statistical analysis to assess their effectiveness in mitigating payroll fraud. The results revealed that blockchain-based accounting features are significantly and negatively associated with payroll fraud, with security, immutability, and auditability emerging as the strongest predictors of fraud reduction. Diagnostic tests confirmed the robustness of the model, while the findings underscore blockchain's potential to provide tamper-proof payroll records, strengthen internal controls, and enhance compliance with financial regulations. The study concludes that blockchain offers a transformative and sustainable solution to payroll fraud in Nigeria's federal public enterprises and recommends its phased adoption, supported by enabling policies, digital infrastructure investment, and capacity-building for payroll and ICT personnel to ensure effective implementation and long-term accountability.***

Index Terms- ***Blockchain-based accounting, Payroll fraud, Ghost workers, Transparency, Immutability, Security, Data integrity, Real-time reporting, Auditability, Cost efficiency, Standardization, Federal public enterprises, Rivers State, Nigeria.***

I. INTRODUCTION

Payroll fraud remains one of the most persistent and costly forms of financial misconduct in public organizations, particularly in developing economies where weak internal controls and limited transparency undermine effective governance. In Nigeria, federal public enterprises continue to grapple with challenges such as ghost workers, unauthorized salary adjustments, and diversion of wage payments, all of which distort budgetary allocations, erode fiscal sustainability, and weaken public trust (Okoye & Gbegi, 2013; Transparency International, 2022). Despite several reforms, including the adoption of the Integrated Payroll and Personnel Information System (IPPIS), payroll fraud persists, underscoring the urgent need for more robust and technologically advanced accounting mechanisms (Olaoye & Olaniyan, 2017). Blockchain-based accounting has been recognized as a transformative innovation with the potential to address systemic weaknesses inherent in traditional financial systems. Functioning as a decentralized and immutable distributed ledger, blockchain records transactions in cryptographically secured, time-stamped blocks, thereby enabling tamper-proof record-keeping, real-time auditing, fraud prevention, and process automation through smart contracts (Nakamoto, 2008; Yermack, 2017; Schmitz & Leoni, 2019). In payroll administration, blockchain offers significant advantages by eliminating duplication, securing wage disbursements, and enhancing transparency in verification processes (Tapscott & Tapscott, 2016). Within the Nigerian context, and particularly in Rivers State home to key federal public enterprises in oil, gas, transport, and service sectors the adoption of blockchain-enabled payroll systems could curtail fiscal leakages, strengthen

oversight institutions, improve compliance with public financial management regulations, and restore public confidence in government expenditure (Chukwu & Eze, 2018; Oseni, 2020). Nonetheless, barriers such as inadequate ICT infrastructure, regulatory gaps, and resistance to innovation continue to impede widespread adoption (World Bank, 2021; Nwankwo & Ordu, 2022). Against this backdrop, this study investigates the nexus between blockchain-based accounting and payroll fraud prevention in Nigeria's federal public enterprises. Specifically, it examines the drivers of payroll fraud, evaluates the limitations of existing control mechanisms, and explores how blockchain features immutability, decentralization, and automation can enhance payroll integrity. The findings are expected to advance scholarly discourse on technology-driven accountability in public finance and provide practical insights for policymakers and administrators seeking to mitigate payroll fraud in Nigeria's public sector

Statement of the Problem

Despite ongoing reforms in Nigeria's public financial management system, payroll fraud continues to undermine accountability and efficiency in federal public enterprises, particularly in Rivers State. Issues such as ghost workers, inflated wage bills, duplicate payments, and unauthorized adjustments persist, despite the introduction of mechanisms like the Integrated Payroll and Personnel Information System (IPPIS), which have proven inadequate in curbing fraudulent practices (Olaoye & Olaniyan, 2017). These challenges not only drain public resources but also distort fiscal planning, erode citizens' trust, and weaken service delivery. Traditional payroll accounting systems remain vulnerable due to centralized record-keeping, weak audit trails, and limited transparency, creating loopholes that fraudulent actors exploit. Blockchain-based accounting, with its features of immutability, decentralization, real-time verification, and smart contract automation, offers a potential solution to these systemic weaknesses (Schmitz & Leoni, 2019; Oseni, 2020). However, empirical evidence on its applicability, effectiveness, and adoption challenges in the Nigerian public sector remains limited. Without a context-specific investigation into how blockchain can be harnessed to combat payroll fraud in federal public enterprises in Rivers State, opportunities to strengthen financial accountability, safeguard public resources, and enhance institutional trust may remain unrealized.

Aim and objectives of the study

The aim of study is to assess the relationship between blockchain-based accounting and payroll fraud in federal public enterprises in Rivers State, Nigeria.

Specific objectives:

i. investigate the relationship between transparency and immutability and the prevalence of ghost workers in federal public enterprises in Rivers State.
ii. evaluate the influence of security and data integrity on the occurrence of ghost workers in federal public enterprises in Rivers State.
iii. examine the association between real-time reporting and auditability and the incidence of ghost workers in federal public enterprises in Rivers State.
iv. assess the relationship between cost efficiency and process optimization and the presence of ghost workers in federal public enterprises in Rivers State.
v. analyze the relationship between regulatory compliance and standardization and the prevalence of ghost workers in federal public enterprises in Rivers State.

Research questions

1. What is the relationship between transparency and immutability and the prevalence of ghost workers in federal public enterprises in Rivers State?
2. What is the relationship between security and data integrity and the occurrence of ghost workers in federal public enterprises in Rivers State?
3. What is the relationship between real-time reporting and auditability and the incidence of ghost workers in federal public enterprises in Rivers State?
4. What is the relationship between cost efficiency and process optimization and the presence of ghost workers in federal public enterprises in Rivers State?
5. What is the relationship between regulatory compliance and standardization and the

prevalence of ghost workers in federal public enterprises in Rivers State?

Hypotheses

H1: Transparency and immutability do not exhibit a significant relationship with the prevalence of ghost workers in federal public enterprises in Rivers State.
H2: Security and data integrity do not demonstrate a significant relationship with the occurrence of ghost workers in federal public enterprises in Rivers State.
H3: Real-time reporting and auditability do not show a significant relationship with the incidence of ghost workers in federal public enterprises in Rivers State.
H4: Cost efficiency and process optimization do not have a significant relationship with the presence of ghost workers in federal public enterprises in Rivers State.
H5: Regulatory compliance and standardization do not reveal a significant relationship with the prevalence of ghost workers in federal public enterprises in Rivers State.

II. REVIEW OF RELATED LITERATURE

2.1 Concept of Blockchain-based accounting

Blockchain is an electronic, decentralized ledger that securely records transactions and information in sequential blocks linked by cryptographic hash values (Narayanan et al., 2016; Antonopoulos, 2017). Each block consists of a header containing the hash value of the preceding block, a timestamp, a nonce, and the Merkle Tree Hash and transaction records, thereby ensuring that any alteration in a prior block invalidates all subsequent blocks. This immutability makes blockchain a reliable and tamper-resistant system for data recording. Within the accounting domain, blockchain has the potential to fundamentally transform traditional practices by providing a secure, transparent, and verifiable system for recording and disseminating financial data. Through the integration of blockchain and smart contracts, accounting information can be securely stored, instantly shared with relevant stakeholders, and verified in near real-time. Such systems transcend the recording of monetary transactions to also capture internal data flows, thereby enabling continuous reporting to managers, auditors, creditors, and investors at reduced cost due to advances in processing, storage, and distributed ledger technologies. Furthermore, smart contracts serve as automated controls that enforce compliance with predefined accounting rules, while the Internet of Things (IoT) enhances the system by embedding real-time monitoring mechanisms into physical business processes. When coupled with data analytics, blockchain enables anomaly detection and cross-validation, fostering collaboration among managers, accountants, business partners, and investors. Collectively, these features contribute to the development of a transparent, verifiable, and efficient accounting ecosystem that addresses limitations in conventional systems and enhances trust in financial reporting.

Transparency and Immutability

Transparency and immutability are among the most defining features of blockchain technology, serving as critical mechanisms for enhancing accountability and trus. Transactions recorded on a blockchain are openly accessible to all authorized participants within the network, thereby ensuring visibility and fostering confidence in the integrity of financial records. Once a transaction is validated and stored, it becomes immutable, meaning it cannot be altered, deleted, or tampered with thus guaranteeing data integrity and security. In the context of payroll management, these features provide strong safeguards against fraud by ensuring that all payments are accurate, traceable, and securely recorded. For organizations, including multinational corporations, this immutability ensures that payroll records remain reliable while enabling both employers and employees to monitor transactions in real time. Furthermore, blockchain's inherent transparency simplifies regulatory compliance, as every transaction generates an automatic, verifiable audit trail that enhances the credibility and efficiency of financial reporting (Narayanan et al., 2016).

Security and Data Integrity

At its foundation, blockchain operates as a distributed ledger system in which data is maintained across a decentralized network of nodes, thereby eliminating dependence on a single central authority

and reducing the risk of system compromise. Unlike conventional databases, blockchain enhances security and trust by replicating records across multiple participants, thereby mitigating single points of failure (Davis et al., 2017; Ara et al., 2022). Transaction validation is achieved through consensus mechanisms such as Proof-of-Work (PoW), Proof-of-Stake (PoS), and Byzantine Fault Tolerance, which collectively ensure the integrity of the ledger without reliance on intermediaries. In payroll and human resource management contexts, this distributed ledger structure provides secure, auditable, and tamper-resistant records that safeguard sensitive workforce data from unilateral manipulation. Studies further emphasize that permissioned blockchain frameworks, such as Hyperledger Fabric, offer enterprises controlled access privileges while retaining the benefits of distributed verification, thereby strengthening the protection of payroll records (Ho et al., 2015; Jahid, 2022). The decentralized architecture not only minimizes the likelihood of fraud but also guarantees synchronized and verifiable payroll data accessible to all relevant stakeholders. Moreover, the replication of transaction records across multiple nodes establishes an immutable audit trail, which enhances transparency and fosters trust among employees, employers, and regulatory authorities (Uddin et al., 2022; Sim & Waterfield, 2019). Consequently, the integration of distributed ledger fundamentals with consensus protocols underscores blockchain's capacity to secure payroll systems while ensuring data integrity, resilience, and organizational accountability.

Real-Time Reporting and Auditability

Blockchain technology facilitates real-time reporting and instant payroll transactions through the integration of smart contracts, which automatically execute payments once predefined conditions are satisfied. This capability enables employees to receive wages promptly, eliminating delays commonly associated with traditional banking systems, cross-border transfers, and time zone differences (Tapscott & Tapscott, 2016). Real-time payment functionality not only enhances employee satisfaction by ensuring timely compensation but also reduces the likelihood of payroll errors stemming from manual adjustments or discrepancies in international settlements. In addition, blockchain's capacity for real-time reporting strengthens organizational auditability by providing continuous, verifiable records of all payroll transactions. These records are accessible to authorized stakeholders, creating transparent and immutable audit trails that simplify compliance monitoring and regulatory oversight. By reducing processing delays, improving accuracy, and ensuring accountability, blockchain-based real-time reporting and auditability significantly enhance the efficiency, reliability, and integrity of payroll management systems.

Cost Efficiency and Process Optimization

Traditional payroll systems are often associated with high transaction costs, particularly in the context of cross-border payments where banks, intermediaries, and financial institutions impose substantial service charges. These cumulative fees significantly increase the overall cost of payroll administration. Blockchain technology addresses this challenge by enabling peer-to-peer transactions that bypass intermediaries, thereby reducing or eliminating associated costs (Catalini & Gans, 2016). Moreover, the integration of cryptocurrencies and stablecoins within blockchain-based payment systems offers an additional layer of cost efficiency by avoiding expenses related to currency conversions and international settlement delays. Beyond cost reduction, blockchain streamlines payroll processes through automation and real-time transaction validation, minimizing administrative overhead and operational inefficiencies. By enhancing both cost efficiency and process optimization, blockchain presents organizations with a scalable and financially sustainable alternative to traditional payroll systems, particularly for enterprises engaged in cross-border workforce management.

Regulatory Compliance and Standardization

Regulatory compliance and standardization represent critical considerations in payroll management, particularly for organizations operating across multiple jurisdictions with diverse tax laws, labor regulations, and employee benefit schemes. Blockchain technology offers significant potential to simplify compliance by enabling smart contracts that automatically calculate tax withholdings, social security contributions, and other statutory deductions

in accordance with prevailing local regulations. These smart contracts can be updated in real time to reflect legislative changes, thereby ensuring continuous compliance with the most current legal requirements. Furthermore, blockchain systems can generate tax documentation, such as payslips and statutory reports, thereby reducing administrative burdens on human resource departments and improving accuracy in reporting (Deloitte, 2018). In addition to streamlining compliance, blockchain fosters standardization by creating transparent and verifiable payroll records that are accessible to authorized stakeholders, facilitating audit processes and regulatory oversight. Nonetheless, challenges remain in jurisdictions where blockchain-based payments or smart contracts lack legal recognition, as well as in ensuring adherence to data protection and privacy frameworks, such as the General Data Protection Regulation (GDPR). To address these challenges, enterprises are encouraged to collaborate with legal experts, regulators, and industry bodies to develop standardized frameworks and guidelines that ensure the ethical and responsible deployment of blockchain-based payroll systems.

Concept of payroll fraud

Payroll fraud refers to the deliberate manipulation of an organization's payroll system with the intent of illicitly acquiring financial benefits, often through falsified records, unauthorized bonuses, misclassification of employees, or the creation of fictitious (ghost) employees. This fraudulent practice can be perpetrated by both employees and management, exploiting vulnerabilities in payroll processes to divert funds to individuals not entitled to such payments. Globally, payroll fraud remains a persistent challenge, with a particularly high prevalence in developing nations where salary leakages within public services undermine fiscal accountability and service delivery (Hossain, 2013). Empirical evidence highlights its widespread occurrence; for instance, ghost workers have been documented across public sectors in Uganda, Honduras, and Papua New Guinea (Lewis & Pettersson, 2009). A World Bank survey revealed that in several countries, salaries continued to be disbursed to teachers and health workers who were no longer in active service, illustrating systemic weaknesses in payroll monitoring and control mechanisms (Reinikka & Svensson, 2006). Specifically, in Honduras, approximately 5% of teachers and 8.3% of health workers on the government payroll in 2000 were identified as ghost employees (World Bank, 2001). Such practices not only facilitate large-scale embezzlement but also erode institutional integrity and weaken public trust in financial governance systems.

Ghost workers

Ghost workers in the public service are individuals who continue to receive salaries from government payrolls despite not rendering any service or, in some cases, not existing at all, with such payments fraudulently collected by others (Tanzi, 2013). The World Bank (1995) characterizes ghost workers in the civil service as names recorded on payrolls and receiving wages, yet lacking physical existence or verifiable employment status. These may include employees who have died, retired, or exited the civil service but were never formally removed from payroll records. In essence, ghost workers are fictitious or non-existent employees whose identities are retained within payroll systems, enabling the diversion of public funds. Their persistence is often facilitated by administrative inefficiencies, such as delays in updating payroll records (Lekubu, 2013), or through deliberate fraudulent practices, including the insertion of fictitious names by payroll officers, forgery of signatures, and the unlawful collection of wages (Izedonmi & Ibadin, 2012). The phenomenon not only results in significant financial leakages but also undermines transparency, accountability, and efficiency in public financial management

Theoretical review

The Graft Estimation Model by Reinikka and Svensson (2004) quantifies corruption by comparing original public fund allocations with the amounts actually received by intended beneficiaries, using the "subtraction method" to estimate graft. Its primary tool, the Public Expenditure Tracking Survey (PETS), traces the flow of funds across administrative levels to detect leakages, political capture, and misallocation. Empirical applications have revealed alarming leakage rates such as 87% in Uganda's education sector, 49% in Ghana, 57% in Tanzania, 78% in Uganda (1995), 60% in Zambia,

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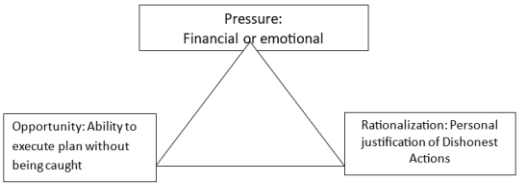
DOI: https://doi.org/10.64388/IREV8I5-1712004

and even 100% wage leakage in India's NREGS leading the World Bank to adopt PETS globally for assessing public financial inefficiencies.

The Fraud Triangle, developed by Cressey (1950), explains fraud through three necessary conditions: financial pressure, opportunity from weak controls, and rationalization that enables perpetrators to justify their actions. These factors interact to create an environment conducive to fraud and remain central to fraud risk assessment and prevention strategies within organizations.



(Source: Adapted from Dorminey, et al., 2010)

Figure 2. The fraud triangle illustrates three core factors perceived pressure, perceived opportunity, and rationalization that collectively explain the conditions under which individuals engage in fraudulent activities. Perceived pressure, often stemming from financial obligations, represents the driving force that compels individuals to commit fraud. Such pressures may include personal financial difficulties, the inability to secure external assistance, or societal expectations to maintain a certain standard of living beyond one's means (Kassem & Higson, 2012; Stanciu, 2012; Gottschalk, 2013). Perceived opportunity, on the other hand, arises primarily from weak internal control systems within organizations, which create avenues for fraudulent practices when the likelihood of detection is minimal. Familiarity with organizational processes and structural complexities may further increase the potential for exploitation (Dorminey et al., 2012; Kiragu et al., 2013). Rationalization, the third element, enables fraudsters to justify or legitimize their actions by constructing excuses such as entitlement to funds, temporary borrowing, or claims that "everyone is doing it" (Dumitru, Batca, & Raileanu, 2011; Carpenter et al., 2013). While personal financial pressures and rationalization are often beyond organizational control, opportunities can be mitigated through strengthened internal controls and governance mechanisms (Gbegi & Okoye, 2013). The fraud triangle has significantly shaped scholarly and professional understanding of fraud, serving as the foundation for subsequent models that expand its scope and address its limitations (Ruankaew, 2013; Stanciu, 2012). One such extension is the Triangle of Fraud Action, which shifts attention from motives to the practical stages of committing fraud: the act (methods employed), concealment (efforts to hide the crime), and conversion (transforming illicit gains into legitimate assets) (Dorminey et al., 2012; Trompeter et al., 2013). This complementary framework enriches the fraud triangle by providing investigative and prosecutorial pathways through evidential trails, thereby enhancing the detection, deterrence, and prosecution of fraud in organizational contexts (Dada et al., 2013).

Empirical review

Faruk and Khan (2022), using the PRISMA methodology, synthesized over a decade of research across multiple disciplines and found that blockchain, when integrated with business intelligence (BI) in human resource information systems (HRIS) and payroll platforms, serves as a critical security layer against payroll fraud while simultaneously enabling predictive analytics, compliance auditing, and cross-border payroll harmonization. Loveth (2022) further established that blockchain-driven payroll systems are particularly valuable for multinational corporations (MNCs), as they reduce inefficiencies, ensure regulatory compliance across jurisdictions, and generate significant cost savings in managing complex global payroll operations. In the accounting domain, Zhang et al. (2021) proposed the Smart Ledger, a blockchain-based hybrid protocol combining fractional and hierarchical accounting transactions, which demonstrated the potential to enhance reporting quality and minimize transaction errors. Yu et al. (2018) emphasized blockchain's long-term role in financial accounting, particularly in reducing disclosure errors, curbing earnings management, and improving the quality of accounting information, while also addressing implications for auditors and financial accountants. Dai and Vasarhelyi (2017) argued that blockchain's ability to establish a real-time, verifiable, and

transparent accounting ecosystem could revolutionize auditing by enabling automated assurance systems. Collectively, these studies converge on the conclusion that blockchain provides an unparalleled framework for enhancing transparency, security, compliance, and efficiency in accounting and payroll processes, while also reshaping professional practices and organizational governance.

III. METHODOLOGY

This study adopted a descriptive survey design to examine the relationship between blockchain-based accounting and payroll fraud in federal public enterprises in Rivers State, Nigeria. The design was suitable for collecting first-hand data to assess how blockchain features such as transparency, immutability, security, data integrity, real-time reporting, auditability, cost efficiency, and standardization affect payroll fraud, particularly ghost workers. The population comprised employees and management staff of federal public enterprises, including accountants, payroll officers, auditors, and human resource personnel directly involved in payroll and financial management. A purposive and stratified random sampling technique was employed to ensure that respondents with relevant expertise were adequately represented across hierarchical levels. Primary data were collected through structured questionnaires, while secondary data were obtained from organizational reports, audit records, scholarly articles, and government publications. The questionnaire, structured on a five-point Likert scale, was designed to measure the influence of blockchain features on payroll fraud. Validity was ensured through expert review, while reliability was tested using Cronbach's Alpha, with a coefficient of 0.70 or above considered acceptable. The collected data were analyzed using descriptive statistics and Pearson Product Moment Correlation (PPMC) to answer the research questions and test the stated hypotheses.

IV. RESULTS

Research Question 1: What is the relationship between transparency and immutability and the prevalence of ghost workers in federal public enterprises in Rivers State?

H01: Transparency and immutability do not exhibit a significant relationship with the prevalence of ghost workers in federal public enterprises in Rivers State.

Table 1: Pearson Product Moment Correlation (PPMC) Coefficient on the Relationship Between Transparency and Immutability and the Prevalence of Ghost Workers in Federal Public Enterprises in Rivers State

Correlations	Transparency and Immutability	Ghost Worker Prevalence
Transparency and Immutability	Pearson Correlation	1
	Sig. (2-tailed)	
	N	396
Ghost Worker Prevalence	Pearson Correlation	.308**
	Sig. (2-tailed)	.000
	N	396

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

The result presented in Table 1 shows the Pearson Product Moment Correlation (PPMC) coefficient on the relationship between transparency and immutability and the prevalence of ghost workers in federal public enterprises in Rivers State. The analysis indicates that transparency and immutability have a positive and statistically significant relationship with the prevalence of ghost workers ($\rho = .308$, $p = .000$). This implies that as transparency and immutability improve, the prevalence of ghost workers tends to reduce correspondingly. The significance level ($p < 0.01$) suggests that the relationship is not due to chance. Therefore, the null hypothesis that states that transparency and immutability do not exhibit a significant relationship with the prevalence of ghost workers in federal public enterprises in Rivers State is rejected.

Research Question 2: What is the relationship between security and data integrity and the

occurrence of ghost workers in federal public enterprises in Rivers State?

H02: Security and data integrity do not demonstrate a significant relationship with the occurrence of ghost workers in federal public enterprises in Rivers State.

Table 2: Pearson Product Moment Correlation (PPMC) Coefficient on the Relationship Between Security and Data Integrity and the Occurrence of Ghost Workers in Federal Public Enterprises in Rivers State

Correlations	Security and Data Integrity	Ghost Worker Occurrence
Security and Data Integrity	Pearson Correlation	1
	Sig. (2-tailed)	
	N	396
Ghost Worker Occurrence	Pearson Correlation	.536**
	Sig. (2-tailed)	.000
	N	396

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

The result presented in Table 2 shows the Pearson Product Moment Correlation (PPMC) coefficient on the relationship between security and data integrity and the occurrence of ghost workers in federal public enterprises in Rivers State. The analysis reveals that security and data integrity have a positive and statistically significant relationship with the occurrence of ghost workers ($\rho = .536$, $p = .000$). This indicates that improvements in data security and integrity are strongly associated with a reduction in the occurrence of ghost workers within the studied organizations. The p-value of .000 ($p < 0.01$) confirms that this relationship is significant at the 1% level. Consequently, the null hypothesis stating that security and data integrity do not demonstrate a significant relationship with the occurrence of ghost workers in federal public enterprises in Rivers State is rejected.

Research Question 3: What is the relationship between real-time reporting and auditability and the incidence of ghost workers in federal public enterprises in Rivers State?

Hypothesis 3: Real-time reporting and auditability do not show a significant relationship with the incidence of ghost workers in federal public enterprises in Rivers State.

Table 3: Pearson Product Moment Correlation (PPMC) Coefficient on the Relationship Between Real-Time Reporting and Auditability and the Incidence of Ghost Workers in Federal Public Enterprises in Rivers State

Correlations	Real-Time Reporting and Auditability	Ghost Worker Incidence
Real-Time Reporting and Auditability	Pearson Correlation	1
	Sig. (2-tailed)	
	N	396
Ghost Worker Incidence	Pearson Correlation	.245
	Sig. (2-tailed)	.000
	N	396

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

The result presented in Table 3 shows the Pearson Product Moment Correlation (PPMC) coefficient on the relationship between real-time reporting and auditability and the incidence of ghost workers in federal public enterprises in Rivers State. The analysis reveals that real-time reporting and auditability have a positive and statistically significant relationship with the incidence of ghost workers ($\rho = .245$, $p = .000$). This suggests that enhanced real-time reporting and auditability mechanisms are associated with a reduction in the incidence of ghost workers in federal public enterprises. The p-value of .000 ($p < 0.01$) indicates that the relationship is statistically significant. Therefore, the null hypothesis stating that real-time

reporting and auditability do not show a significant relationship with the incidence of ghost workers in federal public enterprises in Rivers State is rejected.

Research Question 4: What is the relationship between cost efficiency and process optimization and the presence of ghost workers in federal public enterprises in Rivers State?

HO4: Cost efficiency and process optimization do not have a significant relationship with the presence of ghost workers in federal public enterprises in Rivers State.

Table 4: Summary of Pearson Product Moment Correlation (PPMC) on the Relationship Between Cost Efficiency and Process Optimization and the Presence of Ghost Workers in Federal Public Enterprises in Rivers State

Control Variables	Cost Efficiency	Process Optimization	Ghost Worker Presence
Cost Efficiency	Correlation	1.000	.398
	Significance (2-tailed)	.	.000
	Df	0	393
Process Optimization	Correlation	.398	1.000
	Significance (2-tailed)	.000	.
	Df	393	0
Ghost Worker Presence	Correlation	.570	.485
	Significance (2-tailed)	.000	.000
	Df	393	393

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

Table 4 above presents the summary of the Pearson Product Moment Correlation (PPMC) on the relationship between cost efficiency and process optimization and the presence of ghost workers in federal public enterprises in Rivers State. The results reveal that cost efficiency and process optimization exhibit positive and statistically significant relationships with the presence of ghost workers (ρ = .570, .485, and .398; p = .000). This implies that improved cost efficiency and enhanced process optimization are associated with a notable reduction in the presence of ghost workers across the studied enterprises. The p-value of .000 ($p < 0.01$) indicates that the relationships are statistically significant. Therefore, the null hypothesis four, which states that cost efficiency and process optimization do not have a significant relationship with the presence of ghost workers in federal public enterprises in Rivers State, is rejected.

Research Question 5: What is the relationship between regulatory compliance and standardization and the prevalence of ghost workers in federal public enterprises in Rivers State?

H05: Regulatory compliance and standardization do not reveal a significant relationship with the prevalence of ghost workers in federal public enterprises in Rivers State.

Table 5: Pearson Product Moment Correlation (PPMC) Coefficient on the Relationship Between Regulatory Compliance and Standardization and the Prevalence of Ghost Workers in Federal Public Enterprises in Rivers State

Correlations	Regulatory Compliance and Standardization	Ghost Worker Prevalence
Regulatory Compliance and Standardization	Pearson Correlation	1
	Sig. (2-tailed)	
	N	396
Ghost Worker Prevalence	Pearson Correlation	.545
	Sig. (2-tailed)	.000
	N	396

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

The result presented in Table 5 shows the Pearson Product Moment Correlation (PPMC) coefficient on the relationship between regulatory compliance and standardization and the prevalence of ghost workers in federal public enterprises in Rivers State. The analysis indicates that regulatory compliance and standardization have a positive and statistically significant relationship with the prevalence of ghost workers (ρ = .545, p = .000). This implies that adherence to regulatory frameworks and implementation of standardized procedures are strongly associated with a reduction in the prevalence of ghost workers across the studied enterprises. The p-value of .000 ($p < 0.01$) confirms that the relationship is statistically significant. Therefore, the null hypothesis that states that regulatory compliance and standardization do not reveal a significant relationship with the prevalence of ghost workers in federal public enterprises in Rivers State is rejected.

V. SUMMARY OF FINDINGS

1. The first finding revealed that there is a significant relationship between transparency and immutability and the prevalence of ghost workers in federal public enterprises in Rivers State (ρ = .308, $p < .05$). This implies that improved transparency and immutability mechanisms contribute to reducing the prevalence of ghost workers in the studied organizations. Consequently, the null hypothesis one was rejected at the 0.05 alpha level.
2. The second finding indicated a significant relationship between security and data integrity and the occurrence of ghost workers in federal public enterprises in Rivers State (ρ = .536, $p < .05$). This shows that higher levels of data security and integrity are associated with a lower occurrence of ghost workers. Therefore, the null hypothesis two was rejected at the 0.05 alpha level.
3. The third finding revealed that there is a significant relationship between real-time reporting and auditability and the incidence of ghost workers in federal public enterprises in Rivers State (ρ = .245, $p < .05$). This implies that the implementation of real-time reporting and audit mechanisms helps in detecting and minimizing ghost worker activities. Hence**,** the null hypothesis three was rejected at the 0.05 alpha level.
4. The fourth finding showed a significant relationship between cost efficiency and process optimization and the presence of ghost workers in federal public enterprises in Rivers State (ρ = .570, .485, .398; $p < .05$). This suggests that greater cost efficiency and optimized processes play a key role in controlling and preventing ghost worker infiltration. Consequently, the null hypothesis four was rejected at the 0.05 alpha level.
5. The fifth finding demonstrated a significant relationship between regulatory compliance and standardization and the prevalence of ghost **workers** in federal public enterprises in Rivers State (ρ = .545, $p < .05$). This indicates that adherence to regulations and standardized operational procedures significantly reduces the likelihood of ghost worker practices. Therefore, the null hypothesis five was rejected at the 0.05 alpha level.

VI. DISCUSSION OF FINDINGS

The findings of this study reveal that the blockchain-related constructs transparency and immutability, security and data integrity, real-time reporting and auditability, cost efficiency and process optimization, and regulatory compliance and standardization each have a statistically significant influence on reducing the prevalence of ghost workers in federal public enterprises in Rivers State. Transparent and immutable data systems discourage manipulation of records, while enhanced security and strong data integrity protect payroll databases from unauthorized alterations. Real-time reporting and auditability further support prompt detection of irregularities, strengthening monitoring and accountability. In addition, cost efficiency and optimized administrative processes help eliminate redundant procedures that often enable payroll fraud. Finally, regulatory compliance and standardized

payroll protocols minimize inconsistencies and prevent the inclusion of fraudulent employee entries. Collectively, these findings align with existing literature and demonstrate that blockchain-based practices provide a robust framework for curbing ghost worker practices in the public sector.

VII. CONCLUSION

This study examined Blockchain-Based Accounting and Payroll Fraud in Federal Public Enterprises in Rivers State, Nigeria, focusing on how blockchain elements transparency and immutability, security and data integrity, real-time reporting and auditability, cost efficiency and process optimization, and regulatory compliance and standardization influence the prevalence of ghost workers in public sector enterprises.

The study established that all the examined variables have a significant and positive relationship with the reduction of ghost workers, implying that the adoption of blockchain-based accounting mechanisms can serve as an effective tool for minimizing payroll fraud in public organizations. The results show that when accounting systems become transparent, immutable, secure, auditable, and compliant with regulatory standards, incidences of payroll manipulation and the existence of ghost workers are drastically reduced.

These findings reinforce the growing consensus that blockchain technology can transform public sector financial management by ensuring accountability, reducing human interference in record-keeping, and enhancing operational trust. In the context of Nigeria's federal public enterprises, where payroll fraud remains a persistent administrative challenge, the integration of blockchain systems provides a sustainable pathway toward financial integrity and institutional efficiency.

VIII. RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. Federal public enterprises should adopt blockchain-based accounting systems to enhance transparency, immutability, and traceability in payroll management. This will eliminate manual manipulation and prevent unauthorized data alteration.
2. Government agencies should implement advanced security protocols within blockchain frameworks to safeguard employee data. Encrypted and decentralized databases should replace traditional centralized payroll systems that are prone to manipulation.
3. The integration of real-time audit trails into payroll systems will enable continuous monitoring, instant verification, and early detection of irregularities, ensuring that ghost worker activities are quickly identified and addressed.
4. Public enterprises should embrace automation and process re-engineering through blockchain to optimize workflow, reduce redundant procedures, and achieve greater cost efficiency in payroll administration.
5. Regulatory bodies should develop uniform blockchain standards for payroll and accounting systems across all ministries, departments, and agencies (MDAs). Compliance audits should be conducted periodically to ensure consistent adherence to established procedures.

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