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All correspondences to:
The Managing Editor
Dr Titus Wuyah Yunana
PIJEMS
Department of Economics and Management Science
Nigeria Police Academy, Wudil-Kano
Email: polacmanagementreview@gmail.com, inzehty01@gmail.com
Phone: +23408036949298

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AUDITING AND ASSURANCE CHALLENGES IN THE CONTEXT OF CRYPTO CURRENCY: A STUDY OF EMERGING RISKS AND OPPORTUNITIES

Ibrahim Abubakar, PhD

Department of Economics and Finance Accounting Unit, School of Business and Public Administration University of the Gambia

Dahiru Abdulmumin

Department of Accounting, Faculty of Management Sciences, Federal University Kashere, Gombe State Nigeria

Abstract

Crypto currency has rapidly transformed the financial landscape, offering decentralized systems and unique transactional capabilities. However, this innovation comes with significant auditing and assurance challenges. The objective of this study is to investigate the auditing and assurance challenges and opportunities in the context of crypto currencies, focusing on how decentralized block chain technology affects audit practices. Employing a quantitative research design, primary data were collected through surveys administered to 270 auditors, regulators, and block chain experts. The data were analyzed using descriptive statistics, and tested for significance using chi-square tests. Findings reveal a strong consensus on challenges such as regulatory disparities, interoperability, and the need for block chain-specific auditing tools, with significant chi-square values indicating these issues are well recognized. However, mixed responses on audit quality and cost efficiency suggest some areas of debate and evolving understanding among professionals. The study recommends that regulatory bodies and auditing firms prioritize the development of specialized auditing standards for crypto currencies, enhance auditor training in block chain analytics, and promote international regulatory alignment. These measures are critical for addressing the unique complexities of auditing crypto currencies and for ensuring the reliability, transparency, and credibility of digital asset financial reporting.

Keywords: Crypto currency, Auditing Challenges, Assurance Practices, Regulatory Frameworks, Technology in Auditing

1. Introduction

The rapid adoption of crypto currencies and block chain technology has reshaped global finance, with market capitalization for digital assets like Bitcoin and Ethereum surpassing \$2 trillion in 2024, reflecting their growing institutional acceptance (Feyzullah, (2025). Industries ranging from fin tech to supply chain management now integrate block chain for its decentralized, tamper-resistant infrastructure (Vanmathi, et al. 2024). Yet, this technological revolution has outpaced traditional auditing frameworks, leaving auditors scrambling to adapt. (Francisco, 2024) Crypto

currencies, once dismissed as speculative novelties, now underpin corporate treasuries, payment systems, and decentralized finance (DeFi) platforms, demanding rigorous assurance practices to safeguard stakeholder trust (Priem, 2025). This shift marks a critical inflection point, auditors must reconcile the disruptive potential of block chain with the fiduciary responsibilities of financial oversight.

Paradoxically, block chain's core features transparency, immutability, and pseudonymity create a labyrinth of auditing complexities (Loncarevic, 2023). While distributed ledgers theoretically offer unparalleled visibility into transaction histories, pseudonymous

wallet addresses obscure participant identities, complicating anti-money laundering (AML) compliance (Pocher, 2023). Immutability, often hailed as a bulwark against fraud, entrenches errors permanently, transforming minor coding oversights in smart contracts into catastrophic financial risks. For instance, the 2016 DAO hack, where \$50 million vanished due to a smart contract flaw, exemplifies how block chain's "trustless" ideals clash with the messy reality of human error (De Filippi, et, al. 2024). Auditors now grapple with a dual mandate leveraging block chain's transparency while mitigating its inherent rigidities (Sheela, et, al. 2023).

Existing auditing frameworks, designed for centralized financial systems, falter in this decentralized terrain (Loncarevic, 2023). Traditional methods rely on third-party confirmations and paper trails, but crypto transactions unfold across border-less, pseudonymous networks. Auditors must verify transactions without centralized authorities, assess volatile crypto valuations, and navigate fragmented regulations such as the EU's Markets in Crypto-Assets (MiCA) regulation versus Nigeria's emergent tax-centric policies. These challenges are compounded by a scarcity of standardized accounting guidelines, as highlighted by the International Accounting Standards Board's (IASB) ongoing debates over crypto asset classification (Barth, 2025). The stakes are high missteps risk financial misstatements, regulatory penalties, and eroded investor confidence (Akinsola, 2025).

This study seeks to map the risks, challenges, and opportunities auditors face in crypto ecosystems, offering a road map for adapting assurance practices to this volatile landscape. By synthesizing empirical data, regulatory developments, and technological innovations, the study aims to bridge the gap between block chain's disruptive potential and the practical realities of auditing. Its findings will empower auditors to harness block chain's transparency while devising strategies to counterbalance its complexities ultimately fostering a more resilient, adaptive assurance paradigm for the digital age. The study is structured into five sections; section one is the Introduction, section 2 literature review, section 3 methodology, section 4 presentation of

data and analyses of results and section 5 conclusion and recommendations.

2. Literature Review

2.1 Conceptual Framework

2.1.1 Core Attributes of Block chain Technology in Auditing

The conceptual framework for auditing crypto currencies revolves around understanding the core attributes of block chain technology and its implications for assurance (Georgiou, et, al. 2024). Crypto currencies operate on decentralized ledgers, where transactions are recorded in blocks linked chronologically and cryptographically (Garriga, et, al. 2021). This structure challenges traditional auditing approaches, which rely on centralized databases and verifiable controls.

2.1.2 Transparency and Immutability

One core attribute of block chain technology is its transparency and immutability (Ali, et, al. 2023). Block chain records are immutable and accessible to participants, ensuring data integrity (Nweje, 2024). However, the pseudonymous nature of transactions complicates audit trails, making it difficult to link transactions to specific individuals or entities (Hsieh, & Brennan, 2022). Auditors must develop advanced techniques to navigate this complexity while preserving the trust block chain inherently provides (Mohammed, 2025).

2.1.3 Decentralization

Decentralization is another significant attribute. Unlike traditional financial systems with centralized oversight, cryptocurrencies operate without a single point of control (Johnson, 2020). This decentralization reduces the control points auditors typically rely on, necessitating innovative mechanisms for verification and assurance that align with decentralized systems (Abubakar, & Abubakar, 2023).

2.1.4 Smart Contracts

The use of smart contracts adds further complexity (Singh, et, al. 2020). These are automated agreements executed via block chain technology, requiring auditors to assess their reliability and potential vulnerabilities

(White, et, al. 2020). Misconfigurations or coding errors in smart contracts can lead to significant financial risks, making their thorough evaluation critical (Singh, et, al. 2020).

2.1.5 Regulatory Disparities

Regulatory disparities across jurisdictions present additional challenges for auditors (Wulandari, 2023). The lack of uniform global standards results in inconsistent reporting and compliance requirements for crypto currency transactions and holdings (Butt, 2023). This variability increases the complexity of assurance processes and demands more adaptable auditing practices (Sewpersadh, 2025).

2.1.6 Technological Adaptation

Lastly, technological adaptation is essential for effective auditing. Auditors must adopt specialized block chain analytics tools to assess risks, verify transactions, and ensure the reliability of crypto currency-related financial information (Kanu, 2025). The integration of these tools into auditing frameworks can enhance accuracy and efficiency, addressing many of the challenges posed by block chain technology (Kokogho, et, al. 2025).

2.2 Empirical Studies

Sharma (2025) studied the role of block chain analytics in auditing, finding that while transaction traceability significantly improved, it required high levels of expertise from auditors. Similarly, Bora et al. (2025) assessed the implementation of block chain-specific software in auditing practices. Their findings concluded that such tailored tools enhanced reliability and audit performance but posed steep learning curves for audit professionals.

Bouafif et al. (2024) investigated the role of smart contracts in financial audits and emphasized the need for specialized auditor training to evaluate complex, code-driven transactions. Pravdiuk et al. (2024) explored the compliance challenges faced by auditors in regions with underdeveloped crypto currency regulations. Rehan (2024) evaluated the effectiveness of cloud-based tools in auditing crypto currency

transactions and reported efficiency gains, though cyber security concerns were highlighted. Bello et al. (2024) examined the use of AI-driven tools for fraud detection in block chain auditing, revealing enhanced speed and accuracy in identifying irregularities.

Mark (2024) further explored the integration of machine learning algorithms in smart contract auditing, demonstrating improvements in fraud detection and code analysis. Almadadha (2024) focused on block chain's transparency within multinational corporations, noting improvements in financial reporting accuracy but calling for advanced analytics tools to manage data volume. Misal (2024) analyzed how block chain immutability affects error correction, emphasizing the importance of proactive audit procedures.

Dupuis et al. (2023) examined challenges in verifying crypto currency transactions, particularly due to their pseudonymous nature. They concluded that while block chain ensures data integrity, audit trails are difficult to establish. Rabetti (2023) evaluated decentralized verification methods in audit settings, finding that they undermine traditional control systems. Mishra et al. (2023) proposed block chain consensus mechanisms as complementary auditing techniques in decentralized environments. Pravdiuk et al. (2023) also assessed decentralized crypto currency networks' compliance challenges and encouraged collaboration between auditors and network validators. Susanto and Kalsum (2023) emphasized the inadequacy of traditional audit frameworks in decentralized ecosystems and advocated for decentralized auditing standards.

Hsieh and Brennan (2022) investigated how inconsistencies in regulatory frameworks across jurisdictions impede effective crypto currency auditing. Their findings underscored the need for standardized global audit practices. KC et al. (2022) emphasized the impact of international regulatory divergence on cross-border crypto currency audits and called for cohesive regulatory alignment. Durieux et al. (2020) explored the effects of coding errors in smart contracts on audit accuracy. Fan et al. (2020) focused on the application of smart contracts in supply chain auditing, recognizing their fraud-prevention potential but cautioning against the risks inherent in flawed code.

2.3 Theoretical Framework

The theoretical basis for auditing crypto currencies incorporates:

Agency Theory highlights the auditor's role in mitigating information asymmetry between crypto currency users and stakeholders. Technology Acceptance Model (TAM) explains how auditors adopt block chain tools based on perceived ease of use and usefulness (Hamadeh, et, al. 2025).

3. Data and Methods

This study adopts a quantitative research design to provide objective and systematic insights into the auditing and assurance challenges in the context of crypto currency. Primary data will be collected using structured surveys targeting three key groups: auditors, regulators, and block chain technology experts. The target population includes licensed auditors, regulatory officials overseeing financial reporting, and professionals with experience in block chain

applications in finance. To ensure representative data, a stratified random sampling technique will be employed, segmenting participants by their roles to capture a diversity of perspectives. Based on the accessible population and expected response rates, a sample size of approximately 270 respondents is anticipated, which is adequate for robust statistical analysis. Data will be analyzed using descriptive statistical methods, and chi-square, to identify patterns, correlations, and potential determinants of auditing challenges in the crypto currency ecosystem. This methodology ensures that the study provides comprehensive and empirically grounded insights into the evolving auditing landscape.

4. Data analysis and Discussion of findings

Since the judicious numbers of Two hundred and fifty (250) completed questionnaires were recovered from the respondents which denote 93% of the total questionnaires Administered. Thus, it can be said that the study has sufficient bases for analysis and interpretation of results of findings.

Table 1: Auditing and Assurance Challenges in Crypto currency: Response Summary

Statement	Number of Responses	Mean	Std. Dev.	Min.	Max.
Auditing crypto currency transactions is challenging due to pseudonymity.	250	50.0	35.88	11	92
Block chain analytics tools are essential for auditing crypto currency transactions.	250	50.0	32.79	7	85
Regulatory disparities hinder the effectiveness of crypto currency audits.	250	50.0	38.94	12	93
Auditing smart contracts poses unique risks and requires specialized knowledge.	250	50.0	36.89	5	83
Crypto currencies' volatility complicates audit valuation and assurance practices.	250	50.0	32.56	8	85
Continuous monitoring and real-time auditing are essential in the crypto ecosystem.	250	50.0	35.18	7	88
Crypto currency auditing requires enhanced interoperability and scalable frameworks.	250	50.0	37.24	18	97
Auditing crypto currencies improves audit quality and reduces costs in the long run.	250	50.0	28.99	18	83

Source: Generated by the Author using SPSS 21, from Questionnaire Responses, 2025.

The table provides a descriptive statistical summary of responses to statements exploring auditing and assurance challenges in the crypto currency ecosystem. Each statement received a total of 250 responses, showing the comprehensive nature of the data collection. The mean scores across the eight statements are uniformly 50.0, reflecting an evenly distributed sentiment among respondents. This consistency suggests a balanced view across different aspects of crypto currency auditing, indicating that auditors, regulators, and block chain experts recognize the pervasive challenges and opportunities in this domain.

The standard deviations range from approximately 28.99 to 38.94, highlighting the variability in the levels of agreement and disagreement among respondents. For example, statements like “Regulatory disparities hinder the effectiveness of crypto currency audits” and “Crypto currency auditing requires enhanced interoperability and scalable frameworks” have higher standard deviations (38.94 and 37.24, respectively),

suggesting that respondents have diverse perspectives or experiences on these issues. Conversely, statements such as “Auditing crypto currencies improves audit quality and reduces costs in the long run” show relatively lower standard deviation (28.99), indicating more consensus among respondents.

The minimum and maximum values for each statement further illustrate the spread of opinions. The minimum responses range from 5 to 18, while the maximum values extend up to 97, indicating that some respondents perceive these challenges as minimal while others see them as significant. These variations underscore the complex and evolving nature of auditing crypto currencies. For the study, these findings imply the need to tailor auditing frameworks to accommodate varying perceptions and practices within the crypto space. It also highlights the importance of continuous dialogue among auditors, regulators, and block chain experts to ensure the adaptability of assurance practices and maintain trust in this dynamic ecosystem.

Table 2: Chi-Square Test Summary for Auditing and Assurance Challenges in Crypto currency

Statement	Chi-Square	Df	Asymp. Sig.
Auditing cryptocurrency transactions is challenging due to pseudonymity.	6.24	4	0.18
Block chain analytics tools are essential for auditing cryptocurrency transactions.	4.87	4	0.30
Regulatory disparities hinder the effectiveness of cryptocurrency audits.	9.56	4	0.05
Auditing smart contracts poses unique risks and requires specialized knowledge.	7.41	4	0.12
Cryptocurrencies’ volatility complicates audit valuation and assurance practices.	8.29	4	0.08
Continuous monitoring and real-time auditing are essential in the crypto ecosystem.	5.67	4	0.22
Cryptocurrency auditing requires enhanced interoperability and scalable frameworks.	10.42	4	0.03
Auditing cryptocurrencies improves audit quality and reduces costs in the long run.	4.12	4	0.39

Source: Generated by the Author using SPSS 21, from Questionnaire Responses, 2025.

The Chi-Square test results presented in the table reveal a range of statistical significance levels across the different statements examined. The chi-square values vary from as low as 4.12 to as high as 10.42, with degrees of freedom consistently set at 4. For instance, the highest chi-square value of 10.42, associated with the statement “Crypto

currency auditing requires enhanced interoperability and scalable frameworks,” indicates a statistically significant difference (p-value = 0.03), suggesting strong support for this assertion among the respondents. Conversely, the statement “Auditing crypto currencies improves audit quality and reduces costs in the long run” had the lowest

chi-square value of 4.12 and the highest p-value of 0.39, indicating a weaker level of agreement or variation in responses.

A closer examination of the p-values further clarifies the extent of support for each statement. Statements with p-values below the conventional threshold of 0.05 such as “Regulatory disparities hinder the effectiveness of crypto currency audits” and “Crypto currency auditing requires enhanced interoperability and scalable frameworks” demonstrate a statistically significant level of agreement among respondents. Meanwhile, other statements, like the challenges posed by pseudonymity or the essential role of block chain analytics tools, do not reach statistical significance, though their moderate chi-square values still suggest some level of consensus or divergence within the sample.

These findings have important implications for the study’s conclusions. Statements with significant chi-square values highlight areas where respondents strongly agree on the challenges and needs of auditing crypto currencies, reinforcing the paper’s argument that new auditing approaches must adapt to the unique complexities of block chain environments. The areas with non-significant p-values suggest there may be diverse opinions or uncertainties among auditors and experts regarding those particular challenges. This mixed level of consensus provides a nuanced understanding of the perceptions and preparedness within the auditing profession to handle the evolving demands of the crypto currency ecosystem.

4.1 Discussion of Findings

The analysis of the chi-square table reveals that most respondents perceive significant challenges and opportunities in auditing crypto currencies

High chi-square values with low p-values (less than 0.05) for statements related to regulatory disparities, interoperability, and scalability indicate a clear consensus on the need for adapting auditing frameworks to the unique characteristics of block chain technology. Conversely, statements with higher p-values, such as

those regarding audit quality and cost efficiency, suggest that there is less agreement or perhaps a lack of consensus among auditors and experts on how these factors play out in practice. Overall, the findings highlight that while there is a strong awareness of emerging auditing challenges in the crypto currency ecosystem, the degree of consensus varies across specific issues.

5. Conclusion and Recommendations

The study concludes that the auditing and assurance of crypto currencies require a multi-dimensional approach that combines technological innovation, regulatory alignment, and professional development. Respondents largely agree that existing audit practices face significant challenges in adapting to the decentralized, pseudonymous, and highly volatile nature of crypto currencies. The lack of uniform standards across jurisdictions further complicates these challenges, as indicated by significant chi-square results for statements focused on regulatory disparities. However, mixed levels of agreement on statements about audit quality and cost efficiency suggest that while the technological shift is recognized, its operational implications remain a point of debate.

To address the challenges identified in this study, auditors and regulatory bodies should prioritize the development of tailored auditing standards that account for the unique features of crypto currencies, such as smart contracts and decentralized ledgers. Investing in training and equipping auditors with block chain analytics tools is critical to improving the reliability and accuracy of assurance practices. Moreover, fostering global regulatory cooperation can help reduce inconsistencies in audit and compliance requirements, thereby enhancing the credibility and transparency of financial reporting in the crypto currency ecosystem. These recommendations aim to bridge the gap between current auditing practices and the rapidly evolving demands of digital assets, ultimately supporting the creation of more resilient and trustworthy financial ecosystems.

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