Integrating blockchain technology in financial auditing: A review of transparency, audit efficiency, and skill gap—a case study of Tanzania Breweries Limited

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ABSTRACT

This research investigates the implications of blockchain technology for financial audit at Tanzania Breweries Limited (TBL). With dramatic movements towards digitalization and technological advancements, there has been increased concern about data security, credit and financial information, and the need for cybersecurity, as well as for efficiency and integrity in auditing practices. Following this shift in the financial and accounting sector, blockchain presents an opportunity to enhance the transparency, efficiency, and integrity of data in auditing practice, thereby promoting investor confidence and ensuring the sustainability of the business organization. Researchers used purposive sampling to arrive at a sample of 150 respondents selected from a total population of 1231 employees working at TBL. Data was collected by questionnaires and analyzed through descriptive analysis with the aid of SPSS. Using a quantitative research methods approach, this study assesses the effect of blockchain on audit efficiency through enhanced transparency and improved efficacy and highlights a skill gap for its effectiveness. This study was based on the Technological Acceptance Model and the Diffusion of Innovations Theory. Findings reveal a statistically significant relationship between blockchain adoption and audit efficiency. However, most auditors in developing nations face a critical skills gap that hinders the full potential of blockchain audit. The study concludes that while blockchain holds transformative potential, its successful implementation requires robust training, governance, a sound regulatory framework, and a strategic partnership with leading fintech companies.

Keywords: Audit Practices, Blockchain Technology, Efficiency, Financial Audits, Transparency, Tanzania Breweries Limited

I. INTRODUCTION

The financial and accounting sector has been transformed by technological advancements in the global landscape (Smith & Castonguay, 2020). The rise of blockchain technology, a distributed ledger technology (DLT), marked a pivotal development at its core, promising high transparency, efficiency, and data security in financial transactions. Globally, many organizations are leveraging investments in blockchain technology to modernize auditing processes, reduce fraud, and enhance data integrity (Rozario & Thomas 2019).

Given blockchain's potential to provide an immutable, transparent, and decentralized ledger that can redefine trust in digital transactions, most well-established firms worldwide are struggling to integrate it into their systems to achieve optimal results (Alassuli, 2025). For example, in the United States, adoption of blockchain technology in financial auditing has gained momentum with numerous firms experimenting with its applications (Ejairu et al., 2024).

For instance, the big four accounting firms have begun to explore blockchain for real-time auditing and fraud detection (Dai & Vasarhelyi, 2017). European states exhibit a growing interest in blockchain, with regulatory bodies evaluating its potential to enhance accountability and compliance in financial reporting (Alles & Gray, 2020).

Moreover, in Asian countries, China and Singapore are leading the movement towards the adoption of blockchain technology, focusing on a regulatory framework that facilitates innovation while preserving data integrity (Zhang et al., 2025; Appelbaum & Nehmer, 2020). Also in Africa, adoption of blockchain is still in its embryonic stages. Still, it is rapidly gaining traction as a solution for various challenges, including fraud and inefficiencies in the financial system (Helliar et al., 2020).

Furthermore, in East Africa, the potential of blockchain to transform the financial landscape is significant. Countries like Kenya and Uganda have begun exploring blockchain applications across sectors such as agriculture and supply chain management (Mandal et al., 2020). Blockchain plays a pivotal role in promoting financial inclusion and enhancing transparency in government transactions across the region (Mukherjee et al., 2022)

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On the other hand, in Tanzania, the implementation of blockchain technology in the accounting and auditing sector is becoming increasingly relevant. The country is facing some problems related to data integrity, fraud, and inefficiencies in financial reporting (Mandal et al., 2020). TBL, one of the largest beverage companies in the country, has begun to explore the application of blockchain technology in its financial audits.

By executing blockchain, TBL maintains the transparency and traceability of its financial transactions, thereby enhancing stakeholder trust and responsibility. This is done by utilizing a decentralized ledger for recording transactions related to inventory management, sales, and financial reporting to guarantee real-time access to data related to various transactions, and enhancing transparency in the supply chain and economic process to all stakeholders (TBL, 2022).

Notwithstanding the documented achievements of the potential of blockchain to revolutionize auditing, as further emphasized by research indicating its ability to enhance supply chain transparency, reduce operational cost, and improve overall organizational efficiency (Saberi et al., 2019), there remains a significant gap in understanding the implications of blockchain technology for auditing practices in Tanzania.

Recent studies have explored less the unique challenges and opportunities facing Tanzania firms in the blockchain technological arena (Mandal et al., 2020). This study intended to fill the gap by addressing the practical application of blockchain at TBL, assessing its impact on financial audit, and offering insights to guide other firms in adapting blockchain technology. Therefore, through leveraging blockchain technology, the study will endorse a transformative shift in how auditing is conducted in Tanzania, ultimately promoting transparency, stakeholder trust and operational efficiency

1.1 Statement of the Problem

The bright and promising future of financial auditing in Tanzania rests on a robust auditing system, supported by innovative technologies such as blockchain, to ensure high transparency, efficiency, accuracy, data integrity, and trustworthiness **(**Appelbaum & Nehmer, 2020**).** Yet, the current state of financial auditing faces significant challenges rooted in over-reliance on traditional accounting methods, which are insufficient to detect fraud and financial irregularities in this era of increasingly complex financial transactions and the growing incidence of fraud in the financial sector.

This poor technology integration leads to inefficiency, increased vulnerability to fraud, and questionable data integrity in the accounts and audit sector, threatening stakeholders' confidence and accountability. Moreover, the complexity of financial transactions and the rise of sophisticated cyber threats further exacerbate these challenges, making traditional auditing methods obsolete **(**Zhang, 2020).

If the government, regulatory body, and stakeholders do not implement initiatives aimed at timely corrective action to rescue the situation, the risk of financial loss and damage to reputation among Tanzanian firms will increase, which will eventually erode their competitive advantages and chances of survival in the prevailing global market. With the advancement and shift of the universe towards digitalization, accounting professionals are expected to meet the growing demand for transparency in the digital era. Hence, the inadequate adoption of innovative audit systems, such as blockchain technology, is an urgent challenge that must be addressed effectively (Coyne & McMickle, 2017).

It is on this ground that this study was ambitious to carry out a survey aimed at exploring how the adoption of blockchain technology can enhance the auditing process at Tanzania Breweries Limited (TBL) by finding out the effect of blockchain technology on audit efficiency and transparency, while identifying the existence of a skill gap for navigating into blockchain auditing among Tanzanian auditors. This will foster a more efficient, convenient, and transparent auditing environment that will guarantee and strengthen financial reporting integrity as well as the trust and confidence of stakeholders.

Based on technology acceptance model (TAM), which try to explain how auditors and financial manager can embrace block chain technology in auditing system, Insights of this study will bridge the knowledge gape between risk and benefit of innovative auditing system and act as basis for practitioners to impose sophisticated audit systems and regulation that will ensure high transparency and effective auditing process for flourishment of financial auditing in Tanzanian firms.

1.2 Research Objectives

i. To assess the effect of blockchain technology on the efficiency and effectiveness of financial audits at TBL
ii. To identify the Skill Gaps and Training Needs for effective blockchain audit in Tanzania
iii. To highlight the role of blockchain in enhancing Transparency and Accountability in Financial Reporting

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II. LITERATURE REVIEW

2.1 Theoretical Review

The theoretical framework of this study rests on the Technology Acceptance Model (TAM) and the Diffusion of Innovations theory, developed by Davis (1989) and Rogers (2003), respectively. The theory classifies adopters from innovators to laggards, providing insights into the adoption curve of blockchain within an organization (Rogers, 2003).

2.1.1 Technology Acceptance Model (TAM)

The TAM provides a framework for how people adopt new technology based on their perceptions of the technology. According to Davis (1989) and Chen (2023), perceived usefulness and ease of use are key determinants of users' intention to adopt new technology. In our study based on auditing assignments, this model is of paramount importance for understanding auditors' perceptions of blockchain's utility in promoting auditing efficiency and accuracy. Meaning that if they perceive it as compatible skills, they will respond positively, fostering its adoption. Still, if they perceive it as a threat to their personal ego and as incompatible or sophisticated technology that might complicate their auditing assignment, they will oppose it critically (Chen, 2023).

Based on this study, this theory fits because integrating the trust model, which incorporates security and privacy attributes, further augments TAM in assessing blockchain acceptance, as discussed by Hakami et al. (2024). Furthermore, extended TAM combines social influence processes, like subjective norms, voluntariness, and image, as well as cognitive instruments like job relevance, output, quality, perceived ease of use and results demonstrability to explain technology adoption **(**Liu et al., 2023)

2.1.2 Diffusion of Innovations Theory

Stands on the arguments of Rogers (2003) and Boateng et al. (2017): the adoption of new technology substantially influences effective communication among stakeholders. Key components include the communication channel, social system, and perceived benefits of innovation (Boateng et al., 2017). According to Helliar et al. (2020), Proper communication channels, social systems, and perceived benefits of innovation are critical to the spread of technology and to predicting the extent to which various stakeholders in the value chain can support it.

This framework provides input for examining the barriers and facilitators to the adoption of blockchain technology in auditing among Tanzanian firms, notably TBL Company, which is navigating a noteworthy technological shift. The theory classifies various adopters from innovators to laggards, providing insights into the adoption curve of blockchain within an organization (Rogers, 2003). The rate of adoption is also influenced by not only organizational context, like leadership support and availability of resources, which play a critical role in the diffusion process, but also other elements like relative advantages, compatibility, complexity, trial ability and observability (Mwewa et al., 2025) Therefore this theory is suitable in explaining about diffusion of blockchain technology in auditing practice.

2.2 Empirical Review

2.2.1 Impact of Blockchain Technology on Audit Efficiency

Based on the ground that blockchain outputs are immutable which facilitates real-time data verification, empirical studies pinpoint its significant ability in promoting audit efficiency, data security and trust as compared with traditional auditing process (Helliar et al., 2020) Also, recent studies show that blockchain technology is one of technology that appeals in the quality control and assurance in the field of audit and accounting (Smith et al., 2020; Schmitz & Leoni, 2019).

By simplify work of auditors and accountant, it enables the use of large sample, carrying larger amount of data and transaction at a time, allow critical examination and providing more accurate results that may lead auditors to give a correct opinion in the financial statement about state of affairs as well as any incidence of misappropriation or fraud in the financial statement (Chen, 2023). Moreover, research suggests that blockchain audits reduce audit costs and enhance the reliability of financial information, leading to more efficient and effective audits (Bakshi, 2024).

Also, the application of smart contracts in auditing automates compliance tests and reduces the need for manual testing (Alles & Gray, 2020). This eventually simplifies audits, improves data privacy, and enhances continuous-auditing-enabled blockchain, which guarantees real-time assurance, reduces the need for periodic audits, and improves overall efficiency (Dai & Vasarhelyi, 2017). This aligned with the TBL objective of improving operational performance. But still, it has not yet been thoroughly researched in the Tanzanian context to examine the extent to which blockchain may enhance audit efficiency in Tanzanian firms.

However, the extent at which blockchain enhance audit efficiency in Tanzania remained inadequate explored, hence there were need for intensive study analyzing how and to what extent blockchain audit can revolutionize the

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auditing practice in Tanzania, factors hindering adoption and integration of blockchain audit in Tanzania, and what should be done by policy makers and regulators to achieve the benefits of blockchain audit that are proclaimed in other developing nations.

2.2.2 Role of Block Chain in enhancing Transparency and Accountability in Financial Reporting

Blockchain technology has been recognized for its potential in enhancing accountability and transparency in financial reporting among organizations that have adopted it, as evidenced by major companies from developed countries, notably the United States of America, China, and Singapore (Dai & Vasarhelyi, 2017). Based on the argument of López-Pimentel et al. (2021), its potential has been influenced by a clearer audit trail, which enhances stakeholders' trust.

Furthermore, blockchain's transparent and tamper-proof ledger structure enhances stakeholder trust, making it more attractive in the world of information and technology (Boateng et al., 2023). Moreover, according to Dai & Vasarhelyi (2017), Blockchain-based systems can facilitate continuous auditing, provide real-time assurance, and reduce the risk of fraud and errors. All this shows why companies should adopt it for reliable financial reporting.

On the other hand, Bakshi (2024) found that blockchain empowers stakeholders to monitor financial activities and hold organizations accountable for their actions, as it can improve transparency, while Christidis and Devetsikiotis (2016) found that blockchain can improve transparency. Concluded that blockchain can improve the accuracy and completeness of financial information, enhancing the reliability of financial reporting. From these findings, it is clear that integrating blockchain into audit enhances efficiency, transparency, accountability, and confidence among organizations, thereby improving investors' ability to manage agency-principal relationship challenges.

But from Tanzania's perspective, there is a knowledge gap regarding the integration of blockchain audit, due to a lack of empirical studies addressing the specific challenges organizations are likely to face when implementing it, given our limited technological capacity. Therefore, research aimed to close the gap by examining the context of TBL, including existing information and technology infrastructure, as well as cultural issues that might affect the success of blockchain in achieving transparency and shareholder trust in the financial arena.

2.2.3 Skill Gaps and Training Needs for Effective Blockchain Audit in Tanzania

According to Kostić and Sedej (2022), for blockchain technology in auditing to run smoothly, specific competence in the skills set for its effective utilization is required. Zhao et al. (2021) emphasize the need for appropriate skills, as blockchain will not work if the personnel involved are ignorant of its attributes and do not understand it as a technology.

This finding is relevant to the Tanzania setting, especially at TBL Company, since assessing auditors' current capabilities and identifying knowledge gaps will inform training needs assessment for the successful implementation of blockchain technology (TBL, 2022).

However, existing research often overlooks auditors' unique perspectives in the rapidly growing market, creating a significant disparity in the auditing process (Hakami et al., 2024). By addressing this notable gap, the way will be opened for TBL and other Tanzanian companies in a similar situation to develop viable professional development strategies that leverage blockchain technology to enable effective audit and equip their employees with the right competencies to engage in it.

Based on the study above, it is clear that there is a practical gap regarding how blockchain can be leveraged in Tanzanian firms, as well as the challenges and opportunities it offers that less developed firms can benefit from, given their current low levels of infrastructure and technology development. Moreover, there is a knowledge gap regarding the content and coverage of appropriate training to enhance the leverage of blockchain auditing in Tanzania by equipping accountants and auditors in TBL and other firms with the right competence, confidence, and willingness to adopt blockchain technology.

This had inspired a study to help close these gaps by addressing their operational efficiency and training needs for successful blockchain adoption in Tanzania. Therefore, the theoretical and empirical sections emphasize the transformative benefits of blockchain in the audit and accounting sector while highlighting the critical gaps in realizing its practical application in organizations like TBL. By addressing the highlighted gap, this study will offer actionable insights that enable the successful adoption of blockchain technology in auditing practices, thereby guaranteeing efficiency and accountability.

III. METHODOLOGY

3.1 Research Design

This study deploys a quantitative research design to provide a comprehensive understanding of the impact of blockchain technology on financial audits at Tanzania Breweries Limited (TBL). This approach allows the analysis of

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statistical outcomes related to the effect of blockchain on auditing efficiency, transparency and accountability. Hence, it provides insights into the contextual understanding of the extent to which blockchain influences financial audit practices

This method permits a more robust and comprehensive analysis of the what and why of blockchain adoption in auditing (Creswell & Plano Clark, 2017). While quantitative data provides insights into the extent to which it affects auditing efficiency and transparency, qualitative data offers a deeper understanding of the underlying factors that influence these outcomes. According to Yin (2018), this approach is suitable for studying complex phenomena in real-world settings, such as blockchain adoption.

3.2. Study Area

A study was conducted on TBL, a subsidiary of AB InBev, one of the largest brewers in the world, with operations in over 50 markets and present in 15 African countries (TBL website). TBL is one of the largest brewers, with four branches in Mwanza, Arusha, Mbeya, and Dar es Salaam, and two subsidiaries: Kibo Breweries Limited, a wholly owned subsidiary of TBL, and Tanzania Distillers Limited, a spirituous liquor company that produces popular spirits in Tanzania. TBL owns a controlling 65% interest as of June 2025 (TBL, 2022). TBL plays a pivotal role in the Tanzanian economy by providing employment to more than 1300 people, supporting charity, and generating substantial tax revenue for the government. Company operations face complex financial and regulatory environments, making it an ideal setting for examining the integration of blockchain technology into auditing practices. Current developments in the brewing industry call for greater scrutiny of financial transparency and accountability, amid growing consumer expectations and legislative requirements.

This study adopts TBL to provide insight into how blockchain technology can enhance the audit process, addressing challenges related to data integrity and fraud prevention. Furthermore, TBL's commitment to innovation and its willingness to explore new technology make it a relevant and insightful case for studying blockchain adoption in auditing.

3.3 Targeted Population and Sample Size

According to the TBL annual report as at 31/12/2024, it had 1232 employees working across various departments (TBL, 2022). The study used all 1232 employees as the targeted population. Furthermore, the study selected a sample of employees directly involved in financial, auditing, and information technology procedures, who are expected to provide insights into the practical implications of implementing blockchain technology. Also, the study selected a sample of 248 employees from the Finance, Internal Audit, Compliance, and Information and Technology departments of TBL to gain a comprehensive representation of viewpoints on blockchain integration in financial audit.

The study deliberately focused on the selected sample to ensure validity by isolating a population more closely aligned with the study objectives. Purposive sampling enhances the study’s validity and allows an appropriate conclusion regarding the adoption and impact of blockchain in financial and auditing processes (Bryman, 2016). The sample size was selected to provide adequate statistical power to detect meaningful effects and relationships (Field, 2013). Statistical power assures that the study is sufficient to identify true associations (Cohen, 1992).

3.4. Data Collection Techniques

Data was collected using structured survey questionnaires, which were used to assess participants' awareness, perceptions, and experiences regarding blockchain technology in accounting and auditing. The study chose a structured questionnaire to capture respondents' interest and allow them to focus on precise, valuable information (Bryman, 2016). Also, based on the nature of the respondents, the study was restricted to this questionnaire type to capture their interest and increase response rates and correct answers, as respondents may perceive the mode as time-saving and convenient.

3.5 Data Analysis

The study used descriptive statistics (mean and standard deviation) to summarize quantitative data related to the perception and experience of participants, while the relation between the adaptation of blockchain and audit efficiency was analyzed by inferential statistics through regression analysis.

3.6 Validity and Reliability

The questionnaire was undergoing a review by other professionals in the field of accounting and blockchain technology. The pre-review was conducted to enhance validity and ensure that the questionnaire designed provides accurate information that meets the study's objectives.

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Moreover, the questionnaire was piloted after being double-checked and reviewed to gain significant insights into its attractiveness, which may increase respondents' willingness to participate in the study. However, internal consistency was assessed using Cronbach's Alpha, with $\alpha > 75$ to ensure that questionnaire items yield stable and consistent results. The results show that the Cronbach's alpha coefficient for blockchain adoption was 0.813, above 0.7, indicating good internal consistency.

3.7. Ethical Guideline

The study complied with the ethical guidelines throughout the research process. Informed consent was obtained from the participant; confidentiality was maintained; and data collected from the research were restricted to the study's objectives, as agreed with the respondents. Moreover, respondents' names and titles were not disclosed during questionnaire completion.

IV. FINDINGS & DISCUSSION

4.1. Response Rate

One hundred and fifty (150) respondents returned completed questionnaires out of 248 distributed to participants in the Finance, Internal Audit, Compliance, and Information and Technology departments. This response rate of 60% is appropriate, as it exceeds the standard 50% suggested by Mugenda and Mugenda (2003).

4.2 Descriptive Analysis

4.2.1 Impact of Blockchain on Audit Efficiency and Effectiveness

This aspect was analyzed using regression output and a Likert scale to assess its impact on the financial audit at TBL, as explained below. From the table below, it seems that the efficiency of blockchain audit is viewed in reducing discrepancies in financial reporting, with a mean score of 4.3. This is a critical area in auditing, as it helps ensure that data are consistent, comparable, and relevant. Moreover, over-efficiency seems to imply cost, as it reduces time spent on various activities while enabling the auditor to handle a large set of complex data easily, compared to a manual traditional audit that necessitates the application of a sample, which subsequently exposes the audit to limitations with respect to sampling errors.

These findings align with those of Gökoğlan et al. (2022), who appraise blockchain technology for practical accounting and auditing operations, while reducing costs and risks. However, Alshater et al. (2025) raise concerns about the possibility of error due to garbage-in, garbage-out associated with the risk of immutable data, hence a call for robust data verification and validation at the point of entry to enjoy the efficiency offered by blockchain auditing technology.

Table 1

Perception of Blockchain on Audit Efficiency

s/n/	**Aspect of Blockchain Implementation**	**Mean Score (1-5)**	**Standard Deviation**
	Facilitates real-time data verification	4.2	0.7
	Reduces time spent on audit processes	4.0	0.8
	Decreases discrepancies in financial reporting	4.3	0.6

4.2.3 Perceptions about blockchain Efficiency, Transparency and skill gap

The study used descriptive statistics to summarize respondents' perceptions and experiences regarding blockchain adoption at TBL. As shown in the table below, the researcher reported the mean and standard deviation for different aspects of blockchain technology, assessed using a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

From the table below, based on mean scores for perceived audit efficiency (M=4.39) and transparent, and (M=4.77) it is clear that participant believed that blockchain has positive impacts in these areas, while the moderate score for skill gap highlight possibility of challenges in adopting the technology as justified by the lowest mean score of knowledge attributes about blockchain technology at TBL that is mean score of 2.38.

These findings partially concur with the arguments of Low and Venkatesh (2020), who claimed that while some decentralised applications gain substantial traction; most remain underutilised, potentially reflecting comparable challenges in comprehending the full potential of blockchain.

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Table 2

Descriptive Statistics of Blockchain Implementation at TBL

s/n	Aspect	Mean Score (1-5)	Standard deviation
	Blockchain enhances audit efficiency	4.39	0.75
	Blockchain improves transparency in financial reporting	4.77	0.62
	Auditors at TBL have adequate knowledge of blockchain technology	2.38	1.05

4.3 Regression Analysis

Regression output supplements the above findings by showing a significant positive correlation between blockchain adoption and audit efficiency (see Table 3 below). The regression model depicted in the table below indicates a significant statistical relationship between blockchain adoption and audit efficiency ($p < .001$).

The unstandardized coefficient of 0.69 implies that, under ceteris paribus, a unit increase in blockchain adoption increases audit efficiency by 0.69 units. The *R*2 value of 0.72 indicates that 72% of the variance in audit efficiency is explained by blockchain adoption, offering a reasonably strong model fit.

Table 3

Regression Analysis of Blockchain Adoption and Audit Efficiency

Variable	*Unstandardized Coefficient (B)*	*Standard Error (SE)*	*t*	*p*
Blockchain Adoption	0.69	0.06	9.13	<.001
Constant	1.20	0.15	3.80	<.001
*R*2	0.72			

4.3.1 Impact of Blockchain Audit on Transparency and Accountability

The second objective was to highlight the role of blockchain in enhancing transparency and accountability in financial reporting. Results from descriptive statistics indicate strong agreement among participants regarding the ability of blockchain to improve transparency and accountability (Mean = 4.77, SD = 0.62); see Table 2 above. This is because all transactions are permanently recorded and cannot be altered, thereby providing a clear audit trail and trust among stakeholders. This has been supported by recent literature, including Schmitz and Leoni (2019), which identified transparency as the most influential element for audit efficiency.

4.3.2 Existence of Skills and Training gap for effective blockchain audit in Tanzania

From Table 2 above, respondents strongly disagree with the notion that an auditor at TBL has the required skills for blockchain auditing (mean score of 2.38 and Standard deviation of 1.05). This indicates the need for a planned training program. The study further explored the skills most wanted, or those participants feel they need to be capacitated, with results shown in the table below, which summarizes participants' views on the necessity of a training program on blockchain technology.

From the table below, respondents expressed a high demand for a training program focused on general awareness of blockchain (86%). This implies that participants have a limited understanding of blockchain; as a result, it is difficult for them to navigate it at all. Hence, there are critical skill gaps that should be addressed to facilitate the effective use of blockchain in auditing. A majority (86%) of responses, as shown in Table 2 above, with a mean score of 2.38, strongly disagreed with the statement that auditors possess the required skills to apply blockchain technology in auditing.

Table 4

Training Needs for Effective Blockchain Integration

s/n	Training Area	Percentage of Participants
1	Smart contract auditing	48%
2	Cryptographic validation	59%
3	Blockchain security	63%
4	General blockchain awareness	86%

4.4 Discussion

4.4.1 Impact of blockchain on Audit Efficiency

The descriptive statistics support the regression results, which indicate a significant relationship between blockchain adoption and audit efficiency (mean = 4.39, SD = 0.75), with a coefficient of 0.69 ($P < 0.0001$). These results stem from inherent characteristics of blockchain, such as immutability and real-time accessibility, thereby reducing the time spent on traditional manual audit procedures, such as reconciliation and verification (Zhao et al.,

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2021). Note that blockchain alters how auditors access data by promoting a transparent ledger, reducing the need for complex reconciliation processes.

Furthermore, automation of certain activities through smart contact also contributes to improve efficiency as proposed by PWC, in their analysis reported that blockchain reduces manual reconciliation time by 90%, eventually improve the efficiency of audits, allow for audits covering the whole population instead of sampling, and enable continuous audit process hence reduce limitations of audit associated with audit sample (Elommal & Manita, 2022).

Although blockchain may automate and streamline processes, it doesn't eliminate the need for professional judgment, as it verifies transactions but doesn't examine the internal controls underlying financial reporting (Coyne & McMickle, 2017). Hence, the remaining variance can be explained by professional judgment and audit skepticism. These findings align with the allegations of Farias et al. (2018), who emphasize integrating auditing with operating processes for effective monitoring, reducing the time required for both information retrieval and verification of various transactions during auditing and other financial controls (Farias et al., 2018).

Moreover, for it to be effective, auditors must have the knowledge to evaluate the reliability of blockchain systems and recognize potential risks, such as vulnerabilities in smart contract code. Limited expertise, indicated by a lower mean score of 2.38, creates a significant barrier for auditors to interpret and identify anomalies in blockchain data, undermining the efficiency gains.

4.4.2 Impact of Blockchain audit on transparency

The findings revealed that the unique features of blockchain technology provide the highest level of transparency in financial reporting. This has been agreed by various writers, who found that blockchain transparency improves stakeholder trust by reducing information asymmetry and empowering decision-making based on real-time data **(**Zhang et al., 2025). Also, the decentralized and distributed nature of blockchain promotes resilience and limits the risk of loss or manipulation. Additionally, the application of cryptographic techniques, such as hashing and digital signatures, further ensures the security and integrity of blockchain data (Kulothungan, 2025).

The immutability characteristic guarantees data integrity, provides a single source of truth, reduces the risk of fraud, errors, and manipulation, and promotes greater trust among stakeholders. On the other hand, transparency enables real-time access to information, reducing reliance on traditional, time-consuming verification methods (Christidis & Devetsikiotis, 2016). Also, Kulothungan (2025) found that it offers a transparent and temperature-resistant ledger that improves stakeholders' engagement and participation. Moreover, Jans et al. (2023) concluded that blockchain audit offers accountability and trust. This transparency empowers stakeholders to monitor financial activities and hold management accountable for their actions in a timely manner.

This is supported by Bakshi (2024) and Alshater et al. (2025), who found that blockchain can significantly reduce audit costs and improve the reliability of financial information. Moreover, as noted by Alles et al. (2018), the application of smart contracts in auditing automates compliance checks and reduces the need for manual testing. Therefore, in this context, Dai and Vasarhelyi (2017) concluded that continuous auditing empowered by blockchain offers real-time assurance, reduces the need for periodic auditing, and improves overall efficiency.

4.4.3 Existence of Skill Gap and Training Required for Effective Blockchain Audit in Tanzania

Based on the mean score of 2.38, it's clear that there is a significant skill gap among auditors in Tanzania in navigating the complexity of blockchain technology in auditing. This limits its effectiveness and efficiency; hence, if a nation seeks to leverage blockchain audit potential, it must invest in training to equip auditors with the skills needed for the smooth integration of blockchain. These findings concurred with those from Low and Venkatesh (2020), who claimed that most auditors lack the technological advancements necessary to reshape the auditing and accounting industry, and Jans et al. (2023), who insist on the need for equipping auditors with the skills required to navigate the evolving landscapes of digital technology effectively. Hence, a call for robust training programs

If the government, organizations, and stakeholders do not take the initiative to narrow the skills gap, they may risk falling behind competitors who have leveraged blockchain effectively for quality audits. Moreover, inadequate training may limit auditors' ability to verify transactions and analyze data, thereby failing to capitalize on the full potential of blockchain (Zhao et al., 2021). Therefore, although the future of blockchain is bright and exciting, organization are required to invest in comprehensive training programs ranging from blockchain principles to applications to capacitate auditors to navigate the new digital landscape of the auditing industry. Therefore, a comprehensive strategy comprised of training, infrastructure, mentorship, and a culture of creativity and innovation should be emphasized to uplift the ability of auditors to work on blockchain-related projects and increase collaborations with external expertise

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V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The adoption of blockchain technology into auditing practices at TBL represents a crucial advancement for accounting professionals, leading to a significant increase in efficiency, transparency and accountability. This study elucidates the transformative potential of blockchain to modernize the auditing process, thereby elevating the accuracy and reliability of financial reporting. However, unlocking this potential requires a proactive, strategic approach that cultivates a robust culture of collaboration with fintech leaders, fosters innovation, and invests in specialized training programs.

These initiatives would highlight the importance of adaptive strategies in a rapidly evolving technological landscape, ultimately positioning TBL as a trailblazer in the digital transformation of auditing. Furthermore, the successful implementation of blockchain can vastly improve TBL's operational capabilities, set a precedent for the wider accounting community, and illustrate a critical argument for embracing stakeholders' confidence. As a result of digital innovation, it is clear that organizations which prioritize innovation and adaptability will not only thrive, but will also redefine the standards of excellence in the accounting profession.

5.2 Recommendations

TBL should establish an innovation hub dedicated to blockchain applications. This will combine cross-functional teams like auditors, IT specialists, and data analysts to participate in developing blockchain solutions through a creative and experimental culture. TBL can create a tailor-made blockchain-based auditing process for its organization. Moreover, it should invest in a mentorship program that connects employees with blockchain experts to support succession planning and strengthen strategic partnerships with fintech companies specializing in blockchain solutions, enabling access to cutting-edge technology and innovative methodologies to stay at the forefront of digital transformation in auditing.

Reviewing internal policies to ensure data governance (security, integrity, and compliance with regulatory standards) is appropriate will improve confidence among clients and regulators. Also, it should reverse the employee training and career development policy to incorporate an ongoing training program that is essential for navigating the complexity of blockchain in auditing and financial reporting. While insisting on innovation and constant creativity to create a conducive environment for blockchain, which eventually improves efficiency, accountability, transparency and stakeholder trust.

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