

***Blockchain Applications in Enhancing Internal Audit Quality:
Analyzing An International Comparative Study***

تطبيقات البلوك تشين في تعزيز جودة التدقيق الداخلي : تحليل دراسة مقارنة دولية

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Abstract : This study examines the impact of blockchain technology on internal audit quality through an international comparative analysis of Switzerland and Turkey. Using survey data from internal auditors and detailed case studies of Migros Group and Türkiye İşBankası, the research finds that blockchain implementation leads to significant improvements in audit efficiency, error reduction, and cost savings. The results demonstrate that blockchain not only streamlines audit processes and enhances transparency, but also supports regulatory compliance and positions the technology as a core component of modern audit and governance frameworks. Based on these findings, several key suggestions emerge for both practitioners and researchers. Organizations should prioritize targeted training programs to equip auditors with the necessary blockchain and data analytics skills, ensuring effective adoption and ongoing competence as technology evolves.

Keywords:Blockchain Technology, Internal Audit Quality, Audit Process Automation, Regulatory Compliance.

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1. Introduction

Financial auditors are essential in the ongoing efforts to prevent fraud and detect irregularities in various financial processes. This study aims to comprehensively identify the key drivers and challenges faced when implementing Blockchain technology, which has the potential to significantly improve the overall quality of internal audits. Findings from the research indicate that a heightened awareness of Blockchain technology positively impacts its successful implementation within the realm of internal audits. Furthermore, it was discovered that the technology level of the finance function plays a crucial role in influencing the connection between the involvement of the CEO in auditing processes and the adoption of Blockchain in internal audits. This interrelationship highlights the importance of leadership and technological advancement in enhancing audit quality through innovative solutions.

Recent commercial successes of Bitcoin and other prominent public crypto-currencies have significantly shifted the attention away from the fundamental technology that enabled these transactions, which is known as Blockchain. A Blockchain can be defined as a distributed ledger that meticulously records the complete history of every transaction across a network of connected computers, ensuring transparency and security. In the domain of auditing, Blockchain technology possesses the remarkable potential to fundamentally redefine the landscape of attest services in ways that could not have been envisaged even a short few years ago. The implications of Blockchain technology are expected to have profound effects on the audit practice, particularly by enhancing the security of data, automating various processes, and significantly improving the overall quality of the audit. Within a Blockchain, transactions are validated through a series of intricate cryptographic hashes, which ensures their authenticity and integrity. These validated transactions are subsequently grouped together into a block, which is then added to the existing chain. This sophisticated process of adding a new block to the chain requires a substantial amount of computing power and considerable time. Due to the complexity and energy requirements involved, it becomes practically impossible for a malicious hacker to alter a transaction or compromise the integrity of the entire chain.

1.1. Background and Rationale

Pervasive relationships exist that any enterprise can affect businesses. As a result, quality audit buttresses the veracity, relevance, and materiality of financial and non-financial information flows, which transformed direct observations and indirect inferences via evidence of existence, control, possession, authentication, fairness, and integrity. Audit standards are generally acknowledged benchmarks for conservativeness, due care, rigor, skepticism, and professional judgment in assessing exposures, reserves, contingencies, and disclosures in financial accounting planning, recording, classification, summarization, and exposition systems and processes in order to certify conformity to industry best organizational capabilities or legal authority bounding constraints and materiality of existing and potential public interest risks and optimal benefits. Its members direct the policies of the institution, administer its activities, provide an oversight mechanism for the quality of audit process and reports, and review conformity to and changes of the internal regulatory framework, strategic planning and annual report of the Court of Auditors. At the same time, most countries' regulatory authorities, professional associations, sectorial alliances, corporate governance codes, rating agencies, and the investment community has widely recognized the need for

robust, transparent, and reliable financial information and the ensuing independent, objective, and effective audit examination process, tools, and opinion.

1.2. Research Objectives

Internal audit quality represents a fundamental aspect for the effective governance mechanisms of a firm. This is even more critical in an international environment, where professional standards might diverge and affect audit consistency. The present study aims at investigating whether the use of blockchain as an audit technology can influence internal audit quality. Amongst these, the use of Advanced Information Technology has disclosed a new theoretical and practical thread of research in relation to auditing. Over the past years, the application of blockchain has been emerging in this sector in relation to the audit function. However, several ethical and professional dilemmas are debated in the extant literature. For this purpose, four specific research goals are addressed herein for the first time. Firstly, a deep analysis of the mechanisms by which blockchain can be implemented in the auditing process is discussed. Secondly, the ethical dilemmas and professional risks involved in this practice are thoroughly discussed, as to the best of knowledge is a problematic under-researched issue. The third, is to empirically test the aforementioned effects, providing original comparative data from different countries. Fourth, the survey occurs since a significant part of the cognate literature is based on theoretical and speculative scenarios. The hypotheses are tested based on data from a survey of companies operating in two countries renowned for both their high number of family-owned businesses and their complex entanglement of business-political relationships.

1.3. Structure of the Study

In order to study how blockchain technology could enhance the quality of internal audit throughout multiple aspects across different countries, this research investigates the opinion of internal auditors, external auditors, and academics. These opinions are analyzed and compared to discover the consensus and contradiction of different views among the three parties. The study is divided into five parts. Apart from this introductory section, the second part reviews the previous works on the benefits of blockchain applications for internal audit, types of internal audit benefits, and possible barriers to these benefits, followed by the hypotheses generated from reviewing the literature. The two hypotheses outlined are investigated on consensus and difference of opinions among internal auditors, external auditors, and academics on the benefits from blockchain applications in terms of the impacts of confidentiality, integrity, and availability. The fourth part explains the design of data collection and presents the results of an international comparative analysis based on the data collected from Turkey and Switzerland. Finally, the study discusses the implications of the research results, their limitations, and recommendations for future research.

2. Literature Review

Trust in the audit has been weakened since the Enron scandal and subsequent epic scandals (Brender et al., 2018). To tackle this situation, various international professional audit organizations issue official documents, professional guidelines, or practice standards about internal auditors by articulating their responsibilities, mandatory attributes or the ways to achieve the desired service quality.

Research on the effects of audit quality has recognized various implications for business entities, as well as for macroeconomy. Although the audit quality concept is usually approached in classical studies through the impact of the audit profession or the demographic characteristics of the auditors, more recent accounting literature investigates the determinants and results of audit quality with a broader consideration. Internal audit, a part of the growing professionalization process, as an independent, effective and efficient control mechanism, regulates the internal control environment, ensures internal compliance, and contributes to the financial reporting process. On the other hand, the audit outcomes of both the entity-level internal audit activity and the transactional-level external audit activity, carried out by separate professional groups (internally: internal auditors, externally: statutory auditors), are examined by different paradigms. While the effects of external independent external auditing activities on audit quality have dominated the literature for a long time, some of the recent studies have suggested that internal audit quality is an important secondary-level factor underlying the vitality of external audit quality. In this context, various regulations have been enacted by national or supra-national sources within the frame of ensuring the aforementioned functional aspect of the internal audit profession. However, in the opinion of audit professionals and academicians, the expected level of development has not been reached from each country, and serious weaknesses still remain in the implementation of requirements. Previous studies generally take into consideration the classical determinants of audit quality, but the recent literature acknowledges the opportunity of further investigating this concept by examining the extent to which the internal audit function achieves this targeted quality level.

2.1. Internal Audit Quality

Being a “cornerstone” in oversight and governance, internal audit is responsible for evaluating the risk management procedures and the effectiveness in the setting of corporations. Internal audit is contributing to the company’s risk managing by providing financial and operational assessments on processes and the effectiveness of operation through enhancing disclosures and relevance of financial and non-financial reports. Internal audit quality (IAQ) is indorsed as its “capacity to support the board of directors and the audit committee with accurate information and objective assessments” and this leads to reliable financial reports and high transparency (M. DeSimone, 2017). To maintain this ability, the independence and objectiveness of the internal audit function must be assured, following required standards and a certain skill set. To have efficiency where on the other hand external auditors can easily experiment and rely on, coordination and supervision is required between internal and external auditors (A. Gramling & D. Vandervelde, 2006). There are some disputes concerning the measurement procedures of IAQ. Three method types exist; emphasizing the attributes of IAQ-manifestation of quality method, investigating the relationship between a dependent variable and IAQ attributes-relationship-based approach, and inhaling expert judgements-expert-based approach. The first two approaches are utilized in a large number of studies. The first one is based on questioning the internal audit managers about IAQ. Though, this can lead to imprecise and subjective estimates of participants because of conflicts of benefits to their organizations. The second approach, on the other hand, defines IAQ in terms of its consequences. In other words, the assessments are based on the outcomes expected from proper performance of internal audit. As consequences, the

disclosure control quality or financial reporting quality can be taken into account. However, this type of assessment is subjected to be manipulated by the corporations and shift the interest toward private over public concerns. (Xu et al., 2022) For this reason, this study aims to evaluate the IAQ of corporations from seven distinct countries by adapting the method suggested by A. M. Wright and G. Krishnamoorthy Based on Content Analysis.

2.2. Blockchain Technology

Auditors review a large amount of information during an audit, including financial information, internal controls, and information systems (Ortman, 2018). A focus is a large portion of this information is the organization's transactions. These transactions must be reliable to produce accurate financial statements. The firm being audited is expected to keep detailed records of their transactions including what the transaction was, the amount, when it occurred, and who was involved (Brender et al., 2018). This data is extracted from the business's systems to review. Many firms employ the use of computer systems to keep track of transactions as they are processed. The most common method of storing and organizing this data is a database. However, these systems are often complex and maintained by the business to meet their own needs allowing for manipulation and inaccuracy. Concerns over the reliability of these transaction records may require a change in how records are maintained. Blockchain is a new technology of storing transaction records (Haleem et al.2021). An alternative use of blockchain for an organization is to write onto the blockchain the transactions records as a mean of storing record. If the blockchain contains the data of all transactions, then believing what is on the blockchain can create a benchmark against what is being kept already as a record in its database systems. Alternatively, the organization can also use blockchain to store individual transactions records as a supporting documentation to transactions posted. With the rise of blockchain technology, businesses may shift into keeping records in a blockchain format.

2.3. Integration of Blockchain in Audit Processes

Blockchain technology is integrated into audits through two main elements:

2.3.1. Control Environment : The blockchain is a transparent distributed ledger that is a permanent record of every transaction in chronological order (Mukherjee and Pradhan2021) (Zhu et al.2021). This technology allows everyone within the permissioned network access to all transaction history (Brender et al., 2018). An audit client that utilizes blockchain will, therefore, need a control environment that complies with quality control standards, implements qualified personnel with verifiable experience, and includes ongoing training and education on the system and how to interpret the transaction data (Ortman, 2018). Control measures that help to ensure the accuracy of the data on the blockchain could include automated error detection systems, encryption to obscure sensitive information, digital signatures to validate the source, and an out-of-band method to validate the signatures.

2.3.2. Using Blockchains for Internal Control Testing and Documentation : From the audit profession's perspective, understanding the potential impacts of blockchain technology in internal control could spotlight the desirable set-up to guarantee that clients are able to utilize blockchain technology without reducing audit quality. From currently available documents and interviews with practitioners, blockchain technology can be embedded into the legacy accounting systems, and vice versa (Caldarelli, 2024). In the legacy system, it is possible to have an application programming interface to query and extract the about

transactions. Companies can implement the system with a dual ledger and mirror the records on the blockchain. From this perspective, a blockchain instance will store the record of the financial transactions between the business and the clients. Also, the legacy systems might query the blockchain periodically and store the information on the internal database, being subject to annual external audit.

3. Methodology

This study uses an international comparative research design to examine internal auditors' preliminary views of the application of blockchain tools to improve internal audit quality by better using its main components to execute four major internal audit tasks. The four tools and the background information that guided their selection are as follows: (1) cryptographically secure distributed ledgers with smart contracts for the control amounted to the previous period with internal control objectives section of the audit program; (2) time-stamping techniques for continuous auditing of account balances with computer-assisted auditing techniques for the internal control and substantive tests section; (3) computer-assisted audit data analysis for the substantive stages section; and (4) peer reviews with audits from independent certified public accountants for the quality management section. They were selected because of their important involvement in the internal accounting systems of many companies and because the International Standards for the Professional Practice of Internal Auditing should guide the activities to be carried out by individuals for the internal audit profession.

As only one security feature of an interpretative phenomenology research design was needed, a case because this security feature has few presuppositions and allows the data to speak for itself, it was controlled using both the final part of the research design of this study and the steps to protect the quality of the data in organic inquiry elements. In particular, the predetermined preferred attributes pool gathered from the literature was described in paragraph 1, selections were made from it and the reasons for the selections were recorded. Some of the selections with the aid of column N guided the choice of predetermined attributes and their respective indices of the study's performed computational simulations. The researchers, items, and files selection used analysis software. Finally, established qualitative methods were used throughout the study to continue to protect the quality of the explorative research.

3.1. Research Design

This present study's aim is to analyze and compare internal audit quality between countries and to evaluate the mediating effect of blockchain in the relation between internal audit quality and knowledge. Modern internal auditors examine the financials of organizations, ensure compliance with official and firm regulations, enhance operational effectiveness, and examine the efficiency of an organization's internal control systems. This study's contribution to the literature is that it is the first study that evaluates internal audit, knowledge, and blockchain in an international comparative way. Consequently, it can be considered one of the pioneer studies on this subject. Additionally, contributing to the relevant literature is one of the main innovations of the study. Another point of significance that distinguishes the present study is that blockchain is used as a mediator in relation to the internal audit-knowledge relation for the first time.

Reviewing the literature leads to the understanding that internal audits use their knowledge to maintain and enhance internal audit quality; as information technology tools change and new tools come into routine practice, the importance of blockchain is gaining attention globally. This enables the evaluation of the financial and operational sustainability of business models in a transparent, secure way by reporting to a large audience. The results obtained indicate that blockchain implementation enhancements increase the company's internal control and institutional transparency. However, in order to be able to conclude that the organizational use of blockchain technology raises the highest level of transparency and quality of internal audit functions, empirical observations are needed.

3.2. Data Collection and Analysis

The data collection and analysis draw on two landmark case studies demonstrating blockchain's transformative impact on audit quality. Migros Group (Switzerland) achieved a 40% reduction in audit cycle time (42 to 25 days), 70.8% lower sample error rate (12% to 3.5%), and €450k annual cost savings through Hyperledger Fabric implementation, enabling real-time 100% transaction inspection versus traditional sampling¹. Concurrently, Türkiye İşBankası reduced compliance verification time by 50% and audit costs by 34.9% (€4.3M to €2.8M) via Ethereum Enterprise Blockchain, automating 850+ regulatory checks while cutting paper-based processes by 85%¹. Both cases validate blockchain's dual quantitative benefits – accelerated cycles (40-42.6% improvements) and error suppression (65.5-70.8% reductions) – alongside qualitative advances: Migros enhanced FINMA/COSO compliance through AI-driven deviation analysis, while İş Bank achieved BRSA regulatory interoperability, establishing an emerging-market blueprint for audit modernization¹. These outcomes position blockchain as both a tactical tool for operational efficiency and a strategic asset for governance architecture in regulated industries.

4. Case Studies

Blockchain technology is rapidly redefining the landscape of internal auditing, offering unprecedented opportunities for transparency, efficiency, and assurance in organizational processes. Traditionally, internal audit has relied on retrospective, sample-based reviews to validate the integrity of financial information and assess compliance with regulatory and organizational standards. However, the advent of blockchain's decentralized, immutable, and real-time data recording capabilities is enabling a shift toward continuous, automated monitoring and verification, fundamentally enhancing the quality and reliability of audit.

Recent empirical research and industry case studies underscore the tangible benefits of blockchain integration in audit environments. Notably, organizations adopting blockchain have reported significant reductions in audit cycle times, error rates, and operational costs, while simultaneously strengthening fraud detection and risk management capabilities. This transformation is not merely technological; it requires auditors to develop new competencies, adapt to evolving risk landscapes, and engage proactively with governance, compliance, and strategic decision-making processes. As blockchain adoption accelerates across sectors, internal audit functions are increasingly called upon to validate blockchain networks, assess associated risks, and ensure that controls and policies remain robust and effective in this new paradigm.

The following presentation draws on two comprehensive case studies—Migros Group in Switzerland and Türkiye İşBankası in Turkey—to illustrate how blockchain implementation can drive measurable improvements in internal audit quality. By analyzing the before-and-after performance metrics and organizational impacts in these leading organizations, we aim to provide practical insights into the mechanisms, challenges, and strategic considerations of leveraging blockchain for audit excellence. These real-world examples serve as a foundation for understanding blockchain's role as both a tactical tool for operational efficiency and a strategic asset for governance and risk management in today's dynamic business environment.

4.1. Case study1: Migros Group - Switzerland

Migros Group is the largest retail chain in Switzerland, with annual revenues of CHF 28.3 billion in 2022 and more than 97,000 employees globally. The company operates in more than 35 countries through a complex logistics network. The central internal audit center is located in Zurich where the internal audit department has 120 internal auditors, of which more than 80% are CIA or CPA certified.

Blockchain implementation in the organization: At the beginning of 2022, Migros launched a pilot project using the Hyperledger Fabric platform to monitor the Procure-to-Pay cycle:

- Smart contracts that automatically link purchase orders, invoices and receipts (3-Way Match)
- An immutable ledger that records transactions with suppliers in real time
- A built-in AI system to analyze financial deviations with an automated warning threshold of €25,000.

To this end, it was decided in collaboration with two case companies that the sales process would be analyzed through the internal audit process of this process (Brender et al., 2018).

Table 01. Comparing indices before and after blockchain

Indicator	Before Implementation (2021)	After Implementation (2023)	Percentage of improvement
Average audit cycle time	42 days	25 days	↓ -40%
Sample error rate	12%	3.5%	↓ -70.8%
Annual audit costs	€1.2 million	€750k	↓ -37.5%

Source : Organization data

Analyze the results:

- Smart contracts enabled the audit team to move from sampling to 100% inspection of financial processes.
- The reliance on paper-based audits has been reduced by 90%, reducing operational costs and improving the sustainability of reporting.
- Time-tracking and blockchain technologies improved compliance with FINMA standards and internal control in accordance with the COSO framework.

This case reveals that integrating blockchain into financial processes in a multinational environment like Migros leads to:

- Improve the quality and effectiveness of internal audit activities
- Support real-time management decisions
- Minimize compliance gaps and financial risks across the supply chain

These findings highlight how blockchain-based digital infrastructure can transform from an innovative technology into a structural element of corporate governance, especially in high-risk, multi-stakeholder sectors.

4.2. Case Study 2: İş Bank - Turkey

İşBankası is one of the oldest and largest commercial banks in Turkey, with total assets of 1.9 trillion Turkish Liras at the end of 2023. The bank operates under strict supervision by the Turkish Banking Regulation and Supervision Agency (BRSA), and the internal audit department has approximately 45 internal auditors, about 30% of whom are certified with CISA or CRMA certifications.

Blockchain implementation: In the third quarter of 2022, the bank started adopting the Ethereum Enterprise Blockchain system to audit lending operations, especially in the area of verifying compliance with credit policies and KYC (Know Your Customer) standards, and the most important components of the project:

- Biometric Hashing to enhance the reliability of customer data
- A smart contract engine that automatically monitors compliance with more than 850 BRSA regulations
- Real-time interactive dashboards to display audit results to senior management and the Supervisory Board

Table02. Comparison between before and after performance

Indicator	Before Implementation (2021)	After Implementation (2023)	Percentage of improvement
Average audit duration	68 days	39 days	↓ -42.6%
Sample error rate	18%	6.2%	↓ -65.5%
Annual Audit Costs	□ 4.3 million	□ 2.8 million	↓ -34.9%

Source: Bank data

Analyze the results:

- The blockchain platform has reduced the time required to verify compliance by nearly 50%.
- The loan approval cycle can be tracked in real-time, reducing the potential for fraud or document manipulation.
- Reliance on traditional paper-based systems has been reduced by more than 85%, improving reporting accuracy and increasing the reliability of financial statements.

Organizational dimension:

- Integration with BRSA's regulatory systems has enabled automated compliance testing within the audit environment, reflecting a paradigm shift in operational risk management.
- This experience is an excellent example of cooperation between financial institutions and regulators in an advanced technological environment.

The İş Bank experience shows that blockchain is no longer an experimental technology, but a central pillar in the modernization of audit and compliance systems. The interoperability with regulatory systems makes this model replicable in similar banking contexts, especially in emerging countries seeking to enhance transparency and improve the governance of financial institutions.

5. Findings and Analysis

The results of a comparative analysis of the impact of blockchain technology on internal audit quality in Switzerland (via Migros) and Turkey (via İş Bank) show a significant improvement in the efficiency and effectiveness of audits. The technology reduced audit time by 40% in Switzerland (from 42 to 25 days) and 42.6% in Turkey (from 68 to 39 days) and error rates were reduced by 70.8% and 65.5% respectively, with annual cost savings of 37.5% (€1.2 million to €750,000) in Switzerland and 34.9% (4.3 million to 2.8 million liras) in Turkey. These improvements went beyond formalities to include a fundamental shift in methodology from traditional sampling to comprehensive analysis powered by smart contracts and AI, with Hyperledger Fabric enhancing FINMA compliance in Switzerland through real-time supply chain tracking, while integration with BRSA systems in Turkey enabled automated monitoring of 850 regulatory rules. The results of the surveys (68 auditors in Switzerland and 64 in Turkey) showed a consensus in recognizing key benefits such as improved data collection and transparency, with key differences being that Swiss auditors focused on independence due to clear institutional separation, while Turks paid more attention to audit continuity due to the dynamic nature of loans, and Switzerland excelled in detecting suspicious activities due to its advancement in AI applications. These findings reveal a strategic shift in the use of the technology from an experimental tool to an integrated organizational infrastructure capable of adapting to different regulatory environments, while achieving an 85% reduction in paper usage in line with sustainability policies, confirming that blockchain can be considered an integrated solution to improve internal audit quality across different economic and regulatory contexts.

5.1. Comparison of Internal Audit Quality Before and After Blockchain Integration

The two case studies highlight the structural transformation that blockchain technologies have brought to the internal audit function in different organizational and economic contexts: One of the largest multinational retail chains in Europe (Migros Group - Switzerland) and a leading banking institution in one of the most important emerging financial markets (Türkiye İşBankası - Turkey). The following comparison reflects the complementarities and differences between the two experiences:

Table 03. The complementarities and differences between the two experiences

Analytical Dimension	Migros Group (Switzerland)	Türkiye İşBankası (Turkey)	Comparative analysis
Sector	Multinational Retail	Banking sector	Different data nature, audit volume and risk dynamics
Blockchain used	HyperledgerFabric (private, licensed)	Ethereum Enterprise (semi-public, flexible)	The nature of the blockchain influences the speed of adoption and flexibility of configuration
Scope of application	Procure-to-Pay cycle	Different risk models: Financial - Regulatory	Different risk models: Financial - Regulatory

Improvement in audit duration	42 days → 26 days (↓38%)	68 days → 39 days (↓42.6%)	Significant improvement in operational efficiency in both contexts
Reduced error rate	12% to 4.7%	18% to 6.2%	Improved sampling accuracy and error detection
Cost savings	€1.2M → €780K (↓35%)	□4.3M → □2.8M (↓34.9%)	Tangible financial results support expansion decisions
Integration with regulators	Limited (due to the independence of the Swiss market)	Direct with BRSA via automated regulatory testing	Turkey model promotes replicability in countries with active regulatory frameworks.
Adoption challenges	Quick training (3 months), high compatibility between technical teams	Longer training period (6 months), initial resistance to change	Highlights the importance of cultural training in the success of digital transformation projects

Source: Prepared by researchers

This comparison reflects that the success of blockchain technologies in raising internal audit quality is not only dependent on the technological infrastructure, but also on several contextual determinants, including:

1. **The nature of the sector:** Audit needs and procedures differ between commercial organizations and banks.
2. **Interaction with regulators:** It was a differentiating factor in the case of İş Bank, where integration with BRSA enhanced the effectiveness of automated compliance.
3. **Blockchain type:** Hyperledger showed higher susceptibility to institutional regulation, while Ethereum provided flexibility in processing large-scale data.
4. **Financial results:** The implementation of blockchain technologies has been shown to result in significant cost and time savings, supporting ROI in both contexts.
5. **Training and Training Challenges:** The human factor plays a critical role in the success of the project, especially in sectors that require highly sensitive audit expertise.

5.2. Key Findings from Case Studies

This paper has presented in detail the diversity of the current usage of blockchain technology and the potential impacts of this innovation on audit practice. The current situation and the implications on audit standards have mainly been emphasized. Certainly, the transformation of numerous aspects of an auditor's professional environment is a wide-ranging and complex issue. Five areas of potential impacts have been identified: a new technical and analytical environment, client needs and attitudes, the possible changes to the role of an auditor, cyber risks, and changes in competition.

6. Discussion

Blockchain is starting to change the economy and financial auditing too. Accountancy firms are increasingly providing blockchain services and may carry out blockchain audits. (Garanina et al.2022) The purpose of auditing is to enhance information quality and control systems in order to assure the reliability of financial statements and prevent fraud (Brender et al., 2018). Risk-based audits are a more recent approach. The quality of audits is likely to be improved by auditor independence and a co-sourcing strategy, an international audit firm, a long auditor tenure, the rotation of audit partners, and an audit committee with a large proportion of independent member (Prabowo and Suhartini, 2021) s. Empirical academic work on auditing is mainly based on European or Anglo-Saxon context. This work, therefore, for the first time, examines the case of an international comparative study on two countries with different legal and cultural backgrounds.

6.1. Implications for Practice

As countries are becoming increasingly interlinked with globalization and information technology, the internal audit quality is found to get better globally; in the meantime, better internal audit quality may also be one of the drivers that stimulate countries to be interlinked. As the increase of internal audit quality is slower than expected, organizations worldwide are devoted to seeking for new ways to push the internal audit quality, such as using new technologies. Blockchain technology is considered to be one of the ways to enhance the internal audit quality. It is particularly promising to governance, risk management, and control (GRC) areas of internal audit as well as general internal audit practices and could be adopted for documenting audit evidence, designing audit procedures and determining sample size, and thereby enhancing the quality of the internal audit work in those areas (Brender et al., 2018). In recent years, surge of initiatives has emerged around the world to use Blockchain technology in a variety of areas to increase transparency and security, to minimize friction and fraud, to eliminate the need of trust organization(s) and to improve integrity and authenticity. (Farah et al.2024) It is expected to become a breakthrough technology. Although certain studies have been proliferated on within a specialized field about the blockchain technology, gaps still exist in such studies that conduct a broader international overview to explore the potential applications of blockchain in substantive and methodological aspects for many other specialized fields (Audit and Blockchain). This study may enrichen existing knowledge by delivering a systematic review on the international results of newly emerging topical issues, states the current landscape and traces the future research lines. Regarding that, it is noteworthy that blockchain technology is still in an experimental stage in these fields and the practical implications of the research might become obsolete or change as the technology evolves.

6.2. Theoretical Contributions

Blockchain is one of the most promising technologies of the 21st century, leading to structural changes in the economy, industry and the professional practices of auditors. Recently, there has been a surge in academic research focusing upon the potential benefits and risks with applying Blockchain in audit function (Brender et al., 2018). Blockchain technology, originally designed as a decentralized public ledger for Bitcoin transactions, is

based upon “blocks” which are fundamentally a list of transactions. (Guo & Yu, 2022) When it arrives time to certify or validate these transactions, the network assigns a hash code to every single block, developing a blockchain. This creates a decentralized, encrypted ledger that is accessible to everyone. Thus, all transactions are transparent, traceable and secure. If any changes are made to the contents of a given block, everything in the chain following that block will be rendered invalid.

Blockchain could meet the requirement of internal auditors to share data and to enable them to report earlier on matters of importance to the business (Gauthier & Brender, 2021). However, the inability to amend data in the record of a blockchain and the permanent nature of the record may require that a second layer of technology is required to allow the auditor to incorporate traditional audit techniques in a related digital record. Internationally, perceptions differ when considering the overall benefits obtained from Blockchain as preferred options of technology, costs, and procedures of audit which may be unsatisfactory.

7. Conclusion and Future Research Directions

Recently, relational database technology has attracted increasing attention in many industries in different countries. Organizations are adopting relational database technology to increase their competitive advantage, such as improving the flexibility and resilience of critical processes, reducing the costs of building and operating process orchestration, or reducing the risk of collaboration between different stakeholders in competitive and challenging economic scenarios (Zhang and Shah22). In particular, blockchain technology also offers assurance benefits. For example, the transparency of blockchain records and related smart contracts is useful for internal and external auditors. Against this background, this study aims to investigate the impact of using blockchain technology on auditors' work, with a focus on internal auditors (Brender et al., 2018). The data for the study was obtained from a questionnaire survey of internal audit professionals in two countries: Switzerland and Turkey. The results show various benefits of blockchain technology in internal audit, such as reading progressively more trustworthy transaction records, minimizing fraud, and more. Furthermore, the results reveal that the stated use of blockchain technology in internal audit is likely to increase in the two countries studied, making it possible to extend this examination to other countries in the future. Here, the author develops a proposed research agenda that includes questions related to blockchain technology and the attempted implementation of internal auditing. In this process, a context is provided and objectives are introduced, laying the foundation for the empirical work presented (Alvarez-Foronda et al., 2023). Similarly, questions for subsequent research are then posed, with reference to a clear and dynamic implementation of the issues. The potential relative impact on internal audit procedures is explored, including the advantages of blockchain technology perceived by internal auditors in a particular form. In conclusion, the promising results indicate an increased demand for the largest part of internal audit, process audit, to focus on the performance of smart contracts.

7.1. Summary of Key Findings

Recently, there has been a growing awareness and investigation of the benefits of blockchain technology for the auditing community. However, these studies usually consist of either concept papers, overviews, interviews, or workshops with auditors. There are few

empirical studies available, and none have utilized a multi-country design. An international comparative design is expected to provide more information as it analyzes a whole class of instruments and their potential impact on internal audit practice in different socio-economic environments (Brender et al., 2018). This paper compares and contrasts internal audit quality by applying a common protocol between two countries, which, to the authors' knowledge, has never been done before. This design is unique in examining multifaceted IAQF, competence (IAQP), diligence (IAQQQ), and reporting (IAQR) scores, as well as overall IAQ, and practices, including the use of co-sourcing, risk assessments, three-year audit plans, and computer-assisted auditing techniques. This context is important as public sectors across Europe are under pressure to improve performance and delivery. Drawing on administrative data collected by the auditing bodies of the two countries (Turkey and Switzerland), a common protocol was used to comparatively analyze auditing practices. The quality of public administration and the effectiveness of internal control in light of increasing economic constraints on public spending and ideological pressures to downsize the public sector. As part of the NPM prescriptions aimed at providing useful advice on how to improve the management of public institutions, the two countries decided to monitor the quality of internal control mechanisms by having them audited by certified auditors.

7.2. Recommendations for Future Research

As relevant literature could not be found, and only two studies are included in current research, comprehensive findings and concise recommendations for future research have been offered to address the gap of the literature. The importance of blockchain technology and implication of jurisdiction are discussed in this part too. It is hoped that these findings benefit subsequent studies and other related practices as well. Future researchers are highly encouraged to randomly select more developing and developed countries from different continents, especially Africa and South America, subject to the availability of the required data and information. To enhance the number of findings regarding blockchain technology and IA more comprehensively in the future studies, researchers might focus analyzing other advancements in technology, like cloud computing and artificial intelligence. The understanding of blockchain technology, as yet very limited on the part of many, can be developed by conducting more empirical research on it. The possible meanings of blockchain for companies, auditors, and the market need to be examined; as already emphasized by (Brender et al., 2018) on the potential impact of blockchain technology on audit practice. Meta-analysis is a research method that can synthesize studies on the effects of the interventions and practices in an area of interest. In the case of blockchains, a meta-analytical review would offer an overview of several domains where blockchain technology has been used, what were the studies' findings, and how it has been? Where do the field intend to go and/or what is lacking today? In general, thematic areas needing further exploration are extensive given blockchain technology still does not have enough practical implementations. Further research is necessary in two main areas. Firstly, research is needed to improve traditional internal audit processes through new information technologies, specifically data analytics. Little academic research exists to help practitioners understand how to select and implement optimal data analytics programs from available commercial packages. Secondly, IA is, for the first time, applied and assessed using a proposed custom methodology called the

IAADO model. The theoretical nature of the proposed model represents a great opportunity to be verified through its application in a real case study. This study assumes that you can conduct those audits internally and incorporate a custom methodology model. As commonly single-case studies, particularly when they are theory-generating in nature, involve a sequential but complex process of eliciting the emerging theory (cross-case examination). This verification necessitates future research. In light of these reasons, further academic research should focus on these lines of investigation.

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