

Consequences of Implementing Blockchain Technology in Management Accounting: A Grounded Theory Approach¹

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Abstract

Due to the ever-growing importance of transparency and security in financial processes, there is a necessity to explore the impact of blockchain, an influential innovation in the last decade, in the area of management accounting. The current study seeks to investigate the circumstances and factors that affect the effectiveness of blockchain in management accounting. The statistical population comprised international experts and professors in the area of management accounting. To identify the crucial components in the application of blockchain in management accounting, the current study adopted a systematic literature review and semi-structured interviews with a sample of seven international experts. The current 2024 study applied grounded theory and followed the process of expert sampling until theoretical saturation. The findings demonstrated that the current model can be grouped in six overarching categories: 1 core category, 22 causal conditions, 21 contextual conditions, 14 strategies, 24 intervening conditions, and 11 outcomes. The results also indicated that the application of blockchain leads to enhanced efficiency in the performance of organizations through the provision of transparency, cost-saving due to disintermediation, and automation. Additionally, the study results indicated that the application of blockchain enhances data security through encryption. The application of blockchain supports a transformation in the management accountant's role from traditional functions to data analysis and expert advisory roles.

Keyword: Blockchain Technology, Financial Transparency, Grounded Theory Approach, Management Accounting.

JEL Classification: M41, O32, O33.

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Introduction

The transformation of management accounting from a descriptive historical approach to a predictive, prescriptive approach has expanded its role well beyond diagnostic reporting and established it as a strategic tool. Traditionally, management accounting focused on retrograde and diagnostic reporting. In contrast, modern-day approaches are based on forecasting costs and evaluating internal and external factors, which places decision-making in a data-driven context (Lawson, 2019, p. 20). Reliable, relevant, timely, and accurate information, meaning big data, constitutes the backbone of strategic choices and a crucial bottleneck in this process, which demonstrates the pivotal role of information technology in management accounting. By collecting data from internal and external sources within the organization, management accounting systems aid the processes of prediction, budgeting, monitoring, and evaluating performance (Arkhipova, Montemari, Mio & Marasca, 2024, p. 70). Such information systems enhance strategic decision-making and foster sustainable competitive advantages. Emerging technologies such as big data and business intelligence represent significant opportunities, including new integrated data channels, unstructured data, automated data generation, time and cost optimization, real-time data, enhanced operation and strategic planning, as well as enhanced support for high-level managerial decisions (Rybicka, 2018, p. 29).

The introduction of blockchain in 2008 and its expansion beyond Bitcoin transactions have created a secure, decentralized foundation for logging exchanges (Kostic & Sedej, 2022, p. 132). This technology has proven capable of reducing transaction costs, accelerating transaction processes, reducing fraud risks, and enhancing auditability, thereby enhancing the transparency and effectiveness of regulation (Dai, 2017, p. 57). The distributed nature of blockchain is based on a consensus mechanism. Essentially, all transactions and any changes to them are recorded after they are collectively verified by the network nodes, which creates a responsive anti-fraud system (Mahdani, Putri & Risnafitri, 2023, p. 7). The management accounting system of a firm can employ public blockchains, particularly when there are numerous validators based on transaction-fee or token-based incentive models. Validators are incentivized by transaction fees or reward tokens to participate in the verification and recording process, and guarantee the accuracy and reliability of the data. This mechanism enhances the security and transparency of financial information and improves the internal control processes. Consequently, blockchain as a core data-driven technology creates an infrastructure for transforming management accounting from a pure information function to a predictive, prescriptive, and adaptive system. By employing distributed

ledger technology and real-time data sharing, blockchain helps streamline reporting and control processes and provides accurate, real-time information required for decision-making (Wang, Zhang, Chen, & Wu, 2024, pp. 17-18). Accordingly, the current study examines how blockchain improves the efficiency and abilities of management accounting in organizational settings, seeking to clarify the impact of blockchain on current managerial accounting thought and practice and support the advancement and refinement of management accounting theory and practice.

In the past few years, blockchain has developed into a transformative industrial technology that revolutionized business operations and information flow (Hejazi Sheikhi & Zanjirdar, 2023, p. 169). As a result, its influence on accounting research has become an increasingly prominent topic. Kostic and Sedej (2022, p. 131) argue that blockchain can play a meaningful role in strengthening management accounting systems through enhancing the reliability and precision of information. Similarly, Wu and Wang (2020, p. 29) report that the integration of management accounting processes can be significantly improved by employing blockchain. Findings by Han, Shiwakoti, Jarvis, Mordi, and Buchi (2023, p. 12) also indicate that auditors and accountants in major global companies are using blockchain to make information more transparent and build trust, improvements that in turn lead to higher performance of accounting functions. The information generated by these professionals with the help of the blockchain eventually aids informed decision-making by experts and stakeholders. The current study follows this emerging research trend and seeks to add to the existing literature by bridging the gap between theoretical discourse and practical application of blockchain in management accounting. Given that the findings of this study are based on expert opinions collected in the context of a developing country, Iran, they may be of particular significance. Moreover, a comparison of the results with reputable international studies could help identify aspects of blockchain's role in accounting systems that have been missed and provide suggestions on how to address these gaps, and keep up with international developments. Given the wide-ranging capabilities of blockchain as described above, this emerging technology is expected to influence business operations and management accounting processes to a considerable extent. Given that management accounting research has not seen extensive work on the implications of blockchain, mainly due to the fact that the technology is relatively new, it should be considered a priority to study the effects of blockchain. Such research can help ensure that current practices in management accounting are kept in tune with technological progress and are constantly updated.

Theoretical Background and Hypothesis Development

Blockchain Technology

Blockchain is a new technology for data storage and distribution that bypasses storing information in a centralized location, such as a bank or a central server. Instead, information is shared across a network, encrypted, and maintained by the users. Blockchain was initially developed to facilitate the transfer of digital currencies, the most famous being Bitcoin, allowing financial transactions between users without intermediaries or centralized institutions. The first generation of blockchain was centered on peer-to-peer value transfer, with cryptocurrencies such as Bitcoin, Litecoin, Monero, and Dash being the primary examples. In these systems, value is exchanged between participants through a decentralized peer-to-peer network, with the value of these assets determined by market supply and demand, rather than being pegged to official currencies (Wang, Li, Lu & Cheng, 2022, p. 9). As technology advanced, a second generation of blockchain was produced to overcome the limitations of the first. This generation focused more on the digital representation and storage of assets on the blockchain and introduced "smart contracts," which enable automated conditional transactions without intermediaries. Such agreements are executed by preprogrammed conditions, which allow users to issue blockchain-based assets, such as shares, where the ownership is formally registered on the chain. Such assets can generate dividends or voting rights and integrate well with new fundraising models, such as crowdfunding and collaborative platforms of the sharing economy. This second generation extended the possibilities of blockchain well beyond mere monetary transfers (Lage, Saiz-Santos & Zarzuelo, 2022, p. 438).

A third generation of blockchain later came into the picture, solving scalability issues and reinforcing the concept of user-driven governance. Although Bitcoin is highly secure and decentralized, it has a hard time quickly processing large transaction volumes. As the network has expanded and spread, collective agreement on network changes has become increasingly slow. Third-generation systems use enhanced design to increase processing capacity, facilitate consensus, and meet the ever-increasing needs of large-scale users (Bai, Sarkis, & Xue, 2024, pp. 859-861). Overall, blockchain may be viewed as a series of data blocks connected via robust cryptography, with each block being dependent on the previous one. This hard-bop bond ensures security and integrity of data (Bai et al; 2024, p. 864). Any user can access transaction histories, and network alterations must be approved by all users. This "consensus" process ensures that a transaction is confirmed by the entire network before being appended to the chain. Once recorded, the entry cannot be changed due to the distributed and encrypted nature of the system. Direct execution

and removal of intermediaries between users are the essence of the blockchain. These qualities render blockchain a successful tool for enhancing transparency and lowering transaction costs in financial and commercial systems (Rena, 2024, pp. 6-7).

Blockchain and Management Accounting

Blockchain technology resembles a data recording and maintenance system where the transaction data is stored in encrypted, interconnected blocks. As these blocks are linked together, they create a chain of records that is transparent, traceable, and impossible to manipulate. Owing to features such as decentralization, tamper-resistance, traceability, transparency, removal of intermediaries, and automation of some agreements, blockchain is considered a distributed ledger shared among all network participants. In this environment, storing, retrieving, verifying, and transmitting information is not dependent on a single central authority. Instead, these actions rely on a network of independent, equally privileged nodes, with each node having a full copy of the entire blockchain history. This distributed architecture does not have any centralized point of failure and ensures network security (Zhao, Zhang, & Huang, 2022; Cai, 2021, p. 23).

In addition to the contents of the transaction, each block in a blockchain has an accurate timestamp, which allows one to trace events accurately. Data can only be changed if all saved copies are altered simultaneously, which is practically impossible due to the advanced cryptography and consensus mechanisms between the nodes. This decentralized, encrypted structure enables users to perform peer-to-peer transactions without the involvement of third parties such as banks and payment processors, which significantly reduces transaction costs and enhances confidence levels. Moreover, blockchain has enabled the implementation of smart contracts that automatically execute after certain predetermined conditions are satisfied without human supervision or third-party verification (Zhao et al; 2022, p. 25).

Within the context of management accounting, whose primary function is to present analytical, decision support information to managers and evaluate organizational performance, blockchain has significant potential in enhancing the reliability and security of information. By fostering the exchange of precise, unchangeable, and traceable financial information, blockchain facilitates more efficient management accounting services and better integration between financial and operational systems. Strategically, implementing blockchain will reduce reporting costs, accelerate data processing, and facilitate managerial access to reliable data. Consequently, technology can play a role in the development of more intelligent management accounting systems and create new forms of value in

organizational decision-making (Zhao et al; 2022; Cai, 2021, p. 27) (See Figure 1).

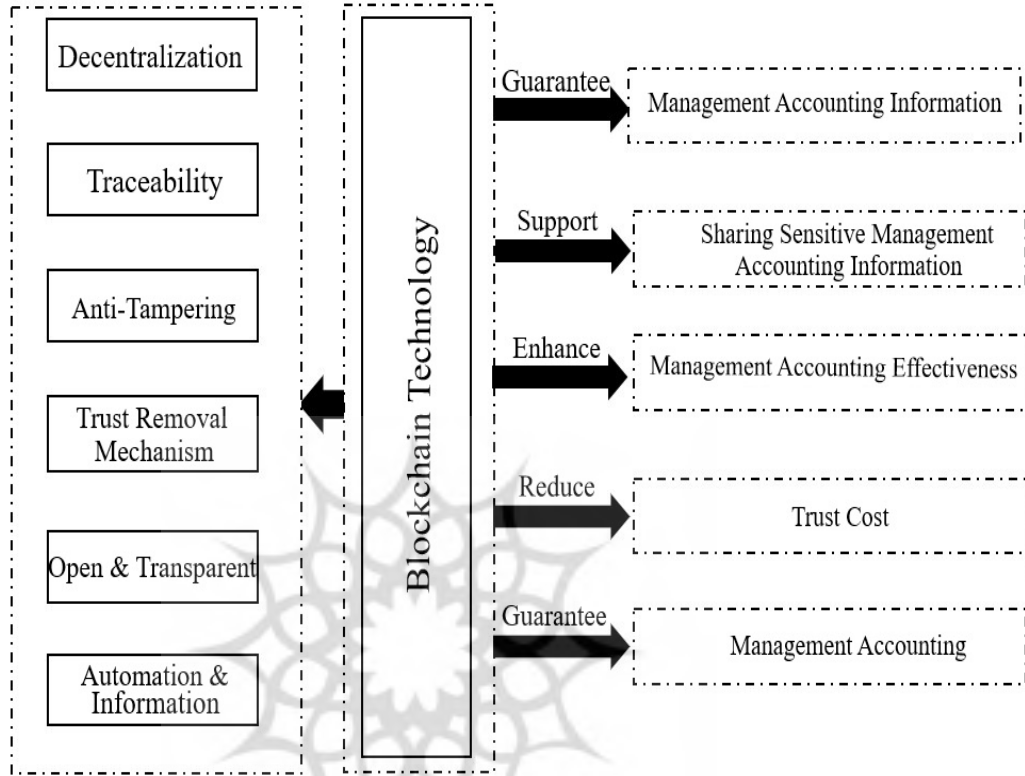


Figure 1. The Relationship Between Blockchain Technology and Management Accounting (Zhao et al; 2022, p. 27)

In the age of digital transformation, technologies like blockchain have fundamentally changed data processing and storage, which has rendered data one of the most valuable organizational assets. Because of its unique design, it is extremely difficult to modify or fake recorded data in blockchain, so information becomes essentially permanent and irreversible after being added to the chain (Zhao et al; 2022; Cai, 2021, p. 27). Recent studies show that this data structure is well aligned with the nature of information systems used in management accounting, particularly in terms of safe and simultaneous data sharing among multiple users (Dai & Vasarely, 2023, p. 6). Integrating blockchain with management accounting reduces the chances of errors or manipulation in key accounting data,

facilitates automated data collection and entry, and notably improves the accuracy and reliability of the accounting information systems (Nguyen, Abu Afifa & Van Bui, 2023, pp. 19-20). Since managerial decision-making depends on analysis of past data, evaluation of current situations, and prediction of the future (Zhao et al; 2022, p. 29; Wang et al; 2024, p. 12), the capability of blockchain to deliver accurate, timely, and traceable data can dramatically enhance the quality and effectiveness of strategic decision-making.

Management accounting integrates financial and operational data to assist in budgeting, performance assessment, product development, risk analysis, and other decision-making processes. Blockchain reduces information delays, loss, and distortion by eliminating intermediate layers and enabling information flow between departments, which fosters consistency of information across operational, financial, and technological departments (Wang et al; 2024, p. 14). Its decentralized system of consensus enhances trust among users and organizational divisions without conventional intermediaries; hence data sharing becomes more credible. Firms can create internal blockchain networks to combine scattered datasets and offer various tools to verify and monitor information. Such integration reduces information asymmetry and its resulting risks while enhancing the quality of information relevant to the decision-making process. Furthermore, inter-organizational blockchain networks, such as those across supply chains, allow companies to share critical data regarding production, procurement, sales, and other activities, achieving high transparency and collaboration via unified data analysis (Wu & Wang, 2020, p. 32; Zare Behnamiri, Maleki, Hassankhani & Ramesheh, 2023, p. 42). Organizations can decide between a number of different types of blockchains, including public blockchains (open access), private blockchains (limited internal use), and consortium blockchains (regulated cooperation among two or more organizations, based on their goals). The data sharing in consortium systems can be viewed and confirmed by members, which allows for a high degree of coordination and trust (Wang et al; 2024, p. 19). Thus, the needs of management accounting determine the most appropriate type of blockchain: Public chains are appropriate for cases where it is necessary to be completely open and have decentralization, such as public reporting or data sharing with other external organizations; private chains are appropriate for ensuring the security of sensitive internal organizational information, such as cost tracking or internal accounting records; and consortium chains are appropriate for multi-organization cooperation in a range of areas such as supply-chain management or financial exchanges between companies. The choice is based on the desired balance of transparency, security, speed, and privacy (Wang et al; 2024, p. 21).

Blockchain technology plays a significant role in increasing efficiency in management accounting and reducing operational costs. By adopting this technology, companies can make strategic decisions faster and with greater accuracy, strengthen managerial controls, increase coordination in even international operations, and better manage resources, which can lead to improved employee performance evaluations and reward systems. These actions can be combined to generate innovation and sustainable value creation (Zhao et al; 2022, p. 25; Zare Bahnamiri et al; 2023, p. 47). One of the standout benefits of blockchain is the ability to permanently and accurately track information, enabling organizations to analyze resource consumption across the value chain and identify cost drivers and non-value-adding activities. This degree of transparency contributes to cost reduction and improves profitability. Moreover, blockchain produces reliable, timely, and secure information by storing data related to purchases and sales in encrypted blocks with advanced access controls. These features minimize intermediary expenses, eliminate process duplication, and provide accurate criteria for selecting suppliers and sales channels (Zhao et al; 2022, p. 28). In systems where costs are allocated according to activities, such as activity-based costing, blockchain can provide clear, unified, and accessible information to all stakeholders, which results in more precise economic decision-making. Performance-related information is also continuously logged in structured intervals on the blockchain, which makes it easier for organizations and departments to assess performance. Nonetheless, excessive focus on short-term results at the expense of long-term assessment can skew managerial judgment.

A company's management accounting system can also leverage public blockchains, where large numbers of participants are engaged in record validations, to boost transparency and strengthen the security of the financial data. Rather than storing all sensitive information about a company on a public ledger, the company stores an encrypted summary or a "digital fingerprint" of cost information or transaction data. Consequently, the authenticity and completeness of the original data can be verified without revealing confidential internal information. Participants who assist in validating transactions on these networks receive financial rewards as compensation. These incentives can include new units of cryptocurrencies or transaction costs, which basically compensate them for the computing power or digital assets they are dedicating to keeping the network secure. For instance, Ethereum requires its validators to place a certain amount of cryptocurrency to participate in the confirmation process, and in return, they receive rewards. This economic system renders the blockchain functional and safe without having to depend on a centralized entity. Therefore, the management accounting system of a company can take advantage of the primary blockchain properties, such as

transparent record-keeping, immutability of stored information, and high-level security using public blockchain infrastructure and the incentives that maintain it, while preserving the privacy of sensitive financial information.

Another notable capability of blockchain technology is supporting smart contracts, which enable organizations to predefine and automatically execute operational processes. Smart contracts reduce the cost of executing agreements and significantly mitigate risks associated with non-fulfilled obligations by removing the requirement to have a guarantee or an intermediary. Participants in a blockchain network can record and share data based on predefined rules without relying on centralized authorities, dramatically reducing the cost of establishing trust (Al-Zaqeba, Jarah, Ineizeh, Almatarneh & Jarrah, 2022, pp. 978-979). Since blockchain is decentralized and based on a distributed ledger, it provides a high degree of stability and data security. Every node contains a copy of the records, so it is almost impossible to make unauthorized alterations. As a result, sensitive management accounting information, such as cost, sales, operational, and financial decision-making data, is stored in a reliable, safe environment. Since all units share the same set of shared records, there is no need for repeated verification, saving managers considerable time and effort (Zhao et al; 2022, p. 28; Zare Bahnamiri et al; 2023, p. 52). Blockchain also makes it possible to establish direct connections between people who require information about management accounting and those who provide it. This access may be provided on specific terms, like the need for confidentiality or payment of fees. Such an arrangement not only enhances the effectiveness of information transfer but also eliminates leakage of personal information and trade secrets. Ultimately, blockchain enables managers to continuously monitor financial information and track transactions in real time, optimizing decisions and the overall performance of the organization (Abad-Segura, Gonzalez-Zamar & Lopez-Meneses, 2024, p. 7).

Research Questions or Hypotheses

To fulfill the objectives of this study, and in congruence with earlier studies and theoretical roots, the following questions are asked:

- 1.1. What is the model of consequences of adopting Blockchain technology in management accounting?
- 2.1. What are the axial conditions of the blockchain technology adoption model in management accounting?
- 3.1. What are the cause-and-effect conditions of the blockchain technology adoption model in management accounting?
- 4.1. What are the contextual conditions that affect the blockchain technology adoption model in management accounting?

- 5.1. What are the strategies involved in the blockchain technology adoption model in management accounting?
- 6.1. What are the intervening conditions of the blockchain technology adoption model in management accounting?
- 7.1. What is the outcome of developing the blockchain technology adoption model in management accounting?

Research Methodology

Scientific studies are typically categorized according to their objective and nature or methodology. From the data collection collective, the present work is classified as fundamental research. In terms of data collection procedures, this study takes an exploratory or mixed approach, employing both fieldwork and library research qualitatively. The library method was mostly utilized to review academic sources, documents, reports, and written materials that can help the researcher gather essential initial data. The temporal scope of the study was the Iranian calendar year 1403 (2024 - 2025). Given the aim of the study, the spatial scope was international. In data analysis, the content analysis techniques and the grounded theory approach were used (Beshiri Manesh, Rahmani, & Mousavi, 2016, pp. 178-179). Content analysis was employed to discover and classify the significant themes and concepts presented in textual data. Grounded theory was used for identifying categories related to the adoption of blockchain in management accounting. Given that the literature lacks a coherent framework in the theoretical foundations of management accounting, semi-structured interviews with experts were undertaken to address gaps and ensure the validation of the identified categories. After identifying these categories, coding was performed using Excel 2020, with the final set of core categories, causal conditions, contextual conditions, strategies, intervening conditions, and outcomes being developed. As the study design is qualitative in nature, following the identification of the major categories through literature review, a group of accounting experts was selected to give their final views through semi-structured interviews until theoretical saturation. The grounded-theory approach was then used to construct the research model. The study population comprised international accounting specialists, university professors in accounting, and other experts in management accounting whose research areas were closely related to the present topic and who had encountered these problems in their professional tasks. The number of people was determined based on theoretical saturation. Specifically, sampling continued until no new components or insights were revealed (Saqafi & Barzegar, 2012, p. 12; Abednazari & Arad, 2019, p. 118). The purposeful snowball sampling method was employed in sample selection. Accordingly, the following seven experts participated: a Chartered Professional Accountant (CPA) in the United

Kingdom, an accounting professor at KU Leuven, Belgium, an AIS systems designer and analyst at Lotusware Inc; Canada, another chartered accountant in the UK, an experienced internal auditor in the UK, a statutory auditor and international business consultant in India (Devesh K. Shah & Associates LLP) and an accounting professor at the University of Gävle, Sweden.

The validity and reliability of the findings were measured through peer review and independent double-coding. For peer review, the research team consulted three experts who had previously participated as interviewees in the study. The study findings were presented to them, with their feedback requested to ensure the credibility of the findings. This measure was necessary to ensure that the data interpretation and the conclusions were representative of the experiences and views of participants. To further ensure the trustworthiness of the study, two independent coders were recruited to conduct the coding process so as not to rely on a single researcher's judgment to carry out the content analysis, as using of two subject-matter proficient coders will increase the validity and reliability of the study in terms of between-rater validity and reliability (Kendraki, Wolman & Amundson, 2002, pp. 229). To ensure intra-rater reliability, these two coders repeated the coding process multiple times so their judgments would be stable over time. In addition, the validity of the study was supported by a thorough literature review and appropriate sampling procedures for data collection. Finally, results from these methods were compared to identify and resolve any discrepancies and contradictions in data interpretation. This reconciliation corrected and refined the results and provided assurance that the findings are not only credible and dependable but also potentially generalizable to a broader population. Through this process, the content and structural validity of the study were enhanced, and the reliability of the study was established by showing the consistency and dependability of results over time.

Subsequently, the validity and reliability of the findings were reassessed by presenting the identified concepts to the seven previously interviewed experts and seeking their judgments. Two metrics were then calculated: 1. The Content Validity Ratio (CVR) and 2. The Content Validity Index (CVI) (Lawshe, 1975, cited in Nabavi et al; 2023, pp. 7-8). To calculate the CVR, respondents were asked to rate each concept on a three-point Likert-type scale as follows: 1. Essential, 2. Useful but not essential, and 3. Unnecessary. In the case of the CVI, the concepts were categorized in a four-point relevance scale as follows: 1. Irrelevant, 2. Needs major revision, 3. Relevant but needs revision, and 4. Highly relevant.

The Content Validity Ratio for each concept was calculated using the following formula:

$$CVR = \frac{(N_e - \frac{N}{2})}{\frac{N}{2}}$$

In this context, N represents the total number of experts, and Ne represents the number of experts who chose "essential."

Given seven experts in this study, the minimum acceptable CVR value is 0.54, and any item with a CVR below 0.54 should be discarded. As at least five experts rated each of the 356 identified concepts as essential, this condition ensures that the CVR is positive for each concept and all are validated.

The Content Validity Index (CVI) for each concept was calculated using the following formula:

$$CVI = (\text{number of experts scoring the item 3 or 4} / \text{total number of experts}).$$

The minimum acceptable value of CVI is 0.79, and items with CVI below 0.79 should be discarded. The results revealed that the CVI for the identified concepts was between 0.81 and 0.96, indicating that the concepts are acceptable.

Research Findings

To explore the impact of blockchain technology on management accounting via a grounded-theory approach, this study was conducted by a combination of literature review and expert interviews. Accordingly, seven experts in this field were interviewed. Table 1 illustrates the demographic characteristics of participants. Given the selection criteria, which required a minimum of 10 years of professional experience, 86% of the interviewees had over 20 years of professional experience. Furthermore, 57% of the experts were over 45 years old, with 100% of the interview participants being male.

Table 1. The Demographic Characteristics of Participants

Criterion	Category	Count	Percentage
Professional Work Experience	10-20 years	1	14
	More than 20 years	6	86
Total		7	100
Age	35-45 years	3	43
	More than 45 years	4	57
Total		7	100
Education	Master's degree	5	71
	Doctoral degree	2	29

Criterion	Category	Count	Percentage
Total		7	100
Gender	Male	7	100
	Female	0	0
Total		7	100

This section presents the obtained results from the literature review and expert interviews in the context of the grounded theory methodology (Strauss & Corbin, 1990, p. 93). Data analysis and extraction of the final research model went through three phases of coding, namely open, axial, and selective coding. The following paragraphs outline the three phases of coding, as well as their applications. Notably, the concepts and categories were analyzed separately for each interview, with an example analytical model provided below.

Open coding

At this phase, similar data were categorized and labelled. Open coding was carried out through careful, line-by-line, and even word-by-word examination of texts, interviews, or documents. After identifying concepts, their relationships, and the common linking themes were determined. Essentially, higher-order common themes arise by comparing concepts to each other, which are referred to as categories (or classes). Once the primary categories were extracted, attributes and dimensions of each one were specified. In this research, an average of 78 concepts was extracted from each interview, with each concept appearing an average of five times. The most common recurring concepts were "technological conditions," "organizational culture," "regulations and laws," and "oversight." An example of extracting concepts from the first interview, directly quoted from the interview transcript, is as follows:

- What are the causal conditions in the model of consequences arising from the adoption of blockchain technology in management accounting?

The major areas where blockchain is expected to have an impact are as follows: Accuracy and verification: The technology allows instant confirmation of transactions and minimizes "discrepancies and errors" in financial records. Automation: Many "routine processes," including "ledger reconciliation" and "audit trails," will be automated, with accountants having "more time to focus on strategic duties." Data

protection: The "cryptographic technology in blockchain" provides an extremely high degree of "safety" for "sensitive financial data," which is particularly critical for "public companies" and institutions that manage a large volume of transactions. Transparency: The "embedded Transparency in blockchain" helps build "trust among stakeholders," as "every transaction" is recorded and reviewed by the "authorized parties."

"Any implementation should begin with an adequate understanding of how blockchain can interface with existing accounting operations," I recommended, "conducting a feasibility assessment" so organizations can determine where blockchain "will provide the optimal value." Furthermore, "accountants need to receive specialized training to work effectively in blockchain environments." "It is also necessary to ensure that regulatory requirements relevant to the organization's jurisdiction are addressed in adopting the technology". "Contextual factors are also highly influential." "Organizational culture plays a significant role," particularly in terms of embracing "innovation and new technologies." "A culture that values digital transformation will naturally make it easier to adopt blockchain." Moreover, "digital literacy is critical," and if employees are "not trained and developed," they will have a hard time "adapting." "A workforce adequately educated in accounting and technology will be indispensable in successful blockchain integration." "An option is to bridge blockchain and existing ERP systems," as it will "enable real-time data synchronization" across different departments, resulting in "enhanced accuracy and efficiency." "Internal auditing is another strategy of blockchain application" where "internal control systems can be strengthened by its transparency and immutability." Ultimately, "designing a clear implementation roadmap," including "ongoing education and training" will ease the transition. "Certain external, uncontrollable forces, such as regulatory changes," must also be considered, particularly considering that "blockchain is still a relatively new technology as far as accounting standards and laws are concerned." "There might also be technological interruptions," such as "system failures" or "cybercrimes." Ultimately, "internal opposition," particularly among "geriatric professionals who might be less familiar with digital tools," can "inhibit or complicate the adoption process." For the "accounting profession," blockchain will mean "a need for new competencies, particularly in data analysis, technology management, and cybersecurity." To prepare students for this changing environment, "academic institutions" will have to

introduce "blockchain in accounting and finance programs" to "prepare their students for future." "Socially," blockchain can enhance "financial transparency" and "curb fraud," eventually increasing the "confidence of the population in financial institutions and corporate governance."

A review of the quotations above and open coding of it identified concepts such as "accuracy and verification, automation, data security, transparency, feasibility study, accountant training, regulatory compliance, organizational culture, technology adoption, digital literacy, ERP integration, internal auditing, implementation roadmap, legal changes, technological disruptions, organizational resistance, new skills, blockchain education, financial transparency, fraud reduction, etc." These concepts were then compared to identify similarities and differences so broader categories that convey shared thematic elements could be formed. For instance, among the presented concepts, "technology adoption" is a manifestation of the core category of "cultural change." Other concepts and categories were drawn using the same comparative approach. In total, this study yielded 356 concepts (open codes) and 92 major categories (axial codes), which constitute approximately one category for every four concepts, as outlined in the research model section. Table 2 depicts both open and axial codes extracted from the interviews. The selected core category is the impact of blockchain technology on management accounting.

Table 2. Sample Interview Coding

Row	Open Code	Axial Code
1	Acceptance of innovation, support for change, encouragement of creativity, backing new projects, fostering innovation, developing organizational culture, managerial support, strengthening job motivation, process innovation, promoting an innovation culture, and transformational leadership	Organizational Conditions
2	Employee training, blockchain awareness, continuous training, holding training workshops, creating training programs, in-house training, enhancing digital skills, professional development, encouraging learning, professional development programs, capacity building, and educational culture	Digital Literacy
3	Flexibility, commitment to improvement, data-analysis skills, professional empowerment, career advancement, development of job skills, work commitment, striving for continuous improvement, developing new skills, focus on work quality, and motivating progress	Professional Behavior

Row	Open Code	Axial Code
4	Regulatory changes, compliance with standards, alignment with international regulations, adaptation to new laws, acceptance of new regulations, regulatory oversight, compliance assessment, legal compliance, monitoring legal changes, strengthening control systems, training on new laws, and continuous regulatory updates	Legal and Regulatory Conditions
5	Existing IT systems, access to technology, development of related software, hardware equipment, advanced software, system upgrades, equipment enhancement, access to tools, IT resource optimization, technical support, and periodic technology assessment	IT Infrastructure
6	Data protection, risk management, access control, network security, security systems, security support, threat management, information security, security risk analysis, enforcement of security policies, and network monitoring	Cybersecurity
7	Data synchronization, compatibility with existing software, secure data exchange, system integration, concurrent data development, improved compatibility, secure information exchange, standardization, data standards, secure data transfer, synchronization optimization, and system performance evaluation	System Integration
8	Error reduction, increased work speed, process efficiency, improved scheduling, process optimization, process automation, reduced repetition, lower operational costs, improved process quality, operational innovation, and reduced execution time	Efficiency and Automation
9	Investment fluctuations, cost-benefit analysis, investment risk, profitability analysis, economic sustainability, allocation of financial resources, budgeting, economic forecasting, financial planning, market analysis, and evaluation of investment opportunities	Economic Volatility
10	Inter-organizational competition, development of competitive strategies, market innovation, attracting new customers, strengthening competitive position, market development, competitor analysis, market-share growth, competitor assessment, reinforcing competitive position, and product innovation	Market Competition
11	Technology acceptance by employees, public awareness, employee participation, organizational culture, encouragement of adoption, culture of technology acceptance, organizational interactions, internal communication, technology training, encouraging collaboration, and promoting organizational culture	Cultural Changes
12	Social pressures for transparency, shifting societal expectations, public oversight, social transparency, increased accountability, social communication, social interactions, social roles, enhanced transparency, community engagement, and responding to societal expectations	Social Movements
13	Rapid technological changes, cybersecurity risks, blockchain system development, network security, technological innovations, technological advancements, technical updates, and technological transformations	Technological Developments
14	Data quality, lack of system integration, improved data management, big-data analytics, enhanced data accuracy, secure storage, data aggregation, database development, optimized data management, big-data analysis, and data infrastructure development	Information Accessibility

Row	Open Code	Axial Code
15	Changes in laws and regulations, financial regulations, international financial laws, local policies, compliance with standards, acceptance of new laws, alignment with regulations, legal oversight, regulatory follow-up, compliance with financial standards, and regulatory evaluation	Political and Legal Conditions
16	Oversight of financial activities, government projects, legal follow-up, engagement with regulatory bodies, financial control, legal evaluation, supervisory monitoring, project evaluation, strict financial control, and engagement with legal institutions	Oversight and Regulation
17	Holding training workshops, development of training programs, external training programs, professional development, specialized training, improving job skills, enhancing knowledge, continuous learning, encouraging ongoing learning, practical training programs, and specialized skill development	Employee Training and Empowerment
18	Small-scale testing, collection of experimental data, practical experiences, documentation, pilot projects, analysis of experimental data, performance evaluation, review of results, empirical assessment, project analysis, and documentation of outcomes	Pilot Project Implementation
19	Collaboration with universities and research centers, networking, participation in projects, research collaborations, knowledge exchange, partnership development, scientific communication, creation of research networks, joint research, development of research networks, and strengthening scientific cooperation	Inter-organizational Collaboration
20	Investment in IT infrastructure, system integration, hardware equipment, advanced software, infrastructure development, technical updates, system upgrades, access to technology, hardware innovations, software upgrades, and infrastructure optimization	Technology Infrastructure Development
21	Applied research, publication of scientific papers, accounting innovations, blockchain impact, scientific research, research development, dissemination of findings, research review, impact analysis, accounting research, and development of analytical models	Research and Development
22	Development of analytical models, risk analysis, blockchain data analysis, statistical modeling, development of theoretical models, conceptual examination, economic analysis, analytical review, risk analysis, data modeling, and conceptual evaluation	Theoretical Model Development
23	Collaboration across disciplines, analysis of social and economic impacts, blockchain technology research, impact assessment, multidisciplinary analysis, development of hybrid research, interdisciplinary study, comprehensive analysis, research development, interdisciplinary review, social analysis, and hybrid research	Interdisciplinary Research
24	Honesty in reporting, maintaining professional ethics, transparency and integrity, adherence to ethical principles, commitment to ethics, professional principles, responsibility, ethical values, commitment to transparency, adherence to professional principles, and strengthening ethical values	Ethical Work Environment

Row	Open Code	Axial Code
25	Process innovation, organizational development, acceptance of changes, training and development, continuous improvement, organizational transformations, process enhancement, digital transformation, continuous process improvement, and organizational development	Organizational Culture
26	Public awareness, technology acceptance, social communication, cultural interactions, public encouragement, public education, raising awareness, technology promotion, promotion of technology, and knowledge enhancement	Societal Culture
27	Macroeconomic decisions, impact on investment, economic policies, economic strategies, macro-level programs, allocation of macro-resources, economic development, fiscal policies, strategic decisions, resource allocation, and economic management	High-Level Governance Decisions
28	Price increases, inflation rate, rising costs, increasing prices, currency devaluation, growing expenses, and price fluctuations	Inflation
29	Sanctions, trade restrictions, prohibitions, punitive actions, severance of economic relations, import/export bans, economic blockade, and international pressures	Sanctions
30	Economic growth, economic progress, economic analysis, growth assessment, and long-term forecasts	GDP Growth Rate
31	Enhancing transparency, reducing errors, better transaction monitoring, increased integrity, fraud reduction, improved financial transparency, accountability, improved reporting accuracy, enhanced data precision, improved reporting, and increased financial transparency and social responsibility	Outcomes

Based on the completed interviews, the initial concepts, presented in Table 2, were identified as initial (open) codes. These concepts were then compared to identify their similarities and differences, allowing for broader categories to be formed, which represented common themes. Following the same procedure, all the remaining concepts and categories were identified. The 92 extracted categories were then defined and allocated to the relevant research questions and eventually linked to the central phenomenon of blockchain technology in management accounting.

Axial Coding

Once the open codes are identified, the axial coding step is where the codes are grouped and classified into larger and coherent categories. As emphasized by Strauss and Corbin (1990, p. 89), the researchers should classify the identified categories into the following five groups. This is what is referred to as axial coding.

a) Causal Conditions: The variables or events that cause or influence the appearance of a phenomenon.

b) Strategies: Outcome-oriented or action-based responses that must be implemented in relation to the phenomenon under study in its particular context, despite conditions of intervention.

c) Intervening Conditions: Conditions that either contribute to or prevent the implementation of strategies.

d) Contextual Conditions: The context or environment of the strategies. Distinguishing these from causal conditions can be difficult. Researchers may mistakenly classify more compelling concepts as causal conditions and less prominent ones as contextual (Strauss & Corbin, 1990, p. 67).

e) Consequences: The results of the implementation of the strategies. The categories discovered in the study were categorized based on this structure.

The results of this section are explained in Figure 1.

Selective Coding

The objective of this stage is to discover the core category and arrange all other categories around this core. In selective coding, the researcher determines the core category systematically and objectively and then fits the other categories beneath it. Afterwards, the researcher links the core category to other categories in an organized manner, confirms these relationships, and develops any categories that need further development (Strauss & Corbin, 1990, p. 98).

Once the core category has been identified, all remaining categories are considered subcategories or descriptors of the central theme. Ultimately, an integrated grounded theory is produced by identifying the relationship between the primary category and its subcategories as well as related concepts (Noori & Mehrmohammadi, 2012, p. 27). In this study, "the impact of blockchain technology on management accounting" was chosen as the central category since all other categories are formed around the central category and contribute to explaining it. The model developed from the three-stage coding process is illustrated in Figure 1. The various parts of this model are described in the following sections. Due to existing limitations, each section refers only to one or a few of the identified categories.



As illustrated in Figure 2 and based on the coding process results, the response to the first subsidiary question indicates that experts identified the influence of blockchain technology on management accounting as the primary category. With regard to the second subsidiary question, it became apparent that the causal conditions that impact the adoption of blockchain in management accounting are as follows: 1. Openness to innovations, 2. Support for change, 3. Encouragement of creativity, 4. Support for new projects, 5. Employee training, 6. Blockchain awareness, 7. Training programs, 8. Continuous education, 9. Flexibility, 10. Commitment to improvement, 11. Legal changes, 12. Adherence to standards, 13. Data governance regulations, 14. Financial regulations, 15. Existing IT systems, 16. Access to technology, 17. Data protection, 18. Risk management, 19. Data synchronization, 20. Compatibility with existing software, 21. Error reduction, and 22. Increased processing speed.

Findings related to the third subsidiary question revealed that the contextual conditions impacting the use of blockchain technology in management accounting are as follows: 1. Transparency and honesty, 2. Professional ethics, 3. Ethical considerations, 4. Acceptance of change, 5. Training and development, 6. Cultural dimensions, 7. Public awareness, 8. Social acceptance, 9. Social dimensions, 10. Economic policies, 11. Support for innovation, 12. Political dimensions, 13. Effects on economic resources, 14. Cost management, 15. Economic dimensions, 16. Trade restrictions, 17. Innovation under constraints, 18. Legal dimensions, 19. Impact on investment, 20. Economic progress, and 21. Economic dimensions.

Analysis of the fourth subsidiary question revealed that the strategies in the implementation of blockchain technology in management accounting are as follows: 1. Conducting training workshops, 2. Creating ongoing training programs, 3. Small-scale pilots, 4. Gathering empirical data, 5. Working with universities and research centers, 6. Networking with other organizations, 7. Investment in IT infrastructure, 8. System integration, 9. Applied research, 10. Publication of academic articles, 11. Building analytical models, 12. Risk analysis, 13. Interdisciplinary collaboration and 14. Studying social and economic impacts.

The fifth subsidiary question revealed that the intervening conditions that impact the adoption of blockchain in management accounting are as follows: 1. Changes in investment pattern, 2. Pressure on financial

resources, 3. Economic aspects, 4. Competition between organizations, 5. Changes in demand, 6. Competitive strategies, 7. Employee acceptance of new technologies, 8. Public awareness, 9. Social factors, 10. Social pressure, 11. Changes in expectations, 12. Managing cultural change, 13. Rapid developments in blockchain technology, 14. Cybersecurity risks, 15. Technological dimensions, 16. Data quality, 17. Lack of system integration, 18. Data management, 19. New blockchain-related regulations, 20. Financial regulations, 21. Political aspects, 22. Monitoring financial activities, 23. Government projects, and 24. Cooperation with regulatory bodies.

Finally, the findings of the sixth subsidiary question revealed that the consequences of adopting blockchain technology in management accounting are as follows: 1. Better monitoring of transactions, 2. Less reliance on intermediaries, 3. Fewer errors and fraudulent activities, 4. Faster transaction processing, 5. Process automation, 6. Data protection, 7. Fewer cybersecurity risks, 8. Accurate and up-to-date data, 9. Data analysis, 10. Change in responsibilities, and 11. Need for new skills.

Discussion & Conclusion

The implementation of blockchain technology in management accounting can bring about far-reaching changes. One of the most important of these is increased transparency in financial reporting. Blockchain creates a secure, unchangeable path of transactions, which helps build confidence in financial data and prevents fraud. Such transparency is particularly important in sensitive industries such as banking, where it can help increase reporting standards and build greater trust among stakeholders. Another important effect of blockchain is its ability to reduce costs and increase operational efficiency. By removing intermediaries and automating processes with smart contracts, operating expenses can be greatly reduced. In addition to accelerating accounting processes, the technology can help organizations spend their resources on other activities that create greater value and boost productivity.

A third significant contribution of blockchain is that it can help in strengthening information security. Through cryptographic methods and the decentralized nature of the blockchain, cyberattacks and data breaches are less likely to occur. Such improved security is particularly useful in financial and high-risk industries, where blockchain can be used to protect

sensitive organizational data and reduce the likelihood of unauthorized tampering.

The role of accountants will change as well due to the increased adoption of blockchain. Accountants will have to concentrate more on data analysis and strategic advisory as repetitive tasks are automated. Such a change will demand the development of digital and technological capabilities among professionals. Organizations must offer the relevant training programs to equip their employees. In addition, regulatory and legal issues continue to be barriers to the implementation of blockchain. Clear and stable regulations are needed to use this technology effectively. Organizations have to comply with both national and international requirements and ensure that accounting standards follow the emerging technologies. Close interaction with the regulatory bodies can play a decisive role in successful adoption. Blockchain acceptance is also influenced by cultural and environmental conditions. Organizational cultures open to innovation and change, along with continuous training of employees, make blockchain far more likely to be implemented successfully. Moreover, wider economic factors such as inflation and macroeconomic policies can pose both opportunities and threats to the adoption of blockchain.

Overall, blockchain technology has the potential to improve efficiency, transparency, and security in management accounting and revolutionize the role of accountants. In order to reap the full benefits of this technology, organizations will need to develop new competencies and pay particular attention to building the appropriate legal, cultural, and technological foundations. Essentially, blockchain could become a central force in the future of management accounting based on a careful interpretation of the findings. However, success depends on the development of suitable organizational, regulatory, and technological conditions. By making transactions more transparent, cheaper, more efficient, and more secure, and changing the professional roles within the system, this technology can cause significant change. However, it is necessary to take a multidimensional approach and pay attention to factors such as organizational culture, economic context, and legal challenges to achieve these advantages. The available literature clearly indicates that the adoption of blockchain requires a cultural and conceptual shift in organizations, and ongoing investment

in training and technological infrastructure is required to realize the full potential.

The findings of this study are similar to the results of Sokcevic et al. (2024, p 171), who discussed the use of blockchain in management accounting, a technology that promotes automation and enhances the workflow and changes the role of employees. The results are also consistent with the work by Abad-Segura et al. (2024, p. 9), who emphasized the capacity of blockchain in improving reliability and efficiency in management accounting. Both studies have an optimistic message on blockchain, noting its role in improving decision-making processes and organizational effectiveness. Likewise, the study by Wang et al. (2024, p. 20) that discussed a blockchain-based enterprise asset management accounting system indicates that blockchain can substantially improve asset management efficiency. These conclusions are closely aligned with the conclusions of Mehdani et al. (2023, p. 8), who concluded that blockchain can improve the quality of financial data and increase transparency compared to previous systems. Zhao et al. (2022, p. 28) also highlighted the role of blockchain in promoting innovation and efficiency in management accounting, which is consistent with the results of Noori Doabi and Talebnia (2023, p. 30), who emphasized the significance of blockchain in reliability and transparent reporting.

The findings of Arkhipova et al. (2024, p. 80) in studying the changes occurring in the management accounting profession due to digital technologies highlight the complexities and challenges brought about by such innovations. This view could contrast with previous research, which tended to focus primarily on the benefits of blockchain. The difference is the focus on the difficulties and complications involved in the integration of new technologies into traditional accounting systems. Similarly, the work of Kostić and Sedej (2022, p. 137), which focuses on interorganizational relationships and the impact of blockchain on them, may differ from the studies focused on the internal accounting process. Their emphasis on the dynamics of organizations and theorizing about such relationships adds a different perspective on the wider implications of blockchain.

Generally, the majority of studies tend to focus on the positive impact of blockchain on the improvement of management accounting processes. Nevertheless, other researchers point out the difficulties and complications with the implementation of this technology. Thus, while there are areas of

agreement, more research is required to develop a better understanding of the practical barriers and examine the impact of blockchain on interorganizational relationships and other dimensions of accounting. Such multiplicity of conclusions does more than just enrich the literature and leave room to inquire in the future. Blockchain has an impact on accounting and other areas such as information technology, risk management, and cybersecurity. Therefore, to perform a thorough analysis encompassing all these aspects requires the contribution of experts from a range of disciplines, which is not an easy task to accomplish due to the limited access to such expertise and the difficulty of combining their opinions, which is the primary limitation of the present study.



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