

Decentralizing the Enterprise: A Case Analysis of Blockchain Challenges in Management Accounting.

Arfah Aisyah Ahmad Sabri¹, Sharina Tajul Urus^{2*}, Noraizah Abu Bakar³,
Zarinah Abdul Rasit⁴

¹*Bahagian Audit Dalam, Aras 3, Bangunan Canselor, Universiti Malaysia Terengganu, 21030, Terengganu, Malaysia.*

^{2*}*Faculty of Accountancy, Universiti Teknologi MARA, Negeri Sembilan, Malaysia.*

^{2*}*Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Kampus Puncak Alam, 42300 Puncak Alam, Selangor, Malaysia.*

³*Faculty of Accountancy, UiTM Cawangan Johor, Kampus Segamat, 85000 Segamat, Johor, Malaysia.*

⁴*Faculty of Accountancy, Universiti Teknologi MARA Cawangan Selangor, Kampus Puncak Alam, 42300 Puncak Alam, Selangor, Malaysia.*

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ABSTRACT

Amidst a wave of innovation and a growing list of benefits, global corporations are increasingly exploring the integration of blockchain technology into their operations. Despite its rapid growth and rising demand, there remains a limited understanding of the challenges associated with blockchain adoption, particularly from a management accounting standpoint. This study sought to address that gap by examining the challenges faced in blockchain adoption within a Malaysian organisation, guided by the Technology-Organisation-Environment (TOE) framework. Using a qualitative, single-case study approach, data were gathered through face-to-face and virtual interviews with ten participants and analysed through thematic coding. The key outcome of this research was the development of a Blockchain Challenges Model (BC Model), which clustered the identified challenges across technological, organisational, environmental, and financial dimensions. The study contributes theoretically by enriching the academic discourse on blockchain adoption and practically by providing actionable insights. The proposed model can serve as a strategic tool for practitioners, helping organisations assess the suitability of blockchain and optimise its implementation to maintain a competitive edge. Furthermore, the findings offer guidance for shaping policies related to the deployment and governance of blockchain technology.

^{2*}Corresponding author. E-mail address: sharina675@uitm.edu.my

1. INTRODUCTION

The evolution of blockchain technology has captured attention worldwide. There has been a substantial focus on blockchain research. Blockchain technology, also known as distributed ledger technology, is a peer-to-peer distributed asset database that may be exchanged between two or more entities across a network without geographical boundaries (Liu, Zhang, & Zhen, 2023; Treleaven, Brown, & Yang, 2019). The decentralised ledger aspect of the blockchain documents transactions across numerous computers, guaranteeing that data remains immutable and transparent, which are characteristic qualities of the technology. These two blockchain attributes are crucial in establishing trust in environments where security is paramount (Wiwin et al., 2023). The rapid global development and adoption of blockchain technology have not excluded Malaysia from this new IT breakthrough. For instance, the global adoption of cryptocurrencies, one of the blockchain applications, has driven regulators around the world to implement various approaches and regulatory measures, while Malaysia has also become part of the expansion (Sharma et al., 2023; Fong, 2017). The Malaysian government has recognised the potential of blockchain technology and launched several initiatives to promote its adoption. The Malaysian Ministry of Science, Technology, and Innovation (MOSTI) aimed to guide the country in adopting Blockchain 2.0 through the recent development of the Blockchain Roadmap 2021-2025. The blueprint extends beyond cryptocurrency practices by offering some solutions for business challenges such as fraud management and supply chain monitoring, as well as identity verification that would enhance efficiency and reduce cost through blockchain adoption (Ministry of Science, Technology, and Innovation, 2022).

Blockchain technology has also received substantial attention in transforming management accounting. Beyond basic transactional recording, blockchain's integration through smart contracts and distributed ledgers has shifted the role of management accountants from historical record-keepers to strategic decision-makers (Li & Kassem, 2021). It directly impacted management accounting controls by automating variance analysis, optimizing supply chain cost monitoring, and facilitating real-time budget adjustments (Liu, Zhang, & Zhen, 2023). However, when these accounting systems were disrupted by new technology, it challenged the traditional formal and informal management accounting of the firm. (Sargent & Breese, 2023; Zhang & Liu, 2023). Notwithstanding its tremendous promise, the extensive use of blockchain technology encounters numerous challenges. As highlighted by Sharma et al. (2023), the adoption of blockchain technology worldwide was only up to the blueprint level. A blueprint is a detailed plan or guide that acts as a step for implementing a plan, project, or idea (Muchira, 2023). Hence, there was a lack of blockchain research on challenges that made it difficult to measure the degree of success of blockchain adoption (Sharma et al., 2023). Despite the tremendous growth of blockchain research, this technology is still new in Malaysian organisations, whether in the private sector or in the public sector. In this study context, the scope was to understand the challenges faced by end users during the adoption phase. As an emerging technology, blockchain presents various challenges for successful adoption that may impact the company's existing technology, including the organisation's readiness and government regulations.

To understand the processes and challenges of blockchain adoption, this study used a Technological, Organisational, and Environmental Framework (TOE) model. Based on researchers' knowledge, the TOE model had not been widely used in blockchain studies. Some had applied other theories in Malaysia, such as cost-benefit analysis (Liu, Zhang & Zhen., 2023); Burns and Scapens' framework (Muhammad et al., 2019); and SWOT analysis (Zakaria et al., 2018), though still deficient in the TOE Model. This study was

considered among the pioneering attempts to integrate the TOE model into the blockchain phenomenon in Malaysia, since the model is normally used in the information systems field, but not specifically in the social science context (Muhammad et al., 2019). By merging some concepts from the TOE Model with blockchain technology, it added value and offered new perspectives for researchers as well as society in studying this innovation. Based on the highlighted literature gap, a deeper understanding of the challenges of blockchain technology adoption, specifically from technological, organisational, and environmental perspectives, was urgently needed. Hence, this study aimed to examine the technological, organizational, and environmental (TOE) challenges faced during blockchain adoption within a Malaysian organization, specifically analysing how these barriers impacted management accounting practices and strategic control mechanisms. The findings will serve as a valuable single-case study of organizational change in management accounting, providing a benchmark for practitioners navigating digital governance shifts.

2. LITERATURE REVIEW

2.1 Blockchain Conceptualization (Definition and Attributes)

Blockchain definition

Blockchain is defined as a chain structure in which all transaction data is packed into blocks and blocks are connected accordingly (Gadekallu et. al, 2021). Blockchain stands as an incorruptible digital ledger capable of recording not only financial transactions but virtually any valuable data. This foundational principle has prompted numerous studies exploring the various applications of Blockchain across multiple industries (Faiz, Kusumo & Alibasa, 2022). Adere (2024) proposed a definition of blockchain using the Aristotelian method, emphasising its role as a type of Distributed Ledger Technology (DLT) characterised by decentralisation, immutability, and transparency.

Blockchain attributes – data reconciliation

A blockchain technology could improve the efficiency, accuracy, and transparency of reconciliation processes (Sabri, Urus & Bakar, 2023). In supply chain management, a blockchain-based reconciliation system can reduce the time and cost associated with reconciliation processes (Bai et al., 2020).

Blockchain attributes - distributed ledger technology (DLT)

The basics of blockchain are that it is known for its DLT, which is its simplest feature. Sunyaev & Sunyaev (2020), postulated that DLT was regarded as a promising innovation with the potential to change organization and collaboration in the economy, society, and industry. Sabri, Urus, and Bakar (2023) proposed that the DLT attributes of blockchain enabled the creation of a tamper-proof and distributed database of transactions without the need for a central authority or intermediary. Others, like Wang et al. (2021), claimed that authentication, authorization, audit, and data protection were the four key areas of focus in blockchain technology.

Blockchain attributes – data synchronization

A data synchronisation using the blockchain system had provided a promising direction for efficiently preserving a company's privacy (Sabri, Urus & Bakar, 2023). The blockchain innovation provided real-time visibility into the supply chain. Amongst the positive feedback of adopting blockchain technology

were providing information and functionality that met the needs of the individual departments within an organization, the capacity to foster creativity, perceived innovativeness, qualities, and the ability to bring stability and order (Sharma et al., 2023; and Sabri, Urus & Bakar, 2023).

Blockchain attributes – integrity of data

The integrity of a data attribute pertains to its capacity to assist management in making business decisions without concern for issues traditionally faced by organisations, such as improper information flow, a lack of trust among partners, fraudulent transactions, and various other risk management challenges (Sabri, Urus & Bakar, 2023). Kumari & Bucker (2021) suggested that the data integrity attribute of blockchain was crucial in addressing the security challenges of big data within organisations that might potentially compromise their financial information. Furthermore, the blockchain's unique characteristics in its functionality and provision of mechanisms for inputting data, processing it, and extracting output made it useful for reporting and analysis (Sabri, Urus & Bakar, 2023).

Blockchain attributes – transparency

The transparency attributes of blockchain technology signified its usefulness in terms of check and balance functionalities, especially to safeguard records that will be easily accessible to authorised parties (Sabri, Urus, & Bakar, 2023). The technology had the potential to increase transparency in financial services (Liao et al., 2020), to which a blockchain can provide greater visibility and accountability in financial transactions and reduce the potential for fraud and money laundering. Overall, the following Figure 1 depicts the blockchain attributes as proposed by Sabri, Urus, & Bakar (2023).

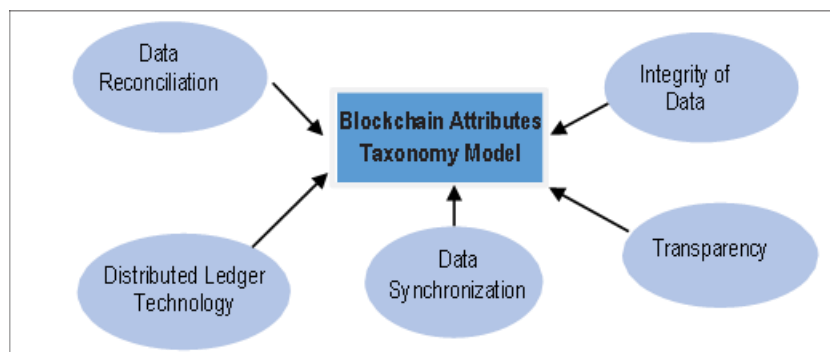


Fig 1. A Blockchain Attributes Taxonomy Model

Source: Sabri, Urus & Bakar (2023)

2.2 Blockchain Technology in Management Accounting

Blockchain technology offers several strategic advantages within the domain of management accounting, particularly by enhancing the operational efficiency of Management Control Systems (Sahoo et al., 2022). A core benefit lay in the transparency and traceability of managerial and operational data (Porath, 2023). Blockchain provided a transparent, decentralized ledger where all internal resource consumption, product movements, and lifecycle costs were recorded and can be traced back to their

structural origin (Agrawal et al., 2022). This feature was uniquely valuable to corporate controllers and management accountants, as it ensured that all internal performance metrics are verifiable and cannot be tampered with (Babaei et al., 2025). This systemic increase in data transparency reduced internal budgetary slack, mitigated fraud, and enhanced goal congruence and trust among internal stakeholders and business units (Bischof et al., 2024).

Furthermore, blockchain technology increased cost efficiency and drastically lowered internal transaction and transaction-processing costs (Verma et al., 2022). In management accounting, blockchain provided robust solutions to bridge the legacy accounting, accountability, and managerial assurance barriers traditionally observed within transnational supply chains (Li et al., 2025). By leveraging this technology, management accountants can streamline cost accumulation processes by automating and simplifying variance verification and inter-company settlements (Ogunwale & Jimoh, 2024). For instance, through the execution of smart contracts, corporate managers can automate supply chain variance tracking—such as material price variances—by reducing the reliance on external intermediaries while minimizing operational delays and logistical bottlenecks (Chowdhury, 2025). This transition drove significant cost savings through optimized overhead allocation and the systemic minimization of manual, human-entry errors in cost sheets (Uddoh et al., 2021). This efficiency gained ultimately shortened cycle times and radically improved overall financial and managerial operations (Appio et al., 2024). The reinforcement of internal data integrity through advanced cryptographic techniques stood as another fundamental structural strength of blockchain applications (Ahmed et al., 2022). For instance, each operational cost and production transaction was encrypted and permanently linked to the preceding block, rendering it virtually impossible for unauthorized parties or individual departments to alter historical performance records to mask operational inefficiencies (Appio et al., 2024). This high level of cryptographic security protected proprietary financial models, product pricing metrics, and sensitive strategic planning information from cyberattacks and internal data breaches (Karaduman & Gülhas, 2025).

Crucially, blockchain technology granted management accountants' real-time access to granular financial and operational metrics, facilitating continuous variance auditing, automated performance appraisal, and dynamic rolling forecast reporting (Oyeleye, Asuzu, & Ibeh, 2024). This real-time accessibility vastly enhanced the accuracy and timeliness of internal cost reports, allowing chief financial officers (CFOs) and divisional managers to make highly informed strategic decisions, optimize capital budgeting layouts, and respond swiftly to macroeconomic market fluctuations (Pedroso & Gomes, 2024). By maintaining a clear, unalterable record of all internal cost pathways and asset utilization logs, blockchain technology helped organizations meet stringent internal governance criteria and reporting standards with unprecedented efficiency (Babaei et al., 2025). Table 1 provides a thematic synthesis of the literature on blockchain technology in management accounting. Rather than presenting each study individually, the table consolidates authors according to common management accounting activities and summarizes how blockchain technology enhanced management accountants' decision-making through improved transparency, cost management, governance, security, and real-time information availability.

Table 1: Synthesis of Blockchain Technology in Management Accounting

Author(s)	Management Accounting Activities	How Blockchain Assists Management Accountants in Decision-Making
Sahoo et al. (2022)	Enhancing Management Control Systems (MCS)	Improved efficiency of MCS for better operational and strategic decisions.
Porath (2023); Agrawal et al. (2022); Babaei et al. (2025)	Transparency, traceability and verification of managerial, operational and performance information	Provided reliable, traceable and tamper-resistant information for planning, control, performance evaluation and governance decisions.
Bischof et al. (2024); Babaei et al. (2025)	Budgetary control, fraud prevention and governance	Reduced budgetary slack and fraud while strengthening governance and stakeholder confidence.
Verma et al. (2022); Ogunwole & Jimoh (2024); Chowdhury (2025); Uddoh et al. (2021); Li et al. (2025)	Cost management, transaction processing, variance analysis, cost accumulation, inter-company settlement and supply chain accounting	Automated costing and variance tracking, reduces processing costs and manual errors, and supported accurate costing and operational decisions.
Ahmed et al. (2022); Appio et al. (2024); Karaduman & Gülhas (2025)	Data integrity, cryptographic security and protection of strategic accounting information	Ensured secure and trustworthy accounting information for strategic planning and risk management.
Oyeleye, Asuzu, & Ibeh (2024); Pedroso & Gomes (2024); Appio et al. (2024)	Real-time reporting, performance appraisal, rolling forecasts, capital budgeting and financial reporting	Provided timely information for forecasting, investment appraisal, resource allocation and rapid strategic decision-making.

Source: Authors' Own Construct

2.3 Possible Challenges of Blockchain Technology Adoption

During the adoption phase, several possible challenges were identified for successfully adopting new information technology, particularly blockchain technology. The challenges identified from previous studies could be categorised into five (5) areas: risks of re-centralisation (Ganguly, 2022; Oke et al., 2022; ALSaqa et al., 2019), government resistance (Sharma et al., 2023; ALSaqa et al., 2019), trust to developers (Afshan, Wijayanayaka, & Karunarathna, 2024), storage capacity (Panghal et al., 2023), and violation of human rights (Nam et al., 2021).

2.4 Technology-Organisation-Environment (TOE) Model

The TOE Model was relevant to be used in studying the adoption of technological innovations (Tornatzky & Fleischer, 1990). There were three aspects that were found to influence the process of innovation adoption in organisations, namely technological context, organisational context, and environmental context. The model was suitable for enhancing understanding of technology innovation adoption within organisations. Blockchain adoption may induce organisational changes related to technological features, internal communication and readiness, and the working environment, particularly through interactions with regulatory frameworks and external technological support. The following Figure 2 depicts the research framework for this study based on the TOE model.

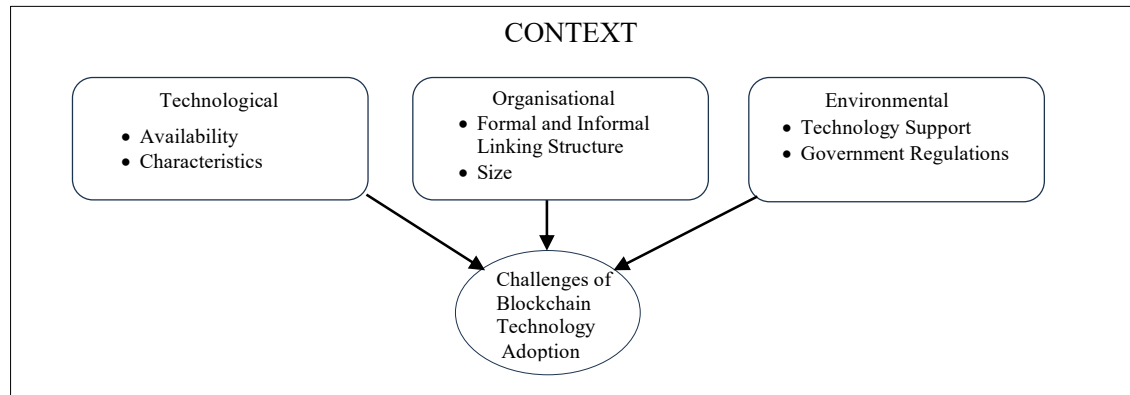


Fig 2. Research Framework

Source: Authors' Own Construct

3. METHODOLOGY

The qualitative method was used for the study to facilitate an understanding of the blockchain technology phenomenon in management accounting procedures and the obstacles organisations encounter. Employing a single case study, it allowed for an in-depth analysis of a particular phenomenon, entity, or situation (Wandin et al., 2023). In light of the fact that blockchain technology was a recently investigated subject, employing a qualitative research approach was very suitable for enhancing the researcher's comprehension of the matter (Andoni et al., 2019). This study used an explanatory case study (Woodside and Wilson, 2003). This method also allowed the researcher to collect detailed information using a variety of data collection procedures over a stipulated period. In this study, the researcher focused on answering the questions "what" and "how" regarding blockchain technology. In this study, the researcher collected the data from the fieldwork through interviews and document reviews with an organisation identified herein as Case A. The data collection process was divided into two (1) phases. The first phase was the pilot study with the aim of obtaining information to enhance the design of the semi-structured questions. The second phase was the face-to-face and virtual interview, with participants being held in separate sessions. The collected data for both phases was from an internal user of Case A. Throughout both phases, review of documents was also performed to include documents such as the blockchain business model, website of the company, financial reports, company policy and guideline on blockchain technology, organisation chart, and news. Field notes were made throughout the process of collecting the data and information from relevant websites retrieved during the process.

Data analysis was performed using the thematic approach (Braun and Clarke, 2006). Due to the interviews being conducted in mixed languages (English and Bahasa Malaysia), the data were translated from Bahasa Malaysia into English. To ensure its validity, a third party verified the translation of ten (10) interviews, representing multiple organisational levels and functional areas. This allowed the results of the research to be applied to a greater range of other similar situations, although the goal of qualitative research is to understand the particular phenomenon in-depth. The identities of the interviewees were kept anonymous by assigning them codes such as Officer A, Officer B, and so forth. The thematic coding used was based

on the approach by Boyatzis (1998), who suggested three (3) stages in the use of thematic analysis. The first stage involved determining the sampling and design issues. Stage 2 involved developing themes and codes. The final stage involved validating and using the codes.

4. RESULTS AND DISCUSSION

4.1 Case Study Profile

Case A was a leading software development and multi-award-winning mobile apps development company that offered mobile, blockchain, and Web solutions to corporate and government agencies. Case A, founded in 2012, had been involved in developing and publishing more than 100 mobile applications in iOS and Android, serving enterprise customers from different industries, including telco, automotive, oil and gas, retail, healthcare, finance, government agencies, and more. Case A had intensive commercialization experience in mobile development with millions of applications downloaded across the world.

Case A used the specific blockchain application named BlockChained Accounting System (BAS) in their business, specifically in management, accounting, and finance. BAS has been integrated into the existing accounting software (SAP) for accounts payable and accounts receivable for the purpose of improving the process of management, accounting, and finance. The processes in accounts payable, accounts receivable, asset register, and supply chain involved blockchain technology by using smart contracts, triple-entry bookkeeping, and cryptocurrency. Thus, this study was constructed from the perspective of the users of blockchain technology.

The involvement of smart contracts from blockchain technology had automated the following tasks in Case A: invoice creation, approval workflows, payment tracking, and reconciliation. Through smart contracts, invoices were automatically generated when goods were delivered or services were rendered. The predefined rules had been set to ensure the invoices were approved. Once the invoice had been approved, the system will trigger and process the payments. The BAS then reconciled the payments with invoices to ensure they matched before the ledger was updated. Figure 3 below shows a diagram of the usage of blockchain in Case A.

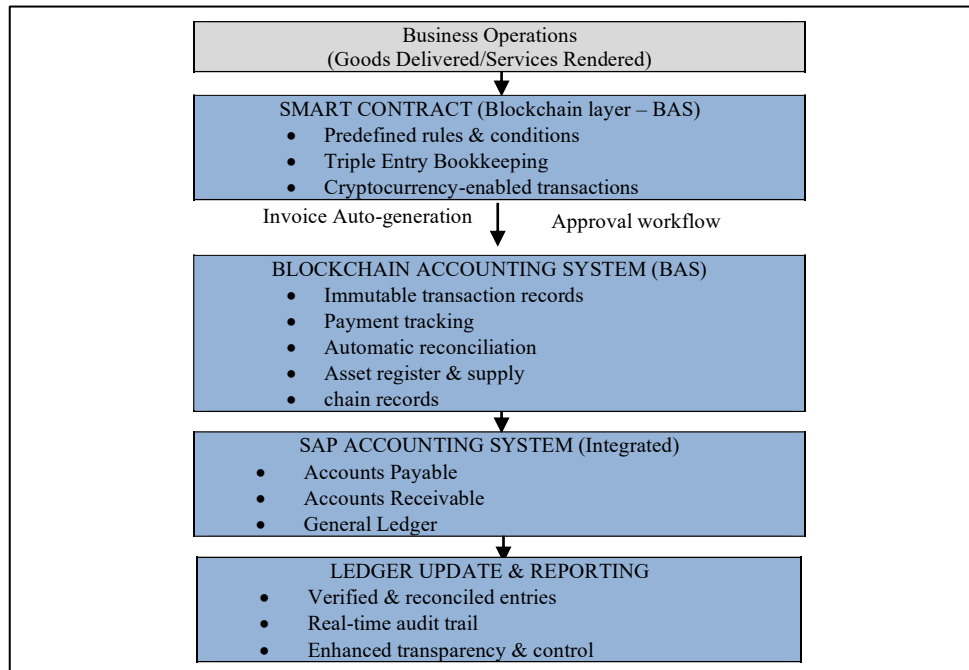


Fig 3. The Usage of Blockchain in Case A

Source: Authors' Own Construct

As illustrated in Figure 3, Case A utilized the BlockChained Accounting System (BAS) integrated with SAP. From a management accounting perspective, this setup drastically transformed cost accumulation and performance measurement. The automated execution of smart contracts for invoices and reconciliation eliminated human error in overhead allocation and material price variance tracking. Management accountants received real-time, tamper-proof cost data streams, changing traditional monthly variance reports into continuous performance tracking dashboards.

4.2 Challenges of Blockchain Technology Adoption

The discussion of findings is structured according to three main themes, namely technological, organisational, and environmental contexts, with these three categories based upon the TOE model of Tornatzky and Fleischer (1990). In addition, the discussion revealed an additional theme from the findings, which was the financial context. Within the technological context, four sub-themes were found: characteristic, complexity, scalability, and interoperability. For the operational context, the four sub-themes identified were formal and informal linking structures, size and support from the management, as well as organisational readiness. The environmental context discussion was surrounded by three sub-themes, namely external technology support, government regulation, and the misconception of blockchain technology. Finally, for the financial context, the three sub-themes discovered were implementation cost, business transactions, and monitoring cost. Overall, a total of 14 sub-themes were categorised within the 4 main themes as shown in Table 2.

Table 2: Summary of Challenges in Blockchain Technology Adoption

RQ	Theme	Sub Theme	Description
RQ1	Technological Challenges	Characteristic	A distinguishing quality, trait, or attribute that helps in defining and differentiating something.
		Complexity	The degree of difficulty or effort required to give a precise and detailed explanation or description of a concept.
		Scalability	The ability of the blockchain system to perform a transaction and accomplish its objectives in an acceptable period.
		Interoperability	The ability of computer systems or software to exchange and make use of information.
	Organisational Challenges	Formal and Informal Linking Structure	The communication process between top management and employees, and between employees in companies
		Size	Number of employees in a company
		Support from Management	Type of assistance from upper management to smooth the process.
		Organisation Readiness	The state of organisation is being fully prepared for any changes
	Environmental Challenges	External Technology Support	Availability of support infrastructure for technology from the industry
		Government Regulation	Any government incentives on procurements and taxation in e-business
		Misconception of Blockchain Terminology	The terms used with a particular technical application in the subject of blockchain technology.
	Financial Challenges	Implementation Cost (Initial)	Cost related to the development and execution of the implementation strategy.
		Business Transactions (During)	Buying or selling anything to operate the business.
		Monitoring Cost (Final)	Observe and check the progress or quality of (something) over a period of time; keep under systematic review.

Source: Authors' Own Construct

Technological Context

The analysis demonstrated that there were four sub-themes that can be grouped into the technological context: characteristics, complexity, scalability, and interoperability.

Characteristics

The findings from this study revealed that blockchain characteristics were one of the technological challenges in Case A. The characteristic was related to the privacy and vulnerability of blockchain technology. A trade-off must be made between security and performance, as blockchain technology was a distributed ledger technology, as stated by one of the participants:

'It is no doubt that privacy concerns are a priority. Even many people attracted to blockchain were attracted by the privacy that it can give. But blockchain is a distributed system, so it allows for a high level of visibility. This will result in an unwillingness to adopt. Most organisations are unwilling to allow sensitive company information to be easily leaked. But that is the trade-off that organisations need to be aware of.'

(IT3)

The findings of this study were consistent with those of Liu, Zhang & Zhen., (2023), and Sharma et al., (2023), that discussed one of the characteristics of blockchain: that it allowed for a high level of visibility and may become a challenge for organisations as most of them were not willing to let the company's information be leaked out easily, especially financial information. They suggested that while higher levels of security can improve the trustworthiness of the blockchain, they can also result in lower performance and scalability. Conversely, higher performance and scalability can improve the usability and adoption of the blockchain but may compromise its security. Therefore, it is important to carefully design and evaluate blockchain systems to achieve the right balance between security and performance.

Complexity

In this study, the complexity was expressed in many forms. The participants in Case A identified that the challenge of complexity referred to the complexity of blockchain technology structures:

'When using technology, it is because of the automation that it can bring. When it is automatic, the coding and algorithms are complex. In practice, the blockchain is difficult to understand from the perspective of adopters, who are organisations. Algorithms may make errors that humans, i.e., the IT person, do not discover until it is too late to fix them. Without the support, it will add hesitation to adoption.'

(E2)

The blockchain technology structure was difficult to understand, which made it impossible to detect errors in real time. This finding supported the previous research by Sharma et al. (2023), Zhang and Liu (2023), as well as Sargent and Breese (2023), which stated that blockchain technology was complex compared to other traditional distributed ledger technologies with complex algorithms. Those studies revealed that the complexity of algorithms were in terms of computation, communication, and storage requirements. Besides that, the findings emphasised the lack of standardization of blockchain programming as a technological barrier to blockchain technology adoption. Similarly, Wang et al. (2022) found that understanding the computer language by IT people was a barrier to successfully adopting the new system. While blockchain technology was extremely effective at eliminating the middleman in every transaction, it

was not effective for IT personnel to understand the complex computer language used without assistance. Zheng et al. (2018) identified several areas where standardization was needed. These areas comprised the interoperability of different blockchain platforms, the standardization of smart contract languages, and the standardization of consensus mechanisms. They further argued that standardization was critical for ensuring the compatibility and interoperability of different blockchain-based systems.

Scalability

Findings from Case A also highlighted another challenge, which was scalability. Scalability of blockchain referred to its block size and speed. It was the ability of a blockchain network to handle a growing number of transactions and users, without compromising its performance and security:

'Scaling the blockchain system also presents a challenge for businesses, especially in financial transactions, as it is very important for the blockchain system to scale efficiently with the increase in transactions. When we talked about financial transactions, it was not about two or three transactions.'

(IT4)

The growth in financial transactions was expected to increase the effectiveness of the blockchain system. However, scalability was still a major concern since the limited size of blockchain hinders its effective usage for large volumes or broader blockchain usage. The result from the study was consistent with Sharma et al. (2023) and Zhang and Liu (2023). These prior studies suggested that the blockchain system was limited in capacity for processing large-scale transactions. They argued that the number of transactions on a blockchain network increased in parallel with the processing time required to validate each block. Hence, a delay in the processing time led to network congestion. As a result, higher transaction costs and slower confirmation times that occurred may reduce the efficiency and usability of the blockchain network.

Interoperability

The last challenge in the technological context was interoperability. This issue was specifically encountered by organisations with many interlinkages. The interview with the IT Department (Case A) had shown that blockchain technology needed to be modified to integrate with its existing system:

'When we decided to adopt a new system, we needed to adjust it accordingly. And of course, it is considered the same as a new development. More time is needed to study, adjust, and adapt to the current one. When time is involved, we need to be fast. Some staff who cannot cope felt stressed and depressed with the job and the new system.'

(IT4)

Therefore, organisational transformation was needed to obtain the benefits from the distributed nature of blockchain technology. This finding aligned with Zhang and Liu (2023), as well as Sargent and Breese (2023), who identified several significant challenges in achieving interoperability. Among the issues were a lack of a universal standard for blockchain networks, differences in consensus algorithms, and the need for security and privacy. This was also consistent with the World Economic Forum (2020), which defined interoperability in blockchain technology as the ability of different blockchain networks to communicate and exchange data with one another.

Organisational Context

The study revealed four sub-themes within the organisational context: formal and informal linking structures, size, managerial support, and organisational readiness.

Formal and informal linking structure

From the interview findings in Case A, formal and informal linking structures were one of the organisational challenges in adopting blockchain technology. Formal and informal linking structures were referred to as communication processes between top management and employees in an organisation. It was a challenge for organisations to change the AIS and make all employees at multiple levels understand the need for top management. The communication needed to be properly delivered, either top-down or bottom-up:

'We understand the changes made to the company need to be well-informed and communicated to all levels. This is to make sure everyone understands and has the same perspective as us, the management team.'

(E1)

Coordination and communication between functions in an organisation, especially between the business function and IT personnel, were important to ensure that there was no communication breakdown that may affect the company's performance. This was consistent with Liu, Zhang & Zhen (2023), Sargent and Breese (2023), as well as Chouki et al. (2020), who showed that the lack of communication ultimately affected the performance of the adoption process. Another notable study by Wang et al. (2022) found that poor communication among team members, stakeholders, and project managers was the primary reason for project failure in organisations. Other than that, the interview findings revealed that the agreement must be sought after from various departments, especially an agreement with the finance department, to ensure the system was aligned with the management accounting treatment. This was similar to past studies by Zhang & Liu (2023) as well as Ganguly (2022), which stated that effective communication with the finance department was essential for the successful digital transformation and that communication breakdown could result in financial losses and damage to the company's reputation.

Size

Another interview finding from Case A discovered that the size of an organisation was crucial in adopting new AIS. For instance, Case A is a multinational company comprising more than 100 staff, had faced some issues with blockchain adoption:

'When it is referring to the number of employees, yes, we found it difficult. There are many people that we need to entertain. Many classes or workshops are needed for everyone to understand the system. Especially this new technology.'

(E4)

This was aligned with past studies by Sharma et al. (2023), Zhang and Liu (2023), as well as Ganguly (2022). They suggested that the larger the organisation with a larger number of employees, the bigger the challenge of adopting blockchain technology. For example, the employees of these organisations were more likely to experience implementation difficulties due to greater complexity and difficulty in coordinating the changes associated with new AIS adoption. In contrast, there have been several studies that suggested the

size of an organisation was not always a failure to successfully adopt new information technology. This was observed in prior studies by Hamidinava et al. (2023); Oke et al. (2022), and Samaranayake et al. (2022). Their results had discovered that larger organisations were more likely to successfully adopt new information systems as they had more resources and a greater ability to manage the complexities and transition of the system.

Support from management

Support from the management was also one of the challenges for blockchain adoption. The interview findings of the IT department in Case A revealed the issue. The management support was crucial as it affected the success in adopting blockchain technology, particularly in providing technical assistance:

'Several activities of the management team that affect the outcomes of blockchain technology adoption are their support for providing technical assistance, providing support in solving problems, encouraging all staff to take part in the project, and sharing their vision. I believed that without the support of our management, this was quite impossible.'

(E2)

Additionally, it will boost the employees' motivation in using the blockchain technology. This finding aligned with Zhang & Liu (2023), Sargent & Breese (2023), as well as Ganguly (2022), that top management support was the degree to which the adoption of a technological innovation was supported by senior management of a firm. Panda et al. (2022) found that the lack of top management support was one of the most important reasons for technological innovation's failure. Hence, support from management was one of the most important challenges of technology innovation at the firm level (Zhang & Liu, 2023; Sargent & Breese, 2023; Ganguly, 2022).

Organisation readiness

From the interview findings by the user in Case A, organisational readiness was a barrier to successfully adopting blockchain technology, as accepting change can be a painful process. Findings from Case A stated that engaging in the new system will interrupt the routine that they normally follow and open themselves to new problems:

'This is burdensome. We do have lots of existing stuff and commitments that already put pressure on us. Why need a new system when we already have one?'

(E3)

There have been several studies that suggested that organisational readiness can become a barrier to companies successfully adopting new AIS, like Sharma et al. (2023), Sargent & Breese (2023), and Rathore et al. (2022), where the employees were not prepared to adopt new technology. For example, when the change benefitted the users, they readily accepted it. However, if the change was unfavourable to them, they will resist it.

Environmental Context

The analysis identified three sub-themes within the environmental context: external IT support technology, government regulation, and misconceptions regarding blockchain terminology.

External information technology support

From the interview findings by the IT Department in Case A, the lack of support from the external IT expertise became one of the challenges to successfully adopting the blockchain technology, as this was seen as crucial to overcoming any technical problems that may arise, especially when Malaysia was still new to blockchain technology:

'We may be looked at as an aggressive company that dares to adopt this blockchain technology when the statistics of adoption in Malaysia are still low. But the work has been done, and we must go on. However, we encounter problems when we need experts' advice to handle some technical issues. So, we were hardly able to find technical experts in the same industry.'

(IT1)

Past studies by Sharma et al. (2023), Lin (2023), and Rathore et al. (2022), had affirmed that external technical support was necessary for businesses to implement blockchain technology effectively and efficiently and emphasised the need for IT support providers to have specialized expertise in blockchain technology. Meanwhile, a study by Pawczuk et al. (2020) did not specifically address external IT support as a barrier. It suggested that external IT support may need to play a role in educating the employees about the benefits and risks of blockchain technology.

Government regulation

Another interview finding from Case A had discovered that government regulation had prevented the blockchain system from becoming widely adopted by imposing new laws and regulations. Regulatory bodies may need to provide clearer guidelines and policies for blockchain adoption, which can help organisations navigate the legal and regulatory landscape more effectively:

'Government agencies started to introduce new laws and regulations that tightly monitor the industry's compliance. But somehow those are still unclear.'

(E1)

This result from Case A supported previous research that suggested regulatory uncertainty and the lack of established standards in the blockchain industry were key barriers to adoption (Sharma et al., 2023; Sargent & Breese, 2023; Ganguly, 2022). All of these studies argued that regulatory clarity was required to provide a framework that enabled the development and deployment of blockchain-based solutions. Additionally, Oke et al. (2022) believed that regulators need to provide clear guidelines and policies for blockchain adoption to ensure the technology was used appropriately and effectively. Meanwhile, Sharma et al. (2023), as well as Ganguly (2022), noted that regulatory uncertainty was one of the key challenges facing the cryptocurrency ecosystem, which had been one of the earliest applications of blockchain technology.

Misconception of blockchain terminology

Another challenge found was the misconception of blockchain technology. Case A results highlighted that misconceptions about blockchain technology were critical to its adoption. The misconception referred to the terminology used to define blockchain technology since the term is used interchangeably. For example, the user was still confused whether blockchain, bitcoin, and cryptocurrencies are considered similar terminologies:

'At first, we didn't understand what blockchain was. Then came Bitcoin. We thought that bitcoin was the same as blockchain, but it is not. Bitcoin is one of the cryptocurrencies that uses the blockchain system, where the blockchain is a distributed asset database. The person who has just heard of blockchain and bitcoin will normally be confused.'

(E4)

As supported by Liu, Zhang & Zhen (2023), Sharma et al. (2023), as well as Li & Kassem (2021), there were still many misconceptions surrounding blockchain technology, pertaining to complexity and its potential to disrupt existing systems. This issue had led to difficulty for organisations to effectively use blockchain technology. Due to the evolution of blockchain technology over time, it was burdensome for organisations to fully grasp the full potential of this technology and overcome its challenges. The findings from Case A also suggested a misconception about the blockchain technology usage in practice. Most of the interviewees (users) highlighted their concern about the clarity of the blockchain usage that had been successfully adopted. Their statements were consistent with the previous study on the blockchain usage for supply chain management conducted by Liu, Zhang & Zhen (2023). Although the blockchain usage was considered well-defined, it was fragmented and not well-integrated. Thus, making it difficult for organisations to use blockchain effectively.

Financial Context

Apart from the three categories from the TOE Model, the emerging category identified from the findings included the financial context. Within the financial context, the analysis showed that there were three sub-themes, including implementation cost (initial), type of business transactions (during), and monitoring cost (final). Blockchain technology was able to reduce the cost of transactions incurred by the company as it eliminated the use of a middleman in every transaction. However, there was a cost that an organisation must bear to successfully adopt and use blockchain technology.

Implementation cost (Initial)

Implementation cost is the upfront cost initially incurred. From the interview findings by top management and the finance department in Case A, the implementation cost was observed to be higher at the early stage of adoption. The organisation had to be financially stable because of the higher cost incurred during the initial implementation phase. The implementation cost was inclusive of the cost of purchasing hardware and software, as pointed out by interviewees of Case A:

'The specialized hardware is installed in the organisation's headquarters (HQ) to feed data to the organisation's patented blockchain system every second. Only our HQ needs the specialized hardware installed. The hardware includes a meter and controller. The software includes an organisation blockchain'

application and a mobile user interface. These are the first costs that we incurred for this project. Of course, we need to incur the high initial investment cost, but we can only see the benefits it brings after a while.'

(IT1)

This was in line with past studies by Sharma et al. (2023), Salman et al. (2023), and Sargent & Breese (2023), as these authors noted that implementing blockchain technology can be expensive, particularly for small and medium-sized enterprises. These authors further argued that more attention should be paid to the costs and benefits of blockchain adoption, to ensure that organisations can make informed decisions about whether to adopt the technology.

Additionally, Zhang & Liu (2023), Falwadiya & Dhingra (2022), and Osmani et al. (2021), urged that while blockchain technology had the potential to reduce costs in various industries, there were also significant up-front costs associated with implementing the technology. Similarly, the investment costs comprised not only the costs of acquiring and implementing the necessary hardware and software, but also the costs of training employees and integrating blockchain technology with existing systems. This was also reflected in the interview findings of Case A by the Chief Executive Officer, who suggested that the initial investment cost could also involve recruitment and in-house training.

Type of business process (During)

One of the challenges of the financial context had included the type of business process. Findings from Case A suggested that operationalizing the company's business process had become a challenge when adopting blockchain technology. In this case study, the type of business process refers to either micro transactions (small) or macro transactions (large). From the case study findings, it was not ideal for micro transactions to use blockchain technology in the business operations, as it would delay the whole process as well as be uneconomical:

'Blockchain is suitable for a company that involves borderless transactions that deal with a large monetary value, and the operation is complex. When dealing with lots of people and big money, trust is an issue, so here comes blockchain to the rescue.'

(IT3)

This was consistent with Lin (2023), as well as Sargent & Breese (2023), as they confirmed that the use of blockchain technology was deemed suitable in macro transactions, which involved large-scale transactions between organisations or governments. Furthermore, Liu, Zhang & Zhen., (2023) and Ganguly (2022) argued that blockchain technology had the potential to revolutionise business processes by reducing transaction costs, increasing transaction speed and security, and enabling new business models.

Monitoring cost (Final)

In this study, monitoring cost refers to that of maintaining the blockchain system to the extent that it is aligned with the benefits of the organisation and served the purpose of adoption, including the cost of getting external IT support. Findings from Case A suggested monitoring the cost related to obtaining support services from overseas. As stated by the Chief Executive Officer, high monitoring costs had resulted in the service of improving and updating the system:

'Of course, there is still a cost involving maintenance and monitoring purposes. We cannot turn away from the subsequent cost, especially where we cannot get enough support from the industry in Malaysia. We seek from the outside. Hence, the cost will be huge.'

(E1)

This was in accordance with past studies by Joseph (2023) and Ganguly (2022), who stated that the implementation of blockchain technology required significant capital investment, including the cost of hardware and software, as well as the costs of hiring and training personnel. They also highlighted the need for ongoing investment in maintaining and upgrading the blockchain system. However, Zhang et al., (2020) and Yli-Huumo et al. (2020) believed that while blockchain technology had the potential to reduce monitoring costs by eliminating the need for trusted intermediaries, it has also introduced new monitoring costs in the form of computational resources and energy consumption, as monitoring costs could increase the number of users and transactions on the blockchain network.

Based on the discussion above, a Model Blockchain Challenges (BC Model) was proposed as the novel contribution derived from this study. The proposed BC Model (Figure 4), had identified some challenges in adopting blockchain technology, including technological, organisational, environmental, and financial. The BC Model had extended the model from Tornatzky and Fleischer (1990), which suggested the challenges of new AIS adoption comprised of three main categories, namely technological, organisational, and environmental. The findings were consistent with the TOE Model, in which technological aspects were emphasised on characteristics; organisational aspects were emphasised on formal and informal linking structures and size; and environmental aspects were emphasised on external technology support and government regulation. Additionally, this study had also included a new and important component in which technological emphasised complexity, scalability, and interoperability; organisational emphasised support from the management and organisational readiness; environmental emphasised misconceptions about blockchain; whilst finance emphasised implementation cost, type of business transactions, and monitoring cost. This financial context was an addition to the existing TOE Model and should be included in the TOE Model. It was thus considered an important contribution to the existing TOE Model.

The following Figure 4 depicts the proposed BC model.

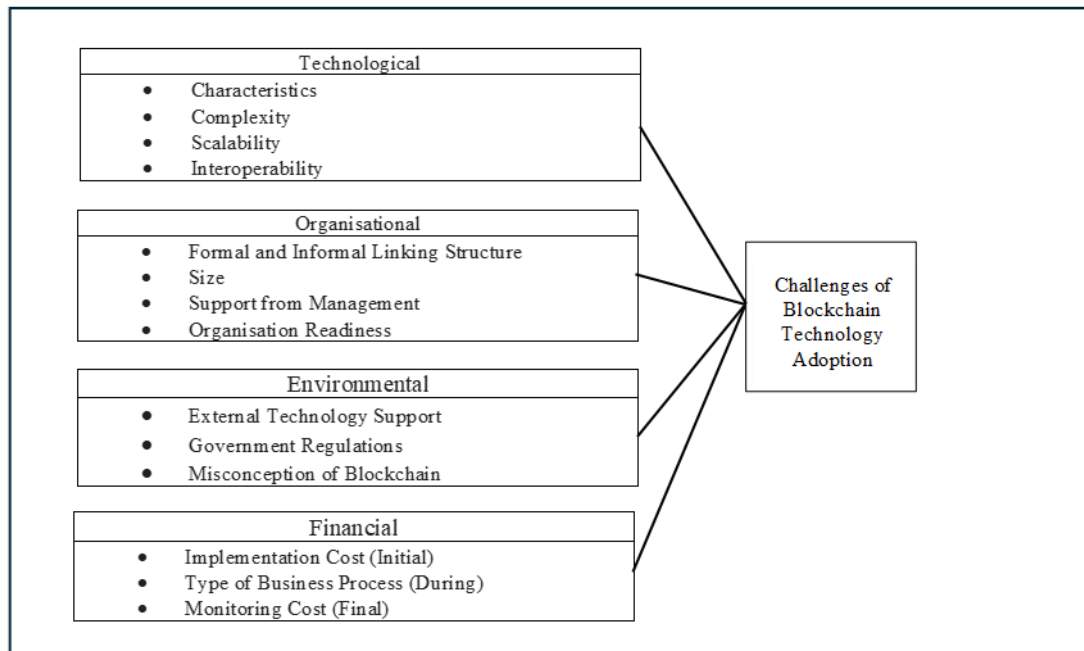


Fig4. The Blockchain Challenges Model

Source: Authors' Own Construct

The proposed BC Model in Figure 4 extends Tornatzky and Fleischer's (1990) classic TOE framework by validating an integrated fourth pillar: the Financial Context. In aligning this model with the focus of strategic management accounting, the identified sub-themes directly correspond with the literature on management accounting under technological change. For instance, the technological complexity and lack of standardization mirror observations by Wang et al. (2022) regarding human capital deskilling risks in automated accounting. Furthermore, the Financial Challenges segment (comprising initial implementation, transaction-driven adjustments, and final monitoring costs) directly reframed how management accountants must calculate Total Cost of Ownership (TCO) and ROI. While prior literature has suggested that blockchain eliminated transactional middleman fees (Lin, 2023), this model proved a cost-transgression phenomenon: transaction costs were merely redirected into system monitoring costs and external overseas IT support. This structural shift required management accountants to redesign capital budgeting frameworks and operational expenditure (OpEx) controls when adopting decentralized applications.

From the Figure 4 above, it offers gives a clear path for how Blockchain technology can restructure traditional management accounting practices. Fundamentally, blockchain served as a baseline infrastructure that optimized Management Control Systems (MCS), directly improving the efficiency of both everyday operations and long-term strategic decisions (Sahoo et al., 2022). By providing a decentralized framework

for records, the technology redefined how transparency, traceability, and data verification operated across an organization. Instead of forcing management accountants to spend time reconciliating data, blockchain delivered a reliable, tamper-resistant pool of operational metrics (Ogunwole & Jimoh, 2024). This trustworthy data environment served as a strong foundation for critical internal management processes—namely planning, continuous control, comprehensive performance evaluation, and localized corporate governance.

Furthermore, blockchain applications directly addressed long-standing challenges in budgeting, internal control, and cost management. In terms of budgetary control, the unalterable nature of blockchain entries reduced the risk of managers building in budgetary slack, while the systematic verification of entries acted as an automated shield against corporate fraud (Babaei et al., 2025). When applied to day-to-day cost management, transaction processing, and variance tracking, blockchain's automated smart contracts altered how numbers were compiled. Routine management accounting workflows—such as cost accumulation, inter-company settlements, and tracking supply chain expenditures—can be fully automated (Ogunwole & Jimoh, 2024). This automation lowered transaction processing costs, minimized manual human-entry errors, and provided management teams with an accurate, real-time look at cost categories to support ongoing operational decisions. Finally, the combination of advanced cryptographic security and real-time reporting capabilities changed how strategic management accountants planned for risk and capital expenditures. Cryptographic data protection secured critical management accounting information from internal and external tampering, providing a dependable environment for corporate risk management (Ahmed et al., 2022). Because decision-makers gained immediate access to live operational figures rather than waiting for monthly reports, traditional backward-looking accounting gave way to continuous performance appraisal and dynamic rolling forecasts. This constant stream of reliable data provided management accountants with the timely insights needed to evaluate multi-year capital budgeting projects, balance resource allocation, and make rapid strategic adjustments in volatile markets.

5. CONCLUSION

5.1 Contribution of the Study

From the theoretical point of view, this study adds to the body of knowledge in management accounting, particularly in the field of blockchain technology. This study could help open new doors of opportunities by providing new insights into clustering the challenges of blockchain adoption from technological, organisational, and environmental perspectives, and including the new findings from the financial perspective. A unique BC Model has been developed from this study by the employment of qualitative research approaches. The development of the BC Model has shed light on some obstacles faced by users in adopting blockchain technology. Hence, the control mechanism could be proposed for future studies to offer effective potential solutions to the blockchain issues raised. The empirical data from the current study had allowed the researcher to identify fourteen (14) challenges that could be tried, debunked, affirmed, or improved by future research based on the BC Model. For instance, a better understanding of the arguments between challenges could be achieved by using the quantitative poll. Thus, the study offers a solid foundation for future blockchain technology research.

From a practical standpoint, the BC Model offers a diagnostic blueprint for Chief Financial Officers (CFOs) and Management Accountants. Because blockchain disrupts routine financial workflows and opens organizations to structural resistance ('organization readiness' barrier), management accountants must execute proactive change management protocols. Continuous budget forecasting must factor in the unexpected, high volatility of cross-border IT maintenance costs discovered in this case. Managers can utilize this model to map out technological vulnerabilities alongside strategic budget allocations before initiating large-scale digital accounting overhauls. Additionally, the managerial focus should be placed on educating users on pertinent blockchain technology. This could be done by tracking issues with the use of blockchain technology over time, implementing training plans, and improving the support services that are already in place. In this situation, training is crucial for both the information technology staff and the consumers of blockchain technology to understand how to use the system in their specific areas and how to respond to any issues that may emerge both within and across the organisation. The importance of the integrated system might not be sufficiently stressed without continuous training. The mastery of blockchain technology takes effort and practice. Time plays a part in the effectiveness of blockchain training, as with enough time and practice after training, end users can reinforce their learning.

This study also provides insights to the Malaysian government in reforming the policy related to the use of blockchain technology. The use of blockchain technology gives a significant change towards how economic activities are carried out in Malaysia, and what impact it may have on the economic growth in Malaysia. Thus, proper policy making is crucial to control the adequacy of use of blockchain technology, specifically in Malaysia. It was noted that the Malaysian government has used economic and political power to involve many parties in determining the direction of the country's future economic situation. This finding served as a guideline to the Malaysian government in deciding the best policy to be implemented. Specifically, this study directly supported the Twelfth (12th) Malaysia Plan via the National Blockchain Roadmap 2021–2025 issued by the Ministry of Science, Technology, and Innovation (MOSTI). Hence, the outcome of the study, in the form of BC Model, would be a benchmark to promote blockchain adoption among the sectors in Malaysia, as well as general organizations by identifying and prioritizing the impact of blockchain technology on business value. Besides, the outcome of this study should provide useful feedback to policymakers when applying the proposed model. The findings are expected to enhance the effectiveness of blockchain in enhancing organisational effectiveness, as well as specifically and generally, heightening the socio-economic value of the country.

5.2 Limitation of the Study

Firstly, it was conducted using a single case study to understand the challenges of blockchain technology in a Malaysian setting. Specifically, this study has been based solely on Case A, the IT company that has developed the blockchain systems and applications. Using a single case study as the research approach had some drawbacks. For instance, it is uncertain whether the findings shown in this study could be applied more broadly to other companies of different industries with variations like business in different countries. Next, there was a possibility of participants' bias that may influence the findings of this study. Data collection was conducted through semi-structured interviews with a limited number of participants in Case A. These participants were involved in the adoption of blockchain technology in Case A, comprising various departments like the Account and Admin Department, IT Department, and Management.

Consequently, this may have caused the analyses and discussion of this case study to be highly contextual in nature and may potentially lead to a degree of bias.

Another limitation involves major concerns about obtaining accessibility in conducting case study research in Malaysia due to its inconvenience. A single case study also implied the limited access to a broader and more diverse group of participants. Therefore, the findings of this study are not generalizable in the statistical sense, yet the results are generalizable into theory and its unique context. Although the interviews conducted were quite extensive in explaining the challenges of blockchain technology, the number was not large enough to claim that the findings apply to the population from which the interviews were conducted. Furthermore, the interviews were conducted during the early stage of adoption of blockchain technology. In Malaysia, blockchain technology was still considered new, and it is not easy to find an organisation that has already adopted this technology in operating its business, specifically in the context of management accounting. The findings may vary if the study is conducted more broadly in other developed countries that are already well known about blockchain technology.

5.3 Future Research

In overcoming the limitations of this study, possible avenues for future research are suggested. First, future research can focus on comparative case studies of two or more organisations, in particular if they were adopting the same blockchain technology and were operating under the same circumstances. Such comparisons would be useful to acquire a deep understanding of their challenges and ways to cope with adopting blockchain technology. Furthermore, the comparison of challenges in adopting blockchain technology could contribute to building a better BC model. Secondly, this study had extended the number of participants. In doing so, further work needs to include the multi-user perspectives across a variety of industries in order to validate the results of the study and to derive additional insights. Thirdly, this study can be replicated in other countries, focusing either on a single developed country or comparing two or more developed countries. Further research into whether the reform paths are similar or not to this study would appear to give different results. Such an examination would allow a more generalizable finding that leads to further understanding of challenges in adopting blockchain technology, specifically in the context of management accounting. Fourthly, this study can be extended to only one coping mechanism used in dealing with the blockchain technology adoption. This would be useful to potentially look in depth at other effective strategies that can be used in dealing with each of the fourteen (14) challenges that have been addressed in the study. Lastly, this study can be extended as longitudinal research to at least up to the post-adoption phase. By carrying out a longitudinal study, issues related to challenges could be examined in more detail and over a longer period of time.

6. CONCLUDING REMARKS

Blockchain technology has the potential to reshape traditional management accounting phenomena in business operations. As the technology continues to evolve and mature over time, collaborations among industries, the Malaysian government, and developers play a crucial role in unlocking its full potential, especially in improving digitization in financial technology. In upcoming years, continued research, innovation, and collaboration will be instrumental in overcoming existing limitations and ensuring responsible blockchain adoption. Embracing blockchain technology with the focus of security,

sustainability, and inclusivity can pave the way for a more decentralized, efficient, and trusted business ecosystem in Malaysia. The developments in technology can change rapidly, and there may have been further advancements since then. For example, the rise of Decentralized Finance (DeFi) platforms and Non-Fungible Tokens (NFTs) worldwide has brought renewed attention to blockchain technology. DeFi platforms aim to recreate traditional financial services using blockchain technology and smart contracts, while NFTs have revolutionized digital ownership and provenance of digital assets.

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8. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

9. AUTHORS' CONTRIBUTIONS

Arfah Aisyah Ahmad Sabri: Conceptualisation, methodology, formal analysis, investigation and writing-original draft; **Sharina Tajul Urus:** Conceptualisation, methodology, and formal analysis writing- review and editing; **Noraizah Abu Bakar:** Conceptualisation, formal analysis, and validation; **Zarinah Abdul Rasit:** Conceptualisation, supervision, writing- review and editing, and validation.

10. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

11. ETHICS STATEMENT

The authors declare that this research involve human participants for interview sessions. All interview sessions involving human participants complied and approved by the Institutional Ethics Committee (Approval No: REC/02/2021(MR/82)). All procedures involving human participants complied with the ethical standards of the 1964 Helsinki Declaration. Informed consent was obtained from all participants, and data anonymity was strictly maintained throughout the study.

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