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FROM DATA TRANSPARENCY AND SECURITY TO INTERFIRM COLLABORATION-A BLOCKCHAIN TECHNOLOGY PERSPECTIVE

Kai-Ping Huang[1], Shih-tse Lo[2],*, and Dhanoos Sutthiphisal[3]

Abstract

In recent years, blockchain technology has gained significant attention and recognition in both academic and practical contexts, due to its remarkable attributes of scalability, security, and sustainability. However, despite the growing interest, there is still a lack of exploration regarding the potential of blockchain to improve data transparency, enhance information security, and facilitate knowledge sharing. To address this gap, this study conducts a focused review of recent studies to examine precisely these aspects of blockchain technology. Various paradigms that highlight how the utilization of blockchain can enhance data transparency, bolster information security, and enable seamless knowledge sharing among organizations, are identified and proposed. These advancements surpass the capabilities of traditional methods of storing and sharing information.

Keywords: Blockchain, trusting records, information security, knowledge sharing

1. INTRODUCTION

Blockchain is recognized as a cutting-edge technology with the potential to drastically alter the landscape of transactional operations. This includes the execution, control, monitoring, recording, and management of transactions, offering heightened security, accountability, and transparency (Xu et al., 2020; Rao et al., 2021; Skwarek, 2017). Known for its ability to gather and organize data effectively, blockchain significantly streamlines transaction processes (Swan, 2015). While it has grown rapidly since its introduction, blockchain is still generally viewed as an emerging technology, sparking considerable interest among countries and organizations for investment and development of blockchain-based applications (Li et al., 2018).

As a distributed database, blockchain maintains a constantly expanding list of records, or "blocks." Each block, secured with a timestamp and a cryptographic hash, is intrinsically linked to preceding blocks, forming an unalterable chain (Swan, 2015). As such, this technology greatly reduces the chances of unauthorized tampering and alterations to the data within each block.

[1] Dr. Kai-Ping Huang is currently working as an Associate Professor in the Department of Business Administration, at Fu Jen Catholic University, Taiwan. He obtained a Ph.D. in International Business from the University of Technology Sydney, Australia.

[2,*] Dr. Shih-tse Lo is currently working as the program director of the Master of Science in Business and Economics program at Assumption University. He has a Ph.D. in Economics from the University of California at Los Angeles. Email: shihtselo@msme.au.edu

[3] Dr. Dhanoos Sutthiphisal is currently an assistant professor of Business Economics at the Martin de Tours School of Management and Economics, Assumption University. She obtained a Ph.D. In Economics from the University of California at Los Angeles, U.S.A. Her research interests include economic history, technological change, and applied microeconomics. She has published her work in the Journal of Economic History and Business History Review.

Since its inception, blockchain technology has seen substantial advancements and improvements. In its current state, it operates on a shared database structure, making it highly secure and robust against cyber-attacks or breaches (Munier & Kemball-Cook, 2019). Furthermore, its anti-fraud features have been significantly enhanced, potentially making it a transformative tool in the business sector. The current iteration of blockchain is notable for its capacity to bolster data security, mitigate breach risks, and promote transparency (Bennett, 2017; Vishnubhotla et al., 2020; Dashottar & Srivastava, 2021).

2. PROPOSITION DEVELOPMENT THROUGH THE EXAMINATION OF PREVIOUS STUDIES

2.1 Blockchain and Trusting Records

Blockchain technology, a form of distributed ledger technology, enhances the efficiency of transactional information sharing compared to traditional methods (Yoo, 2017). As a decentralized database, blockchain consists of an ever-expanding chain of data records, with its shared structure preventing modifications by any single operator. This positions blockchain to potentially serve as a universal ledger for a multitude of transactions, spanning digital currencies to non-tangible assets. As miners generate new blocks, the blockchain continually grows, with each new block storing data related to addresses, balances, and more, inclusive of the original block (Lemieux, 2016; Prybila et al., 2020; Jabbar & Dani, 2020).

Various scholars have delved into the characteristics of blockchain technology. Rennock et al. (2018), for instance, differentiated between two types of blockchain networks: private and public. Private blockchains cater to proprietary use, allowing only authorized individuals to execute transactions. Public blockchains, on the other hand, resemble open-source networks and are accessible to all without specific authorization or authentication, as exemplified by Bitcoin. Furthermore, blockchain is often associated with the development of Bitcoin or cryptocurrency (Wamba et al., 2020). Bitcoin, a prominent cryptocurrency, utilizes peer-to-peer technology to enable direct transactions between users without intermediaries such as banks or credit card companies (Smith & Kumar, 2018). Brünnler et al. (2018) noted that systems lacking central control could fall prey to double or multiple spending issues. However, this risk is mitigated in Bitcoin’s case due to blockchain’s detailed, public transaction records. Bahga and Madisetti (2016) posited that increasing security for issuing, circulating, and managing digital currency transactions was a primary motivation behind blockchain’s design.

Researchers such as Sultan et al. (2018) and Alfa et al. (2021) underscored that blockchain’s security and irrefutability stem from its amalgamation of several innovations, including cryptographic links between transaction records, which make it difficult to tamper with recorded information or manipulate the process. In light of these unique properties, Oh and Shong (2017) offered a comprehensive definition of blockchain: “blockchain is a technology to secure the integrity and reliability of transaction records without a trusted 3rd service provider, by having all the participants in the network create, record, store and verify transaction information jointly, and has the structure to realize various application services based on distributed network infrastructure using security technologies including Hash, Digital Signature and Cryptography” (p. 336). Iansiti and Lakhani (2017) further contended that blockchain made data management more “secure, irreversible, distributed, transparent, and accurate” than prior technologies for cryptocurrency transactions. Essentially, blockchain technology forms a series of data structures, or “blocks”, encrypting information for secure mining and execution of cryptocurrency transactions. Once data is encrypted into blocks and linked into blockchains, alteration becomes impossible, rendering the entire network tamper-proof (Crosby et al., 2016; Weber et al., 2016).

2.2 Preservation of Trustworthy Digital Records Using Blockchain Technology

Atzori (2017) underscored that blockchain emerged as a foundational technology for cryptocurrency, notably Bitcoin. However, its potential extends far beyond, with diverse applications poised to transform and streamline the way transactions and interactions are recorded and conserved across business, political, and societal domains. Swan (2015) mirrored this view, arguing that blockchain's primary function was to serve as a distributed database system, adept at storing transactional data. Moreover, he described it as an advanced data structure using cutting-edge IT to sequentially record data in interconnected blocks, forming a chain.

Therefore, blockchain acts as a pivotal technology, supporting reliable transaction execution and offering a platform that can be tailored for various industries. For instance, Tian (2016) suggested utilizing blockchain to manage data within the "agri-food supply chain traceability system," traditionally relying on RFID technology for accurate tracking of agricultural products. Drescher (2017) expounded that the blocks of data in the blockchain are crafted through nodes possessing a preservation function. Additionally, due to the absence of a centralized management system, the rights and obligations instantiated by blockchain technology for any node are, by default, equal. This model of data management is particularly suited for data storage, as it ensures that the information is verifiable and satisfies usability objectives, while also allowing the originators to establish a decentralized consensus.

Blockchain technology facilitates a decentralized data management system, altering the way information is distributed and recorded, thereby curtailing potential breaches while maintaining trustworthy digital records (Weber et al., 2016). The inherent decentralization of blockchain enables users to exchange transactional data and uphold information security independently (Tian, 2016). Hence, Kosba et al. (2016) dubbed blockchain as "trusted for correctness and availability" (p. 843), due to its cryptographic protocols that balance transparency, confidentiality, verifiability, and enforceability. Blockchain's distinctive feature of processing every transaction on every block of the network ensures a secure and efficient execution process, thereby maintaining reliable records of any kind, setting it apart from traditional technologies (Lin & Liao, 2017).

Empirical research has intermittently explored the role of blockchain technology and applications in creating and preserving trusted records. Saari et al. (2022) reviewed literature on blockchain in real estate, revealing that blockchain-generated records, such as land titles, are perceived as more reliable than traditional centralized solutions. Similarly, Mintah et al. (2021) showcased the superiority of a blockchain-based land registration system in Ghana, generating real-time, dependable ownership records. Dutta et al. (2020) surveyed supply chain operations and found that blockchain's ability to create consensus in recording and verifying transactions enhances trust within the network. Furthermore, Chen et al. (2023) analyzed how blockchain-based systems could generate reliable records to foster strategic banking alliances.

In summary, blockchain technology's capacity to create and preserve reliable records, as documented in the literature, leads us to posit the following:

Proposition 1: Blockchain technology institutes trusting records and establishes the preservation of such trustworthy digital records.

2.3 Blockchain and Information Security

Zyskind et al. (2015) demonstrated various efforts undertaken to assess and rectify privacy concerns associated with blockchain technology from both legislative and technological perspectives. These efforts highlight blockchain's ability to integrate with the recently introduced Open Public Distribution System (PDS) framework. The Open PDS framework, designed for independent PDS deployment, operates by returning computed data and responses rather than delivering raw data to analysts (Rennock et al., 2018).

In an industrial context, corporations seem to prefer customized proprietary authentication software that leverages the Open Authorization (OAuth) protocol, an industry-standard authorization protocol, to meet their unique requirements (Lin et al., 2017). Blockchain technology's inherent openness and flexibility offers possibilities for customization, accommodating the needs of corporate or organizational users. Importantly, it facilitates data anonymization and ensures the security of personally identifiable information (Zyskind et al., 2015).

Blockchain technology's technological advances aim to enhance its immutability to data breaches, preserving the data logging process as tamper-proof and democratic (Zalan, 2018). The realization of these goals considers three principal characteristics of blockchain technology: decentralization, cryptography, and consensus (Aitzhan & Svetinovic, 2018; Kosba et al., 2016; Kraft, 2016). These traits, in their complex interaction, bolster information security during transaction logging, simultaneously minimizing the risk of foul play (Aitzhan & Svetinovic, 2018).

Traditionally, ownership is a vital prerequisite for effectively storing, processing, and sharing information. However, from a blockchain viewpoint, ownership depends heavily on the stages of creating, borrowing, or transmitting a block, which may require permission. It is crucial to ensure data accessibility on the open PDS network, thereby publicizing any changes (Swan, 2015). Any changes or additions to the blockchain-recorded information become immediately public, with the public serving as watchdogs. This transparency makes any future discrepancies easily traceable, significantly undermining the potential for covert foul play (Lin & Liao, 2017). Given blockchain technology's inherent decentralization, anyone attempting to secretly manipulate a single block would need to modify all previously recorded blocks, leading to an easily detectable breach (Zyskind et al., 2015).

Blockchain technology's fundamental principle centers on maintaining the highest standards of security in its information management process. Peters and Panayi (2016) highlighted that one of its main objectives is facilitating tamper-resistant virtual transactions. The rise in blockchain usage is likely due to its capabilities in assuring data security and promoting transparency by tracking and validating independent truth sources and agreements among transaction participants. These advantages have led to notable adoption in sectors such as banking and financial services, where blockchain applications offer safeguards against data breaches, enhance fraud detection, enable digital currencies, and automate claim processing, all while promoting data privacy, inventory management, and real estate record maintenance.

Compared to conventional alternatives, blockchain technology is lauded for its capacity to enhance information security through a steadfast commitment to superior data protection and immutability (Böhme et al., 2015). The data within a blockchain is dispersed across a network of computational nodes or blocks, making alteration attempts highly challenging. This structure minimizes cyberattack risk, safeguards against potential technical malfunctions, and circumvents the data loss issues that may occur in traditional, centralized information systems in the event of primary computer failure without backup (Preuveneers et al., 2017).

Blockchain technology simplifies verification processes and discussions among involved parties and intermediary institutions, promoting efficient, timely, and cost-effective transactions. It is especially utilized in facilitating cryptocurrency transactions, such as Bitcoin, with each transaction continually verified across the decentralized network (Böhme et al., 2015).

Consider, for example, a securities sale settlement. The data stored on the blockchain streamlines the decision-making procedure, making it timely and cost-efficient. Data is not only stored but also verified by legally authorized sellers, either with or without permission (Yeoh, 2017). This revolution in information security means intermediaries managing and recording data serve as guarantors of information reliability. Kim and Just (2018) observed that blockchain technology drastically reduces data verification time and costs compared to traditional mechanisms, enhancing the authenticity of shared data and the transactions informed by such data.

Empirical studies exploring blockchain technology's benefits for information security often involve creating blockchain systems or frameworks and comparing their performance against traditional alternatives. Alvi et al. (2022) developed a blockchain-based election voting system demonstrating enhanced security features. Azbeg et al. (2022) presented a blockchain-integrated healthcare system focused on remote patient monitoring, which showed improved data security in managing diabetes. Jayabalan and Jeyanthi (2022) proposed a blockchain-based framework for electronic health records that effectively bolstered privacy and security.

Despite the limited practical examples demonstrating how blockchain technology enhances information security, the wide array of potential systems that could incorporate blockchain technology to improve security underscores the following proposition. Given blockchain's ability to protect information, enable open authentication and data anonymization, maintain tamper-proof and democratic data logs, and facilitate transparent transactions, it is proposed that:

Proposition 2: Blockchain technology enhances information security.

2.4 Blockchain and Knowledge Sharing Between Organizations

Inter-organizational networks have emerged as a cornerstone of our globalized environment. These networks, while prevalent, lack a self-evident and comprehensive definition within the disciplines where they are practiced. They operate on a foundation of social interactions, relationships, collaboration, interconnectedness, collective action, trustworthiness, and cooperation, forming a collaborative ethos (Devarakonda & Reuer, 2018).

A significant aspect of these networks is knowledge sharing, which has been proven to potentially enhance organizational performance both within and across entities (Wahid et al., 2019; Siri & Lorsuwannarat, 2020). However, before sharing knowledge, especially highly confidential and sensitive information, parties are expected to establish a strategic alliance through inter-organizational networks (Jiang et al., 2018). Moreover, the attributes of the shared information or knowledge, such as its ambiguity, tacitness, and complexity, can considerably impact the formation of these networks (Rathi et al., 2014). Thus, while these networks are vital in today's interconnected world, their effective implementation requires careful navigation and strategic alliance building.

Moreover, Wang et al. (2018) and Schreier et al. (2021) posited that trust and transparency, considered foundational elements of inter-organizational networks, play a pivotal role in fostering collaboration and cooperation among participating entities. In this context, blockchain technology has emerged as a revolutionary force, offering safer and more secure environments for these networks (Yohan & Lo, 2020). This transformative technology prompts a reevaluation and potential reconfiguration of traditional inter-organizational ties, emphasizing governance transparency and reliability. By effectively diminishing, or even eliminating, the reliance on control agents to mitigate data breach risks, blockchain technology garners acclaim for enhancing the efficiency of inter-organizational networks (Beck et al., 2016). Consequently, this technology has both reshaped and established greater trust within the relationships among stakeholders than was previously achievable.

Although blockchain technology brings

invaluable attributes of immutability, integrity, and transparency, to inter-organizational systems, it's important to acknowledge its limitations (Seebacher & Schüritz, 2017). The refinement of this technology is imperative, ensuring its continued efficiency and fostering reliable knowledge exchanges within inter-organizational networks. Taking this discussion further, Beck et al. (2016) propose a three-tiered incentive structure within the blockchain economy - an economic system rooted in blockchain technology. This structure includes the facilitation of digital processes in peer-to-peer exchanges to add value to blockchain-based digital goods, the generation of private and public goods, and the institution of innovative network-based processes that incentivize peer-to-peer nodes toward consensus. Adding to this discourse, Xu et al. (2016) suggest a comparative advantage for permissioned blockchain-based inter-organizational systems over their permissionless counterparts when assessing blockchains' role in inter-organizational knowledge sharing. Moreover, they recommend logging certain data off-chain to uphold privacy, as opposed to recording all information directly onto the blockchain. This preference for permissioned blockchain systems could be driven by factors such as reputation, security deposits, or effective rating mechanisms.

Okada et al. (2017) bifurcated blockchain systems for knowledge sharing into two incentive types: market-based and non-market-based. Market-based incentives for implementing blockchain technology in information sharing predominantly pivoted around cryptocurrencies such as Bitcoin. Conversely, non-market-based incentives were exemplified by consortium blockchain systems, which did not require specific participants for the process of data mining or retrieval.

In certain fields, like accounting, blockchain technology was perceived to enhance the overall quality of shared information, thereby elevating trustworthiness while also reducing the time and cost associated with the knowledge-sharing process (Yermack, 2017). The inherent transparency in blockchain's application in information sharing may stimulate improved sharing across inter-organizational networks by accommodating automated governance requirements (Pazaitis et al., 2017).

From a distinct viewpoint, Tian (2016) suggested that utilizing blockchain for knowledge sharing on inter-firm platforms could foster trust by allowing parties to trace comprehensive information about product or service characteristics via smart contracts. These contracts, being a set of written rules registered in the blockchain, could regulate interactions between network actors and potentially influence data-sharing patterns within the network. This was commonly observed in supply chains striving for ongoing improvements.

Governance systems anchored on smart contracts integrate the characteristics of blockchain technology to authorize actor certification and approval, aligning with the technology's broader security principles (Saberi et al., 2019).

A number of empirical studies have underscored the potential of blockchain technology in the realm of knowledge sharing. For instance, an experiment conducted by Hajian et al. (2023) aimed to evaluate patient interactions with electronic health records created using blockchain-enabled information systems. The confirmatory factor analysis and regression investigation of this study provided evidence that the application of blockchain technology by healthcare providers stimulated patients to share their information.

In a separate study, Wan et al. (2022) delved into the impact of blockchain applications on collaborative innovation among manufacturing firms in China between 2016 and 2019. Their findings suggested that blockchain technology played a significant role in promoting collaborative innovation and indirectly enhancing trust among involved parties.

Both studies lend support to the argument that blockchain technology can significantly aid in knowledge sharing, thereby underlining its importance in this regard. Drawing from these observations, the following proposition is put forth:

Proposition 3: Blockchain technology facilitates knowledge sharing between organizations.

Based on an extensive exploration of prior studies on blockchain technology, a conceptual framework for the findings has been constructed, as shown in Figure 1.

Succinctly summarized in Table 1 are the recent empirical studies that were selected to underscore the support for the three propositions.

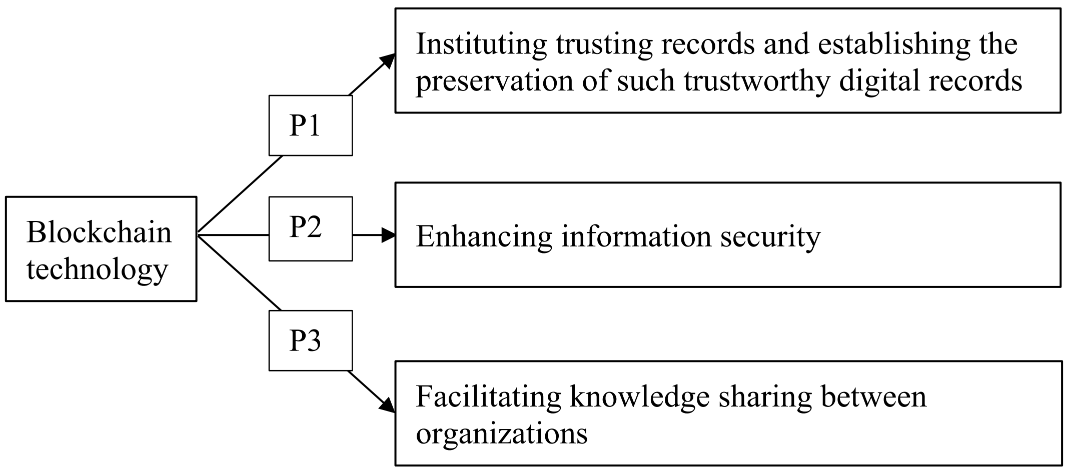

Figure 1. Conceptual framework

Table 1 Summary of Recent Empirical Studies Supporting the Three Propositions

Study	Study method	Industry/Sector/ Operation	Key findings
Panel A: Blockchain technology institutes trusting records and establishes the preservation of such trustworthy digital records.			
Chen et al. (2023)	Exploratory research design	Banking industry	Blockchain may reduce ambiguous conduct. Blockchain may improve inter-organizational trust. Blockchain technology enables strategic alliances between organizations to collaborate at the data level.
Dutta et al. (2020)	Review of prior studies	Supply chain operation	Blockchain benefits supply chain operations in data management, transparency, response time, smart contract management, operational efficiency, disintermediation, immutability, and intellectual property management.
Mintah et al. (2021)	Exploratory research design	Land registration	The blockchain-based land acquisition framework provides a transparent

Table 1 (Continued)

Study	Study method	Industry/Sector/ Operation	Key findings
			process to address challenges such as tampering with land titles and land buyers' failure to perfect their allocation notes by obtaining leases or registering them with the land commission.
Saari et al. (2022)	Review of prior studies and thematic content analysis	Real estate	The empirical evidence for most conceptual blockchain benefits remains inconclusive, practical applications demonstrate potential for efficiency improvement, time reduction, verifiability, transparency, and automation, even in smaller-scale environments. Furthermore, these applications indicate that blockchain could help mitigate fraud, enhance security, and foster trust compared to centralized digital solutions.
Panel B: Blockchain technology enhances information security.			
Alvi et al. (2022)	Exploratory research design	Electronic voting system	The blockchain-based digital voting system improves security, privacy, and integrity, of voting results.
Azbeg et al. (2022)	Exploratory research design	Healthcare system	The blockchain-based healthcare system enhances security, scalability, and processing time.
Jayabalan and Jeyanthi (2022)	Exploratory research design	Medical records	The integration of a blockchain-based framework with InterPlanetary File System (IPFS) for electronic health records ensures the creation of fail-safe and tamper-proof healthcare ledgers.
Panel C: Blockchain technology facilitates knowledge sharing between organizations.			
Hajian et al. (2023)	Survey study employing confirmatory factor analysis, regression analysis, and structural equation modeling	Health information system	Blockchain-based information systems empower patients by granting them a sense of control over their health records. The utilization of blockchain technology motivates patients to share their information with healthcare provider systems, leading to reduced healthcare costs and enhanced diagnosis management.
Wan et al. (2022)	Regression analysis	Collaborative innovation among Chinese A-share lised manufacturing firms	The application of blockchain enhances collaborative innovation and amplifies the positive impact of social trust on this process.

3. DISCUSSION

In contemporary transactions, multiple independent parties often participate in a centralized framework, with third-party intermediaries overseeing the exchange of goods or services. However, this setup can be costly, time-consuming, and vulnerable to fraud and security breaches. Centralization also applies to sectors like gaming, supply chain management, business, and software development, where the control of information often resides with independent organizations, possibly overlooking the primary parties' interests. These challenges highlight the need for reliable, transparent, information management methods.

3.1 Theoretical Implications

The blocks in blockchain technology inherently offer anonymity, promoting safer and more secure knowledge sharing compared to traditional centralized systems. Thus, blockchain technology emerges as a potent solution for transactions, especially those involving cryptocurrencies.

Three propositions form the conceptual framework for empirical testing. Firstly, organizations using blockchain technology likely have higher trust in record-keeping than those using alternative technologies. Secondly, blockchain-adopting organizations may experience superior information security. Lastly, organizations employing blockchain technology might engage in more intensive knowledge sharing. Testing these propositions can further our understanding of the effects of blockchain technology.

Despite the potential benefits, this technology's challenges and limitations cannot be ignored. Ongoing monitoring and technological advancements are essential to maintain transactional integrity, security, and privacy. Risks such as security breaches can be mitigated, but not entirely eliminated. As highlighted by Swan (2015), blockchain technology will require continuous evolution and refinement to meet future changes and needs.

3.2 Managerial Implications

Blockchain technology has been primarily developed to overcome the limitations of traditional transaction systems. By creating a decentralized environment, it mitigates the influence of third parties while improving transparency, validity, and security. This distributed database solution allows for secure and transparent data sharing across nodes in a computer network, effectively addressing issues related to information asymmetry and the lemon problem. Consequently, it facilitates easier, safer, and more efficient transactions and knowledge sharing, thereby holding substantial potential for enhancing operations across diverse industries. The decentralized nature of blockchain ensures access to all blocks, present and future, thereby minimizing the risks of tampering or alteration. This heightened transparency and security boost transactional confidence and knowledge sharing, underscoring the technology's significant economic impact. For instance, Chuchuen and Chanvarasuth's (2022) research highlights that Thai users prioritize trust and security in mobile payment adoption. Thus, a blockchain-based mobile payment system could alleviate concerns and expedite adoption in this context.

However, like any emerging technology, blockchain encounters its own set of challenges that need to be addressed. One of the foremost obstacles is the significant cost associated with replacing legacy systems. This encompasses expenses such as extensive employee training programs, the potential recruitment of specialized IT staff to handle blockchain implementation and maintenance, and the upgrading or replacement of outdated equipment to ensure compatibility with the new technology. These challenges have been extensively documented in technology adoption literature, and studies such as Daowadueng (2022) have shed light on the negative correlation between the age of a firm and its likelihood of adopting blockchain.

In addition to the financial implications, the adoption of blockchain technology can also be hindered by a lack of entrepreneurial spirit among decision-makers. This lack of enthusiasm or reluctance to embrace innovative solutions may result in delayed implementation and consequently, hinder the realization of blockchain's full potential benefits (Ketkaew et al., 2021). It is crucial for organizations to foster a culture of innovation and forward-thinking leadership to overcome this obstacle and effectively integrate blockchain technology into their operations.

Furthermore, the network externality of blockchain technology poses another challenge to its widespread adoption. The utility and value of blockchain depend on its extensive usage and acceptance within a network or industry. If only a limited number of individuals or organizations embrace blockchain technology, the benefits derived from network effects and collaboration opportunities may be diminished. This reduced level of adoption can lead to decreased usage incentives and potentially hinder the overall growth and impact of blockchain technology.

Addressing these challenges appropriately is essential for the successful and widespread adoption of blockchain technology. By actively tackling the financial barriers, cultivating an entrepreneurial mindset within decision-making processes, and fostering a collaborative environment for network effects, organizations can overcome these obstacles and fully harness the transformative potential of blockchain technology.Therefore, it is expected that the adoption of blockchain technology will be gradual until it reaches a critical usage threshold. By effectively addressing these challenges, the transformative potential of blockchain can be harnessed to significantly enhance the efficiency of transactions and knowledge sharing across various industries.

4. LIMITATIONS AND FUTURE RESEARCH DIRECTION

This study provides a comprehensive overview of the potential advantages of blockchain technology in maintaining reliable digital records, securing information, and facilitating knowledge sharing across organizations. The decentralized nature of blockchain ensures the immutability of stored information, thereby preventing data breaches and increasing information authenticity. Through an examination of selected studies, it becomes evident that the decentralized mechanism of blockchain enhances transaction security, leading to significant changes in critical dimensions of cryptocurrencies, particularly the consensus among involved parties. Additionally, this technology has brought innovations to the fields of computer science and cryptocurrency, addressing issues related to internet protocols affecting Bitcoin transactions.

While blockchain and its applications extend beyond information-related issues, this study focuses solely on trustworthiness of data, information security, and inter-organizational knowledge sharing. It is important to note that the findings presented in this study are not exhaustive, and further exploration of blockchain's utilization and impact in other fields is encouraged to assess its potential benefits.

To empirically test the potential of blockchain technology in enhancing data transparency, information security, and knowledge sharing, various approaches can be employed. One such approach involves conducting a survey study utilizing modified versions of the Technology Acceptance Model (TAM) or the Unified Theory of Acceptance and Use of Technology (UTAUT) to understand why organizations adopt blockchain technology. These propositions can be considered as factors nested under perceived usefulness, and the formulation of the testable theory may vary depending on the industry and nature of blockchain adoption. Quantitative studies can then validate and extend the qualitative claims and arguments put forth in this paper and existing literature.

Another empirical approach to explore the potential of blockchain technology is through the use of firm-level data. This approach would measure firm performance as the dependent variable while considering whether the firm has adopted a blockchain-enabled system or application and the underlying motivations for adoption. Control variables such as industry and size should also be included in the analysis. By comparing organizations that have adopted blockchain technology to those that have not, valuable insights can be gained regarding the potential benefits of blockchain and the conditions under which it is most effective.

Furthermore, a study focused on examining the managerial challenges or obstacles in the adoption or widespread use of blockchain technology could help bridge the knowledge gap. Despite the transformative nature of blockchain, limited research has been conducted on the challenges it presents. Understanding the procedures and processes that require further improvement to fully realize the benefits of blockchain after adoption, as well as the challenges that may arise with its widespread use, can provide valuable insights for future blockchain technology development or replacement. Such research would contribute to a better understanding of technology development and its implications.

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