

Blockchain Technology and the Future of Accounting

Emon Kalyan Chowdhury

Abstract

This paper aims to investigate the implications of blockchain technology in improving the quality of financial information. To achieve this objective, the author has studied several published journals, newspaper articles, book series, and case studies. It is observed that blockchain technology can create a platform for organizations to disclose their information voluntarily in the short run while it decreases errors in financial disclosure, enhances the quality of accounting information and reduces information redundancy in the long run. A harmonized movement of accountants, auditors, regulatory authorities, and other relevant parties can extract the optimum benefits of blockchain technology in the accounting ecosystem. The findings of this study will encourage top management and policymakers to adopt blockchain in their business to increase the quality of data and the acceptability of the reports. This study indicates necessary ways out to improve the quality of accounting information by applying blockchain technology. It further identifies potential threats in implementing blockchain technology and recommends appropriate remedies.

Keywords: Blockchain, Distributed Ledger Technology, Financial Accounting, Quality, Triple Entry System

JEL Classification Code: M41, O30

1. Introduction

The power of Blockchain has been growing gradually and the use of blockchain will have ever-changing significance in the world of business and society in general. In short, a blockchain is a digital ledger which exists to record, store and exchange information through a peer-to-peer network (Ducas & Wilner, 2017). Under distributed ledger technology system, there are many duplicates of the ledger that are handled and verified by those who are also on the same network. They are engaged in transactions which are added in a sequential chain with older validated transactions in the form of blocks that are connected through hash also known as a cryptographic signature. A cryptographic signature is a digital output used to verify the authenticity of data. There is no way or any block to be out of order in the blockchain as each blockchain is marked in numerical order and then a temporary process follows which follows the information of the new transaction and the previous transactions that had happened before (Buterin, 2014). What could be said

is the main appeal of blockchain is decentralization the of information, records are kept at various nodes instead of one location. The records can easily be accessed by those who have authorization, are in the peer-to-peer network and are immutable as well. In brief, blockchain is a secure, clear, simple, efficient, and very effective way to record and deal with transactions moreover, the records are kept as they are, unchanged and safe just like an online ledger (Buterin, 2014). Although at the earlier stage of blockchain, it was treated as a technology behind the cryptocurrency, nowadays, it is used extensively in the field of accounting also as it can enable transaction process, voucher generation, inventory management, and execution of contracts (Dai & Vasarhelyi, 2017). The top four accounting firms are also gradually embracing blockchain technology to provide improved services to their clients in association with major financial and professional institutions. For instance, Deloitte uses Rubix (Minichiello, 2015), Ernst and Young applies EY Ops Chain (Prisco, 2017) and KPMG uses blockchain-based prototype models (KPMG, 2017) to automatize

Emon Kalyan Chowdhury

CIU Business School, Chittagong Independent University, Chattogram – 4000, Bangladesh;
emonkalyanchy@gmail.com

the reconciliation and cross-checking of financial data of clients for healthcare, financial services industry, and public sector to verify invoices, payment system, inventory management and digital contacts. Price Waterhouse Coopers (PWC) uses De Novo (PWC, 2017) in the supply chain. Moreover, these four accounting firms and the American Institute of Certified Public Accountants (AICPA) have jointly created an association to take care of blockchain issues in accounting and auditing (Kokina *et al.*, 2017). Since, at this stage, the uses of blockchain in accounting are very limited and there is a dearth of sufficient literature this study covers the gap by highlighting the implications of blockchain and uncovering the potential challenges in the field of financial accounting.

2. Literature Review

Blockchain is a database that stores data. Although the current applications of blockchain generally contain cryptocurrency and commerce exchange data, any sort of data can be put away in a blockchain. As the title proposes, blockchain stores data within the frame of squares, and each piece is associated (chained) with the past pieces. Blockchains share three common characteristics: A disseminated initiative, peer-to-peer trades, and the utilization of cryptography and hashes (Lewis, 2018). As the data are stored at numerous points known as nodes, it is very tough for hackers to temper the data stored in thousand nodes instantly thus providing extreme security and reliability. Secondly, in blockchain, information flows between peers. This contrasts with a conventional database where information flows between a server and clients. In a blockchain, each hub is associated with several peer hubs, and these peer hubs are in turn associated with several distinctive peer hubs, making up the entire organization comprising of associated peer hubs. Each hub approves and keeps a record of exchanges and communicates its record with others (Chowdhury & Chowdhury, 2017). Further, blockchain does not depend on a central specialist, who/which holds monopolistic control to preserve the database and subsequently can be corruptible. The introductory application of blockchain innovation was Bitcoin (Nakamoto, 2008), an open blockchain where anybody can peruse and take an interest in exchanges. Businesses have exclusive data and need to ensure restricted access to it. In such cases,

a private blockchain can be created where commerce can control (give consent to) the members of the blockchain. A private blockchain can also adjust a few highlights of an open blockchain. For example, a private blockchain can have a central specialist or numerous specialists, utilize middle people, and can create a trust-based framework among members (Chowdhury, Dhar & Stasi, 2022).

Even though blockchain is still in its infant stage (Ahluwalia *et al.*, 2020), it will benefit organizations of all kinds to meet the objectives of 4th industrial revolution (Moll & Yigitbasioglu, 2019). Nakashima (2018) claims that blockchain most likely would lead to significant automation of numerous organizational functions that may require either very low or perhaps zero human interaction, for example, the way a newly built self-driving car is operated. As blockchain is efficient and less expensive, massive adoption of this technology will swallow many jobs (Lee & Shin, 2018). Blockchain can be used in accounting to record, store, use and share accounting data ensuring transparency and enhancing data quality, through distributed ledger technology without any human intervention (Ahluwalia *et al.*, 2020). With the replacement of human affords, the blockchain will help to account for to shift from the 3rd to 4th industrial revolution (Dai & Vasarhelyi, 2017). Moll and Yigitbasioglu (2019) advocate that accounting organizations and industries should not be dominated by blockchain rather they should have the necessary liberty to adapt to any given circumstances.

3. Research Methodology

This study has searched papers in the database of Wiley, Emerald, Springer Nature, Taylor and Francis, and the American Accounting Association using the words 'Blockchain in Accounting', 'Tripple Entry System', and 'Artificial Intelligence in Accounting'. Out of 58 papers, a total of 46 papers have been selected considering their relevance and scope.

4. Impact of Blockchain on the Financial Accounting

The goal of traditional accounting and auditing is to establish confidence and to protect the interest of investors by developing necessary mechanisms. The

history of modern accounting can be traced back to trading activities in the 13th century in Italy. To increase accountants' precision, traders developed the double-entry bookkeeping method that has been commonly accepted since it was summarized by Luca Pacioli in his Mathematics textbook published in Venice in 1494 (Basu & Waymire, 2008). The continuous growth of the firms' activities has progressively contributed to demands for external financing, and firms have incentives to gain the belief of capital providers to minimize the cost of capital. Capital providers such as investors and lenders, often need information to monitor the company's financial status and operating performance to guarantee the safety and security of its capital (Chowdhury, 2019). Practically, insiders have more internal information than outsiders about their business operations. The presence of information asymmetries provides firms with the opportunity to manipulate reports. Insiders intentionally mislead outside capital providers about the financial position and operating performance of the entity, to gain more money, or for personal interests (Watts & Zimmerman, 1983). The independent external auditing system was established to ensure the accuracy of the financial statements and disclosure. The auditors discover fraud and errors in the financial statements by conducting auditing procedures and thereby reduce the opportunistic behaviours of insiders to some extent. The external audit system improves a firm's image by reducing the information asymmetry between firms' insiders and external information users (Jensen & Meckling, 1976). However, the notorious accounting scandals like Enron and WorldCom indicate that external auditors failed to preserve their independence or discover frauds and errors in firms' financial statements adequately. Auditors can enhance the possibility of fraud detection by strengthening the organization's internal control system. Although, as a third-party monitoring entity, it cannot eliminate fraud and errors (Healy & Palepu, 2001). After auditing, the reliability of publicly disclosed financial statements and notes is guaranteed to some extent. However, outside information users do not have access to observe a firm's true transactions and accounting process and thus cannot get a full, accurate, and timely understanding of the company's financial position, operating performance, and cash flow situation by simply looking at the financial statements (Chowdhury, 2021). In this critical situation, blockchain emerges as a true resolver. Blockchain records

and validates the information in a decentralized way and the blockchain technology guarantees the information to be transparent, secure, tamperproof, and reliable through the distributed ledger technology, hash chaining. It requires no intermediary in the entire process thus efficiency minimizes the information asymmetry between firms and outside investors (Yermack, 2017).

4.1 Challenges

As blockchain technology is in its early stage, there are some challenges which include restricted data processing, regularity challenges and information confidentiality (Yu, Lin, & Tang, 2018). Firstly, the existing blockchain technology is incapable of handling the accounting information of firms which is massive (Zheng, *et al.*, 2017; Chowdhury, 2023). The application of blockchain requires huge capital involvement. Secondly, due to technical mechanisms, information can be accessed and used by anybody at any time as it comes up with the characteristics of information transparency. Data transparency may cause significant loss to the firm if they need to maintain any commercial secrecy (Rao *et al.*, 2021).

Finally, regulation will become more complicated because of the diversity, and anonymity of nodes as well as the existence of a "51% attack"¹ to manipulate the stock price and make a one-time profit some nodes are likely to add false information on the blockchain. If nodes that collaborate can handle more than 50% of computing power, the problem is compounded (Zheng *et al.*, 2017). As a result, it is not feasible for all firms to conduct accounting and reporting using blockchain technology in the short run. However, if the technology is advanced enough as well as companies anticipate the proprietary cost of revealing information and decide how much confidential data to put after weighing the cost and benefits, the two issues can be solved. After these two issues are resolved, many firms would be enticed to use blockchain as a major voluntary disclosure platform in the short run as the flow of information will lower the cost of capital and information asymmetry (Shroff *et al.*, 2013).

¹ A 51% attack happens when a malicious user in a network acquires control of a given blockchain's mining capabilities. It implies that the attackers will have more than 50% mining power and can mine faster than everyone else.

4.2 Short-Run Benefits of Using Blockchain Technology

The technical characteristics of blockchain make the information highly transparent, traceable, and tamper-proof as previously stated. Voluntary disclosure through blockchain is an appealing option for firms looking to minimize information asymmetry with investors. In the short run, companies may use blockchain to share some beneficial but not obligatory information which includes earnings forecasts and Corporate Social Responsibility (CSR) reports. Investors benefit from self-disclosure because it allows them to make more informed decisions as well as gain a better understanding of the company (Chowdhury, 2017).

4.3 Long-Run Benefits of Using Blockchain Technology

In the long run, more and more firms and investors will conduct voluntary disclosure after weighing the cost and benefits when they realize that voluntary disclosure is a high-quality signalling mechanism for lowering the cost of trust (Yu *et al.*, 2018). The comparability of information can become an issue as more information is revealed on the blockchain. To improve the information comparability, regulators may require information to be standardized and they may even use blockchain as a major platform for mandatory disclosure anticipating that such use will improve the authenticity, accuracy and comparability of disclosure information while also reducing firms earning management (Chowdhury, 2012; Pimentel & Boulianne, 2020). The source documents of transactions and events, accounting policies and procedures embodied in smart contracts² will be the subject of mandatory disclosure and such information should be made available on a real-time basis. Apart from this, companies should also reveal common contents including CSR reports, business reviews, and earnings forecasts on the blockchain which they would like to voluntarily reveal in the short run. The frequency of disclosure should be determined by the firm's discretion and firms will have the incentive to reveal non-confidential information promptly if they want to make a good impression on the market (Fullana & Ruiz, 2021).

² A smart contract is a computer program or a transaction protocol which is intended to automatically execute, control or document legally relevant events and actions according to the terms of a contract or an agreement.

4.4 Accounting in the Age of Triple Entry System

The literature recommends switching to a new method of accounting: a triple-entry system, to shift the accounting process onto the blockchain (Chowdhury, 2021). Triple-entry accounting is an expansion of the double-entry system which has been used since the 16th century. As described by Grigg (2005), it can be argued that double-entry bookkeeping is one of the most significant breakthroughs in enterprise and commerce and double-entry bookkeeping was a revolution to the single-entry system at the time of its conception. The single-entry system depended on a simple asset list where the asset was entered and as they moved in and out of the company it was crossed off. The constraints of such a system are quite evident as errors are hardly noticeable, making deception easy. The double-entry system leaves a trace for every transaction as assets and liabilities had to be balanced and transactions had to be matched. However, as Grigg (2005) described, a double-entry system could not be deceived as easily as a single-entry system because it depends on proof or verification of each transaction. This clarifies the essential role of receipts in today's commerce, being the "dominating record of the event". The signed receipt provides a confirmation from both parties that the transactions match and occurred and it is based on the principle that "The User and the Issuer hold the same information" (Grigg, 2005).

For increasing the practice and introducing a method for triple-entry, different proposals have been made over the years (Chowdhury, Abdullah and Tooheen, 2021). Among the lot, Grigg's proposal of third-party validation has appeared to be an eminent one even though others have varied in their suggested application of the third entry. It has recently become specifically intriguing for blockchain although it was proposed in 2005, before the invention of blockchain (Dai & Vasarhelyi, 2017). Grigg's model (2005) suggested a system where two parties transact, and the transaction is confirmed by a third party. The requirement and limitation of the receipts would be removed by this third party. As Grigg highlights / according to Gregg receipt is vital for double entry and "the receipt is the transaction" in the current system. An expansion of the current system along with the introduction of a third party would make it far safer than two party signature and this would establish a validation of the transaction that

is harder to argue. The traditional receipt would become outdated proof of a transaction with this impact. By matching the other party's receipt, a transaction could be simply proved.

Grigg (2005) recommends that with modern cryptography, the digital, cryptographic signature “gives powerful evidentiary force to the receipt”. As a result, there will be a reduction in deceitful behaviour and an increase in internal control. Grigg also recommends that transaction and its proof get integrated into the three-party system as well as invoice goes through this process. This entire system would enable a level of automation by running on software.

However, Grigg's proposed triple entry has a major flaw in requiring a reliable and impartial third party. This system hardly seems secure or realistic enough for implementation because of the difficulties posed by this and combined with risks such as cyber-attacks. As this concept offers an automated, secure, and permanent solution, it might be a perfect fit for the blockchain. The distributed ledger could act as a third (digital) party verification by storing verifications and giving a tamper-proof audit trail automatically (Dai and Vasarhelyi, 2017). It could even follow accounting standards or pre-determined business rules with/through smart contracts. The only published and peer-reviewed research on the topic is Dai and Vasarhelyi's study “Toward Blockchain-Based Accounting and Assurance” (2017) and their research shows the detail of how this system operates and the future possibilities of this offer.

5. Discussion and Conclusion

The use of blockchain technology in financial accounting offers the benefits of traceability, timeliness, protection against manipulation and high transparency when compared to traditional financial reporting methods. Additionally, smart contracts can automate the generation of financial statements which can significantly reduce the cost of financial accounting while also improving the timeliness, reliability, and comparability of information as well as, it can minimize errors in disclosure and earnings management allowing the financial statements to correctly mirror the firm's financial position and operating performance. It helps to reduce information asymmetry. However, the above benefits of blockchain

technology will take time to materialize due to the current limitations such as financial, technological, policy-related, and well-trained human resources. Accounting and financial reporting will be a feasible and appealing choice in the long run as blockchain technology matures.

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