A Literature Review of Blockchain Technology and Cryptocurrency: Impact on Finance and Accounting

Megan Zhang

Chengdu University of Technology, Chengdu, 610059 Sichuan, China

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Abstract: This paper conducts a literature review based on current research on blockchain, an emerging cutting-edge technology, providing an overview of blockchain in terms of its impact on finance and accounting. The literature collection for this review is primarily through Google Scholar and Chengdu Polytechnic Library, and papers published in high ranked scientific journals are given preference. The findings indicate that in finance, blockchain technology offers a more efficient operation, accompanied by an increased likelihood of significant price volatility and additional risk. As regards accounting, stored data can be secure while allowing for triple-entry bookkeeping, faster transactions, and real-time accounting. However, blockchain cannot eliminate fraud entirely. The literature examining blockchain technology in accounting practice is quite limited and relevant research deserves further exploration.

1. Introduction

As an emerging cutting-edge technology, blockchain technology was originally gained recognition as the technology underlying the most successful cryptocurrency, bitcoin.

In recent years, blockchain technology has also captured the public's interest in the academic field and has become an increasing subject of research. Yli-Huumo *et al.* [24] provide a systematic literature review of current research topics on blockchain technology, indicating that 80% of the research is focused on the Bitcoin system.

This paper conducts a literature review of blockchain based on the existing literature, contributing to provide an overview of blockchain technology in the field of economic management, identifying research gap, thereby suggesting, and supporting future research on blockchain.

2. Research Methodology

The research question in this section is: what impact the implementation of blockchain has on the real world.

To address this research question, this paper manages to provide a scientific literature review. As suggested by Tranfield et.al. [20], a pre-defined search protocol is needed to reduce the possibility of researcher bias. This paper creates a search protocol at first. Specifically, the search strings used for Google scholar and CDUT Library in finding the appropriate literature are ('blockchain impact' 'blockchain application' 'blockchain accounting') without timeframe restrictions. Additional searches use the referred works of relevant papers. The papers focusing more on blockchain architecture are excluded, and the resulting papers are then scanned respectively.

Based on some preliminary reading, the research topics about blockchain application involved in literatures focus on finance, credit, accounting, and others. According to Crosby *et al.* [5], the use of blockchain-based application in finance is widely discussed (more than half of the total), while its use in accounting has received limited attention. So, in the following subsections we briefly illustrate the current blockchain developments in the financial sector, and then focus more on how blockchain impacts the accounting ecosystem.

3. Financial Applications

Kokina, Mancha and Pachamanova [13] indicate that the financial industry was the first to realize the potential of blockchains' distributed database technology as something separate from Bitcoin. Blockchain technology is presently adopted for various services in the financial market such as the settlement of financial assets [10].

Peters and Panayi [17] highlight a trend, noting that the global financial system is exploring how blockchain-enabled applications can be used for financial assets, for example, by providing a more efficient way to implement operations such as securities and derivatives transaction (e.g., clearing and processing) [2], cryptocurrency payment and exchange (i.e., e-wallets) [15] , loan management schemes [8] or general banking services [17].

Notably, Kokina, Mancha and Pachamanova [13] find that Fidor Bank partnered with Ripple (a distributed database technology company) and started experimenting in digital currency exchange and bitcoin trading in 2013. Meanwhile, Crosby *et al.*, [5] find that a range of the world's largest banks, including Barclays PLC, and Commonwealth Bank of Australia, have joined forces with R3 (a blockchain technology company) to create a blockchain-based operational framework for financial markets. Some of the members have since left, but Kokina, Mancha and Pachamanova [13] state that their exit is not necessarily a result of discouragement with blockchain technology, but rather that some of them have invested in competing blockchains. The widespread and active applications of blockchain by commercial banks raises the question: how will central banking respond in a new world that seems to have been irreversibly transformed by this new technology?

A latest study by Raskin and Yermack [18] employs economics to predict the future of the central banking. The results indicate that the blockchain technology behind cryptocurrency can potentially improve central banks' payment and clearing operations, as well as to serve as a platform for central banks to launch their authorized digital currencies. According to Broadbent [1] , in most mature economies, central banks take a no-ban stance on cryptocurrencies. However, due to the protection of legal tender laws, Raskin and Yermack [18] also state a sovereign digital currency can have far-reaching impacts on the banking system. Specifically, they believe that it could serve to eliminate public demand for deposits in fractional reserve commercial banks, leading to a serious de-funding in the commercial banking sector and spillover effects on credit creation and monetary policy. Meanwhile, Krahel and Titera [14] highlight that while cryptocurrencies are applicable to legitimate fundraising activities by high-quality entrepreneurs, they are also applicable to blatant abuse by fraudsters. Consistently, Catalini and Gans [3] note that cryptocurrency acts like a technological bubble, bringing dramatic price volatility and additional risk to the financial market due to indistinguishable nature of worthy investments from the high-volume low-quality projects, as well as the entry of speculators.

4. Impact of Blockchain Technology on Accounting

4.1 Real-Time Accounting

Fanning and Centers [7] conduct research on the coming impact of blockchain. They state that generally, recording transactions will require a long time and a lot of processes. With blockchain, faster transactions can be offered and also the costs involved can be reduced [7]. Yermack [23] examines blockchain-based real-time accounting. He proposes that companies voluntarily disclose ordinary business transactions through the public blockchain, where anyone can verify the transactions or get the correct financial information and financial statements in a timely manner without the auditor's opinion.

However, Krahel and Titera [14] point to the fact that companies have not yet chosen to disclose their current ledgers, confirming their preference for the confidentiality of private ledgers. They also argue that this preference for confidentiality does not surprise them, as supplier and customer lists and strategic transactions recorded in the ledger, for example, can constitute competing trade secrets. To keep confidentiality, Yaga *et al.* [22] state that a private blockchain can only be accessed by authorized users (e.g., the company, its suppliers or customers, and auditors), but this requires the supply chain network to use the same blockchain technology. In this case, according to Vincent

[21], different currencies for different and incompatible blockchains would force companies to have multiple duplicate blockchains based on different counterparties, thus making the implementation of blockchains cumbersome.

However, a number of solutions have been proposed regarding privacy issues [4], so confidentiality is not a permanent barrier against the introduction of blockchain in accounting.

4.2 Triple-Entry Accounting

Serval papers link blockchain to triple-entry accounting. Grigg [9] states that as double-entry system (i.e., current accounting legers) cannot provide full assurance on the enterprises' financial statements, the "triple-entry system" has recently been proposed as a response to improve the reliability of financial statements. However, he also notes that such a mechanism requires a trusted third party to validate each transaction, and even then, entries stored by the third party may be loss or tampered due to cyber-attacks.

Karajovic, Kim and Laskowski [11] state that the blockchain create a chance for triple-entry accounting, an automation system that can confirm the ledger entry (i.e., the debit/credit entries recorded) for each group in each transaction to realize reliable accounting. Consistently, Dai and Vasarhelyi [6] agree that Blockchain technology can serve as an intermediary to guarantee the security through a distributed and automated storage and validation process. At the same time, they note that the encrypted and permanent nature of the data in the block also form the basis of security against tampering and irregular accounting entries. However, Fanning and Centers [7] believe that permanent data, as the inherent nature of blockchain technology, prevents tampering but also makes it difficult to change data when necessary, which would be a weakness in the implementation of blockchain.

Unlike the mechanism designed specifically for Bitcoin systems by Kiviat [12], Dai and Vasarhelyi [6] provide a simplified triple-entry accounting information system that can be applicable to prevalent business accounting systems and would record data flows within a corporate. The results demonstrate that by encoding a third accounting entry into the blockchain, a transparent, cryptographically secure and self-verifying accounting information system is created, and this can promote reliable sharing of data between commercial parties [6].

However, Krahel and Titera [14] state that the maintainers in blockchains have no idea of the true validity of the transactions, they simply need to confirm the verifiability, compliance and integrity of the economic events captured by the transaction. They therefore believe that applying blockchain cannot obviate the need for fraud prevention, earnings management, and accounting errors. Auditors perform better in this regard, but auditors do not need a blockchain to exercise this capability. Due to the limited research, it is unclear whether blockchain would be any better than traditional systems at keeping track of accounting transactions.

4.3 Accounting Profession

Karajovic, Kim and Laskowski [11] state that the existence of self-auditing put the future of the accounting profession in jeopardy. Some authors (e.g., [16]) even imply that blockchain will eliminate the need for auditing the financial statements. However, as discussed above, blockchain does not fully eliminate fraud, merely transforming lies into encoded lies, so audit work will still be required on transactions for either evidence of fraud or a classification error.

Blockchain technology can benefit the accounting profession by simplifying the matching of corresponding accounting entries, reducing reconciliation work, and offering less chance for human error [7]. Based on these benefits, a study points out that blockchain-based accounting information systems can reduce the accountant work area, but future accountant are estimated to have a new role in making the rules for the validation process and being the validator in the final choice [19].

Kokina, Mancha and Pachamanova [13] state that in response to this trend, some accounting firms are beginning to experiment and train staff on the technology.

5. Conclusion

To conclude, the impact of blockchain technology on finance is significant. The blockchain technology offers a more efficient way for performing operations in finance. Also, the blockchain technology behind cryptocurrencies can improve central banks' payment and clearing operations, making it possible for central banks to introduce sovereign digital currencies, which would have a profound impact on the banking system. Meanwhile, cryptocurrencies can cause significant price volatility and additional risk to financial markets.

The impact of blockchain technology on accounting will arise in terms of its impact on real-time accounting, triple-entry accounting, and the accounting profession. Specifically, blockchain-based application in accounting process can secure data stored, enable triple-entry bookkeeping, and provide faster transactions, real-time financial reporting. It can also increase transparency at the expense of confidentiality. However, blockchain cannot help eliminating fraud completely. Additionally, encrypted data makes it difficult to change a piece of data when necessary. Furthermore, blockchain would reduce accountant work field but also offer an opportunity for accountants to act as strategic partners in blockchain implementations.

The limited literature examining blockchain technology in accounting practice results in a lack of understanding as to whether blockchain will be better than traditional systems in tracking accounting transactions. Related research deserves further exploration.

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