RESEARCH ARTICLE

Blockchain: A Threat to Modern-Day Auditing

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ABSTRACT

This study evaluates the threat blockchain poses to modern-day auditing. The study introduces blockchain in accounting as a more secured means of dealing with modern-day data. The research work majorly discusses two forms of blockchain; permissioned and permissionless blockchain. The benefits and drawbacks of blockchain in accounting are furthermore discussed. The relationship between blockchain and auditing is examined. Briefly, auditing is studied to help understand this research work better. The core of this study which is the threat of blockchain to modern-day auditing is critically analyzed and a way forward is stated. The study concludes that blockchain despite being very innovative and helpful has threats and limitations which can be a challenge to modern-day auditing.

Keywords Blockchain; Auditing; Modern-Day Accounting

Introduction

In the early 2000s, the average individual was majorly bothered about security, especially as it relates to their assets. With the fast-growing global technology and the abandonment of crude methods of transacting, the fears in people's minds have not been settled. There are doubts, unanswered questions, intellectual engagements, and researches on how to mitigate the many challenges of technological advancement. In the accounting field specifically, blockchain technology was introduced. The advent of blockchain proffers solutions to many accounting problems of data compilation, handling large documents, securing information, processing data amongst many challenges of accounting. Blockchain came with many promises and solutions. Many accounting challenges have been handled with the introduction of blockchain to accounting, but, just like every new reform, it is not void of challenges. The blockchain is a decentralized ledger technology owning characteristics invention, permanent, and immutable - possessing the potential of enhancing and improving the level of trust in business amongst participants. The application of blockchain to modern-day auditing seems progressive since there is no limit to the quantity of data blockchain handles, the security, and the regulatory process. According to Ting, Zhiwei, & Tang (2019) firms could use blockchain as a platform to voluntarily disclose financial and non-financial information in the short run. High-quality signaling enables firms to solve the trust problem with outside information users. In the long run, blockchain technology and smart contracts can help to reduce errors in disclosure and earnings management and effectively improve the reliability, comparability of accounting information, timeliness, and accordingly mitigate information asymmetry. According to Healy & Palpu (2001), publicly traded companies reduce partial information asymmetry with outside information users by consistently providing financial statements which have been approved by independent auditors through auditing. The blockchain despite having huge influence and positive effects is not without bad sides. Agencies still face problems that weaken the active role and importance of financial accounting and independent auditing in resolving information asymmetry despite the advent of blockchain. The introduction of blockchain has popularized many challenges in accounting, and these are core challenges that pose a threat. This research work studies blockchain technology, the threat associated with its introduction to modern-day auditing.

Blockchain

Blockchain is high-quality signaling which enables firms to resolve the trust dilemma with partners and outside information users. Firms utilize blockchain as a platform to voluntarily and legally disclose financial and non-financial information in the short run. In the long run, blockchain technology and smart contracts can help reduce errors in

disclosure and earnings management and effectively improve the reliability, timeliness, mitigating information asymmetry existing amongst firms, partners, and users. The smart contract is a program that automates some procedures or transactions. Smart contract codes can be automatically executed under certain conditions by the blockchain networks without the need of involving third parties. According to Antonopoulos (2017), Narayanan, et al (2016), The blockchain is an electronic ledger that records transactions and information. Each block contains information as, a block header and the current transactions carried out in the block. The block header contains the following; the hash value of the previous block, the timestamp, and other information, which are based on all transactions and information recorded in the current block. The hash value of the previous block contained in the current block is calculated by the hash function. Blockchain uses sequential blocks for the recording of information and connects each other with hash values. The presence or notice of manipulation in the previous block will result in a change in the hash values of the following blocks. The blockchain is also understood as a distributed ledger that consists of a series of nodes, that is, copies of the ledgers.

What are nodes?
Nodes are computers that are connected to a network of blockchain, they are responsible for the relaying and validation of information in the blockchain. Each node tries to find a nonce that can make the first few digits of the current block's hash value zero by trial and error. In the blockchain, if there is a change in the data in one block, the hash values for that block and the subsequent blocks will change. For instance, if node A has tampered with the data recorded on the -X block, and the hash value of the X block changes immediately, this, in turn, causes all subsequent blocks' (i.e., block X + 1 and the following blocks) hash values to change. This mechanism ensures traceability and trust that any form of tampering will be quickly discovered with the help of distributed ledger technology and hash chaining. The blockchain ensures information to be immutable, transparent, and secure.

Blockchain technology majorly uses a mechanism known as the proof-of-work (POW) mechanism, this helps in the mining of new blocks. POW assigns the right to build new blocks and specific rewards to the earliest user who has calculated the nonce. Specifically, each node in the blockchain competes for the franchise to build a new block by being a party in the calculation of a nonce. The node which first calculates a nonce will not only obtain the mining right but will also receive a bonus. For the bonus attached to each block to be obtained, all nodes are encouraged to participate in the building of new blocks. In this competition, the first node that obtains the nonce has obtained the right to record new information in a new block and relay this information to other nodes. After taking a record of this information, the information of the blocks is validated for authenticity, after the validation of the information, other nodes will add this new block to their ledger copy.

Forms of Blockchain
Blockchain can be grouped into private or permissioned blockchain, and public blockchain based on the level of openness of the blockchain. The permissioned blockchain includes private chain and consortium chain, the private blockchain, also known as the permissioned blockchain can only be read, written, and built by permissioned nodes. In the consortium chain, instead of using proof of work mechanism (POW mechanism), the central controller, the size of the stake, or the outcome of the group vote are rather used in determining who has the right to read or/and to write in the blockchain. The originality and consistency of the information in the blockchain will be somewhat weakened, but confidentiality and efficiency will accordingly rise. The public blockchain requires that everyone can read and write, and the mining right of new blocks is highly dependent on the proof of ownership (POW) mechanism.

Benefits and Drawbacks of Blockchain

Benefits of public Blockchain
A public blockchain has four advantages they include

I. The distributed ledger nature of the blockchain ensures that there is transparency and information openness since each node of the blockchain has a copy of the ledger.

II. The distributed storage gives the assurance that it is difficult for all nodes to be attacked, violated, and destroyed at the same time. This, therefore, ensures the security of the information in the block.

III. The hash chaining ensures that as long as historical information has been tampered with, immediately, the information will be quickly found accordingly, therefore, ensuring that data fraud is almost impossible and unachievable.

IV. The proof of work (POW) mechanism increases the cost of counterfeit and lowers the possibility of fraud in a new block, this hence guarantees the reliability and originality of information in the blockchain (Iansiti & Lakhani, 2017).

Drawbacks of Blockchain
Blockchain technology however has its valid limitations.

I. Data is immutable. Data that has been written in blockchain cannot be removed. if an individual utilizes a digital platform that runs blockchain technology, any problem or mistake the individual encounters in the process of data imputation cannot be corrected, hence, the individual will be unable to remove traces. This, therefore, limits privacy rights.

II. Blockchain networks can be controlled by an entity that owns 50% of the nodes this makes the blockchain vulnerable.

III. Though the distributed nature of the blockchain ensures information openness and transparency, it also makes it hard to keep the information confidential on the blockchain especially in the public blockchain.

IV. Interoperability. The interoperability issue occurs when multiple types of blockchain networks that work in different ways try to solve the distributed ledger technology challenges in their various unique ways, the chains will not be able to effectively communicate this, hence resulting in interoperability.

V. Regulating the blockchain is hard, the reason being since nodes in the blockchain are worldwide and anonymous, if some nodes collude and add false information in the block, regulators cannot timely contain this action thus, punishment will be difficult afterward.

Blockchain and Auditing: What is the Connection?
According to R.K. Mautz, "Auditing is concerned with the verification of accounting data determining the accuracy and reliability of accounting statements and reports." R.E Schlosser states that "Auditing is the systematic examination of financial statements, records, and related operations to determine adherence to generally accepted accounting principles, management policies and stated requirement" Accounting and auditing are naturally evolved mechanisms of realizing mutual trust and protection of investors' interest. Auditing is a part of the accounting world. Auditing involves the examination of financial and accounting records and this act is undertaken independently. The sole aim of auditing is to certify that the accounts have been prepared according to the accounting principles. Modern accounting originated from commercial transactions in 13th century Italy. To improve the accuracy of accounting records, merchants invented the double-entry bookkeeping method, which was widely adopted after Luca Pacioli summarized the double-entry bookkeeping method in his mathematics textbook published in Venice in 1494 (Waymire & Basu, 2008).

The continuous expansion of firms' activities has gradually led to the demand for external financing, and firms have incentives to obtain the trust of capital providers to reduce the cost of capital. Meanwhile, capital providers including investors and lenders also demand information to keep track of the financial positions and operating performance of the firm to ensure the safety of their capital. To gain the trust of capital providers, firms have incentives to provide financial information to existing and potential capital providers. In theory, insiders have more internal information about business operations than outsiders. The existence of information asymmetry provides opportunities for firms to manipulate reports to obtain more capital or for the personal interests of insiders. Insiders have the opportunity to mislead outside capital providers about the financial positions and operating performance of the entity (Watts, 1977; Watts & Zimmerman, 1983).

Objectives of Auditing
As businesses advance, the objectives of auditing change. Initially, auditing was done just to check the validity of receipts and payments. Auditing objectives are classified into two major groups

I. Main objective: auditing's main objective is to find financial statements and ensure that profit and loss statements are reliable. The objective is to ensure the accounts reveal a true and fair view of the business transactions and also to verify and establish that at a given date, the balance sheet presents a true fair view of the financial positions of the business and the profit and loss account gives the true and fair view of profit or loss for the accounting period. It is to be established that accounting statements satisfy a certain degree of reliability. Thus, the main objective of

auditing is to form an independent judgment and opinion about the reliability of accounts and truth and fairness of financial state of affairs and working results.

II. Subsidiary objective: Includes detection and prevention of fraudulent activities including; falsification, manipulation, alteration of records or documents, misappropriation of assets, recording of transactions without substance (NAN, 2015).

To assure the integrity of financial statements and disclosure, the independent external auditing system emerged (Watts & Zimmerman, 1983). Auditors could discover fraud and errors in financial statements through the implementation of auditing procedures, therefore accordingly reducing the opportunistic behaviors of insiders to an extent. Consequently, the external auditing system could to a certain extent reduce information asymmetry between firms inside and outside information users and increase the value of the firm (Jensen & Meckling, 1976). However, the Enron and WorldCom accounting scandals have shown that the external auditors did not maintain independence properly, or cannot discover fraud and errors in a firm's financial statements fully. The supervision and restraint on the firm's insiders are not strictly and confidently effective. Except for auditors wanting to reduce the detection risk well, the intrinsic and control risks of the audited firm are also very essential factors of audit risks. In other words, auditing, as a third-party monitoring mechanism, can only control but not eliminate fraudulent activities as well as and errors in firms' disclosure.

In summary, the development of independent auditing is to solve the problem of information asymmetry which exists amongst firms and their external information users. However, as a result of conflicting interests amongst insiders and outsiders, the complexity of accounting and auditing, and the nonindependence of financial accounting, auditing and external auditing cannot solve the problem existing between insiders and external information users.

The Application of Blockchain to Financial Accounting
However, the application of blockchain in financial accounting has the potential threat that firms would construct transactions to get desired accounting numbers. This will change the focus of independent external auditors from identifying major misstatements of firms to analyzing the authenticity and reasonability of transactions and events. Meanwhile, the duty of financial accountants will also change from taking records of transactions and preparing financial statements to ensure the genuineness of source documents and the reasonability of smart contracts which are used in accounting blockchain. Applying permissioned blockchain could partially mollify information confidentiality and regulatory difficulty problems.

Benefits of Blockchain To Auditing
Though firms are required to apply accounting methods specified by accounting standards for the recording, presentation, and disclosure in traditional accounting, they still have discretions over accounting methods such as the accounting policies used, accounting estimates, and judgments made. Listed companies only provide regular financial statements to the market, but do not publicize the accounting procedures for the preparation of reports. Although this institutional arrangement could protect the proprietary information of firms, there are a series of negative consequences as well. First, the risk of tampering and damaging transactions exists whether the firm uses a paper-based or electronic-based ledger. Second, the managers or controlling shareholders of listed companies may carry out manipulation or construct transactions to benefit personal interests. Because the accounting process is opaque, outside information users will find it very difficult to access information and find out these problems (Healy & Wahlen, 1999). Finally, even if there exists external auditing, the auditors may not be able to detect all fraud and errors of the firm, or may not have the independence to inform the market of the problems discovered.

The advent of blockchain technology provides novel ideas for financial accounting and will have a tremendous impact on recognition, measurement, presentation, and disclosure in financial accounting, which can reduce errors in disclosure and earnings management, therefore largely improving the quality of information.

First, firms can post source documents to the public blockchain, and the public blockchain automatically generates accounting ledgers and financial statements through smart contracts. Accounting assumptions and standards by firms will be mirrored in smart contracts, and this will be recorded permanently. This process fundamentally changes the measurement, presentation, and disclosure in financial accounting.

Secondly, the application of blockchain technology to auditing can reduce the risk of operation and errors in measurement since financial statements are automatically generated by smart contracts. Furthermore, the timely provision of accounting information partially reduces the time lag existing between the generation of accounting

information and reporting. The traceability and transparency of accounting blockchain will increase the probability of fraud being found in auditing, also largely increasing the counterfeiting costs. With fewer opportunities and higher costs, earnings management will decrease.

Thirdly, using blockchain in financial accounting means there will be thousands of backups once the block is posted on the public blockchain and all transactions are visible to all members of the network (Yermack, 2017). This will make the process of accounting and reporting more transparent and traceable since they are verified and supervised by all nodes in the accounting blockchain, which will increase the reliability of accounting information. Moreover, with the application of blockchain technology, financial statements can be produced timely. More radically, outside information users can even aggregate a firm's transactions into financial statements at any time by themselves (Yermack, 2017). Furthermore, the traceability of accounting policies and assumptions in smart contracts will make the accounting choices and judgments more transparent and correspondingly increase the comparability of accounting information.

In conclusion, the advent of blockchain technology will have a tremendous impact on measurement, presentation, and disclosure in financial accounting, which reduces errors in disclosure and earnings management, largely improve the qualitative characteristics of information and mitigate the problem of information asymmetry.

Meanwhile, in the short run, engaging in accounting and reporting duties through the blockchain is not realistic. However, as long as the technology is mature enough, the problem of information asymmetry can be solved. If firms foresee the proprietary costs of disclosing specific information, they will choose the appropriate amount of confidential information to disclose on the blockchain after balancing the costs and benefits. Also, many firms will have the incentive to use blockchain as an important voluntary disclosure platform in the short run since the flow of information could reduce information asymmetry and lower the cost of capital to firms (Shroff, Sun, White, & Zhang, 2013).

As mentioned above, the technical characteristics of blockchain make the information disclosed highly transparent, traceable, and tamper-proof. For firms that desire to reduce information asymmetry with investors, voluntary disclosure through the blockchain is a very attractive way. In the short run, firms may disclose some valuable but not compulsory information through the blockchain. Information such as earnings forecasts and corporate social responsibility reports. Such self-disclosure helps investors better understand the business and make more informed decisions. In addition, disclosing publicly disclosed information through the blockchain has many positive effects; On the one hand, historical information has some feedback value. In the case of major uncertainties, investors will verify the existing information by looking up historical information (Drake, Roulstone, & Thornock, 2016) (Hail, Muhn, & Oesch, 2017). On the other hand, disclosing publicly available information through official channels can have an impact on investor decision-making (Christensen, Eric, Lisa, & Mark, 2017; Fedyk & Hodson, 2017).

In the long run, when firms and investors recognize that voluntary disclosure on the blockchain is a high-quality signaling mechanism to reduce the cost of trust, more and more firms will choose to conduct voluntary disclosure on the blockchain after balancing the benefits and costs. As more information is disclosed on the blockchain, the comparability of information will become a problem. Regulators may require information to be standardized to improve the comparability of information.

Foreseeing that blockchain technology could increase the authenticity, accuracy, and comparability of disclosure information and reduce the earnings management of firms, regulators may even use blockchain as a major platform for mandatory disclosure. The content of mandatory disclosure would be the source documents of transactions and events, as well as the accounting policies and methods embodied in smart contracts. The confidential information would be disclosed on a real-time basis while the other non-confidential information such as earnings forecasts, corporate social responsibility reports, and business reviews, which are common contents firms would like to voluntarily disclose in the short run would also be disclosed in the blockchain. However, disclosure frequency depends on the discretion of firms. If firms want to make a good impression on the market, they will have the incentive to disclose the nonconfidential information promptly.

In summary, compared with the traditional financial reporting methods, the use of blockchain technology in auditing has advantages of high transparency, traceability, timeliness, and tamper-proof. In addition, smart contracts can realize the automation of financial statements generation, which can not only greatly reduce the cost of financial accounting, but also improve the timeliness, reliability, and comparability of information. Moreover, errors in disclosure and earnings management can be reduced so that the financial statements can truly and accurately reflect

the financial position and operating performance of the firm. Correspondingly, the problem of information asymmetry can be mitigated. With the maturating of blockchain technology, accounting and auditing through blockchain will become a feasible and attractive option in the long run.

Hazards of Blockchain to Auditing

Due to the existing shortcomings of blockchain technology, the aforementioned advantages take time to become a reality. Adopting blockchain technology in financial accounting has two main effects in the long run. One of the effects is, the raw data posted on the blockchain has the characteristic of tamper-proof. On the other hand, smart contracts allow the automation of accounting and reporting, which helps to trace business activities. These changes will increase the difficulty of firms to manipulate accounting data, but it does not mean that the use of blockchain in financial accounting can eliminate fraud because as long as the potential benefits are large enough, there are still chances of the firm cheating by faking the source of data (Ting, Zhiwei, & Tang, 2019)

One of the potential threats of the adoption of blockchain in financial accounting is that firms may turn to construct transactions to get the desired accounting numbers. As to auditing, this change means that the inherent risk may increase whereas control risk in the audit will decline. Under such circumstances, the main focus of the auditors will shift from the prevention of major misstatements in accounting to analyzing the reasonability and authenticity of the business of the audited entity. This, therefore, makes the auditors' job more rigorous and cumbersome.

As a result of performance and transparency characteristics, the information can be downloaded and viewed by anyone anywhere, this will increase the proprietary costs of firms with proprietary information. If the disclosure of information leaks the commercial secrets of the information provider, a proprietary cost will be incurred, which will adversely affect the firm's operations. Therefore, firms with very high proprietary costs may not have incentives to use blockchain for the disclosure of information. Finally, with the diversity and anonymity of nodes, the difficulty of regulation will rise. Because corporate information disclosure is important in affecting stock price, some nodes will likely add false information on the blockchain to manipulate the stock price and make a one-off profit. This problem is exacerbated if nodes that collude can handle more than 50% computing power.

The application of accounting blockchain has other threats in the future when applied. They are; shifting duties of the auditors and worsening the information confidentiality problem for firms as well as increasing the difficulty of regulations. Blockchain technology could take over the automation of recognition, measurement, presentation, and disclosure, which replaces the position of traditional financial accountants in the future. It reduces traditional accounting jobs such as recording and preparing financial statements but creates more jobs on assuring the authenticity of source documents and the reasonability of smart contracts. This becomes a challenge for auditors as the changes happen.

Moreover, the information confidentiality problem, in the meantime, only affects the quantity of information that firms are willing to disclose in the blockchain, but in the future, drastic changes in financial statement generation automation will largely increase the proprietary costs of companies, which would probably cause hindrance to the application.

There also exists the potential problem of rising difficulty of regulation. With the diverse and anonymous nature of nodes, speculators could make use of the mining right to put "useful" information to gain one-off profits. Even the false information could be discovered quickly, though finding out the speculator who posts the false information will be difficult. Moreover, the existence of attacks also increases the difficulty of regulation. Possessing more than half the calculating power may seem difficult but then, there is a possibility of collusion and regulators cannot contain this action if it occurs to happen.

Way Forward

Having discovered the possible threats which apply to utilizing blockchain in modern-day auditing, there is a need for a way forward from all of these possible existing threats in blockchain accounting and auditing. One of the possible ways forward is, apply permissioned blockchain instead of the public blockchain. The basic idea of permissioned blockchain is for centralized control, in other words, there is one central organizational control enabled with the right to read and/or write new information in the blockchain. It can partially solve the information confidentiality problem and rising difficulty of regulation

Strict auditing should be put in place to mitigate the challenge of falsification of data and records. The falsified numbers that can be encouraged as a result of blockchains' ability to deal with larger numbers can be a huge disruption and threat to the auditors. However, the solution is auditing.

Blockchain technology is still in the development phase, patience in the growth process is a way forward. As time goes on, more development that will reduce the existing threats will be birthed. Hence, users should exercise patience with blockchain technology and be optimistic about blockchain technology.

Conclusion

Blockchain plays a visible and important role in modern-day auditing. The importance of blockchain cannot be overly-emphasized. Blockchain has moved auditing from the traditional method to a more modern and easier phase. Some benefits of blockchain technology are transparency, time conserving, and availability of information, but, just like every new technology that seems promising, there are underlining factors that serve as a threat to the many users of the technology. These threats are not uncontrollable but they are capable of causing huge damage to auditing resulting in the tampering of information and making the auditor's job more complex. Being aware of these threats and not ignoring them will prepare auditors and accountants ahead for the challenges and equip them with the knowledge for pivoting their way through the threats and still not tampering with accounting values and principles, hence maintaining the standard.

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