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BLOCKCHAIN TECHNOLOGY AND VERIFICATION OF INFORMATION FROM FINANCIAL STATEMENTS

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Abstract
There are many models used to detect fraud, but also to detect manipulation of numbers especially in accounting. The objective of this paper is to describe and interpret the results applying blockchain technology on data from financial statements of companies. The paper examines the following hypothesis: The efficiencies that will be gained through forensic audit automation will be balanced by the requirements for new procedures to address the risks associated with the blockchain environment. Our study confirms that blockchain accounting is tamper proof and transparent and it can reduce manipulations and corrupt behavior, increase transparency of transactions and it can develop automated processes of accounting.

Keywords: *blockchain, financial statements, forensic accounting, audit*

1. INTRODUCTION

There are several cases known from the past where financial fraud has occurred in companies that wouldn't happen if there was a blockchain used. The blockchain will not cure all of the problems which were present in these companies, however, it would definitely solve at least some of them (e. g. antedating of records, destruction of evidence, and the audit trail of the procedures (not) carried out in the respective period).

The price to book ratio reflects the market value to book value of equity. Due to accounting convention on treatment of certain costs, the market value of equity is typically higher than the book value of a company. Also accounting standards applied by companies vary, so price to book ratios may not be comparable. As it is shown in the graph bellow, price to book value is roughly four times higher than book value of equity.

Figure 1. Historical price to Book Value Data

Source: https://ycharts.com/companies/NYT/price_to_book_value

Though the accounting is deemed to provide a reliable data of either confirmatory or predictive value, it is not always the case. Inspired by one of the common malpractices in business, Lomax (2008) has conducted research focused on the backdating of stock options (for the period 1992–2002). The results were appalling, the practice was present in 30% of cases. It could be served as the evidence of the problems with trust and confidence.

The problem has three serious consequences:

- creation of auditing profession,
- adoption of the concept of prudence,
- lack of reliability of accounting data.

Since then, there have been several initiatives to restore confidence in accounting. One of them is a blockchain application in accounting. Selection of correct decision in an environment with trust issue has been described in "The Byzantine Generals "Problem" (Lamport, Shostak, Pease, 1982). The Byzantine generals must agree upon a common battle plan only by communicating by messenger. However, one or more of them may be traitors who will try to confuse the others. The problem is to find an algorithm to ensure that the loyal generals will reach agreement. It is shown that, using only oral messages, this problem is solvable if and only if more than two-thirds of the generals are loyal; so, a single traitor can confound two loyal generals. With unforgeable written messages, the problem is solvable for any number of generals and possible traitors. These solutions were applied to reliable computer systems. One of them is blockchain technology.

Blockchain technology was conceived by Nakomoto (2008). He used a chain of blocks to create a secure digital currency system. It ensures published transactions and makes it almost impossible for a single or a small group of users to tamper blockchain records. (Nakomoto, 2008) Later were developed private blockchains (Pilkington, 2016) that involve a limited number of participants and information stored in the private chain is only accessible to predetermined participants. It can be used to share accounting records (within the company or with suppliers and customers). (Ondrušová, 2016)

Blockchain is a sequential database of information that is secured by methods of cryptographic proof, and it offers an alternative to classic financial ledgers. (De Meijer, 2016) After several years of successful use with bitcoin, blockchains have become recognized as an alternative to ownership ledgers based on classical double-entry bookkeeping. (Zhang, Wen, 2016)

2. METHODOLOGY

Because blockchain accounting is still not adopted by masses, a qualitative approach will be taken to make initial explorations on the topic. In order to fulfil the purpose of analyzing the use of blockchain technology in accounting, the paper will give insight into how this field is developing. Based on the use of methods of analysis and synthesis, the areas of accounting and auditing were identified where the blockchain technology could be used and further developed. In our paper, we will therefore look at the extent to which accounting issues can be solved by blockchain, and on the contrary, what problems are associated with its application.

3. RESULTS

Although the technological world has provided business with computers, internet, and advanced analytic methods in order to speed up and reduce the cost of data processing, the essence of the accounting – the main principles of double-entry accounting has been founded in Middle Ages and remains in force even today. Though the double entry system is self-balancing system on its own, it doesn´t provide enough assurance of:

- symmetry of the accounting entry (e. g. the transaction as a purchase by the buyer and the sale by the seller; in fact, it could be recognized as a sale by the seller but as a loan by the buyer),
- authenticity of accounting entries.

The current state of use of blockchain technology in accounting is still at an early stage compared to other industries.

Blockchain technology brings revolution in supply chains, payments, and income streams in a way that documents and harmonizes complex and diverse information from multiple sources. The potential of blockchain technology is in its ability to collect and record transactions from which all participants have an identical copy that can be retrieved and viewed in real time. Blockchain technology is a decentralized database technology that collects transactions and ensures their permanence through encryption. This means that each transaction is shared between trusted parties and verified, giving greater transparency, trust and increasing efficiency. Real-time technology continually delivers management reports and provides access to quality data that current systems cannot provide.

Real-time accounting on the blockchain would reduce manipulation of reported earnings. Irreversible, time-stamped transactions guarantee that contracts cannot be backdated to a prior reporting period and operating expenses which should be expensed immediately cannot be pushed into future periods. Real-time accounting on the blockchain could allow to spot suspicious asset transfers instantly and other transactions that imply conflicts of interest. Transparency in blockchain accounting would provide less possibilities to tunnel assets out of the firm and it would permit real-time surveillance against fraudulent actions by distressed companies.

Accounting on the blockchain include also smart contracts that can dramatically reduce costs of verification and enforcement. A number of blockchain platforms are designed to apply blockchain technology to execute smart contracts based upon simple events such as the passage of time or future financial outcomes. Smart contracts can have following applications – mechanical exercise of options, the payment of employee compensation when goals are achieved, instant collateral transfers and many others.

The double-entry system relies on the proof or verification of each transaction as long as the user and the issuer hold the same information. Blockchain accounting extend it by third-party validation. An extension of the current system by third-party by inclusion of independent third-parties would create a validation of the transaction that is harder to dispute making it much more secure than the two-party system. This extension requires trusted and neutral third-party – Blockchain – private blockchain that company would retain control over their information and could exclude irrelevant parties. To extend existing double-entry system by a third blockchain party would record transactions both within the organization and with external parties. The bookkeeping would be done by connecting each blockchain account to its corresponding double-entry account. The ledger prepared like this is invariable, meaning no one can change the information written in the ledgers. It is also transparent which allows everyone entitled to read it. In blockchain accounting the rules can be implemented, systems can be programmed to follow accounting standards and regulations automatically using smart contracts. System can include balance controls, payables and receivables confirmations, inter-organizational confirmations. All these can be automated by using smart contracts. This system can be integrated with the Internet of Things technology for further automation.

Client accounts – shared accounts – are created automatically when transactions occur. The accountant of the profession will not disappear; on the contrary, the profession's accountant will be less burdened on stereotypical work and the manual activity and activity of the accountant will be directed to more sophisticated tasks. The client will no longer need to

provide information and documentation to the paper accountant. Accountants will monitor clients' financial results online, in real time. Businesses can also see the results of their business online without waiting for data to be processed by accountants. Companies will no longer have to pay for processing their data in the accounting software, but will pay to accountants whose role will analyze and interpret the data.

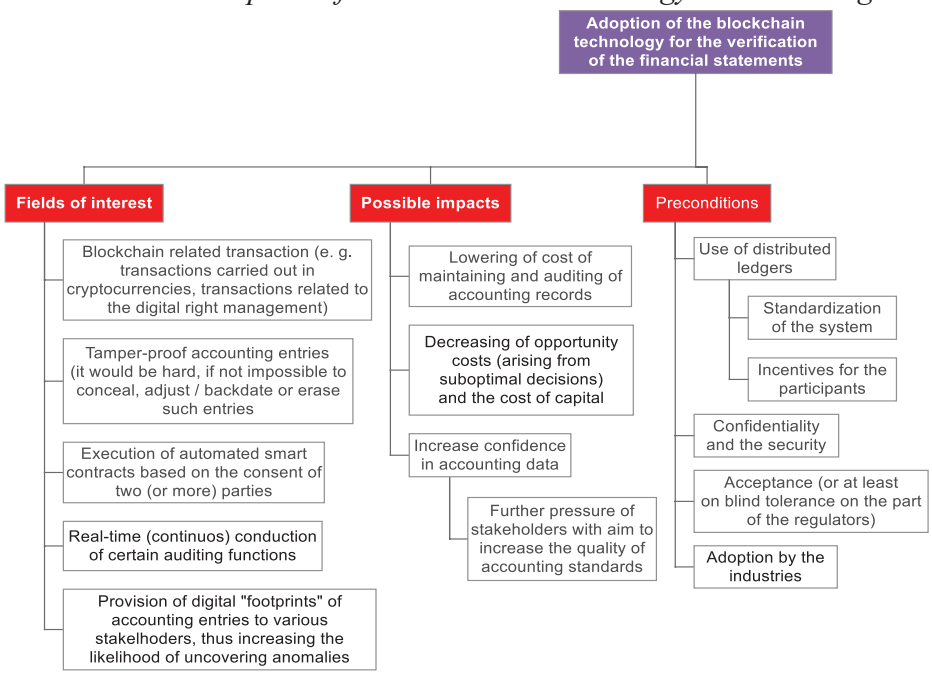
For reasons of simplicity of information transfer and automated processing of each transaction, blockchain technology can simplify and automate accounting elements, facilitate trading with new global customers, and automate auditing. Blockchain technology can investigate anomalies and unusual transactions in real time as they appear.

Auditors will also have to change the normal way in which audit processes work. The audit will be less time-consuming when using the blockchain system, and access to data processed by blockchain technology will also be cost-effective. Blockchain technology is a way to increase auditing automation.

Blockchain technology enables companies to confirm the authenticity and legitimacy of documents. When data is processed by a blockchain, a string is created to create a unique identifier for the file, and then it is labeled. This recorded transaction cannot be changed, so if this string is retrieved, everyone can be sure that the document remains unchanged and the time stamp is accurate. Transactions that are recorded in real time cannot be altered, they can be checked daily, thereby increasing confidence in accounting and increasing transparency. Blockchain technology will also facilitate state control functions. State authorities will have access to information on business-to-business transactions and will be able to check more efficiently on tax returns, whether for income tax purposes, but in particular tax returns for value added tax. Businesses will not be able to avoid paying taxes or claiming undue excess deductions related to value added tax. Businesses will need to work closely with regulators to develop new solutions that will be usable by both sides.

From the point of view of creditors and banks, communication with clients can also be more effective. At present, the bank's clients document their financial results, which banks must additionally verify. By accessing data, parts of data through blockchain technology, such administrative burden is eliminated.

Scheme 1. Adoption of the blockchain technology in accounting



Source: Own processing

Blockchain technology allows clients to analyze more effectively their clients and find out who they are "good" and who customers "are bad", respectively. which contracts are loss-making or not profitable, even if the revenues from them grow or vice versa which contracts are profitable. So, some features of cost or management accounting may be incorporated into blockchain technology. Of course, individual business transactions will only be available to businesses, state institutions, and individuals who have access to these data. However, all transactions can be processed within the system and provide results only aggregated for individual sectors or groups of enterprises. Other businesses can, on the basis of these analyses, compare with the industry's average results and predict future developments.

Removing manual interventions in accounting transactions has many benefits in terms of errors and frauds. Recorded time stamp transactions can also serve as evidence for litigation.

Technological blockade has undeniable benefits for different users, it remains to be seen who will work on the further development and implementation of this technology, whether private or public, how it will be created and how it will be managed.

Table 1. Data processing by different systems

	Decentralized data processing	**Blockchain**
Processing speed	Low	High
Processing costs	High	Expected to be lower
Transparency	Low	Very high
Security	Susceptibility to hacking attacks	Relatively high

Source: Own processing

The use of blockchain technology for accounting purposes is only at the beginning of development; in other areas of the economy in the most developed countries, this technology is already actively used. As already mentioned, trading with cryptocurrencies is done with the support of blockchain technology. In the field of agriculture, blockchain technology is used to monitor the movement of food (ex. grain) in the supply chain. Energy companies use blockchain technology enabling direct trade between manufacturers and consumers. Australian Post develops an electronic voting system based on digital identity verification. Airlines and booking systems use blockchain technology to change real-time reservation changes and make these data and changes accessible to all users in order to speed up and reduce the cost of data processing.

4. CONCLUSION

The current state of use of blockchain technology in accounting is still at an early stage compared to other industries. The introduction of blockchain technology requires considerable investment in systems and processes to meet their goal of creating a safer, more transparent and more efficient system, but at the moment removing the need for time-consuming financial controls. Under blockchain accounting all transactions are recorded in a virtual blocks and sequentially new blocks are created and linked to all the previous blocks in the chain. Blockchain uses hash strings and digital fingerprint is given to every financial information and allows automatical verification of these transactions. The primary benefits discussed above include increased automation, decreased risk of fraud, decreased costs and increased truthfulness of financial statements. Blockchain accounting allow examination of potential errors or frauds within accounting entries (validation of transaction and prevention of duplicated transactions – invoices, duplicate payments etc.), automation of transaction

verification and faster and automated control of the recording process. This can expand providing assurance and change the role of auditors and could even automate tax filings. Blockchain accounting are fully reliable and cannot be corrupted because the transactions cannot be altered retroactively. Entire system of blockchain accounting is required to be designed in a manner that fraud is impossible or at least very difficult to commit.

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