ROLE OF BLOCKCHAIN TECHNOLOGY IN ACCOUNTING AND AUDITING

Abstract. The invention of the blockchain technology can be equated with the invention of the writing or Internet network, considering their major role in the communication between individuals as well as legal persons, regarding information transfer, money transfer etc. The authors analyse the technology, the implemented and projected examples of its use, its relationship with accounting and auditing as well as its influence on the development of these economic sciences.

The development of accounting and auditing is linked to the development of modern technologies. Nowadays, according to the technological progress the role of blockchain technology is constantly increasing. Blockchain is a distributed database that maintains a continuously-growing list of data records secured from tampering and revision. Blockchain can be used in financial and banking sectors first of all, but also in e-government and administrative sectors.

The implementation of blockchain technologies in accounting and auditing doesn’t change their fundamental principles but increases the auditing capacities. In some countries blockchain is adopted for auditing as a practical matter, including the national level.

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Introduction. Accounting functions (information, analytic, evaluation and control) and audit assignment (increasing of confidence in the information reflected in the relevant documents) are publicly available. These conceptual foundations have been remaining unchanged over the course of many years, but the technologies of their support have been subject to constant transformations. They change ways of ensuring each of the stages of accounting: the identification, measurement, generalization and accumulation of information on financial and operating activities of economic entities. For example, since the beginning of fixation of business processes, the technology of data representation in documents has changed and the generalization of information from simple accounting, in which transactions have been recorded, to double accounting – when the events have started to be entered into documents along with the grounds for their implementation. Such records have been made (and are still made today) in paper registers, later they have been transferred into the
digital environment with wide use of software of all kinds with the help of computers. Thus, the method of data accumulation has been changed. Following the invention of XBRL technology, new demands for the presentation of business (financial) reporting data and their transfer to interested persons are raised. Approaches remaining of current interest and virtually unchanged are those giving the users confidence in reliability of the information in the reporting accounting records: the need for their processing by auditors, checking the accounting data, regardless of their form (paper or digital).

Thus, the development of accounting and auditing as a professional activity is inextricably bound up with technologies which are in constant interconnection. And modern approaches to the information flow organization need constant attention on the part of the scientists in this area.

With the inventions of the distributed database of blockchain and the corresponding data management technology, by present day the question about its application has arisen, in particular, for accounting and auditing purposes. This technology is designed to extend the possibilities to keep records and to increase public confidence in accounting information. At the same time, it is important to clarify the perspective of the auditors’ role in verifying the reliability of financial and other business reporting data in the context of the use of blockchain technology.

**Research analysis and objective.** The issues of accounting and auditing in the context of application of the information technologies are brought up in the works of such authors as: Yu. Idziri, P. Kwest, K. Kloiz, D. Koderr, P. Kook, B. Odintsov, V. Paliy, D. Pankov, V. Podolsky, A. Romanov, T. Singleton, Ya. Sokolov, J. Hunton, J. Hall, E. Chambers. Issues regarding the use of computers in the audit have been also considered by M. Abdolomohammadi, G. Bodnar, P. Williams, A. Williamson, J. Van Dyck, R. Cascarino, J. Robertson, J. Champlain, V. Hopwood and others.

Each of the indicated scientists has contributed to the development of science, but the issue regarding the role of blockchain technology in the development of accounting and auditing in the scientific literature has been practically disregarded.

Modern researches, which study contemporary problems of a successful combination of information technologies and audit tasks, refer to the crucial role of public financial reporting, the openness of which is possible precisely thanks to the use of blockchain technology [Spoke 2015].

Attention is also paid to the possibility and perspectivity of the technology use in the banking sector with the purpose of the fastest decision-making by credit institutions regarding service delivery due to operational analysis of financial indicators as compared to other social and personal customers’ data [Krah 2016] and improvement of business efficiency due to blockchain technology introduction [Mougayar 2016].

The purpose of this article is to study modern approaches to the definition of blockchain technology and to determine its role in the development of accounting and auditing.

**Research results.** Modern system of information and money flows has a centralized organizational structure. This is particularly so with the organization of money circulation at the state and interstate levels and information on important aspects of public life.

For example, as of today, there is a monopoly of state or other authorized institutions for the data bases in various important areas of society: passport
data, driving licenses, rights to property, availability and flow of the cash of bank customers, e-mail and other telecommunications services etc. (Fig. 1). Actually, every Internet transaction is based today on a certain structure, in which society places its confidence to a greater or lesser extent when it comes to the transfer of funds, we have to rely on the legality and reliability of the bank, payment system or regulatory authorities, which carry out regulatory activity in this area. This can also be said when it comes to messages from the mail service, that the letter has been delivered (has not been delivered) to the addressee, or when the message is received from an antivirus on a computer that the information security of the system is out of danger.

All of these aspects literally create an illusion for the users of modern amenities regarding the systems reliability, regarding safety in their everyday lives, until the moment when something goes wrong. At the same time, unscheduled situations, connected with the reliability of information, arise practically every day: banks are declared bankrupt, security of society turns out to be in danger, reliable borrowers and clients cease to be capable of paying, etc. Such negative events have their own prehistory which is either successfully hidden until the occurrence of adversary circumstances, or the information is presented in a distorted form, which destroys public confidence to seemingly indisputable figures of authority which are the most reliable among existing ones as of today.

**Figure 1** - Centralized system of accounting data processing
Source: development by O. Melnychenko based on [Adriano, Monro 2016]

For example, invulnerable centralized databases practically do not exist: they can be hacked by violators, their organizers may distort their content as a result of the error. Therefore, currently much attention is paid to information security, money is spent on its provision in small and especially in large companies. All of this requires a lot of resources, therefore primarily entrepreneurs are interested in search of and in efficient use of reliable technologies which will ensure the continuity and reliability of the information system.

From this perspective, one should rely on technologies minimizing risks or making them impossible as for the object of cooperation. Such an example may be modern Uber system - individual transportation service, which, unlike the recognition of authoritative monitoring taxi services by certain inspection
(nominally, state inspection), relies on corporative responsibility - public estimation and confidence. For example, such inspection carries out an analysis of the work of the taxi service according to a certain list of objective indicators: reliability of nodes and mechanisms of vehicles, presence of driving license, presence of a first aid kit and a fire extinguisher, driver’s knowledge about road traffic regulations, absence of contraindications of medical nature for passenger transportation, etc. However, it should be borne in mind that the driver of such a taxi must also have other qualities, including personal ones, which would satisfy the users, have a high reputation, and so on. In this case, the service surveillance department cannot provide adequate level of public confidence, for this very reason Uber is becoming popular worldwide, since each driver has a history of users feedback and established reputation.

Under such preconditions and in the context of world technological evolution, rampant development of services based on blockchain looks quite logical. Blockchain (which means a chain of blocks) is a distributed database containing information about all operations performed by the participants in the system. The information is stored in the form of a chain of blocks, in each of which a certain number of such transactions is recorded [Ulieru 2016].

This technology is based on distributed data registers. This means that there is no single place where all records are stored, there is no single register holder or data bank. Such register is kept simultaneously by all participants of the system and is automatically updated to the latest version with each change made to it and everyone is the guarantor of the reliability of information in it. Such register is actually an accounting book of entries about events in the digital environment. Once recorded information can not be changed or destroyed. It means that the technology of transactions test and accounting between individual nodes of the network without central computing center and each new transaction is confirmed by the history of the previous ones (Fig. 2).

![Figure 2 - Accounting information system based on blockchain technology](image)

Source: development by O. Melnychenko based on [Adriano, Monro 2016]
Each user of the system, having access to the Internet, can test and record transactions in their own copy of the register. Transactions for a particular period are combined into a block that is associated with a block for the previous period - hence the term "chain of blocks", or blockchain.

Another peculiarity of the technology is that it is used not only for information transferring but also for values transferring. So-called digital assets economy is being implemented. It is about the fact that the users can transfer funds, securities and other digital assets to another participant of the system. Difference from the existing system is that today, in order to effect, for example, payments through the international payment system, several transactions are carried out and implementation of some necessary conditions is required for fulfillment of their conditions. Such transactions include recording or transmission of the information, clearing, settlement of accounts, verification, etc., and conditions include availability of security funds at the participants in the payment system accounts, entry into such system with the resources consumption of organizational, legal, financial and other characters.

When making settlements with the help of blockchain technology, the payment corresponds to the settlement directly. This approach is made possible due to cryptography, with the help of which the digital object is transferred without copying it. It should also be understood that the transfer of values with the help of blockchain has completely different nature compare to work, for example, with e-mail, when sending a certain file is actually only a copy of it, and it itself continues to be on the sender's computer. When sending the values, in particular monetary funds, it is important that they are not left at the sender after their sending.

It should be explained that in fact the values exist in the network, and each owner has the key to them. After the value transferring, the key of a new owner is generated in a new way using a certain algorithm, therefore the previous owner of the asset does not have access to it.

According to the World Economic Forum estimates, by the year 2027, 10% of the world’s GDP will be stored based on blockchain technology [Deep Shift Technology Tipping Points and Societal Impact].

Thus, due to the technology, it is possible to establish level of credibility in a society of a considerably higher level and without attracting additional resources, and information acquired from such database can be used in litigations, tax calculations, audit evidence, decision-making on granting of credits, etc., since the technology does not provide for falsification of data in any sense.

In such systems, each assembly of data and each digital transaction leaves a unique record in the database, creating opportunities for auditing any digital event in the past without violating the confidentiality of personal data.

Promising application area for blockchain use is financial sector, which traditionally leads the way in the latest information technology adoption. This area is usually the most interested in the public confidence in the services provided by it, since it is related to monetary funds, instability with which is always associated with social tension. At the same time, usually there is no reliable alternative to financial and credit institutions as for the transfer of funds. Therefore, each institution has obligations as a reliable intermediary between individual and legal persons which do not know each other, and the central authorities regulating this area maintain this confidence by way of supervising the banks. The latter, in their turn, will receive considerable rewards for such
confidence literally from every transaction between counterparties.

During carrying out of the transfer of funds with the help of blockchain technology, according to expectations, need to maintain traditional electronic payment systems will be eliminated. This situation, however, looks negative for those entities and systems for creation of which considerable resources have been used and many years have been spent (SEPA, SWIFT, etc.). For such systems and organizations which ensure their functioning, this will mean the imminent collapse and, in fact, destruction because of their inexpediency and obsolescence.

At the same time, regulators of individual countries worldwide already today carry out pilot projects on the use of blockchain even for the emission of national currency equivalents. For example, Bank of Canada has announced the test emission of CAD-COIN Crypto-Canadian Dollars, using distributed blockchain bases. The indicated project, which also involves Big Five Canadian banks: Bank of Montreal, Canadian Imperial Bank of Commerce (CIBC), RBC, Toronto-Dominion Bank (TD Bank) and Scotiabank, can be considered the first step towards "blockchainisation" of the banking system [Canada Has Been Experimenting With A Digital Fiat Currency Called CAD-COIN].

In general, currently there are many examples of financially oriented projects based on blockchain (apart from the crypto-currency bitcoin, one can mention, in particular, blockchain platform for P2P-crediting), but with a rare exception, they have not yet got state legalization and, consequently, they are not distributed.

In addition to the financial and banking sectors, the sectors offering state and administrative services are attractive for purposes of blockchain use.

Estonia is the first country that has implemented use of blockchain at the state level with digital citizenship programs (e-Residency) based on the notary service Public Notary [Estonian Government Partners with Bitnation to Offer Blockchain Notarization Services to e-Residents] and the Electronic Healthcare Fund (eHealth Foundation) [Estonian citizens will soon have the world’s most hack-proof health-care records]. The basis of the latter is the principle of safe keeping of the patient medical records, and e-Residency provides for the possibility of certification of marriages registration, birth certificates, business contracts, etc., with the help of blockchain technology.

So, turning to the issue of the role of blockchain in the development of accounting and auditing, it should be noted that the trends and tendencies of technology use described above require, in the first place, the appropriate accounting organization. The issue of audit should be addressed with the understanding that the origin of each transaction can be verified using the history of transactions which have preceded it.

It is important that all principles of maintenance of accounting records remain unchanged with the appropriate application of the elements of the accounting method. Only technology of processing, storing, transmission and accumulation of information is changed. For example, in asset deals, the principles of their accounting and recognition are fully adhered to: controlled by the business entity as a result of past events and from the use of which is expected to receive future economic benefits [Conceptual Framework for Financial Reporting]. At the same time blockchain allows to carry out a complete, automated audit of all transactions to recognize the controllability of the asset by the enterprise. Such inspection is carried out with the help of construction and storage of information in the blocks about the initial cause of the origin of any
asset due to the mechanisms for storing information described above: each digital transaction leaves a unique record in the database, creating opportunities for auditing of any digital event in the past. Such record is made in all registers related to this asset and each enterprise in its copy of such register can gain access to the relevant information knowing the required key. Having access to the registers, other interested persons can also receive complete and unbiased information about the research object in case, for example, when decision is made regarding granting a credit by a bank or checking the completeness of payment of taxes, etc. - blockchain allows carrying out a full, automated audit of all transactions.

Thus, unlike the current practice of record keeping about an asset, when it is necessary to carry out counter inspection of various business entities documentarily involved in the manufacture, acquisition or change of the asset under consideration in order to ascertain the reliability of the information, it is enough to have only access to the copy of the register when working with blockchain (Fig. 3).

**Figure 3** - Technology of processing, storing, transmission and accumulation of information using blockchain

Source: development by O. Melnychenko based on [Blockchain Technology. A game-changer in accounting?]

Each transaction with such technology becomes as notarized on the level of authenticity, and therefore confidence in information acquires a higher level. The important and main task of the auditors will be to determine the authenticity of the first transaction with the object under consideration, and all transactions which have been carried out later, will be considered to be accomplished and reliable.

**Conclusions.** To conclude, in this article we have reviewed modern approaches to the definition of blockchain technology and have outlined its role in the development of accounting and auditing. It is proved that such distributed database is a technology of working with information and it does not change the fundamental principles and basics of accounting and auditing. It has been found that the transactions recorded in such database are considered to be reliable and can be used as an evidence base when banks make decisions about granting credits to the clients, in litigations, etc. Confirmation of this is the practical implementation of blockchain technology in accounting of transactions in
individual countries, including at a state level.

Reference


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