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BLOCKCHAIN IN ACCOUNTING IN THE DIGITAL ECONOMY

The article examines the changes taking place in accounting in the context of the development of digital technologies, justifies the need for economic entities to search for new technologies aimed at the formation of competitive advantages. The purpose of the study is to identify and analyze the possibilities and conditions for the effective use of blockchain technology in accounting. Practical significance of the work: It is proposed to introduce cloud and blockchain technologies in the field of accounting to increase its efficiency and prevent errors. The structure of these technologies, the basic principles of operation are described, as well as the advantages and disadvantages are analyzed.

The research methodology is based on a theoretical review, study and analysis of foreign and Kazakh experience in implementing pilot blockchain projects. To identify the factors of the internal and external environment that affect the development of blockchain technology in accounting, a SWOT analysis is presented. Separate regulatory legal acts of the Republic of Kazakhstan regulating digital technologies have also been studied. A sociological survey was conducted on the implementation of blockchain for accounting. According to the results of the study, it was concluded that there are both opportunities and obstacles for the introduction of this technology in the accounting of the Republic of Kazakhstan.

The idea of blockchain is that it is a public register that uses a peer-to-peer approach to form a chronological database of transactions using the "append" approach, which allows you to preserve the immutability of distributed information.

Keywords: blockchain, digital economy, digitalization, accounting, information technology.

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Цифрлық экономика жағдайында бухгалтерлік есептегі Блокчейн технологиясы

Мақалада цифрлық технологиялардың дамуы жағдайында бухгалтерлік есепте болып жатқан өзгерістер қарастырылады, шаруашылық жүргізуші субъектілердің бәсекелестік артықшылықтарды қалыптастыруға бағытталған жаңа технологияларды іздеу қажеттілігі негізделген. Зерттеудің мақсаты – бухгалтерлік есепте блокчейн технологиясын тиімді қолдану мүмкіндіктері мен шарттарын анықтау және талдау. Жұмыстың практикалық маңыздылығы: оның тиімділігін арттыру және қателіктердің алдын алу үшін бухгалтерлік есеп саласына бұлтты және блокчейн технологияларын енгізу ұсынылады. Бұл технологиялардың құрылымы, жұмыстың негізгі принциптері сипатталған, артықшылықтары мен кемшіліктері талданған.

Зерттеу әдістемесі пилоттық блокчейн-жобаларды енгізудің шетелдік және қазақстандық тәжірибесін теориялық шолуға, зерделеуге және талдауға негізделген. Бухгалтерлік есепте блокчейн технологиясының дамуына әсер ететін ішкі және сыртқы орта факторларын анықтау үшін SWOT талдауы ұсынылған. Сондай-ақ, цифрлық технологияларды реттейтін Қазақстан Республикасының жекелеген нормативтік-құқықтық актілері зерделенді. Бухгалтерлік есепті жүргізу үшін блокчейнді енгізу тұрғысынан әлеуметтік сауалнама жүргізілді. Зерттеу нәтижелері бойынша осы технологияны Қазақстан Республикасының бухгалтерлік есебіне енгізу үшін мүмкіндіктер де, кедергілер де бар деген қорытынды жасалды.

Блокчейннің идеясы – бұл "append" тәсілін қолдана отырып, транзакциялардың хронологиялық дерекқорын құру үшін тең-теңімен тәсілді қолданатын жалпыға ортақ тізілім, бұл таратылған мәліметтердің өзгермейтіндігін сақтауға мүмкіндік береді.

Түйін сөздер: блокчейн, цифрлық экономика, цифрландыру, бухгалтерлік есеп, ақпараттық технологиялар.

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Блокчейн в бухгалтерском учете в условиях цифровой экономики

В статье рассмотрены изменения, происходящие в бухгалтерском учете в условиях развития цифровых технологий, обоснована необходимость поиска хозяйствующими субъектами новых технологий, нацеленных на формирование конкурентных преимуществ. Цель исследования – выявление и анализ возможностей и условий эффективного применения технологии блокчейна в бухгалтерском учете. Практическая значимость работы: предлагается внедрение облачных и блокчейн-технологий в сферу бухгалтерского учета для повышения его эффективности и предотвращения ошибок. Описывается структура этих технологий, основные принципы работы, а также анализируются преимущества и недостатки.

Методология исследования построена на теоретическом обзоре, изучении и анализе зарубежного и казахстанского опыта внедрения пилотных блокчейн-проектов. Для выявления факторов внутренней и внешней среды, влияющих на развитие технологии блокчейна в бухгалтерском учете, представлен SWOT-анализ. Также изучены отдельные нормативно-правовые акты Республики Казахстан, регулирующие цифровые технологии. Проведен социологический опрос на предмет внедрения блокчейна для ведения бухгалтерского учета. По результатам исследования сделан вывод о том, что имеются как возможности, так и препятствия для внедрения данной технологии в бухгалтерском учете Республики Казахстан.

Идея блокчейна заключается в том, что он является публичным регистром, который использует одноранговый подход для формирования хронологической базы данных транзакций с использованием подхода «арренд», который позволяет сохранять неизменность распределенных сведений.

Ключевые слова: блокчейн, цифровая экономика, цифровизация, бухгалтерский учет, информационные технологии.

Introduction

The main trends of the digital economy include technologies such as Big Data, artificial intelligence, distributed registry system and cryptocurrencies, cloud technologies, augmented reality, neurotechnologies, etc. The urgent question is how, in the context of the rapid development of information technology, the rules and standards of accounting and reporting should change in order to remain relevant for the evaluation of digital business.

The latest effective trend in digital accounting is blockchain, which has gained some popularity in the West and is gradually being introduced by some organizations in Kazakhstan. This system attracts users with its security and transparency, as each transaction is recorded and processed in a P2P (peer-peer) network consisting of many servers and computers connected to each other. Then the performed and recorded operation is added to the previous block transactions, thereby creating a certain sequence. This system provides reliable protection of the entered data, due to the impossibility of changing them, and also makes it impossible to lose information. In relation to accounting, the system solves such problems as erroneous or intentional changes in data in accounting registers or accounting system,

making hidden transactions. Thus, the availability and irreversibility of data will be a solid foundation for building a transparent and open accounting system (Dai J., 2017).

Based on the recognition that the functions of blockchain technology will be very useful in accounting, we have set as the main goal of our research the identification and analysis of prospects and opportunities for the use of blockchain technology in accounting (Momo F. S, 2019).

The object of the study is blockchain technology in accounting, and the subject we have identified the effectiveness of the introduction of blockchain in accounting in Kazakhstan. Thus, the hypothesis is that the use of blockchain technology in the field of accounting will determine the positive and negative sides of its implementation.

Literature review

In the course of writing this article, the experience of foreign and Russian researchers was analyzed: K. Schwab, E. Brynjolfsson, A. McAfee, M. Spence, M. Matthews, N. Kamorganova, A. Bakaev, I. Semin, S. Dyatlov, D. Gilmanov, D. Pankov and many others on the impact of digitalization on the functioning of the economy, enterprises, the work of

the financial sector, accounting methods, changing the existing business model. The article is also based on research by such organizations as Ernst & Young, PwC, McKinsey & Company, PEW Research Center, Agency for Strategic Initiatives, articles of periodicals devoted to changes in legislative and other regulations, etc.

There are different opinions about the advantages of using blockchain ideas in accounting. First of all, the idea of blockchain is considered as a fraud-blocking system that can form a real, proven and transparent accounting ecosystem. However, the implementation of accounting on the blockchain is currently technically not feasible due to its low speed and high energy intensity. Experts believe that blockchain has the potential to transform current accounting and auditing practices, as it provides an accurate, timely and automatic assurance system (Dai J, 2017).

Despite the fact that the potential application of blockchain has been proposed in the literature in many other fields, there is a limited number of studies examining the use of this technology in accounting and auditing practice. David Yermack (D. Yermack Digital Currency, Blockchain and the Future of Financial Services) presented a brief discussion on the use of blockchain for real-time accounting (Yermack D, 2018).

BlockShow Europe in May 2018 published the top 10 best countries for the active use of Blockchain technology, which takes into account the regulatory framework, initiatives and the use of blockchain. The leaders are Estonia, Switzerland and Japan. The main positive criteria in the above-mentioned countries are the progressively developed 142 legislations in the field of digital economy and regulation of "crypto relations", active support for startups, mainly starting with the introduction of technology into the public administration system, the effective operation of cryptocurrency exchanges and some other aspects, including political and economic development in general (Rindasu S.M., 2019).

Methodology

In our opinion, the use of blockchain in relation to reporting will allow you to track it at various time stages. For example, before and after the audit; before and after making bug fixes. This expands the capabilities of users (Odintsovo, T. M., 2018).

The technology of distributed decentralized data storage blockchain, which until recently was nothing

more than a trend word, is gradually becoming a reality in Kazakhstan. The segment of public administration and the financial sector are most actively interested in and see great prospects in this technology. At the end of March, it became known about two new projects that will be built on blockchain technology, and both are related to the financial sector (Tan B. S., 2019).

The Ministry of Finance of the Republic of Kazakhstan, the Association of Financiers of Kazakhstan (AFK) together with IBM and Pricewaterhouse Coopers (PwC) are developing an administration system using blockchain technology. It is planned to launch a pilot project of the information system in August this year (Baev A. A. 2020).

The essence of the project is the formation of a decentralized database that allows you to instantly track the chains of financial transactions of taxpayers and make them a guaranteed VAT refund. As you know, there are a number of "schemes" that allow you to get an illegal offset and VAT refund, so the relevance of this issue is beyond doubt (Bochkova, S. V. 2019).

"Since a number of tax evasion schemes and even withdrawal of funds from the budget were associated with VAT in Kazakhstan, the task is to provide a more reliable mechanism for VAT administration.

As you know, according to the new amendments to the Tax Code, VAT amounts transferred between enterprises must be stored in separate bank accounts. These are ordinary settlement accounts with limited transactions. When a company issues an invoice for a payment that includes VAT, the amount is received in two parts. The main part goes to the usual settlement account, VAT — to the VAT settlement account. After that, the money received on the VAT account can only be used to pay the VAT issued in the invoice for payment, or to the budget. The offset of VAT paid and VAT refund to exporters is possible only for VAT carried out on such special invoices and confirmed in electronic invoices.

The main principle of the proposed solution is to monitor the financial flows of VAT and the transparency of the fulfillment of taxpayers' tax obligations in real time, for the implementation of which the so-called VAT control accounts of VAT payers opened in second-tier banks will be used.

In addition, in April, the Ministry of Finance plans to introduce a single personal account, taking into account tax and customs payments.

The proposed solution is a so-called "corporate blockchain" and has a number of differences from

classical implementations. The nodes of the blockchain network will be located in banks and government agencies. Bank nodes will store a limited amount of information that does not allow disclosing transaction details. Nodes of government agencies will receive full information about transactions. The mechanism of consensus (confirmation of authenticity of data) also differs from public decisions and was not disclosed during the past meetings.

All transactions on VAT accounts and interbank exchange will take place within the blockchain network without the participation of the CMR.

To study all the issues of technology implementation, a laboratory for applied research in the implementation of blockchain technology will be created at AKF PIT.

Commercial operation of the system for some taxpayers was planned for mid—2019, and full launch – by 2020, however, only in 2022 the pilot program was launched.

Since blockchain technology is currently at the stage of innovation and pilot projects in Kazakhstan, it is necessary to identify and analyze the factors of the internal and external environment that affect the processes and results of the introduction of blockchain technology in the field of accounting. To do this, we use the method of strategic analysis – SWOT analysis, which allows us not only to emphasize the strengths and weaknesses of blockchain technology, but also to assess the opportunities and threats of implementing this technology in relation to accounting.

Table 1 – SWOT analysis of the use of blockchain technology in accounting

Strengths (S)	Weaknesses (W)
1. Decentralization (all data is stored by everyone) 2. Accessibility and transparency (data is available to all participants of the private blockchain) 3. Security (changes to the private blockchain cannot be added from the outside) 4. Real-time operational accounting, absence of primary documents. 5. Blockchain allows you to effectively fight fraud. Tax evasion becomes impossible as all transactions will be digitized.	1. The effect of slow work with an increase in users. 2. Lack of legislative regulation. 3. High power consumption. 4. Lack of specialists of the required level 5. Pilot and experimental levels of implementation. 6. The high cost of storing data in a distributed network compared to storing a centralized database.
Opportunities (O)	Threats (T)
1. Real-time information transfer 2. Data verification by network participants 3. Differentiated Access Levels	1. The threat of failure to reach consensus between the parties concerned. 2. Hype of expectations from technology when they are unjustified on pilot projects can stop the development of the industry. 3. The emergence of fraudulent and shadow technologies. 4. The threat of resistance to the large-scale introduction of technology by a part of the business providing intermediary services
Note: compiled by the author based on the source (Baev A.A., 2020)	

Thus, the SWOT analysis showed that a number of draft laws have already been adopted, public organizations have been formed, initiatives are operating, professional communities are developing. However, it should be noted that projects on the blockchain platform are mainly implemented in a pilot format.

There are barriers that complicate the process of introducing blockchain technology into accounting activities. Thus, it is necessary to improve regu-

latory regulation, develop unified approaches to standardize the implementation of this technology in various industries and spheres. The information security system requires improvement, there are certain difficulties with the integration of information systems, and it should also be noted the high cost of developing and implementing projects. At the same time, when creating the necessary conditions, this technology has a good prospect (Paytayeva K.T., 2018).

How is it possible to apply blockchain technology in accounting? Firstly, the technology can be compared with a typical accounting program, only in a primitive form and with the minimization of details. This is far from a positive moment, but it gives an incentive to improve the system, since initially the technology was not created specifically for accounting and control purposes. Secondly, it complies with some basic accounting principles: the information placed in the blockchain system is reliable and truthful, since any changes to already recorded blocks are impossible, and there is no possibility of forgery or substitution of data; this information can be trusted, even if there is no trust in the counterparty; each transaction is carried out only with approval by both parties and is recorded twice: in the same amount for each of the parties and is reflected in the same estimate for the debit of one and the credit of the other account. This corresponds to such a principle of accounting as a double entry. The system's information is open and protected at the same time, which ensures its transparency. But there is a prob-

lem of confidentiality of information. However, this is considered solvable, since users of the chain can have cipher codes, or so-called "keys" to view certain information, that is, use a private blockchain. The main advantage of the technology is the acceleration of transactions: the ability to work without intermediaries, banks; there is no need to reconcile calculations (Shamina E.V., 2018).

Results and discussions

Figure 1 shows the directions of digitalization of accounting in connection with the pyramid of the accounting process. Blockchain technology can close compiled reports at different stages of its audit, approval and approval. Robotization begins to develop actively when processing various kinds of accounting operations implemented through the preparation of registers. The technology of digital twins can create a "living asset", which, with the help of sensors, will generate primary documents about business transactions in an actual automatic mode (Bonson E., 2019).

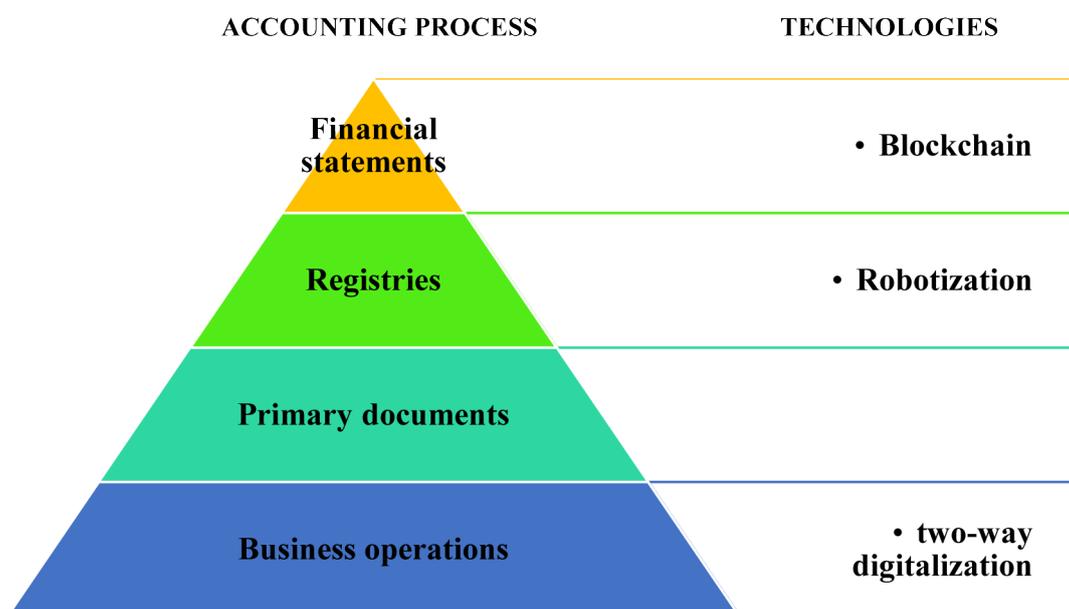


Figure 1 – The structure of accounting in digitalization

Note. Compiled by the author based on the source (Odintsovo T. M., 2018)

Blockchain technology as an accounting system, it is worth noting the following: 1) a package of documents or other useful information about the transaction must be linked to each block containing

the fact of the transaction (the document on the basis of which it was carried out, the conditions for its conduct, mandatory requisites, counterparties of the transaction), and its simultaneous reflection in finan-

cial and tax accounting is possible, that is, primary documents could be formed automatically inside the system on the condition of an electronic digital signature; 2) it is possible to develop automated generation of standard reporting forms, thus not missing a single completed operation; 3) each subsequent block contains information from all previous ones, which makes it impossible to make additional operations between already built blocks — on the one hand, this may form a problem of lack of completeness of information, if there are cases in which the logical sequence of operations has been violated, and on the other hand, there is an increase in the requirements for the accuracy and reliability of operational accounting. Thus, the use of blockchain technology can accelerate the process of economic activity of companies, as well as bring all accounting, reporting and control to uniform international standards. However, the expediency of such a transition and its consequences should be assessed taking into account the economic situation in the world.

At a minimum, since any practical action requires a theoretical basis for itself — the most important 144 at the moment is the development of a regulatory framework for the transition of the economy to "digital" and the development of a technology implementation plan.

As part of writing the article, a survey was conducted among the accountants of 25 companies about the introduction of blockchain technology into accounting and the answer options "Positive", "Negative" and "Neutral" were provided, where 12 accountants responded Positively, only 3 negatively, and 10 accountants neutrally.

The survey showed that less than half of respondents (48%) have a positive attitude to new technologies in the field of accounting, and only 12% of respondents said that they do not have a general understanding of the technology; 40% of respondents do not know that blockchain technology has the property of data immutability, and they are neutral about this novelty (Fig. 2).

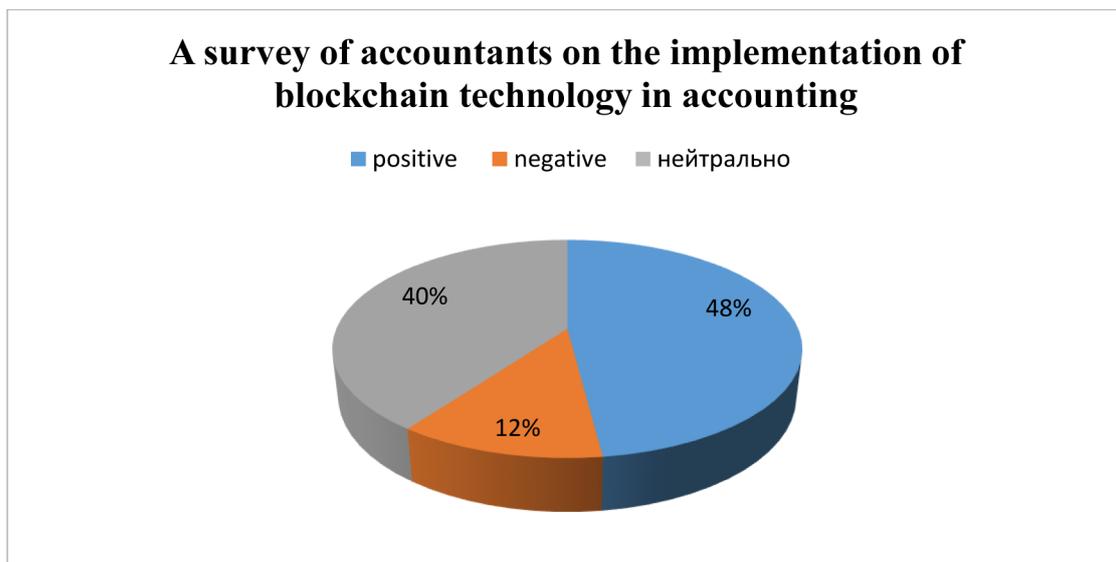


Figure 2 – The results of a survey of accountants on the introduction of blockchain technology

Note: Compiled by the author based on survey research data

As a result of the analysis, we came to the following conclusions. It is obvious that blockchain technology represents a new organizational paradigm for accounting. However, all conditions, including legislative, financial and technical ones, have not yet been created for the large-scale implementation of the blockchain.

Conclusion

The conducted research allowed to formulate a number of recommendations on the development and implementation of blockchain technology in accounting of the Republic of Kazakhstan:

1. It is necessary to form models of basic concepts, develop legislation, regulatory documents, instructions and regulations on accounting in the new digital economy.

2. To train specialists and attract experts of the necessary level to implement blockchain technology in the accounting system.

3. creation of special innovation clusters. The need for developers of blockchain solutions for comprehensive support makes it necessary for them to work in jurisdictions where the conditions for obtaining comprehensive support have already been formed. The Republic of Kazakhstan has already had experience in creating special economic zones, some of them continue to work. Within such a zone, it is recommended to encourage blockchain start-ups, create pilot products that solve public admin-

istration tasks, apply limited regulatory measures to them, and lower tax rates.

Blockchain technology has good prospects for use in the accounting system, where it is necessary to ensure the reliability and immutability of data. The high degree of information security achieved through cryptographic encryption and allowing data to be stored in an unchanged state makes it very relevant for any field.

Undoubtedly, the digital economy is our future, it is the potential that will help the economy of Kazakhstan develop properly and reach the international level. The field of accounting will undergo changes, the introduction of innovations will speed up routine work and ensure the safety of data at a high level, but when making complex, professional decisions, they will still need human participation.

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