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## Transformation of accounting in the digital economy and prospects for its development

**Abstract.** *The article examines the features of digital economy, analyzes its implementation in the Republic of Kazakhstan with the study of domestic and world statistics. The authors present the technologies and methods of digitalization of accounting. The paper presents the blockchain technology, a flowchart of the technology is given, its features, advantages and problems of implementation are analyzed. Blockchain technology makes it possible to apply in accounting procedures such as triple entry, digital audit, smart contracts, cloud data storage, use of transactions, exclusion of unconfirmed expenses and others. Along with the undoubted advantages of using blockchain technologies, it is necessary to name a number of problems related to their implementation, primarily in the field of regulatory support, ensuring the availability of competent specialists, as well as their training, investment and management systems. The authors propose directions for the introduction and development of digital technologies in accounting, including changing the accounting system, using a digital asset, expanding the qualitative and quantitative characteristics of «leased assets», the use of new digital currencies, and improving the skills of accounting personnel. Currently, it is necessary to actively develop the use of digital technologies in the field of accounting, since this is becoming one of the necessary conditions for maintaining the competitiveness of organizations. The purpose of this article is to study the main indicators of the development of the digital economy in the Republic of Kazakhstan, to analyze the problems in the field of digitalization in accounting, as well as to identify the main ways and factors of the development of digital accounting.*

**Keywords:** *accounting, digitalization, blockchain, cryptocurrency, digital assets, token, mining.*

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### Introduction

The State Program «Digital Kazakhstan» implemented by the Government of the Republic of Kazakhstan through the development of innovative digital technologies is aimed at creating an economic environment that ensures the most effective interaction of citizens, society, business and the state [1]. The main innovative tools of digitalization are artificial intelligence, cloud technologies, big data, and process robotization. During the transition to digital technologies and the formation of the digital economy, the main trend of socio-economic society is information, as the main most valuable resource. In the accounting system, the information component is also

one of the most important and priority. In the works of modern Russian scientists devoted to this problem, it is noted that the development of the theory and practice of accounting is impossible without high-speed information technology complexes, digitization and transmission of information online. Relevant information, along with the means, objects of labor and labor itself, turns into a full-fledged factor of expanded reproduction.

Accounting, being the main subsystem of management of an economic entity and the recognized language of business, is constantly changing under the influence of external factors, which are reflected in the legislative acts of Kazakhstan. Over 80% of the information characterizing various processes and facts of financial and economic activity of economic entities is concentrated in the accounting system. Accounting, which includes the collection, registration and provision of economic information about the financial and economic activities of an organization in the context of digitalization and changes in information content, is losing its relevance [2]. This is confirmed by the use of tools for collecting, analyzing and storing information that have not changed for a long time, and by the stagnation of theoretical and methodological approaches to building an accounting system and forming financial statements. The ongoing processes of globalization and digitalization, the use of cloud technologies, artificial intelligence capabilities, big data and tools that allow processing a large amount of information in a short period of time by economic entities in their practical activities, affect the conceptual foundations of theoretical and methodological approaches to the organization of the accounting system, fill the concept of «accounting» with a new meaning. The reform of the accounting system is inevitably associated with a change in the legislative framework, the influence of the surrounding reality, the economic conditions in which an economic entity operates, and the rapid development of digitalization.

### **Research methods**

The digital economy, as a new socio-economic phenomenon, is evolving at such a rapid pace that the theoretical and methodological aspects of building an accounting system are significantly lagging behind in the development of this phenomenon. The research theory is based on the works of leading domestic and foreign modern scientists and practitioners devoted to the development of accounting during the digitalization of the processes of collecting, consolidating and analyzing information about the activities of economic entities [3].

Currently, the issues of global transformation of the accounting system through the influence of the information potential of the existing economic space are particularly acute. The research, based on the transformation of the content of accounting methods under the influence of innovative digital technologies introduced into the accounting process, is based on a systematic approach. Dialectical and empirical methods are used as the main methodological principles of the study.

### **Discussion and results**

The State Program «Digital Kazakhstan» [1], approved by the Government of the Republic of Kazakhstan No. 827 dated December 12, 2017, defines the conceptual and categorical apparatus in the field of digital economy, the goals and objectives of its implementation and development, and also designates the following structure, consisting of five main directions of the program implementation (Table 1).

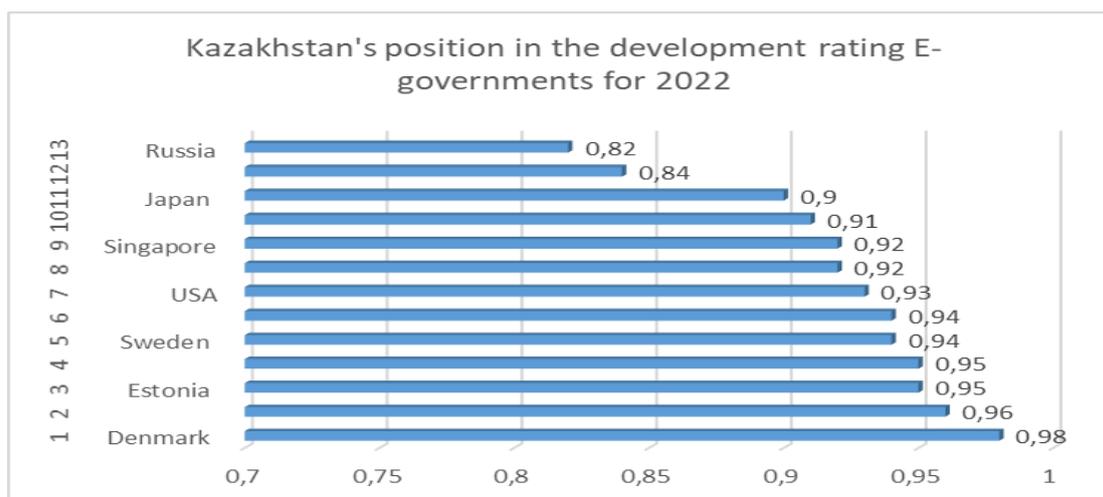
Table 1 - Structure of the «Digital Kazakhstan» Program

| № | Name of the program                       | Program content  |
|---|---|--|
| 1 | «Digitalization of economic sectors»      | the direction of transformation of traditional sectors of the economy of the Republic of Kazakhstan using breakthrough technologies and opportunities that will increase labor productivity and lead to an increase in capitalization.   |
| 2 | «Transition to a digital state»           | the direction of transformation of the functions of the state as an infrastructure for providing services to the population and business, anticipating its needs.  |
| 3 | «Implementation of the Digital Silk Road» | the direction of development of high-speed and secure data transmission, storage and processing infrastructure.  |
|   | «Development of human capital»            | the direction of transformation, covering the creation of a so-called creative society to ensure the transition to new realities - the knowledge economy.  |
| 5 | «Creating an innovative ecosystem»        | the direction of creating conditions for the development of technological entrepreneurship and innovation with stable horizontal links between business, the scientific sphere and the state. The state will act as a catalyst for the ecosystem, capable of generating, adapting and introducing innovations into production. |

Note: compiled on the basis of the source [1]

One of the key goals of the state program is to accelerate the pace of development of the republic's economy and improve the quality of life of the population through the use of digital technologies in the medium term, as well as creating conditions for the transition of the economy of Kazakhstan to a fundamentally new development trajectory that ensures the creation of the digital economy of the future in the long term [4].

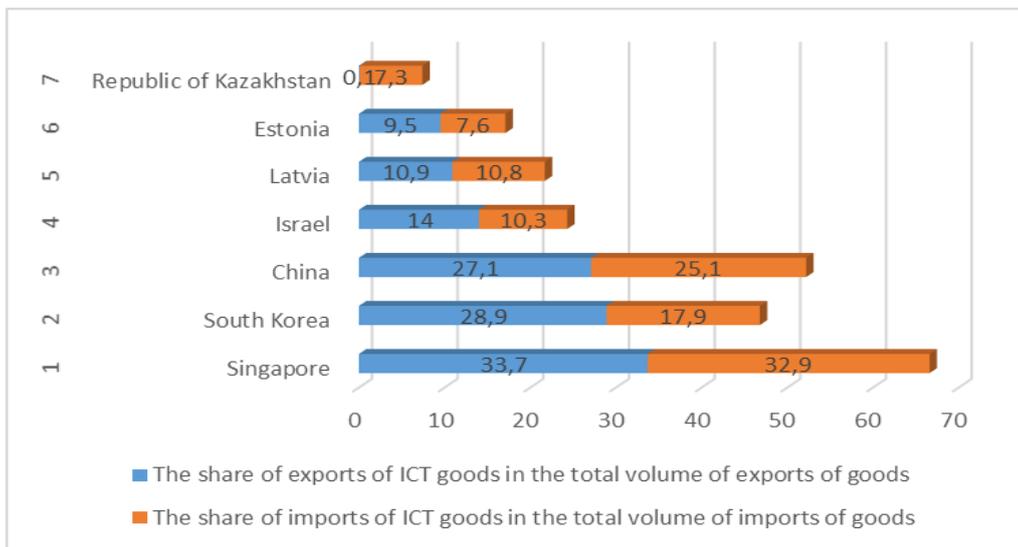
The reporting data of the central state bodies of the Republic of Kazakhstan indicate that there are positive trends in the field of digitalization. In the ranking of countries by the level of development of electronic government (E-government) by the end of 2022, Kazakhstan ranked 29th among 193 countries (over the past 3 years, an increase of 10 positions up). Kazakhstan also ranks below other economically leading countries in the total GDP (Figure 1).



**Figure 1** - Kazakhstan's position in the development rating E-governments for 2022

Note: compiled on the basis of source [5]

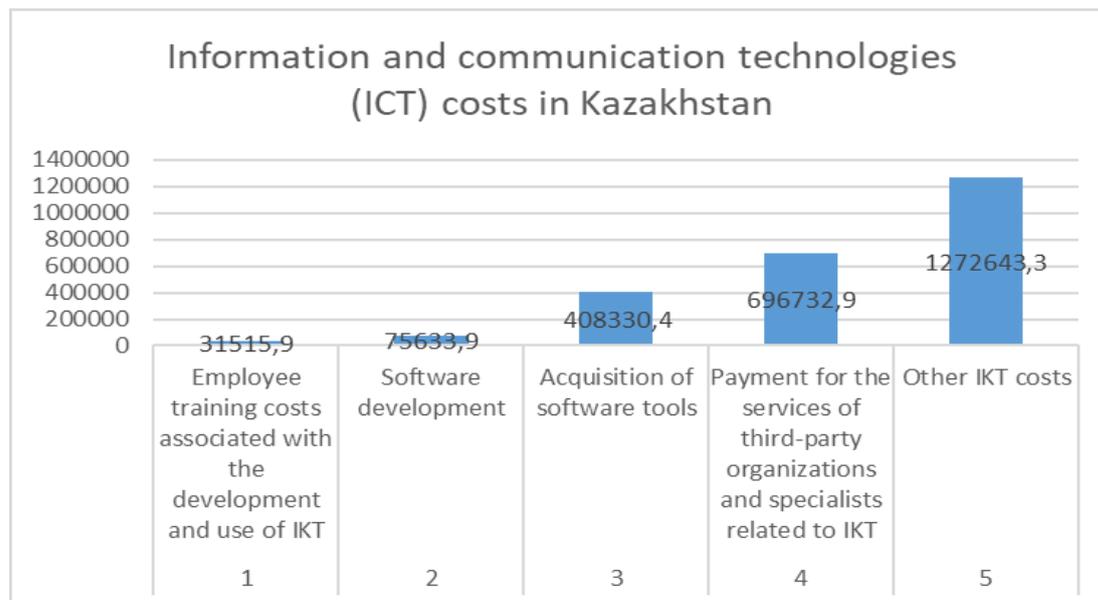
According to this indicator, Kazakhstan is significantly inferior to such countries as Israel (30th place), Russia (36th place), China (45th place), Uzbekistan (87th place), India (100th place), etc. To assess the effectiveness of investment volumes in the field of digitalization, which affects, among other things, socio-economic development, on basis of official data since 2015, the ratio of such effective qualitative indicators as exports and imports of goods related to information and communication technologies (ICT) has been considered and it can be stated that in comparison with other countries with a sufficiently developed economy, the share of exports of ICT goods in Kazakhstan in total exports remains extremely low (Figure 2).



**Figure 2** - Comparative analysis of countries with a developed digital economy in terms of the share of exports and imports of information and communication technologies in the total volume of exports and imports of goods, respectively, with similar indicators of the Note: compiled on the basis of the source [5]

The volume of total ICT costs for the period 2015-2022 amounted to 2,484,856.4 million tenge, including the costs of public administration - 310 668.2 million tenge or 13% of the total (private sector – 87%).

The volume of total expenditures on information and communication technologies (ICT) in Kazakhstan for the period 2015-2022 amounted to KZT 2,484,856.4 million, including expenditures of public administration bodies - KZT 310,668.2 million or 13% of the total (private sector - 87%) (Figure 3).



**Figure 3** - Information and communication technologies (ICT) costs in Kazakhstan for the period 2015-2022 and their structure, million tenge

Note: compiled on the basis of the source [5]

Against the background of the growth of the total volume of ICT costs, which in 2022 increased by 168,080.8 million tenge (or 76%) compared to 2015, the lion's share falls on the payment of services of third-party organizations and specialists (outsourcing) related to information technology - 696,732.9 million tenge or 42.5%.

In addition, relatively significant costs associated with the acquisition of software used on the basis of a license agreement, their share at the end of analyzed period was 16.6% with positive growth dynamics (2015 – 9.7% and 2022 - 16.6%).

It should also be noted that there is an increase in the need for IT specialists, which in 2022 increased by 63% compared to 2015 (2015 - 4,449 people, 2021 – 7,038 people).

On the contrary, independent software development within the organization and employee training related to the development and use of ICT by the end of 2022 accounted for a relatively low share in the structure of total costs (4.4% and 0.3%, respectively), in the latter case with negative dynamics of the indicator (2015 – 1.5% and 2022 – 0.3%).

As a result of a number of studies in the field of digitalization of accounting, using software, databases, as well as the principles of their configuration and construction, two directions of such digitalization have been identified:

- technology for obtaining, storing and transmitting the necessary information to addressees in accounting;

- methodology of systematization of information [6].

The technology of obtaining, storing and transmitting information includes the use of modern information systems related to the creation, operation and maintenance of databases in accounting. The development of such information systems is directly influenced by two main factors:

- innovations in the technical base and equipment, entailing the creation of new information needs;

- innovations in automated information systems.

The essence of the accounting method is to understand and know its elements, which are documentation, inventory, accounts, double entry, valuation, calculation, balance sheet and reporting.

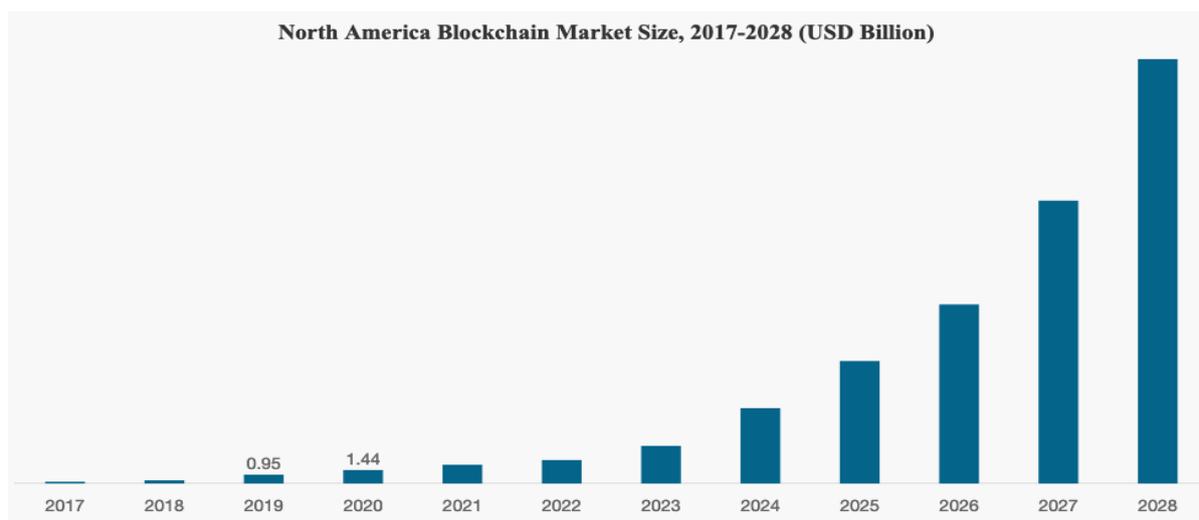
Therefore, with regard to accounting methodology, it is advisable to talk about the use of accounting technologies such as:

- methods of primary observation, for example, documentation, inventory and others;
- methods of systematization and ordering, for example, accounting accounts, double entry;
- methods of cost measurement, for example, calculation, evaluation and others;
- ways of combining information, for example, the balance sheet or accounting statements [7].

Digitalization of accounting contributes to the fact that any aspect of economic activity is entered into the register (database) in the form of a set of details, among which account details, debit and credit appear. Since they are written in binary code, it is possible to use more than two accounts. As the number of details increases, for example, analytical accounts, accounting accounts, management and other information, it is more convenient to generalize, systematize and present the entire information array for use in a format different from that achieved with manual data entry [8].

Blockchain technology, which has been developing at an accelerated pace in recent years, can become one of the most effective and working tools for digitalization of accounting [9].

Analysts of the well-known Indian consulting company Fortune Business Insights in their report on the blockchain market research identified the leading regions, industry and market trends, technologies being rapidly introduced at the global level, growth-stimulating factors and constraints, as well as the competitive environment and presented an overview of the blockchain market (Figure 4).



**Figure 4** - Dynamics of the global blockchain market, billion US dollars

Note: compiled on the basis of the source [10]

The volume of the global blockchain market in 2020 amounted to 3.06 billion US dollars. In 2020, the global market showed significant growth – by 52.4% compared to the average annual growth in 2017-2019. It is predicted that in 2021-2028, the market will grow from 4.68 billion US dollars (current figure) to 104.19 billion US dollars, and the average annual growth rate will be 55.8%.

Blockchain technology makes it possible to store data on financial transactions, legal obligations, property rights, providing full transparency and universal accessibility for review, but at the same time reliably protecting against any forgery, hacking, and so on. Increasingly, at present, certain elements of this technology are used both at the state level and in individual corporations.

The essence of blockchain technology is to build a continuous sequence of blocks according

to certain rules. Each block of the system has a direct connection with the previous block, secured with a digital signature [11].

The use of blockchain on a regulatory basis in accounting will be a promising and effective direction. The essence of the tool is presented in the form of a diagram (Figure 5).

Blockchain technology has a number of advantages that are most widely used in the field of finance, such as: traceability of financial transactions and transactions on the site; data security using a permanent digital record; access of each participant to an up-to-date copy of the database; speed and reliability of operations performed; protection of operations and users due to data decentralization between servers [13].

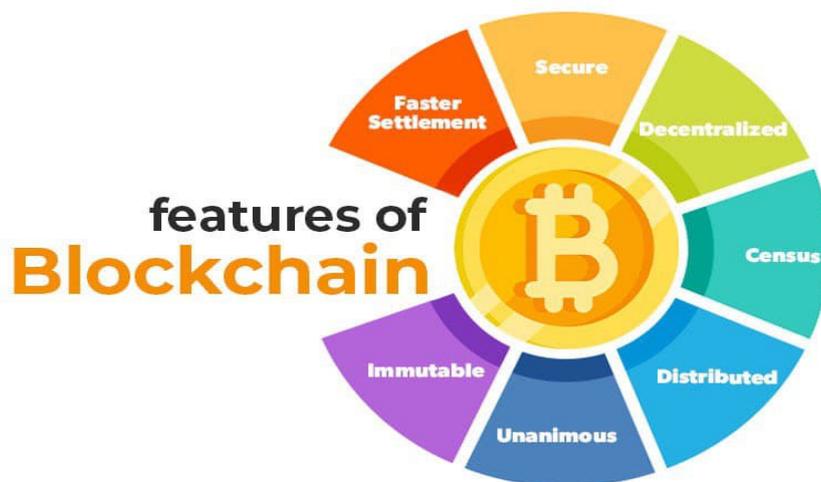


Figure 5 - Block diagram of the use of blockchain technology in financial transactions  
Note: compiled on the basis of the source [12]

Accounting, along with financial analysis and financial audit are among the most successful areas of implementation of blockchain technology. The following features of the application of this tool can be named (Table 2).

Table 2 - Features of blockchain application in accounting

| № | Name   | Content   |
|---|--|---|
| 1 | Triple entry, namely, the registration of data for each debit and credit transaction of organizations with a third entry in the state or international register. | Permanent access to the financial statements of each registered organization for regulatory authorities. This will demonstrate the financial transparency of the activities of legal entities, constant monitoring, avoiding mistakes, reducing financial risks, reducing the cost of obtaining and verifying documentation, etc. |
| 2 | Digital audit  | Creating the necessary conditions for conducting an audit at each stage of product creation.  |
| 3 | «Smart» contracts  | The use of an electronic signature will reduce the time and labor costs for fulfilling the terms of contracts. Decentralization of the contract, reliability of data sources, powers of attorney of the parties, automation of payments and more are also involved.   |
| 4 | Cloud data storage   | Secure storage of all organization data. Saving money on the operation of central servers.  |

|  |   |   |
|--|---|---|
| 5  | Simplification of the reflection of the movement of assets within the organization. | The movement of assets is carried out in the form of a transaction, which, in turn, provides access to financial and management information in real time.   |
| 6  | Using transactions to make settlements with the organization's counterparties.      | The block system used in the blockchain will allow you to generate and write off accounts receivable and accounts payable at the same time, without having to confirm the fact of the transaction every time. |
| 7  | Simplification of the resource management process.                                  | Thanks to the secure registration of transactions, the entire process of managing the organization's resources is simplified.   |
| 8  | Exclusion of corruption, embezzlement and unconfirmed expenses.                     | The exclusion of these negative factors will be possible thanks to the full transparency of information online.   |
| Note: compiled on basis of the source [14] |   |   |

The advantages of introducing digital accounting in organizations prevail over the problems that accompany them, however, one should be aware that a number of significant measures will be needed to facilitate the transition to full digitalization, including both the training of qualified personnel and the introduction of information and communication technologies themselves, including the preparation of the necessary equipment, resources, and information base.

Let's outline the main problems associated with the introduction of blockchain technologies in accounting, and requiring changes and adjustments to the system of regulatory and legal regulation, information support, personnel changes (Table 3).

Table 3 - The main problems of implementing blockchain technologies in the accounting of organizations

| №  | Name of the problem            | The content of the problem  |
|--|--------------------------------|---|
| 1  | Legal problems.                | The absence of a number of regulations in the field of regulation of accounting law, general rules and regulations for the control of accounting processes, financial accounting management at the state level. |
| 2  | Learning challenges.           | Inconsistency of certain areas of training in the field of financial and accounting with the requirements of the modern information society.  |
| 3  | Personnel problems.            | The absence or low percentage of specialists-financiers and accountants, competent in the field of digital technologies, proficient in programming languages and APIs.  |
| 4  | Problems of investment support | The presence of risks for investors when placing funds in the development and management of management and accounting systems.  |
| 5  | Perception problems            | The position of individual specialists associated with the opposition of digital accounting in business and the accountant profession.  |
| Note: compiled on the basis of the source [15] |                                |   |

Along with the noted advantages and problems of introducing digital technologies into accounting, a number of areas of such development should be noted:

1. Changing the accounting system in organizations.

We are talking about the development of accounting policies in organizations of various types. To date, there are three types of enterprises in science and practice;

– traditional organizations operating normally, but at the same time using modern technologies to solve certain business tasks;

– organizations that operate and interact with customers only through the Internet and various kinds of virtual channels;

– Internet organizations that are not tied to a physical asset. Their number is constantly growing, including various innovative projects.

2. Using a digital asset as an innovative accounting object.

Digital assets are one of the types of intangible assets, which is associated with taking into account information about objects that do not have a tangible form [16]. Assets such as franchise, trademark, customer loyalty and others are a kind of intangible assets, and, among other things, they can be considered as digital assets, but they are often not accounting objects, and in addition, there is a problem of estimating their value. A number of issues are also related to intellectual capital, namely, its accounting and evaluation of its value.

3. Expansion of qualitative and quantitative characteristics of «leased assets».

According to a number of scientists, «the new business model of an enterprise in the digital economy allows replacing the sale of a physical object with the sale of its working resource» [17]. Since leased property is included in the assets of the organization in accordance with international requirements from 2019, it is necessary to envisage changes in the methodology of accounting and identification of such «rental assets».

4. The emergence of new digital currencies.

At the level of domestic legislation, attempts are being made to consolidate such digital financial assets as tokens, cryptocurrencies and a number of others as means of payment, and virtual organizations engaged in mining and other activities will acquire the status of full-fledged participants in the financial market of digital assets [17].

5. The growth of the competence of accounting personnel.

The accountant profession in the digital economy will need new competencies, for example, he will have to perform certain tasks of the organization's business, solve risk assessment issues, possess knowledge in the field of economics, which will require constant professional development and self-improvement. The accountant profession cannot disappear for objective reasons, however, it will have to meet the new realities of business in the digital economy.

## **Conclusions**

Thus, it should be noted that the development of the digital economy and accounting in Kazakhstan, despite lagging behind other developed countries in a number of points, is actively developing. The introduction of digital technologies at all levels of the economy, including the development of the regulatory framework and the creation of conditions for application, affects most areas of activity. The field of accounting, being one of the most conservative, requires a special approach and developments on this issue. It is necessary to train accountants, actively introduce digital technologies at enterprises, develop a legislative framework, and solve problems arising in the process of implementation. The competitive advantage of organizations owning information and communication technologies is obvious, and now it is necessary to move more actively on this path.

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### **Цифрлық экономикадағы бухгалтерлік есепті трансформациялау және оны дамыту перспективалары**

**Андатпа.** Мақалада цифрлық экономиканың ерекшеліктері қарастырылып, оның ішкі және әлемдік статистиканы зерделей отырып, Қазақстан Республикасында енгізілуіне талдау жүргізілді. Авторлар бухгалтерлік есепті цифрландырудың технологиялары мен әдістерін ұсынады. Жұмыста блокчейн технологиясы ұсынылған, технологияның блок-схемасы берілген, оның ерекшеліктері, артықшылықтары мен енгізу мәселелері талданған. Blockchain технологиясы бухгалтерлік есепте үштік жазба, цифрлық аудит, «ақылды» келісімшарттар, бұлтты сақтау, транзакцияларды пайдалану, расталмаған шығындарды алып тастау және т.б. сияқты процедураларды қолдануға мүмкіндік береді. Блокчейн технологияларын қолданудың сөзсіз артықшылықтарымен қатар, оларды енгізуге байланысты бірқатар проблемаларды, ең алдымен, нормативтік-құқықтық қолдау, Құзыретті мамандардың болуын қамтамасыз ету, сондай-ақ оларды оқыту, инвестициялық және басқару жүйелері саласында туындайтын мәселелерді атаған жөн. Авторлар бухгалтерлік есепте цифрлық технологияларды енгізу және дамыту бағыттарын, оның ішінде бухгалтерлік есеп жүйесін өзгертуді, цифрлық активті пайдалануды, «жалға алынған активтердің» сапалық және сандық сипаттамаларын кеңейтуді, жаңа цифрлық валюталарды қолдануды, есепке алу кадрларының біліктілігін арттыруды ұсынды. Қазіргі уақытта бухгалтерлік есеп саласында цифрлық технологияларды қолдануды белсенді дамыту қажет, өйткені бұл ұйымдардың бәсекеге қабілеттілігін қолдаудың қажетті шарттарының біріне айналады.

Осы мақаланың мақсаты Қазақстан Республикасында цифрлық экономиканы дамытудың негізгі көрсеткіштерін зерттеу, бухгалтерлік есепте цифрландыру саласындағы проблемаларды

талдау, сондай-ақ цифрлық есепті дамытудың негізгі жолдары мен факторларын айқындау болып табылады.

**Түйін сөздер:** бухгалтерлік есеп, цифрландыру, блокчейн, криптовалюта, сандық активтер, токен, тау-кен.

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## **Трансформация бухгалтерского учета в цифровой экономике и перспективы его развития**

**Аннотация.** В статье рассмотрены особенности цифровой экономики, проведен анализ ее внедрения в Республике Казахстан с изучением внутренней и мировой статистики. Авторами приведены технологии и методы цифровизации бухгалтерского учета. В работе представлена технология блокчейн, дана блок-схема технологии, проанализированы ее особенности, преимущества и проблемы внедрения. Технология блокчейн позволяет применять в бухгалтерском учете такие процедуры как тройная запись, цифровой аудит, «умные» контракты, облачное хранение данных, использование транзакций, исключение неподтвержденных расходов и другие. Наряду с несомненными преимуществами от использования блокчейн технологий, необходимо назвать и ряд проблем, связанных с их внедрением, прежде всего, лежащих в области нормативно-правовой поддержки, обеспечения наличия компетентных специалистов, а также их обучения, инвестиционных и управленческих систем. Авторами предложены направления внедрения и развития цифровых технологий в бухгалтерском учете, в том числе изменение системы бухгалтерского учета, использование цифрового актива, расширение качественных и количественных характеристик «арендованных активов», применение новых цифровых валют, повышение квалификации учетных кадров. В настоящее время требуется активно развивать применение цифровых технологий в сфере бухгалтерского учета, поскольку это становится одним из необходимых условий поддержания конкурентоспособности организаций.

Целью данной статьи является исследование основных показателей развития цифровой экономики в Республике Казахстан, анализ проблем в области цифровизации в бухгалтерском учете, а также определение основных путей и факторов развития цифрового учета.

**Ключевые слова:** бухгалтерский учет, цифровизация, блокчейн, криптовалюта, цифровые активы, токен, майнинг.

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