

## IMPACT OF DIGITALIZATION ON ACCOUNTING IN THE TRANSITION TO INDUSTRY 4.0

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The article analyzes the transformation processes in accounting. The aim of the research is to investigate the influence of digital technologies on accounting in the context of Industry 4.0. It is emphasized that modern society is on the way to significant changes in the digital sphere. It was figured out that there are benefits and drawbacks of the digitalization of accounting. The article reveals a variety of digital technologies used in modern accounting (artificial intelligence, blockchain, and cloud technologies). SWOT-analysis of accounting digitalization was performed. It has been studied that in the accounting field, artificial intelligence has great opportunities. It was discussed that the key benefit is that it is capable of processing large quantities of data in the shortest possible period. In the field of accounting, the idea of «blockchain» has become increasingly common. The benefits and drawbacks of blockchain have been revealed. It was mentioned that blockchain has a number of properties that are important for accounting work. The benefits of using cloud technology were determined, they include immediate access, regardless of time and place, to cloud information; saving financial, labor, and capital resources. The drawbacks include the need for a permanent connection to the Internet and the vulnerability of viruses. Recommendations have been provided to businesses and governments about how to facilitate digitalized accounting and address future problems related to it. The key point in different recommendations is to encourage the organizations to use digital technologies by different incentives (both financial and non-financial ones). The article emphasizes that it is important for the enterprises to develop a strategy for the company's digitalization (including the digitalization of accounting), re-teach accountants to use special tools to work for them, and to buy high-privacy security and virus protection. It is also stated that the government needs to reduce taxes or to set up a preferential tax regime for companies with digitalized accounting and to encourage the companies to use a digitalized accounting by subsidies and other incentives. Following the results, the prospects for future research were outlined.

*Keywords: accounting, digitalization, Industry 4.0, technologies, blockchain, artificial intelligence, cloud technologies.*

DOI: 10.21272/1817-9215.2022.3-6

### INTRODUCTION

Modern society is on the way to the profound transformation processes in the digital sphere. Digital competence is recognized as one of the key competencies for a fulfilling life and activity of people in the 21st century. Management of the economic and socio-cultural development of society, economic activities of enterprises can be effective when there is reliable and complete digital information.

The transition to Industry 4.0 has an impact on all types of human activities, including accounting processes. Digital technologies make it possible to significantly speed up the process of collecting information, increase the speed and volumes of its processing and storage (as a result, to save plenty of time for employees and optimize the work of the company). Digitalization of accounting allows creating conditions for the availability of information for users [8]. Therefore, the quality of information increases significantly. Digitalization has an impact on significant improvement in the characteristics of accounting information and the possibilities of its application.

Ukraine participates in leading organizations and projects in the field of electronic interaction of information resources. It indicates the formation of a state demand for the transformation of both the terminological core of accounting and the system of professional practices and technologies [5]. It is not limited by automating existing mechanisms for building an accounting system. Data collection, description, storage, and processing in the digital economy are modified and become a logical combination of modern scientific developments within the accounting information system.

The relevance of digital transformation of accounting will only grow in the future since the use of IT innovations allows solving new problems, modernizing the concepts of receiving, processing, and transmitting information, and contributes to an increase in the efficiency of accounting processes. However, there are certain problems connected with new technologies in accounting, including the possibility of dismissal of some accountants. Anyway, this topic is relevant and requires profound research.

#### ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

Many Ukrainian and foreign scientists study the importance of using disruptive technologies for the digitalized economy in general and for accounting specifically. To analyze the scientific publications on the digitalization of accounting, the Scopus Toolkit and VOSviewer software were used. For analysis such keywords were utilized: accounting, digitalization and blockchain. The time span covered 2017-2021. The scientific field was chosen as «Economics, Econometrics and Finance» and «Business, Management and Accounting». According to our keywords and other requirements and limitations, the search engine of the Scopus Toolkit found 1306 appropriate results. According to Scopus statistics, there is a significant rise in the number of scientific publications about this issue. In 2017 there were only 47 articles concerning accounting, digitalization and blockchain, whereas in 2021 – 653 papers (Figure 1). The pandemic of COVID-19 led to a significant increase in the number of such publications that, in our opinion, can be explained by the change in the format of the work of enterprises, the transition to remote work of employees (in particular, accountants) and, as a result, more active use of new technologies in business work

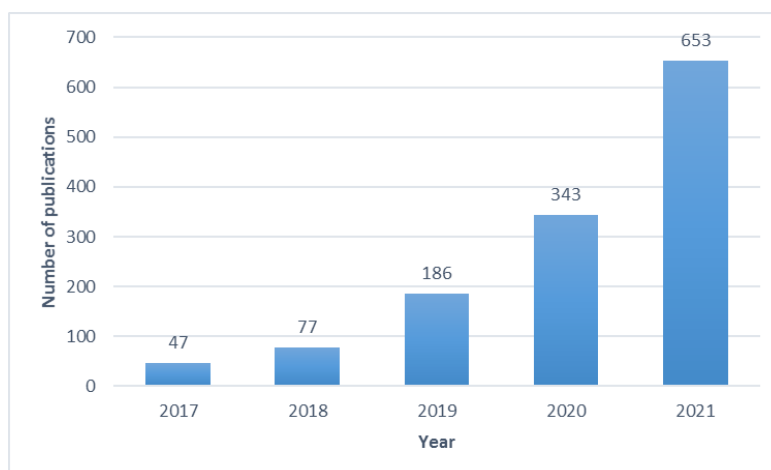


Figure 1 – The number of scientific publications about accounting digitalization in Scopus (developed by authors)

The results of the bibliometric analysis carried out using VOSviewer allowed to identify eight groups of articles that investigated the digitalization of accounting. The largest cluster unites the articles about technological changes, based on the blockchain systems. These transformations include smart contracts, cryptocurrencies, initial coin offering (ICO), etc. Another big group involve such digital advances, which are not commonly based on blockchain. They are cloud computing, machine learning, big data, and Internet of Things. All of these things can be employed in accounting processes, and we will analyze them further in this research. Other clusters have less total link strength, but they also include articles about innovations in accounting in the context of Industry 4.0. Some keywords concern the use of digital accounting in the public services (e.g., e-governance and public management). One of the clusters touches on the issue of the education of accountants as an integral basis for the rapid and effective introduction of digital technologies into the work of

the enterprise. All eight clusters are located close to each other, indicating the strength of the relationships between them. Indeed, the synthesis of various digital technologies can significantly improve the operation of economic systems at various levels (enterprise, region, country), in particular in the field of accounting. The results of this analysis demonstrate that digital technologies are becoming an important part of accounting processes both in business and governmental sectors.

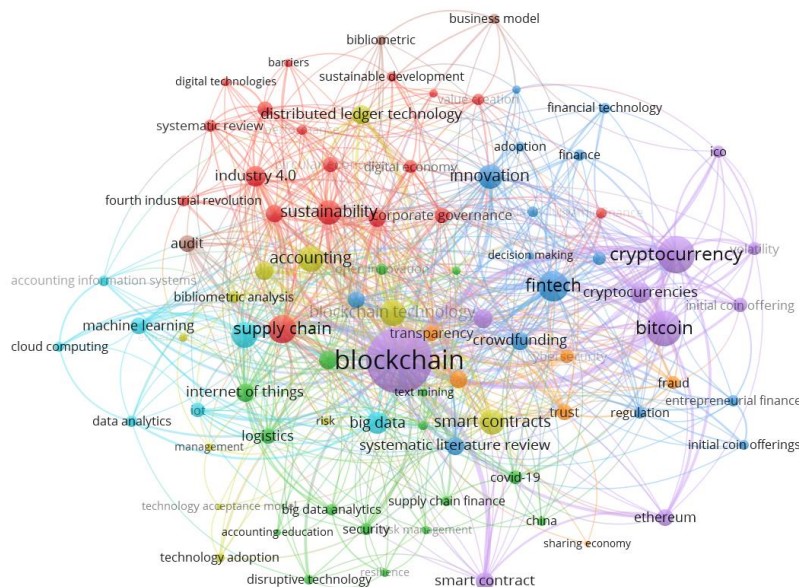


Figure 2 — The network map of bibliometric analysis about accounting digitalization (developed by authors, using VOSViewer)

The role of digitalization for better economic growth and sustainable development was described by F. Habibi and M. Zabardast [6]. They emphasized a crucial role of digital transformations for economic stability and environmental quality. M. Rautinger and R. Rauter explain the interaction between the company's success and their digital development [12]. At a macro-level, this connection was clarified by T. Niemand and J. Rigtering [11]. Innovations in the accounting sphere were studied in many publications [1-16]. Most researchers state that modern accounting processes are tightly connected with digitalization. D. Agostino, E. Bracci and I. Steccolini explained the importance of accounting digitalization in the public sector. The authors stated that it has a significant positive impact on the governance quality and political stability [1].

There are some researches dedicated to the interaction between digitalization and the development of the accounting processes. Nevertheless, this issue requires further research, because of its significant relevance and constant changes. Our article will concentrate on advantages and drawbacks of different technologies in order to boost their implementation in accounting system on the enterprise.

#### OBJECTIVES OF THE ARTICLE

The purpose of the article is to investigate the influence of digital technologies on accounting in the context of the Fourth Industrial Revolution.

#### METHODS OF THE RESEARCH

In this study, a variety of research methods were used, such as: analysis and synthesis, induction and deduction, abstraction, generalization, modeling, analogy. SWOT-analysis was performed in order to figure out opportunities and barriers connected with accounting

digitalization. The comparative analysis was utilized to clarify the peculiarities of different digital technologies (e.g., blockchain, artificial intelligence, cloud technologies).

#### RESULTS OF THE RESEARCH

Most scientists believe that the key changes in the modernization and digitalization of accounting will be as follows: expanding the role of accounting in the organization, improving the quality and efficiency of accounting; identification and increase in the number of new accounting objects; development of innovative methods for evaluating new accounting objects; formation of approaches to the integration of various types of accounting; the use of more advanced domestic and foreign information technologies; development of theoretical, methodological and applied aspects of the development of accounting [15].

The 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 requisites, among which are the requisites of accounts, debit, and credit [3]. Though they are written in binary, more than two accounts are possible. As the number of requisites increases, for example, analytical accounts, traditional accounts, management, and other information, it is more convenient to summarize, systematize, and present data for use in a digital way.

Digitalization in accounting has its advantages and disadvantages. It is important to analyze them to provide recommendations for improving the economic aspects of digital accounting. SWOT-analysis of accounting digitalization is conducted (Table 1). This analysis demonstrates that the opportunities and strengths of accounting digitalization outweigh the weaknesses and threats.

Table 1 — SWOT-analysis of accounting digitalization (developed by authors)

<b>Strengths</b>	<b>Weaknesses</b>
The higher speed of many accounting operations More exact results of calculations The minimization of problems connected with the human factor Fast data transfer Possibility to get access to data from all over the world Possibility to generate financial reports immediately	Possibility to lose the data due to the technical problems The necessity to re-teach employees to work with the software Possible computer virus attacks
<b>Opportunities</b>	<b>Threats</b>
Saving plenty of time for employees Optimization of the work of the company Fewer tax crimes Further development of disruptive technologies	Dismissal of some accountants

It is important to consider the effective and popular ways of digitalization of accounting at the present stage, including artificial intelligence, blockchain, and cloud technologies. These technologies can be observed in Figure 3.

Artificial intelligence (AI) is a unique product of scientific and technological progress that allows machines to learn using human and personal experience, adapt to new conditions within the limits of their application, perform diverse tasks that were previously only human, predict events and optimize company's resources [13].

AI has great opportunities in the accounting field. Its main advantage is that it can process huge amounts of information in the shortest possible time [2]. This means that in the future, AI will be able to create various reports and do it quickly. The technology is also useful in various financial studies, allowing you to collect and analyze data dozens of times faster. It should be noted that the largest audit and financial companies have already adopted AI systems. These are various programs and applications that use AI and cognitive technologies to perform certain calculations and data analysis. For example, Business Process Robotization functions as a virtual workforce controlled by business operations

professionals. It can quickly automate repetitive, time-consuming tasks that are performed according to certain rules. It uses artificial intelligence to perform complex tasks, which allows developing a cognitive digital workforce [16]. Such technologies are still used to solve simple problems, but the range of their capabilities is expanding every year.

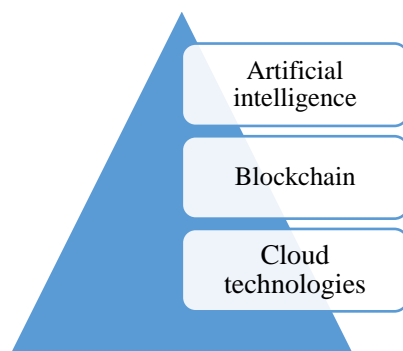


Figure 3 — Digital technologies in accounting

In the past ten years, the concept of «blockchain» has become increasingly popular in the field of accounting. This technology is a continuous sequence (list) of blocks, built according to the necessary rules. Such a chain of blocks of records allows the user to store information in a distributed manner. In turn, each subsequent block in the system is linked to the previous one, which is recorded by a digital signature, excluding any possibility of changing the data. This technology has enormous and promising potential in the field of accounting [4]. Blockchain has a number of properties that are important for accounting work: security and permanent data recording; personal limited access to certain data; the reliability of the information provided in the blockchain in the absence of trust in the counterparty; high speed and accuracy of transactions.

One of the latest major trends in accounting is cloud technology. Cloud technology is a paradigm that involves remote processing and storage of data. This technology provides Internet users with access to server computer resources and the use of software as an online service. That is, if you have an Internet connection, you can perform complex calculations, process data using the power of a remote server. The prospects for the use of cloud technologies in accounting show the forecast that by 2030 the volume of the global cloud market (a component of the IT market) will exceed \$ 320 billion [7]. The advantages of using cloud technologies in accounting include instant access to information in the cloud, regardless of time and location; saving financial, labor, and capital resources for program maintenance; constant software updates, database backup, data protection from unauthorized access [9]. However, cloud technologies have their disadvantages. The most significant one is the necessity of a permanent connection to the Internet. Another drawback is its viruses' vulnerability. One of the most popular cloud storage Google Drive does not recommend saving any important information in the «cloud» [14]. When we talk about the enterprises it is important to take into account the price of such software (which is sometimes too high for small and medium businesses).

It is important to give out some recommendations for enterprises and governments on how to support digitalized accounting and to solve possible problems connected with it.

For enterprises:

- To develop a strategy for the company's digitalization (including the digitalization of accounting).
- To re-teach accountants and motivate them to work with the special software or IT systems.
- To purchase software with high privacy and viruses' protection.

For governments:

- To reduce taxes or to set up a preferential tax regime for companies with digitalized accounting.
- To encourage the companies to use a digitalized accounting by subsidies and other incentives.
- To deregulate and to simplify the interaction between a state fiscal service and enterprises (e.g., by e-governance implementation).

## CONCLUSIONS

The influence of digital technologies on accounting in the context of the Fourth Industrial Revolution was investigated. SWOT-analysis of accounting digitalization demonstrated that digitalization in accounting has its advantages and disadvantages. This analysis also showed that the opportunities and strengths of accounting digitalization outweigh the weaknesses and threats. The effective and popular ways of digitalization of accounting at the present stage, including artificial intelligence, blockchain, and cloud technologies, were considered. It was analyzed that artificial intelligence has great opportunities in the accounting field. Its main advantage is that it is able to process huge amounts of information in the shortest possible time. The concept of «blockchain» has become increasingly popular in the field of accounting because of the variety of its advantages. Both the advantages and disadvantages of the «blockchain» were investigated. Some of them include security and permanent data recording, high speed and accuracy of accounting transactions. The strengths of using cloud technologies include instant access to information in the cloud, regardless of time and location; saving a variety of company's resources for program maintenance. The drawbacks are the necessity of the permanent connection to the Internet and viruses' vulnerability. The recommendations for enterprises and governments on how to support digitalized accounting and to solve possible problems connected with it were given. The key point in different recommendations is to encourage the organizations to use digital technologies by different incentives (both financial and non-financial ones). Given the technologies always change, it is crucial for governments, companies and high educational institutions to improve learning standards of accountants and support the lifelong education. In further research, it is advisable to consider each of the described digital technologies separately, to investigate the role of the accountant in their implementation, to apply econometric approaches to modeling the impact of digitalization of accounting on the financial indicators of the enterprise, in particular, its profitability.

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