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DIGITAL INNOVATIONS IN TAXATION: BIBLIOMETRIC ANALYSIS

Abstract. Active development of digitalization processes worldwide is changing the usual mode of the operation of all areas of human activity. These processes have a special impact on the development of economic systems. The introduction of new information technologies in economic relations today is the norm and objectively necessary to ensure the competitiveness of national economies. Up to date, the outlined technologies play an essential role in reforming tax systems, which determines the relevance of this sphere of research considering the potential of digitalization and its application in this area. The purpose of the article is to conduct a bibliographic analysis of the state of research papers in the digitalization of tax systems and establish current trends in the scientific development of this system. The systematization of scientific sources and approaches to solving the taxation digitalization problem showed the lack of scientific papers in this area. Accordingly, the urgency of solving this situation is to conduct new research in this area to deepen the understanding of current trends in introducing new innovative technologies from the theoretical, methodological, and practical points of view. The methodical toolkit of the study was the methods of bibliographic and comparative analysis. As the information base to conduct research, the Scopus database was used. The empirical study was conducted using a bibliometric approach known as «the common words analysis» using the VOSviewer software. The analysis of the relevance of the study of taxes and digitalization as a separate scientific category was conducted. It was determined that for the last five years, there had been a significant growth of scientific research in digitalization as an objective process of reality, the analysis of which is studied within various sciences. The categorial relationship between keywords found in scientific papers, where the words «taxes» and «digitalization» are met, is analysed within the article. It made it possible to identify the following areas of research, within which the issues of digitalization of the tax system were studied individually: works related to the study of peculiarities of the international trade development, taxation in online trade; research papers, within which the taxation issues of business entities that do not have a physical location in the countries where they operate are studied; articles, which study the issues of enterprise management, the development of enterprise management in the digital age; papers, which analyse the issues of reforming tax systems, the introduction of innovations to improve their functioning.

Keywords: bibliometric analysis, digitalization, sphere of taxation, tax system, information technologies, taxes, digital economy.

Introduction. Digital technologies are being actively implemented in all spheres of society, transforming their established form of functioning. These technologies play an active role in developing economic systems, changing the usual way of producing goods, their sale, paying, and, in general, the concept of customer service. Consumers of these goods and services today, based on the use of innovative technologies of interaction with other economic agents, also change their worldview and set new requirements for service and product quality, thereby increasing the competition between economic entities in the market of goods and services.

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Digitalization affects the transformation of market systems in the economic system and changes the work of state institutions, which play an integral role in the implementation of state functions. Such institutions include the state tax service, which is an integral part of the state's functioning. The tax sphere in the context of active development and implementation of digital technologies is also undergoing significant changes, which, accordingly, affects the relationship between the state and other economic agents involved in paying taxes, fees, and other payments. Modern technologies contribute to the formation of new models of tax authorities, allow to change conceptually the process of collecting and analyzing tax information, better access tax risks, and create convenient ways for taxpayers to report, pay taxes, and interact with public authorities. The «use» of digital technologies in taxation processes, as the world experience shows, is the basis for efficiency, transparency, and simplification of routine processes.

If there is one universal lesson from the Coronavirus pandemic, it is the importance of digital agility. The past few months have shown businesses and governments alike that they need to adapt their operating model in a time of crisis swiftly. This pressure is particularly acute for tax administrations. As the global recession places renewed emphasis on revenue strategy, tax administrations are finding themselves on the front lines of a rapid and intense digital transformation, finding ways to conduct every day and emergency business while complying with mandates to maintain social distance (Estevao, 2020). Digital technologies in the tax sphere play a particular role in forming trust relations between taxpayers and state institutions involved in their collection. It is maximum automation of all processes in the operations of such institutions that allows to reduce the number of errors, prevent the subjective attitude of tax officials to taxpayers, and increase the transparency of such state institutions. New technologies make it possible to transform tax authorities' work and turn them into auxiliary and taxpayers' friendly state institutions. Accordingly, the change of trust relations in the tax system, the consumerization of the work of the outlined bodies are the basic transformations in tax systems of all developed countries.

That only confirms the importance of the digital technologies introduction in the functioning of the entire tax system of any country. The transformation of the tax system in the context of the digital economy around the world is an objective process that will only deepen changing the traditional model of tax authorities. It is the reason for the need for new research in this area, deepening theoretical and methodological foundations of the knowledge of transformations that occur in such systems in the digitalization context.

Literature Review. The processes of digitalization and their impact on the country's economic development today are the focus of many scientists due to the global and comprehensive nature of digitalization and its impact on all spheres of modern society development. Such scientists, first of all, should include the founders of the information economy concept, namely: Bell (1980), Castells (1997), Masuda (1983), Toffler (1984), and individual scientists, who focus on the study of the digital economy formation, the impact of modern technologies on economic processes. It is appropriate to include in their number the following researchers: Cosmulese et al. (2019), Shkarlet (2018), Grosu (2019), Gobble (2018), Kelly (2017), Lane (1999), O'Neil (2016), Steiner (2012), Ross (2016), Skinner (2018), Tapscott (1994), Shkarlet (2019), Kholiavko et al. (2020). Remarkably, Tapscott (1994) first proposed the «digital economy» concept in 1995. The scientist described the features of this economy and the prospects of its development. Among the basic features of this model of economic development, the scientists also identify knowledge, digitalization, virtualization, innovation, which by their nature are the most relevant to the tax systems development.

A significant number of scientists studied the development of the taxation system in terms of the active implementation of digital innovations. Although the systematic research in this area is insufficient, the issues of taxation of digital companies in the global economic space are analyzed in detail (Blahodir and Filatova, 2020; Low, 2020; Bauer et al., 2019; Revina et al., 2020; Turina, 2020; Morinobu, 2019; Ndajiwo, 2020; Lagovska et al., 2020), tax stimulation of the enterprises' development in the ICT sphere

(Samoilkova et al., 2021; Lester, 2018, Guellec and van Pottelsberghe, 2003; Thompson, 2007; Khudolei et al., 2021), the introducing digital technologies in the work of state authorities responsible for taxes collection to improve the interaction between such authorities and taxpayers (Lipniewicz, 2017; Shkarlet et al., 2020; Cheng et al., 2017; Cotton and Dark, 2017).

In particular, Hanschitz and Campbell (2018), in their research «Digitalization of Tax: Epistemic Tax Policy», explored the potential of digital technologies in taxation. The authors considered these technologies' introduction peculiarities, positive and destructive phenomena from their use for tax authorities and taxpayers. Besides, considerable attention is paid to ensuring the secure use of complex digital technologies, given a significant amount of information cumulated by tax authorities.

Casey and Castro (2015) studied the issue of using Electronic Fiscal Devices (EFDs) (2015) to ensure tax administration efficiency, to improve the quality of relevant services provided by tax authorities. They noted that the introduction of such devices itself could not change the current tax system from the standpoint of its development. Still, it could only be an additional, effective means for efficient implementation of a holistic, new concept of the tax system established in the state. Research in this area has also been carried out in the works of Magutu et al. (2010), Perekrestova and Nadochiy (2020), Seely (2021), Pavlova et al. (2021) paid considerable attention to investigating the impact of digitalization processes in the sphere of tax and customs control, the influence of the above processes on the transparency of the operation of relevant state authorities. The outlined issues are studied by Drobyshevskaya et al. (2020), namely: features of using the risk-oriented approach by conducting control measures based on the use of modern information technologies for the collection and analysis of large arrays of tax information.

Meall (2017) considered the experience of individual countries (Estonia, Brazil) in the new technologies introduced in the tax sphere as part of the national strategy of the entire system digitalization. This analysis revealed the benefits of innovation in this area. In particular, in addition to traditional benefits (calculations acceleration, reduction of tax evasion), a significant amount of economic information was obtained. That allowed better analysis of economic processes in the country and helped increase the efficiency of the state economic policy. In the paper by Strauss et al. (2020), the world experience of the reaction of tax authorities to digitalization processes is also analyzed. The authors considered the reforms of certain types of taxes implemented in the countries most affected by digitalization. Berberov and Milogolov (2020) studied the impact of digitalization processes on developing rich and poor countries' taxation systems. They concluded that underdeveloped countries are the most vulnerable to introducing new technologies in the field of taxation. The authors emphasized the importance of these issues and the need to find optimal solutions to ensure the harmonious development of all countries. However, they immediately stated that difficulties in ensuring effective cooperation in this sphere between the countries.

In turn, Olowska et al. (2020) noted that Blockchain, Fintech, Cloud Computing, Artificial Intelligence (AI), Robotics, the Internet of Things, and Industry 4.0, among other available technologies, disrupted traditional modes of operations, processes, and global value chains, and pushing the existing boundaries of taxation. Yet, at the same time, these technologies gave rise to the opportunities to transform how tax administrators operate and interact with taxpayers. The scientists are considering three cases of the tax systems digitalization in China, India, and Korea. Therefore, one could agree with the researchers that in the future, in the field of taxation, the potential of the outlined technologies will be gradually attracted, which will significantly transform the entire tax system. The outlined issues are also considered in the paper by Portolese and Folloni (2018), where it is specified that it is clear that digitalization leads to a paradox for tax, business, and wealth evolution system: the more digitalization, the more horizontalization of tax law and a speedup in verticalization from international to supranational can be seen.

Cotton and Dark (2017) paid more attention to the practical implementation of innovative technologies in taxation, the formation of appropriate strategic and tactical measures to change the work of tax

administrations. The scientists described the structure of software products, how to implement them in the work of tax authorities, responsibility, and availability of information for specific categories of employees of such institutions. Logically, these issues are essential. They play a vital role in the digitalization processes of taxation and the rational use of new available software products and technologies to work with bulked information. In addition, some aspects in the digitalization sphere of taxation were studied by other researchers. Devereux and Vella (2017) examined how digitalization processes affect corporate tax reform worldwide. Lowry (2019) studied taxation features of digital services, the impact of these processes on the economic development of countries in detail. Jimenez et al. (2013) examined specific IT solutions for tax administrations and how to increase their work efficiency. Warning et al. (2020) studied the digitalization impact on tax consultation systems' employment level and organization for employers and unemployed. The role of digitalization in the organization of the effective tax planning and forecasting system is also studied by Koniagina (2020).

Selection of previously unsolved parts of the overall problem. Despite the constant relevance of taxation as a scientific field of research and the permanent interest of scientists in studying this field, the issues of the tax system digitalization, especially the theoretical provisions deepening, the formation of a holistic system of knowledge in this area, are poorly understood. It necessitates the state of research relating to the tax systems digitalization, the bibliometric analysis of research papers in this field.

The purpose of the article is to deepen the theoretical provisions of the digital technologies development in the tax system by carrying out the bibliometric analysis of the current state of scientific research in this sphere.

Methodology and research methods. Within the article, a range of general and special methods of scientific research was used. The specificity of the chosen topic led to the use of a comparative research method as a basic way to learn about the state of research in tax system digitalization and the introduction of modern innovative digital technologies in taxation.

The main method used in this article is the method of bibliographic analysis. It allowed conducting a thorough analysis of existing scientific research in tax system digitalization. It was implemented based on the information tools use of the Scopus database for the search, selection, and systematization of the papers, which study the issues of digitalization in the tax sphere.

At the first stage, to review the scientific literature in the taxation sphere, the number of research papers indexed in the Scopus database by the keyword «taxes» was identified. The analysis was carried out from 1960 to 2020. Then, it was determined the studies indexed by the keyword «digitalization» in the titles. Subsequently, using new capabilities of the Scopus database, research papers, in which titles the words «taxes» and «digitalization» appear at the same time, were singled out. At the next stage, the analysis of research papers was carried out.

This study involved the methods of comparison, measurement, and analysis. That allowed conducting a study of the historical retrospective of scientific knowledge of taxation and digitalization, the taxation digitalization. In addition, methods of visualization of the obtained research results are used. In particular, the VOSviewer was used to build maps of interrelated categories. In turn, it made it possible to substantiate the main areas in which the research is conducted in the field of the tax system digitalization field to determine the set of the basic economic and financial categories used within this research.

Results. Taxes as elements of the financial system of any country have always been an integral part of the state's functioning. Notably, the history of the origin and development of taxes dates back several millennia. It indicates their essential role in society's development in different historical epochs. The importance of taxes since ancient times was due to the need of the state to accumulate its own income to use it further to protect its own citizens and ensure their livelihoods. Thus, the objectivity of the tax's existence and their decisive role in public finance development have led to scientists' increased interest in their study. The study of tax systems gained special attention among scientists in the XX-XXI centuries.

Figure 1 presents the dynamic of scientific works indexed by the keyword «taxes» in the topics. The documents were retrieved from the Scopus database.

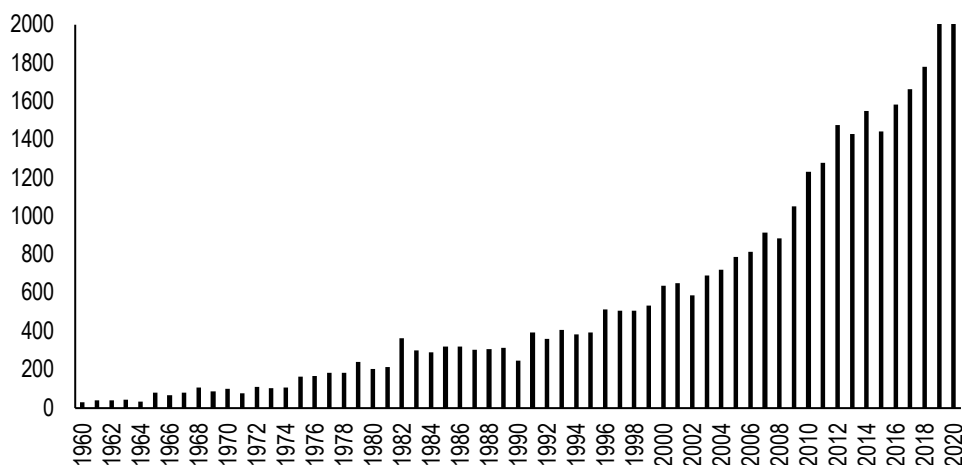


Figure 1. The number of publications indexed by the keyword «taxes» in the titles, 1960-2020
Sources: compiled by the author based on the Scopus database.

Figure 1 shows that the number of scientific publications in the taxation field has constantly grown since the 90-s. The growth rate of the publications in this area is also high. At the end of 1990, the number of publications in the Scopus database was 249, in 2000 – 639 (an increase of 390 documents), in 2010 – 1232 (an increase of 593 documents), and 2020 – 2010 (an increase of 779 documents). Therefore, there is a positive growth rate of research papers in the taxation every ten years. It should be noted that the interest in the taxation field among scientists could be explained by the complication of the economic sphere, complex structuring of the national economy, constant emergence of new areas and industries within it, which the introduction of a new corporate taxation mechanism is required. Active development of the world economy during the twentieth century, the competition between countries for financial resources have also led to the complexity of tax systems, their use to ensure the competitiveness of national economies. As mentioned above, all countries' tax systems are undergoing a new stage of their own systematic transformation due to the digital technologies introduction in all economic sectors, including the taxation field. This transformation is a response to new basic changes in societies due to the total introduction of information technologies, changes in the conceptual model of interaction between economic agents. Accordingly, the issues of digitalization have also been actively studied by scientists worldwide to understand the potential of digital innovations, their ability to change certain areas of society. Active use of such technologies is primarily studied by economists, who consider such technologies as one of the ways to save costs on production, sales of goods and services as a new direction of creating additional businesses that could bring huge profits to their owners.

Figure 2 presents the information concerning the number of scientific works indexed by the word «digitalization». Figure 2 shows that the number of outlined works has increased dramatically over the last five years. If in 2014, the number of publications in the Scopus database indexed by word «digitalization» was 25 documents, then in 2015 – 67, in 2016 – 104, in 2017 – 227, in 2018 – 383, in 2019 – 693, and 2020 – 945. Therefore, scientists actively study digitalization in all scientific spheres. The growth rate of works in this sphere is enormous.

Over the past seven years (2014-2020), the number of research papers studying digitalization features, the essence of this phenomenon, has increased from 25 to 945 units, or more than 37 times.

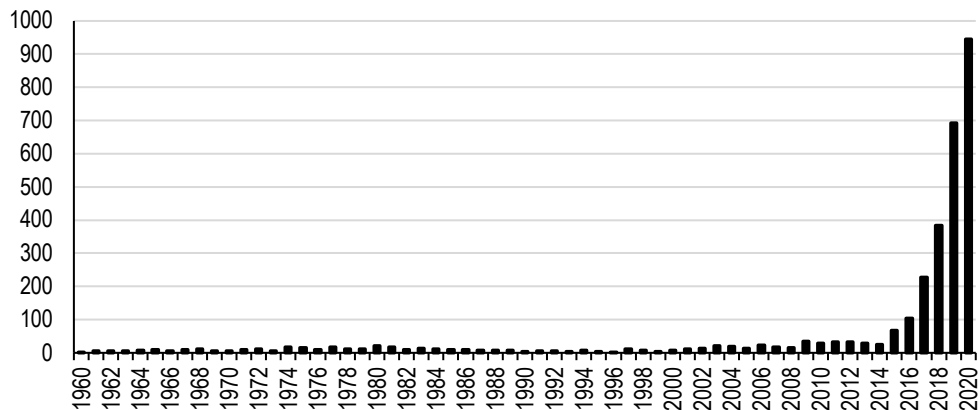


Figure 2. Dynamics of scientific works indexed by the keyword «digitalization», 1960-2020
Sources: compiled by the author based on the Scopus database.

This situation only emphasizes the importance of digitalization processes and their enormous potential for change in all spheres of our life. It is appropriate to analyse the state of research in the tax systems digitalization. Notably, since this sphere is currently new for research, there is an insignificant number of outlined works in the Scopus database (Fig. 3). It stands to note that the data for 2021 was included in this statistical sample because it allows determining the basic current trends in the relevance of the study of digitalization processes in the taxation field. Logically, these data are not considered when carrying out a retrospective analysis in this area as this period has not been yet ended.

Thus, at the end of 2021, only 18 papers indexed by «digitalization» and «taxes» were presented in the Scopus database. Thus, it is an extremely low indicator for the scientific sphere. It could be predicted that the number of these works would increase, as the formation of the digital economy in the world is just beginning. Therefore, it would undoubtedly actively influence transformation processes in tax systems of all countries. In addition, the reasons for publications growth in the sphere of taxation digitalization are as follows:

- 1) changing clients' views on services, financial services, settlement operations, and the formation of new requirements for tax authorities to simplify the interaction system with them necessitate the search for a new model of work with taxpayers and requires scientific justification for its construction;
- 2) digital technologies make it possible to obtain economic effects from the state's implementation by reducing the costs for tax administrations, which updates the study to describe the potential economic effects of taxation digitalization;
- 3) complication of economic relations, the emergence of new business types that do not have physical assets and operates in cyberspace requires finding new ways to tax such companies, taking into account all specific features of their activities;
- 4) digital technologies also save transaction costs within the national economy contribute as well to new research, as this sphere is poorly studied;
- 5) digitalization as an objective process requires adaptation of society to the consequences of its passage, which, above all, actualizes research in improving the financial literacy of citizens, their

knowledge of the taxation process, taxes payment, use of affordable software to improve the interaction with tax authorities, which would also influence the number of scientific works in this sphere.

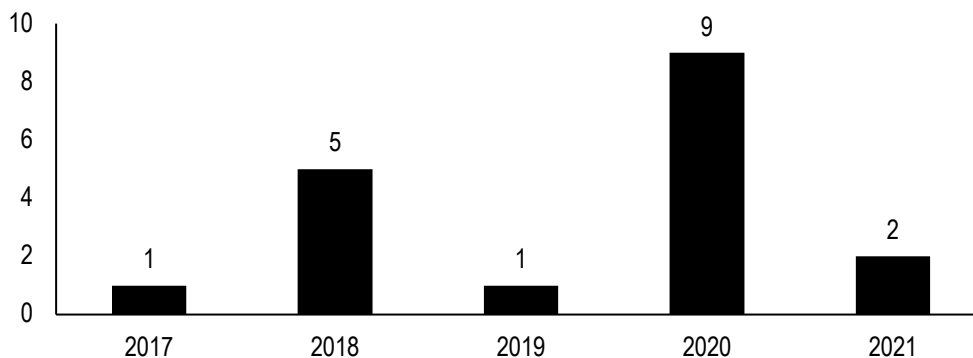


Figure 3. Number of publications indexed by the keywords «digitalization» and «taxes», 2017-2021

Sources: compiled by the author based on the Scopus database.

It is appropriate to analyse which spheres in the context of the tax systems digitalization are studied by scientists. Figure 4 demonstrates the map of the interaction between critical words in scientific papers indexed by the keyword's «digitalization» and «taxes».

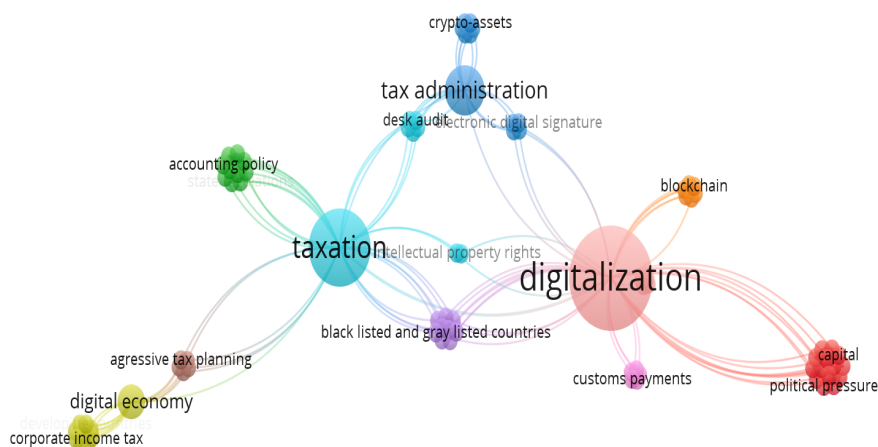


Figure 4. Network map of the keywords interaction in the analyzed scientific papers

Sources: compiled by the author based on the Scopus database.

Figure 4 indicates that most scientific papers devoted to the knowledge of peculiarities of the digital technologies introduction in the tax systems functioning consider the issues of tax administration, peculiarities of the tax system development in the digital economy. In addition, a significant number of works explore modern technologies that can be used in the field of taxation to improve its work (e.g., blockchain) and the peculiarities of changing the tax policy considering new conditions in which business operates and develops in the digital age. The number of studies that indirectly reveal the issues of digitalization in taxation should be analyzed. Therefore, Figure 5 presents the dynamics of scientific papers

indexed by «digitalization» and «taxes». Notably, nowadays, the number of such scientific works is bigger than the number of researches on topics exclusively in taxation digitalization. As of the end of 2020, the number of these scientific works was 57 documents.

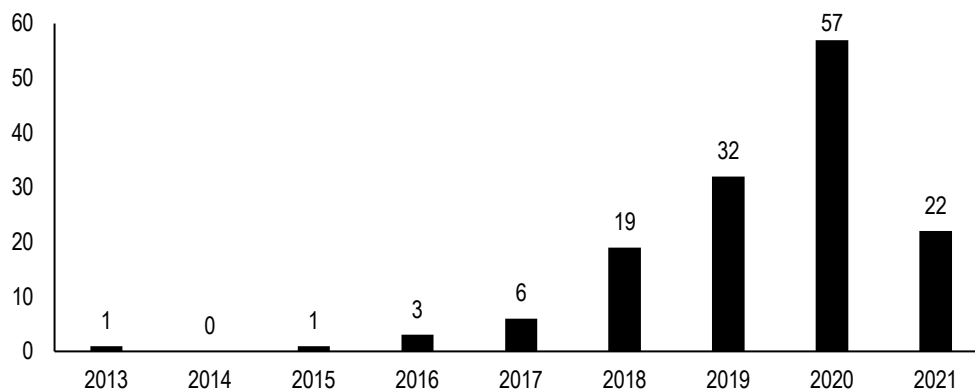


Figure 5. Number of publications indexed by the keywords «digitalization» and «taxes»
Sources: compiled by the author based on the Scopus database.

Figure 5 indicates a positive tendency of the analyzed works. Therefore, it confirms the relevance of the investigated topic. It is worth noting that a significant range of different scientific issues is studied in such works. In turn, the study of digitalization processes of the tax system is carried out under the knowledge of similar interconnected economic systems. Figure 6 visualizes the network map of the keywords interaction of publications indexed by «digitalization» and «taxes» in the keywords, topic, or abstracts. Thus, implementing information innovations in taxation could be considered regarding economic systems and processes where taxation plays an important role.

Based on Figure 6, it is possible to identify the following research areas, in which the issues of the tax system digitalization were studied individually:

- 1) papers related to the study of the development peculiarities of online trading, taxation in online trade (key categories: «international trade», «electronic commerce», «international taxation», «globalization», etc.);
- 2) articles addressed to taxation of business entities without a physical location in the countries where they carry out their activities (key categories: «value creation», «tax reform», «beps», «corporate taxation», «international taxation» and others);
- 3) research devoted to studying enterprise management, development of enterprise management in the digital era (key categories: «ecosystems», «ecosystem development», «change management», «human engineering», «embedded system» and others);
- 4) works focussed on tax system reform, the introduction of innovations to improve their functioning (key categories: «tax system», «tax competition», «tax policy», «digitalization», «sustainable development», and others).

Thus, tax issues are essential for the national economy development, ensuring competitiveness in the global investments, goods, and services markets. No less important is the transformation of the tax system for individual companies, especially those that carry out their own activities with the help of information technology in cyberspace. By the way, taxation of such economic entities is a controversial issue among governments of many countries today.

papers, and Victorova – 3 papers. The outlined analysis also gives grounds to assert the existence of a small number of scientific works. The issues of the digital technologies impact the taxation development in countries were studied more systematically and in-depth. Besides, there are empirical studies devoted to the analysis of these technologies' effectiveness by the introduction of these technologies, their impact on the attitude of taxpayers to the work of relevant authorities. In addition, the macroeconomic impact of the tax system transformation on the development of public and local finance systems, reducing the level of the shadow economy in the countries introducing new technologies to reduce corruption in taxation, is poorly studied. Therefore, the outlined issues need further research.

Conclusions. Digital transformations change reality and affect all spheres of society without exception. Information technologies play an essential role in the tax system development as well. Most countries attach great importance to digitalization processes of the tax sphere, which can significantly improve its functioning, ensure the accumulation of taxes and fees in full. The above raises the issue of new research in this area. First, it is worth noting the growing level of the researchers' contribution before carrying out the study in digitalization and taxation. The article already made scientific achievements in this sphere, which is implemented using analytical information of the Scopus database, is analyzed. The findings showed that the number of papers addressed to taxation has grown from 1583 units in 2016 to 2010 in 2020. The same situation could be observed by studying the digitalization sphere. If in 2016 the number of investigated publications in the Scopus database was 104, then in 2020 – 945 papers.

This paper provides the bibliographic analysis of publications devoted to the impact of digitalization on tax systems development. The results showed 18 such research papers in the Scopus database. Based on the above, the publications addressed to the digitalization of taxation were studied fragmentary and indirectly. Finally, it was determined that there are 141 such papers, which state the gradually increasing interest of researchers in researching this sphere. In the article, the objective sphere of the digitalization of taxation systems was analyzed. It was found out that most papers presented in areas such as Business, Management and Accounting (8), Social Sciences (8), Computer Science (6), Engineering (6). The analysis by the countries showed that the most productive were the Russian Federation (9 papers), Austria (2 papers), Great Britain (2 papers). Thus, it is safe to say that the research direction of the digitalization impact on the tax system development is relevant. Therefore, in the future, the number of scientific papers in this area would increase. It is assumed that the most appropriate for further research are as follows: 1) improving the interaction quality between tax authorities and taxpayers, ensuring trust between them; 2) automation of all processes without exception in the collection of taxes, fees, and other payments; 3) reducing the influence of the human factor on the tax system functioning to reduce the manifestation of corruption in it, determining the role of the information technology in ensuring the competitiveness of national tax systems in the world, etc. Therefore, the gradual elaboration and deepening of scientific research of the outlined issues would form a basis for further digitalization of the entire sphere of taxation.

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Цифрові інновації в оподаткуванні: бібліометричний аналіз

Активний глобальний розвиток цифровізації змінює чинний режим функціонування фактично всіх сфер людської діяльності. Процеси цифровізації здійснюють особливий вплив на розвиток економічних систем. Сьогодні впровадження нових інформаційних технологій у господарські відносини є нормою та об'єктивно необхідним процесом для забезпечення конкурентоспроможні національних економік, реформування податкових систем. Метою даної статті є бібліографічний аналіз наукових напрацювань у сфері диджиталізації податкових систем для визначення сучасних тенденцій наукових розробок у даній сфері. Результати систематизації наукових джерел та підходів до розв'язання проблеми цифровізації сфери оподаткування свідчать про незначну кількість наукових напрацювань, присвячених досліджуваній тематиці. Таким чином, актуальним є нарощення кількості наукових досліджень в даній сфері з метою поглиблення розуміння сучасних тенденцій впровадження нових інноваційних технологій з теоретичної, методичної та практичної сторін. Методичним інструментарієм проведеного дослідження стали методи бібліографічного та компаративного аналізу. Інформаційною базою для проведення дослідження є наукометрична база даних Scopus. Емпіричне дослідження проведено з використанням бібліометричного підходу, відомого як «аналіз спільних слів», та застосуванням програмного забезпечення VOSviewer. У рамках дослідження проаналізовано актуальність вивчення податків та диджиталізації як окремих наукових категорій. Результати дослідження засвідчили, що протягом останніх п'яти років відбулося значне зростання інтересу різногалузевих науковців до дослідження питань диджиталізації як об'єктивного процесу. У рамках даної статті проаналізовано категоріальний взаємозв'язок між науковими напрацюваннями, які індексують за ключовими словами «податки» та «диджиталізація». Отримані результати дозволили виділити наступні напрямки наукових досліджень, присвячених питанням цифровізації податкової системи: 1) особливості розвитку міжнародної торгівлі, оподаткування у сфері онлайн-торгівлі; 2) оподаткування суб'єктів господарювання, які не мають фізичного місця розташування в країнах, де здійснюють діяльність; 3) менеджмент підприємств, розвитку управління підприємствами в цифрову епоху; 4) реформування податкових систем, впровадження інновацій у податковій системі.

Ключові слова: бібліометрика, цифровізація, сфера оподаткування, податкова система, інформаційні технології, податки, цифрова економіка.