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tsybrova@ukr.net***Abstract**

Within the article, a bibliographic analysis of e-commerce research is provided. In particular, using the Scopus database it was established that research of this type of commerce began in 1996 with gradual emergence of services for the sale and purchase of goods and services online. In addition, retrospective analysis of scientific publications in this field allowed to establish the wave of scientists' interest in conducting e-commerce research due to the level of the information technology development, which directly determines the e-commerce development in the world. In addition, within the article, scientific fields in which the majority of scientific works have been prepared for its study are analyzed, and the countries in which the most research is conducted are considered.

Key words: *e-commerce; commerce, e-business; bibliographic analysis; digital technologies; digital economy.*

JEL Classification: L81

I. INTRODUCTION

The formation of digital economy around the world is happening very fast. Today, the processes of digitalization and informatization are already integral components of economic development of all developed countries. The objectivity of these processes determines global trends in the transformation of other, primarily social, systems that are actively changing, updating and developing in new conditions.

Digitalization processes have a special impact on the development of economic systems, namely on the functioning of national economies and activities of business entities. This is due to the potential of new technologies to increase the efficiency of such systems, to use available resources, to reduce costs and to have a positive impact on the profitability level of enterprises, and to increase the growth rate of economies. Therefore, digitalization today is the major trend that will continue to determine transformation vectors of the world economy, and the development of new information technologies will be extremely fast.

Accordingly, due to the introduction and development of information technology in the structure of the national economy of most developed countries, new spheres and industries have emerged, which are now integral components of innovative development and centers of production of new advanced technologies and innovations that are gradually changing the world. Such areas include e-commerce, which has shown remarkably high growth over the past decade; and the Covid-19 pandemic has only increased the demand for online shopping among consumers.

Another aspect of active development of this type of commerce in the world was the growing number of scientific publications on the study of buying and selling goods and services on the Internet, the impact of these processes on services and the global economy in general. Rapid development has only accelerated the growing interest of scientists in conducting research in this area.

II. ACTUAL SCIENTIFIC RESEARCHES AND ISSUES ANALYSIS AND THE RESEARCH OBJECTIVE

The development of e-commerce is directly related to information technologies, their development and implementation in the activities of economic entities. Thus, the formation of information economy gradually intensified this commerce development. Issues of the above commerce development were considered in the works of Dubyna (2015), Kholiavko (2017), Shkarlet (2018). Colin (2015), Gobble (2018), Kozlyanchenko (2019), Skinner (2018), Lane (1999), Kling (2000) have studied issues of digitalization individually in recent years. Tapscott D. (1995), Kolyadenko (2016), Lane (1999), Dahlman (2016), Mesenbourg (2001), Margherio (1999) made a fundamental contribution to the digital economy study.

In addition, issues of the e-commerce development are reflected in a number of scientific publications of various scholars. Among them are the following: Balyk (2014), Zhelikhovskiy (2007), Khan (2016), Wei (2021), Cheba (2021) and others.

Thus, the relevance of new e-commerce research today is beyond doubt. Accordingly, there is also a need for a bibliographic analysis of the studies that have already been conducted by scientists. Understanding the state of research in this area and its potential for further study is an integral part of substantiating new theoretical and applied provisions for the e-commerce development, finding new ways to accelerate its development in the digital economy era.

III. RESEARCH METHODOLOGY

The methodological basis of the research is the use of the bibliographic and comparative analysis to study the basic trends that describe the activity of scientists in the study of e-commerce. Within the framework of this study implementation, general and special scientific methods were used. These include: analysis, measurement, comparison, generalization, clustering. The information base of the research is the analytical information of the Scopus database on the number of scientific publications, within which the issues of the e-commerce development were studied. In addition, the VOSviewer toolkit was used to cluster and visualize results of the study.

IV. RESULTS

Thus, the study will begin with the analysis of the number of scientific papers in the e-commerce field. It should be noted that at the end of 2020, almost 12,000 publications were recorded in the Scopus database alone, which substantiate theoretical and applied provisions for the e-commerce development. This once again confirms high level of the research relevance in this area. As well, of the specified number of works, most were published from 2011 to 2021. Such activity of scientists in the e-commerce study, in our opinion, is usually associated with the rapid pace of its development. The reasons for this are:

- 1) active development of information technologies, increased access to the Internet, the cost of services, which allows attracting new users and potential sellers and buyers of goods and services and, which contributed to the rapid development of e-commerce;
- 2) acceleration of the pace of life and convenience of ordering goods and other products in any place and at any time;
- 3) emergence and active development of various devices (mobile phones, smartphones, tablets, etc.), which allow you to buy and sell goods and services even faster;
- 4) changing the habits of shoppers who are increasingly shopping in e-shops, where there is a wider choice of goods;
- 5) active involvement of sellers and global retailers in the creation of their own electronic platforms for the sale of goods, products, their promotion primarily among young people;
- 6) the global pandemic due to Covid-19 has become a new catalyst for the e-commerce development, the spread of this model of sales of goods and services to new areas and sectors of the national economy. During the pandemic, a large number of stores, especially those selling non-food items, were forced to look for new ways to sell their products. At the same time, classic retail food chains also actively created and developed online trade;
- 7) transformation of the global system of electronic payments, which occurred as a result of the development of new information technologies and their active involvement in the field of financial services and other reasons.

Thus, e-commerce in terms of growth and scale of development is already an integral part of the national economies development and often generates new impetus to economic development of the state. Given the innovation of this commerce, the need to attract new technologies in order to improve the quality of customer service, information security, speed of product delivery, this area is not only a sphere where modern digital technologies are used, but is a sphere within which such technologies are developed and implemented in life, increasing the level of innovation in the whole world economy.

In general, e-commerce is a separate type of e-business, the essence of which is the formation and development of economic relations between economic agents in the sale, purchase of goods and services on the Internet, the use of digital marketing technologies for their sale, electronic systems to pay for them in order to satisfy the demand for such goods and services and to make profit.

In Figure 1, information on the number of scientific publications in 1996-2021, which explore theoretical and applied issues of e-commerce, is provided.

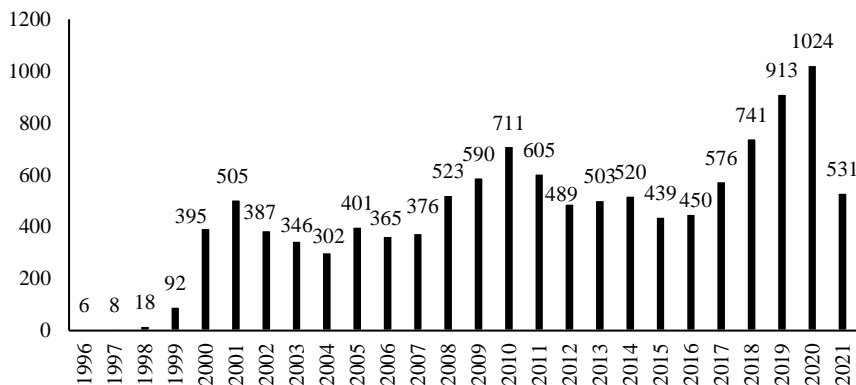


Figure 1 – The number of scientific publications in 1996-2021, in which titles the word "e-commerce" is met

Source: compiled based on analytical information of the Scopus database

Information in Fig. 1 makes it possible to draw the following conclusions. During 1996-2021, there was a gradual increase in the scientists' interest in the study of e-commerce as a separate type of e-business. In particular, if in 1996 there were only 6 publications in this field, then in 2020 - 1024 works. Thus, the outlined information allows to trace the whole process of studying e-commerce in the world. It should also be noted that already in 2021, 531 works were registered in the Scopus database, which gives grounds to claim that by the end of the year the number of such works will be much bigger than in 2020.

We'd like to note that Figure 1 also notes a wave-like trend in the number of publications in the e-commerce field, which indicates certain periods of growth and decline in the scientists' interest in conducting research in this area. In our opinion, this situation is associated with the emergence and introduction of new technologies, which at some point became new impetus to the e-commerce development. For example, it is clear that the beginning e-commerce is associated with the Internet development. However, the speed of communication and consumer access to its use were insufficient. Thus, given the invariability of the situation, the insignificant role of this type of commerce in the national economy development, the number of studies remained constant from 2002 to 2007. Since 2008, due to the introduction of new technologies, increased speed of communication, the development of mobile Internet, a new stage in the e-commerce development has taking place, and the number of publications is growing, as the potential of this sector of economy to significant development increases. Over time, active development of mobile communications, smartphones and other mobile devices has again led to significant transformations in the e-commerce sphere, and this has again updated the conduct of new research in this area. Active implementation of online trade models using mobile phones and smartphones, the development and use of appropriate applications contributed to the growth of sales of goods and services in e-shops, gradual change in the model of consumer behavior of customers.

Please note that Fig. 1 shows the number of only those works, in which titles there is a category of "e-commerce". However, there are many other studies that address certain aspects of the e-commerce development. Their number is shown in Figure 2.

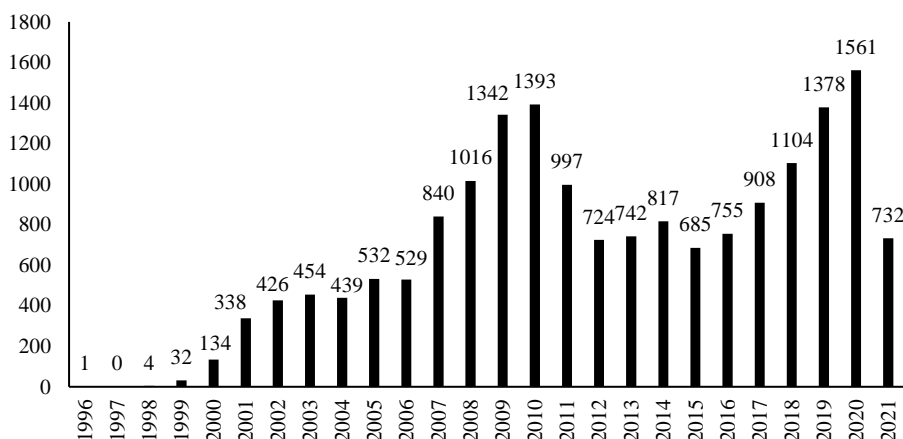


Figure 2 – The number of scientific publications in 1996-2021, in the keywords of which the word "e-commerce" is met

Source: compiled based on analytical information of the Scopus database

Thus, the data of Figure 2 reflect the number of scientific papers in the e-commerce field, among the keywords of which there is a word "e-commerce". Therefore, in fact we observe a similar trend in the number of publications, in which titles the word "e-commerce" is already mentioned. However, the data in Figure 2 suggest that there is a significant amount of research that also indirectly examines issues related to the functioning and development of e-commerce. For example, if in 2021 there were 1024 works in the Scopus database, in which title and topic was the word "e-commerce", i.e. these works were devoted exclusively to the study of the nature, functioning and development of the studied type of commerce, then for the same period there were 1561 publication, in which the outlined issues are considered in fragments. This only confirms the complexity and multifaceted study of e-commerce, due to its important role in the development of national economies, the impact on different types of economic entities, significant potential for their own development and further transformation of economic relations within the countries involved in the world trade. In addition, these findings are confirmed by the presence of a significant number of research areas in which e-commerce is studied. Relevant information is presented in Table 1.

Thus, analyzing the information in Table 1, we can see that most publications do not relate to the field of Business, Management and Accounting, namely Computer Science. During the whole period of research within this science, 6788 scientific publications were published. The next area of science, within which the outlined issues are actively studied by scientists, is Business, Management and Accounting - 3292 scientific papers. In addition, a large number of works were written in Engineering – 3162 papers. Therefore, the analysis once again confirms the thesis that the e-commerce development is primarily associated with the development of technologies, innovations that allow the introduction of an electronic model of sales of goods and services. Accordingly, it is within Computer Science, Engineering that the largest number of works in the sphere of e-commerce research was conducted.

Table 1. Scientific directions in which e-commerce issues are studied (in the title of the topic of the scientific publication)

No.	Science	Number of publications	No.	Science	Number of publications
1	Computer Science	6788	7	Economics, Econometrics and Finance	961
2	Business, Management and Accounting	3292	8	Materials Science	415
3	Engineering	3162	9	Environmental Science	309
4	Social Sciences	1483	10	Physics and Astronomy	263
5	Decision Sciences	1357	11	Energy	261
6	Mathematics	1209	12	Chemical Engineering	221

Source: compiled by the author based on information of the Scopus database

It should be noted that among all areas listed in Table. 1, namely the direction of Economics, Econometrics and Finance in the number of publications ranks seventh (961 publications). This indicates that most of the e-commerce issues are studied within Social Sciences (1483), Decision Sciences (1357) and Mathematics (1209). This reaffirms the universality of e-commerce as an object of study that is being studied by scientists in various fields of science and continues to be actively studied today.

In addition, based on the Scopus database, we will analyze regional distribution among the countries of scientific publications in which e-commerce issues are studied. Relevant information is presented in Figure 3.

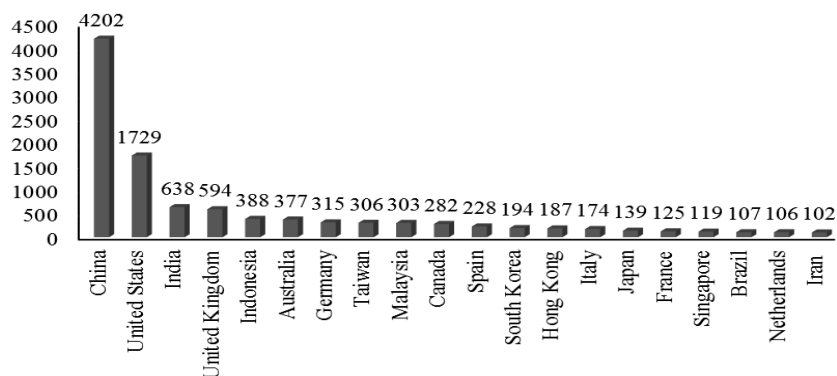


Figure 3 – Number of scientific publications in 1996-2021, in the topic of which there is a word "e-commerce", by country

Source: compiled based on analytical information of the Scopus database

Therefore, the analysis of the data in Figure 3 gives grounds to state that the largest number of works in the e-commerce field has been published in China, the USA and India. It is logical that the largest number of publications in the e-commerce field is made in countries that play a key role in the world trade development, and in which the world's largest e-commerce giants - Amazon (USA) and Alibaba (China) are located. It is also worth noting a significant number of scientific papers in this field from the region of Southeast Asia (Indonesia, Taiwan, Malaysia), which, in our opinion, is also associated with active development of e-commerce in these countries and growing demand among the population for relevant services.

In addition, to confirm the diversity of e-commerce, its scale and dependence on a large number of factors, in Figure 4, a graphic map of the relationship between keywords in publications that indicate the category of "e-commerce" is presented.

Analyzing the data of Figure 4, we can state that there are several groups of keywords that occur in publications in the e-commerce field:

- 1) information technology (machine learning; websites; Data mining; models, etc.);
- 2) customer service (surveys; service quality; trust; consumer behavior, etc.);
- 3) impact on economic development (rural e-commerce; economic and social; effects; finance; e-commerce enterprise, etc.);
- 4) doing business in the e-commerce field (costs; logistics; warehouse; optimization modeling; budget control, etc.).

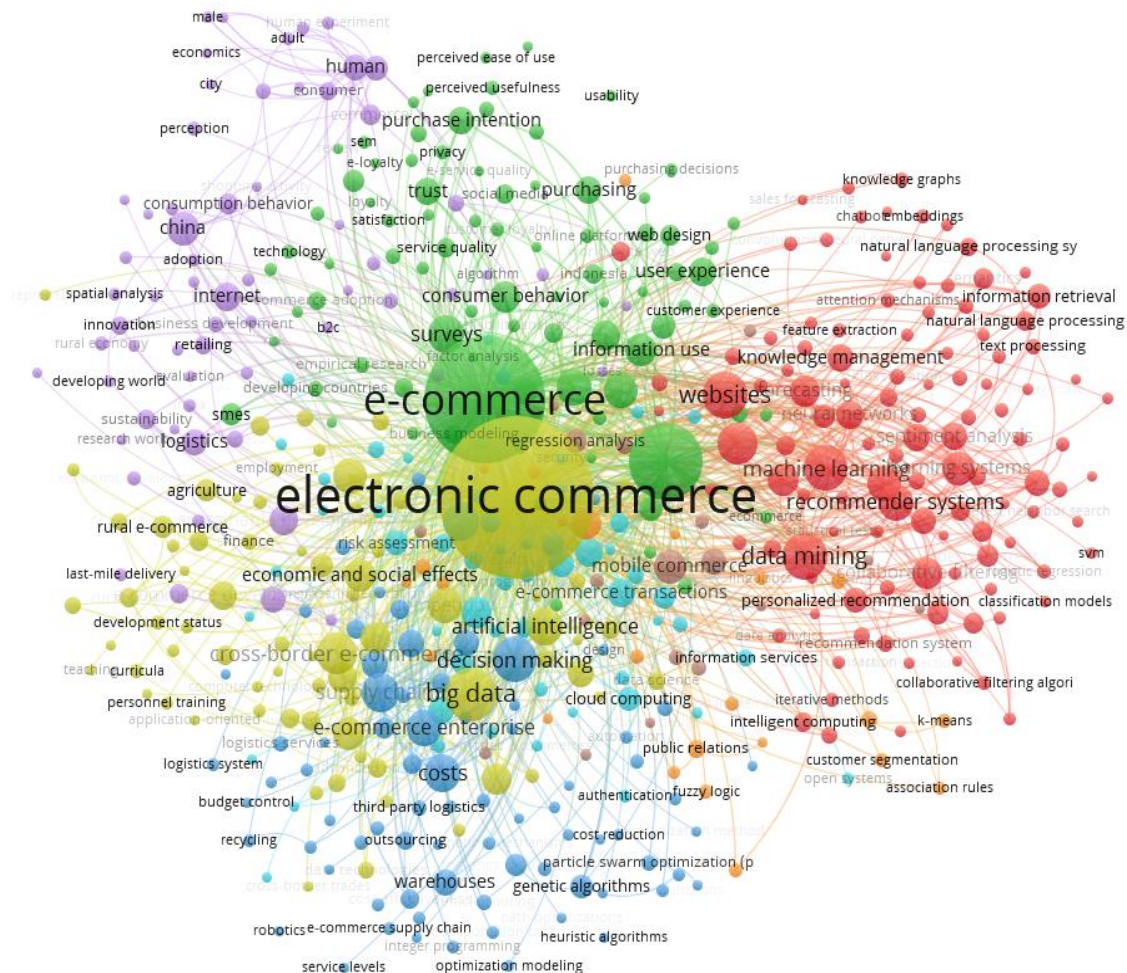


Figure 4 – Graphic map of the relationship of keywords found in articles, in which titles the category "e-commerce" is met

Source: compiled by the author based on the Scopus database data and using the VOSviewer

V. CONCLUSION

Thus, the article provides a bibliographic analysis of scientific papers in the e-commerce field. In particular, this type of commerce is considered as a separate type of e-business, the essence of which is the formation and development of economic relations between economic agents in the sale, purchase of goods and services on the Internet, the use of digital marketing technologies for their sale, electronic systems to pay their value in order to meet the demand for such goods and services and to make a profit.

The information base of the research was the Scopus database, on the information of which a retrospective analysis of scientific publications in the outlined field was conducted. In particular, it is established that research on this type of commerce began in 1196 with the gradual emergence of services for the sale and purchase of goods and services online. The study of analytical information allowed to establish the wave-like state of the number of scientific works in this field. This situation is directly related to the development and gradual introduction of new information technologies both in the lives of citizens and, accordingly, in the work of enterprises that provide e-commerce services.

Within the article, scientific areas, in which the study of e-commerce is carried out, are analyzed, and it was found that most publications do not relate to the field of Business, Management and Accounting, namely Computer Science. During the entire period of research within this science, 6788 scientific publications were published. The next area of science, within which the outlined issues are actively studied by scientists is Business, Management and Accounting - 3292 scientific papers. As well, a large number of works were conducted in Engineering - 3162 papers. In addition, we will analyze regional distribution among countries of scientific publications that study e-commerce and determine that the largest number of works in the e-commerce field was published in China, the USA, India, which is associated with active development of e-commerce in these countries.

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