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Inna Tiutiunyk,


D.Sc., Associate Professor, Sumy State University, Ukraine

 ORCID ID, 0000-0001-5883-2940

email: i.karpenko@finance.sumdu.edu.ua

Yuliia Humenna,


Ph.D., Sumy State University, Ukraine

 ORCID ID, 0000-0001-5309-6016

email: y.gumenna@finance.sumdu.edu.ua

Anna Flaumer,

Kolping Academy, Germany

 ORCID ID, 0000-0003-0596-2199

email: an.flaumer@gmail.com

Correspondence author: i.karpenko@finance.sumdu.edu.ua

COVID-19 IMPACT ON BUSINESS SECTOR ACTIVITY IN THE EU COUNTRIES: DIGITAL ISSUES

Abstract. This article is devoted to the study of the impact of the COVID-19 pandemic on the functioning of the business sector of European countries through bibliometric analysis. The purpose of this paper is to analyze the scientific achievements on this topic in terms of identifying key categories and phenomena that characterize the impact of COVID-19 on the activities of business entities. Methodological support for this paper includes trend and bibliometric analysis (based on VOSViewer v. 1.6.10 toolkit). The results of the trend analysis showed recent stable gradual growth in the number of user search queries on business issues caused more by the COVID-19 pandemic that has become an inhibitor of economic growth and sustainable development. The object of the paper is 2406 publications indexed in the Scopus database and 4666 publications indexed in the Web of Science database on the effects of pandemics on the business sector. The time horizon of the study was in 1980-2021. According to the results of the analysis of papers indexed in the Scopus database the decreasing number of papers during 2014-2015 (from 99225 to 28836) were identified. The article identifies the top 15 Scientific Journals indexed by the Scopus and Web of Science databases in which the issue of the effects of COVID-19 on the business sector were considered most often. It is concluded that the majority of publications were published in journals that were indexed in both databases - Scopus and Web of Science. According to the results of the analysis of metadata of publications devoted to the effects of COVID-19 on the business sector, the 9 clusters by the Scopus database and 8 clusters by the WoS database were identified. The results of the bibliometric analysis devoted to the effects of COVID-19 on the business sector allowed defining 10587 keywords, the frequency of use of which exceeds 5. According to the Scopus database the most popular keywords within this problem are: humans, female, organization and management, commerce, risk assessment, economic aspect and others. At the same time, the most popular keywords in the Web of Science database are: pandemic, impact, business, performance, crisis, management, entrepreneurship, innovation.

Keywords: COVID-19, business, digitalization, EU country, cluster, economic development, bibliometric analysis, trend analysis.

Introduction. The economic development of countries significantly depends on factors and levers, the nature and strength of which constantly varies depending on changes and fluctuations in the external environment. Recently, COVID-19 has become a global problem that has supplanted all others and come to the fore. Negative consequences of pandemic are observed in all spheres of functioning and development of countries. Thus, since March 2020 the pandemic has a crucial impact on more than 90

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trillion of the global economy. According to the report by the Congressional Research Service (CRS Reports, 2020), indicators of economic development in more than 200 countries were negatively affected by the pandemic. Estimates suggest a slowdown in global economic growth, ranging from -4.5% to 6.0%, due to COVID-19, with a projected partial recovery of 2.5% to 5.2% in 2021. COVID-19 spread across the countries - appearing in China, it shifted firstly to Europe, in particular large-scale loss of human life was observed in Italy, after - there was a rapid death rate, followed by economic shocks in the USA. Today, the critical level of human losses, which reached record levels in these countries, is observed in Brazil and India. In general, COVID-19 has sickened more than 142 million people all over the world, over 3.0 million people died.

It should be noted that in addition to the negative consequences for public health, it is important to study the economic effects of the pandemic in a global context. The use of bibliometric analysis of publications on the relationship between the impact of COVID-19 for the functioning of business and the country's economic development, in general, is an essential and decisive tool for forming a set of measures to prevent and further manage the effects of pandemics on economic entities. The results of the bibliometric analysis will form in prospect the basis for the government to determine the roadmap for the prevention of the negative effects of COVID-19 on the business entities' economic activity.

Literature Review. Despite the recent existence of the COVID-19 phenomenon, its global implications make it necessary to conduct official calculations and assess its impact on the world economy within cross-country analysis (WHO, 2021; WHO Coronavirus (COVID-19) Dashboard).

Moreover, scientists worldwide are currently studying the issues and features of the influence of COVID-19 on economic and financial indicators. According to the International Monetary Fund, the COVID-19 pandemic will cause significant systemic changes that will change the ways of doing business and conducting financial transactions (International Monetary Fund, 2020).

In general, according to the results of the analysis, most scientists (Greene and Rosiello, 2020; Prashar et al., 2020; Gregurec et al., 2021; Zhang et al., 2020) and representatives of international organizations agree that the pandemic has a severe impact on the global economy. According to the Organization of Economic Cooperation and Development predictions until the end of 2021 the global gross domestic product will fall by 6 %, and the World Bank (World Bank, 2020) predicted a contraction of 5.2 %.

At the same time, some researchers (Papadopoulos et al., 2020; Bonfield et al., 2020; Javaid et al., 2020) emphasize that the pandemic has accelerated the digitalization of the economy and the more active use of digital technologies in all areas of business.

Methodology and research methods. The main hypothesis of this paper is the assumption of an impact of COVID-19 on business activity in EU countries. The validity of this hypothesis will be verified by bibliometric analysis of publications in the journals indexed by Scopus and WoS databases in the following sequence:

1. To study the degree of interest of the population in the business sector trends at the first stage, we will conduct a trend analysis of the dynamics of changes in the number of search queries of Google search engine users.
2. We will analyze the dynamics of change in the number of publications on business activities indexed in the Scopus database at the second stage.
3. Based on the analysis of scientific publications, the top 15 Scientific Journals indexed by the Scopus / Web of Science databases and publishing the articles on the effects of COVID-19 on the business sector will be determined.
4. Using the VOSViewer toolkit, scientific effects of COVID-19 on the business sector by country will be clustered.

The object of the paper is 2406 publications indexed in the Scopus database and 4666 publications indexed in the Web of Science database on the effects of COVID-19 on the business sector. The time horizon of the study was chosen in 1980-2021.

Results. The intensification of the global economic crisis caused by the COVID-19 pandemic resulted in the relevance of business development issues and the study of the pandemic impact on the economic activity of business entities.

One of the indicators that reflects the relevance of the research questions is the number of search queries of Google users. The increase of that indicator demonstrates the intense interest of users in business tendencies and peculiarities. The trend analysis results on the number of user search queries in business issues shown in Figure 1 confirm stable gradual growth since mid-2019 (Figure 1).

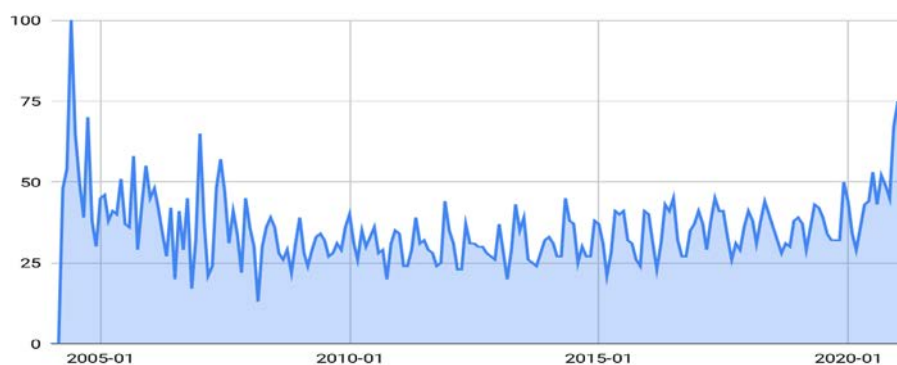


Figure 1. The trend of changes in Google user search queries on business activity
Sources: developed by the authors using data from Google.

The large quantity of factors drives the growing relevance of the business issues among Google users. The most significant nowadays factor is the COVID-19 pandemic that has become an inhibitor of economic growth and sustainable development.

The increase in user activity corresponds with the number of publications on business issues, particularly journals indexed by scientometric databases.

Thus, the analysis of the publications shown in Figure 2 showed that the number of papers indexed in the scientometric database Scopus significantly decreased during 2014-2015 (from 99225 to 28836). It accompanied the relatively low economic growth and deterioration in global financial markets. The issues of business functioning were deeply investigated in 2013, during which 99225 publications were published and indexed in the Scopus database (10% of all publications are indexed in the Scopus database). Since 2015, there has been a slight annual increase in the number of publications on these issues.

Thus, we can conclude that the issues of business activity are not new for economic science. At the same time, periodic effects of market turbulence have a negative impact on business development indicators and lead to a shift in emphasis in the interests of scientists and civil servants. Along with the issues of economic growth of the country, the economic aspects of minimizing the turbulence impact and eliminating its negative consequences come to the fore.

At the next stage of investigation, let's conduct a bibliographic analysis of the publications on the effects of COVID-19 on business sector' activity using VOSViewer v.1.6.10 toolkit.

The scientific papers covering the issues of investigation on the effects of COVID-19 on business sector' activity are published both in the journals on economic, social and medicine topics. The list of the

top 15 scientific journals publishing the majority of articles on the impact of pandemic on the business sector is presented in Table 1.

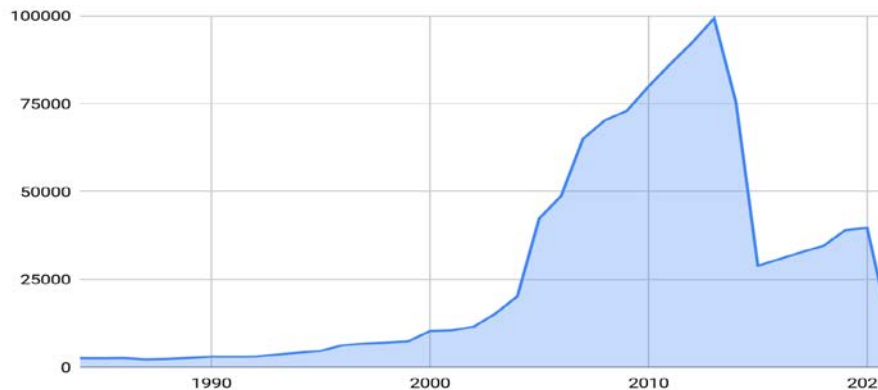


Figure 2. The number of publications on business activities indexed in Scopus database
Sources: developed by the authors using data from Scopus database.

Table 1. Top 15 Scientific Journals indexed by the databases Scopus/Web of Science and publishing the articles on the effects of COVID-19 on business sector

Source title	Number of the papers		Quartile
	Web of Science	Scopus	
Sustainability Switzerland	77	87	Q2
International Journal of Hospitality Management	18	24	Q1
International Journal of Environmental Research and Public Health	13	15	Q2
Journal of Asian Finance Economics and Business	11	15	Q3
Emerald Emerging Markets Case Studies	-	13	Q3
Plos One	6	12	Q1
Science of the Total Environment	12	12	Q1
IEEE Engineering Management Review	-	10	Q3
Journal of Open Innovation Technology Market and Complexity	-	10	Q1
Current Issues in Tourism	11	9	Q1
Journal of Medical Internet Research	11	9	Q1
Journal of Business Research	9	8	Q1
Critical Perspectives on International Business	7	7	Q2
International Journal of Contemporary Hospitality Management	7	7	Q1
International Journal of Information Management	6	7	Q1

Sources: developed by the authors using the Scopus and Web of Science data.

The conducted analysis allows us to assert that most publications were published in journals that were indexed in both databases - Scopus and Web of Science. Moreover, more than half of journals belong to the first quartile (Q1). Articles on the relationship between the effects of the pandemic and business activity and the implications of COVID-19 in general for the economic growth of countries, which are published in the journals of these databases, confirm the relevance of the issues raised in the study.

Analysis of publications in terms of research areas allows us to conclude about the intersectoral nature of research. The study results of the COVID-19 impact on the business sector have been published in

journals related to various sectors of the economy. For example, almost 31% of all publications indexed in the Web of Science database are published in journals related to Business Economics; 12% - Environmental Sciences Ecology; 10% - Science Technology; 8% - Social Sciences; 5% - Government Law; 4% - Engineering, etc (Figure 3).

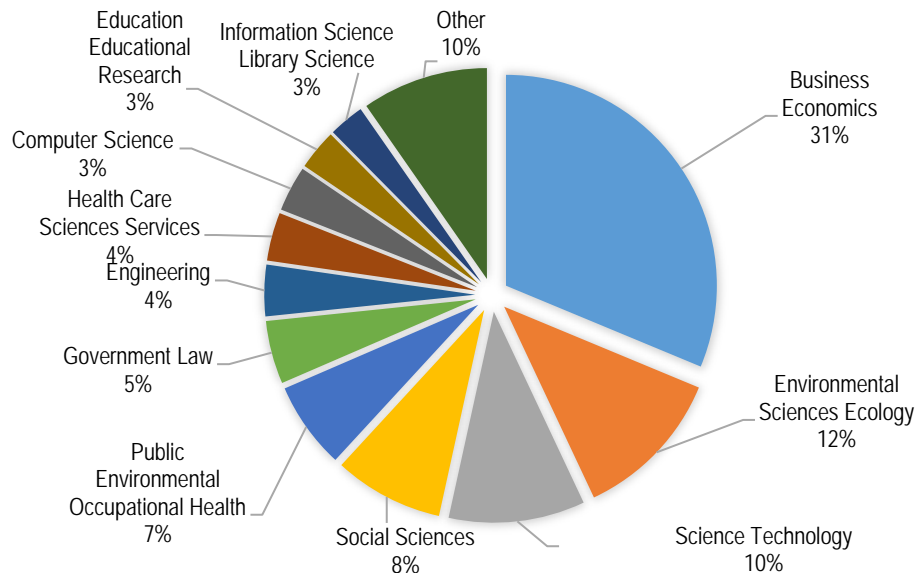


Figure 3. Distribution of publications on the effects of COVID-19 on business sector indexed in the Web of Science database by research areas

Sources: developed by the authors using Web of Science data.

Publications related to the investigations within relationship between categories «business» and «COVID-19» according to the Scopus database are distributed in the following way: 17,88 % of all articles were published within the subject area of Social Sciences; 15,52% - Business, Management and Accounting; 9,94% - Medicine; 8,83% - Computer Science; 7,84% - Economics, Econometrics and Finance; Environmental Science - 7,43%; Engineering - 6,49%; Energy - 4,37%; Decision Sciences - 3,64%; Mathematics - 2,75%; Others - 15,3% (Figure 4).

The COVID-19 pandemic is a global problem, the negative consequences of which are felt by businesses in all countries of the world. At the same time, there are significant differences in the peculiarities of doing business in different countries. The reasons for such differences are the level of economic development, the stability of the economic system, the specifics of entrepreneurial activity in the country, etc.

The above mentioned provides the necessity for investigating the peculiarities of a pandemic's impact on business performance, considering the peculiarities of the development of a particular country. This leads to an expansion of the geography of scientific publications on this issue.

Conducting the analysis of publications by the option on geographical area (Figure 5) confirmed the existence of three clusters reflecting international research cooperation related to the investigations on the effects of COVID-19 on the business sector. The majority of publications on the impact of pandemic on the business entities' activity were published by scientists from the USA, UK, China, Australia and India (Table 2).

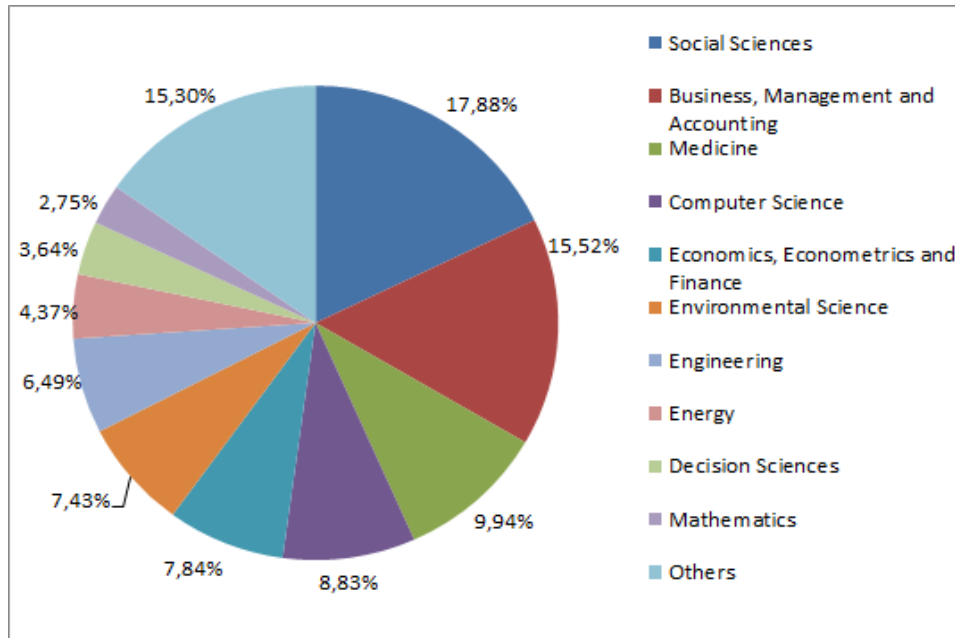


Figure 4. Distribution of publications on the effects of COVID-19 on business sector indexed in the Scopus database by fields of knowledge
Sources: developed by the authors using Scopus data.

Table 2. Ranking of countries by number of publications indexed in the Scopus and WoS database, which investigated of effects of COVID-19 on the business sector

Country	Number of the papers		Country	Number of the papers	
	Web of Science	Scopus		Web of Science	Scopus
USA	413	520	New Zealand	30	43
United Kingdom	192	251	Saudi Arabia	29	39
China	123	152	Scotland	28	
Australia	123	134	Poland	28	37
India	105	154	Indonesia	28	81
Canada	74	79	Vietnam	26	
Italy	74	87	Malaysia	25	54
Spain	68	81	Brazil	-	30
Germany	66	83	Switzerland	-	44
	Web of Science	Scopus		Web of Science	Scopus
France	40	41	South Africa	-	44
Russian Federation	40	78	Japan	-	36
Netherlands	30	40			

Sources: developed by the authors using the Scopus and Web of Science data.

Analysis of the level of international cooperation between scientists in terms of their countries of origin has identified 74 countries, which can be divided into 7 clusters depending on the congestion of collaboration between scientists: cluster 1 – Egypt, France, Hungary, Morocco, Netherlands, Norway,

Poland, Romania, Sweden, Tunisia; cluster 2 – Argentina, Australia, Brazil, Croatia, Indonesia, Spain, New Zealand, United Kingdom; cluster 3 – China, Denmark, India, United States, Pakistan; cluster 4 – Canada, Ghana, Kenya, Nigeria, Peru, Philippines, Zambia; cluster 5 – Austria, Belgium, Cyprus, Germany, Greece, Ireland, Israel, Italy, Portugal, Switzerland; cluster 6 – Bulgaria, Czech Republic, Georgia, Kazakhstan, Lithuania, Slovakia, Ukraine; cluster 7 - Chile, Finland, Iran, Japan, Serbia, Taiwan, Turkey. Even though most countries are presented in cluster 1, the interrelation analysis of cooperation between scientists allows us to identify cluster 3 as having the closest link and the most significant number of publications on the issues of the topic.

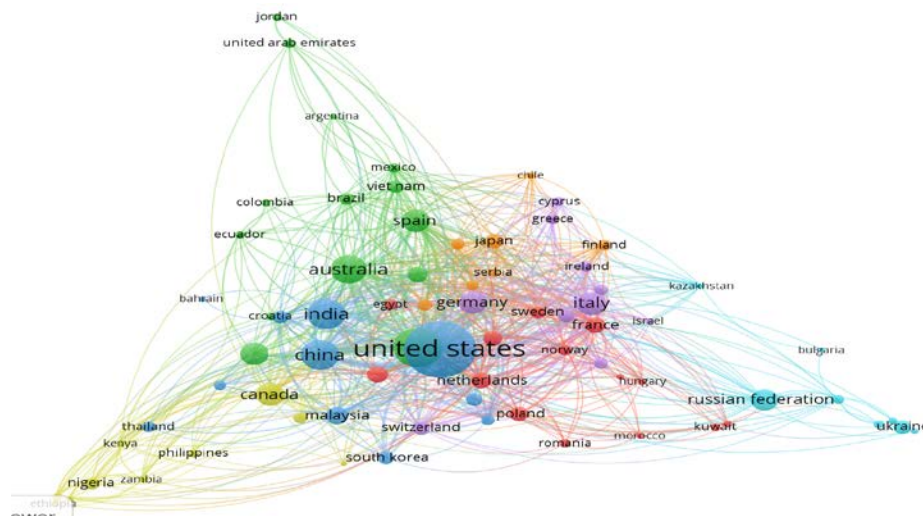


Figure 5. Bibliometric analysis of the investigation of effects of COVID-19 on the business sector by countries

Sources: developed by the authors using data from Scopus by VOSviewer tool.

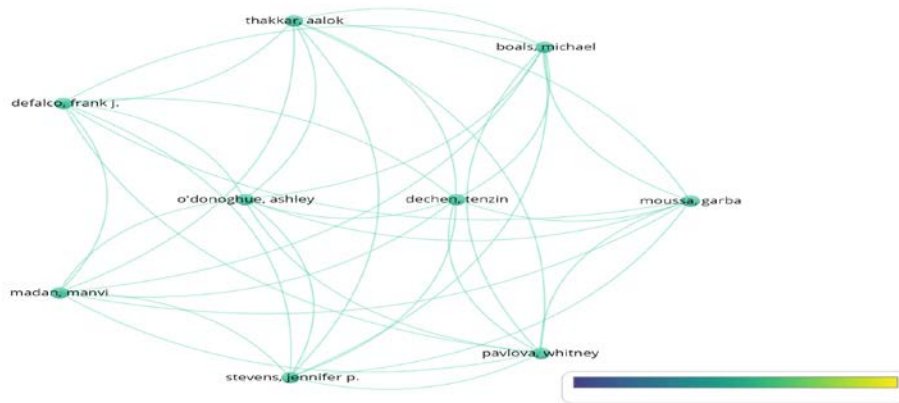
Bibliographic analysis of the most cited authors of publications devoted to the study of the impact of the COVID-19 pandemic on business issues (Figure 6) allowed identifying 1 network of authors' cooperation (9 scientific) according to the Web of Science database and 4 networks according to the Scopus database. The most cited scientific on these issues include Y. Li, H. Wang, Y. Zhang, G. Moussa, W. Pavlova, J. Stevens, Y. Liu.

The analysis of publications metadata related to the development of the business sector in pandemic (Scopus database) allowed defining 10587 keywords (the frequency of use is more than 5), which were grouped into 9 clusters (Figure 7a). The most popular combinations of words within that problem are: humans (frequency of use - 13549), female (1960), organization and management (1167), commerce (800), risk assessment (775), economic aspect (607) and others.

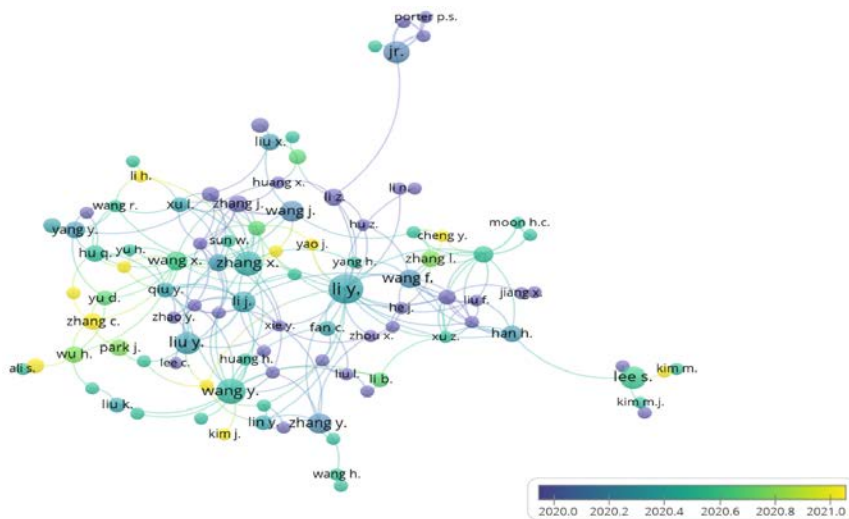
Analysis of publications indexed by the WoS database (Figure 7b) allows to select 8 clusters with a total volume of 4262 keywords. The most commonly used keywords are: pandemic (176), impact (169), business (141), performance (116), crisis (109), management (101), entrepreneurship (82), innovation (89)

In order to analyze in detail, the publications devoted to the study of the pandemic impact on business indicators we will analyze keywords in terms of major clusters. Within the red pattern (365 links) effects of COVID-19 on the business sector were investigated relative to the following keywords: business, business

model, business cycle, commerce, competition, cost, crisis, crisis management, data mining, decision making, digital economy, digitalization, digital technologies, e-commerce, e-learning, economic crisis, economic impact, economic growth, industry 4.0 and others (Figure 8).



a) Web of Science



b) Scopus

Figure 6. The network of co-authors of publications on of effects of COVID-19 on the business sector

Sources: developed by the authors using data from Scopus and WoS by VOSviewer tool.

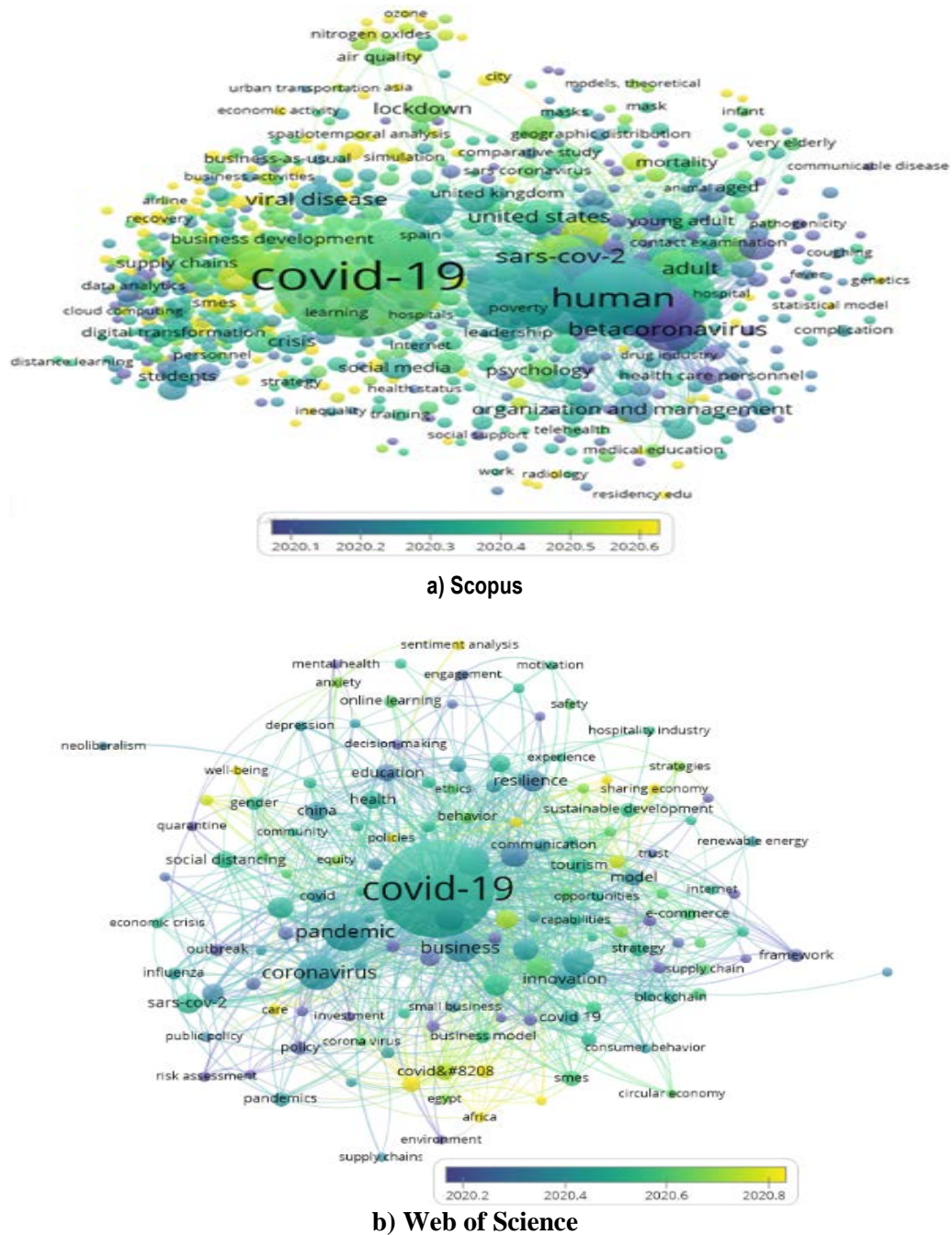


Figure 7. Bibliometric analysis of the investigation of effects of COVID-19 on the business sector
Sources: developed by the authors using data from Scopus and WoS by VOSviewer tool.

The third (yellow) cluster includes keywords that mainly reflect the medical component of these processes and study the impact of the pandemic on public health (75 links): blood, chemistry, biotechnology, diagnostic, epidemics, genetics, global health (Figure 10).

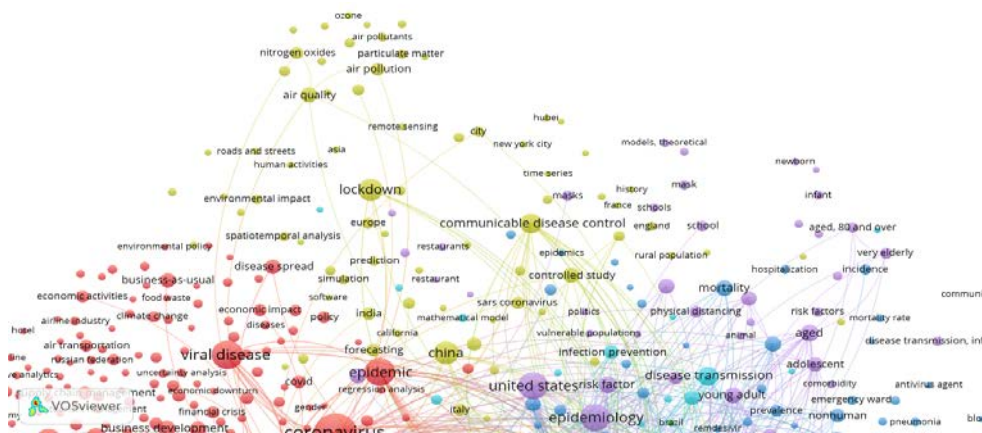


Figure 10. The yellow cluster of visualization of the co-citation of the papers on of effects of COVID-19 on the business sector

Sources: developed by the authors using data from Scopus database by VOSviewer tool.

The blue pattern (100 links) is presented by the following keywords: algorithm, awareness, case report, economic aspect, editorial, government, government regulation, mortality, trust. In general, most keywords are directly related to the coronavirus, its impact on public health and vaccination issues. (Figure 11).

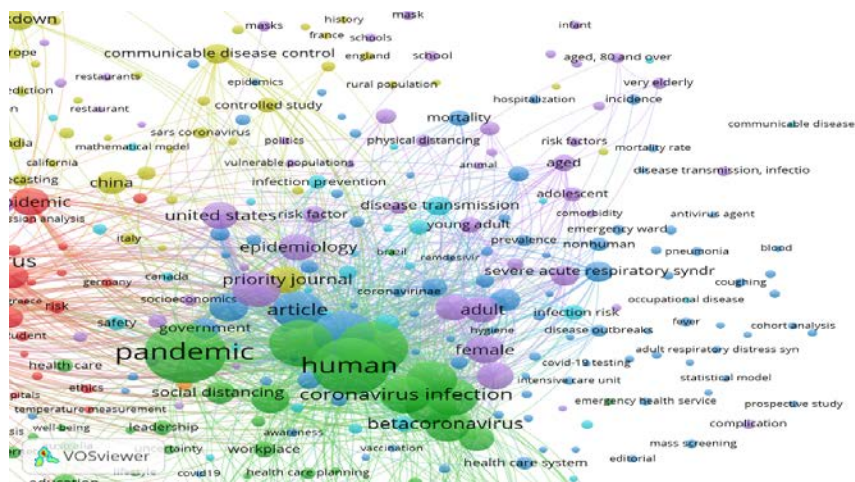


Figure 11. The blue cluster of visualization of the co-citation of the papers on of effects of COVID-19 on the business sector

Sources: developed by the authors using data from Scopus database by VOSviewer tool.

The smallest pattern (2 links) contains the following keywords: economic recession, small business (Figure 10).

Thus, bibliometric analysis on the investigation of COVID-19 impact on the business sector (Figure 7) reflects that pandemic phenomenon is related both with social aspects (mostly with humans and its health care) and economic issues. In terms of economic aspects, a bibliometric analysis of the relationship between the pandemic and business confirms general global trends. Thus, while impacting global e-commerce, the current COVID-19 pandemic has changed the nature of business practice. According to investigation (Shkodkina et al., 2020; Humenna and Tymoshenko, 2020) more than 50% of consumers try shopping online in order to avoid crowded areas. It is worth noting that nearly one third of consumers avoid traditional forms of shopping until they get a coronavirus vaccine.

The formation of e-business revealed two important aspects. Firstly, the Internet has proven its high efficiency as a means of communication, moreover, the global electronic market is built on it. Secondly, the experience of companies which used the network as a complement to the traditional business, or those who built their online business from the beginning, has confirmed the importance to apply all existing business experience and principles. Doing business in an information environment is accompanied with the emergence of a new economic and legal phenomenon - e-business, in particular e-commerce and e-marketing as its significant components. Until recently, information and communication technologies (ICT) did not play such a fateful role for a business entity's success. Now, as a result of COVID-19 pandemic impact there is a significant necessity for digitalization of both financial and economic sphere, thus, it is almost impossible to separate business activity from digital technologies.

Conclusions. The results of the bibliometric analysis showed a significant impact of the COVID-19 pandemic on business activities in most countries around the world. The analysis of scientific publications devoted to these issues allowed us to draw a conclusion about the relevance of these issues and the interest of scientists. The number of publications on the effects of COVID-19 on the business sector is growing every month. This is due to the significant economic losses caused by the pandemic and the desire of scientists and practitioners to develop mechanisms to bring countries out of crisis. This contributed to the expansion of international cooperation of scientists in the direction of research on this issue.

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Інна Тютюнник, д.е.н., доцент, Сумський державний університет (Україна);

Юлія Гуменна, Ph.D., Сумський державний університет (Україна);

Анна Флаумер, Коллінг Академія (Німеччина)

Вплив COVID-19 на діяльність бізнес-сектору в країнах ЄС: цифрові аспекти

Стаття присвячена дослідженню впливу пандемії COVID-19 на функціонування бізнес-сектору європейських країн. Метою дослідження є аналіз наукового доробку з даної тематики в розрізі визначення ключових категорій та явищ, що характеризують вплив COVID-19 на діяльність економічних суб'єктів. Здійснений трендовий та бібліометричний аналіз на основі використання інструментарію VOSViewer v.1.6.10. Результати проведеного трендового аналізу засвідчили поступове стабільне зростання кількості пошукових запитів користувачів пошукової системи Google з питань розвитку бізнесу, спричинених більшою мірою пандемією COVID-19, яка стала інгібітором економічного зростання та сталого розвитку більшості країн світу. Об'єктом статті є 2406 публікацій, проіндексованих у базі даних Scopus та 4666 публікацій, проіндексованих у базі даних Web of Science, щодо впливу пандемії на бізнес-сектор. Часовим горизонтом дослідження був період 1980-2021 рр. За результатами аналізу робіт, проіндексованих у базі даних Scopus, було виявлено зменшення кількості публікацій упродовж 2014-2015 рр. (з 99225 до 28836). У статті визначено Топ-15 наукових журналів, проіндексованих базами даних Scopus та Web of Science, у яких найчастіше розглядалося питання впливу COVID-19 на бізнес-сектор. Зроблено висновок, що більшість публікацій були опубліковані в журналах, проіндексованих в обох базах даних. За результатами аналізу метаданих публікацій, присвячених впливу COVID-19 на бізнес-сектор, було виявлено 9 кластерів за базою даних Scopus та 8 кластерів за базою даних WoS. Результати бібліометричного аналізу, присвяченого дослідженню впливу COVID-19 на бізнес-сектор, дозволили визначити 10587 ключових слів, частота використання яких перевищує 5. За даними бази даних Scopus, найбільш популярними ключовими словами при дослідженні даної проблеми: люди, жінка, організація та управління, торгівля, оцінка ризиків, економічний аспект та інші. У той самий час, за даними БД Web of Science найпопулярнішими ключовими словами є: пандемія, вплив, бізнес, ефективність, криза, управління, підприємництво, інновації.

Ключові слова: COVID-19, бізнес, цифровізація, країна ЄС, кластер, економічний розвиток, бібліометричний аналіз, трендовий аналіз.