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Coverage of the Russian armed aggression against Ukraine in scientific works: Bibliometric analysis

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Abstract. The barbaric war of Russia against Ukraine is accompanied by the death of tens of thousands of people. Millions of Ukrainians were forced to leave their places of residence, hundreds of thousands had their homes completely destroyed, and a large part of the country's enterprises, energy and transport infrastructure was disabled. This war violates all international laws and, in fact, is a challenge to the entire civilized world. Its causes and consequences are discussed, analyzed, and considered by society and experts. Scientists do not ignore it either.

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The increase in publications on the topic of war and the uniqueness of this kind of research caused the desire to map the corresponding thematic landscape and identify the main trends. The methodological basis of analysis in the presented study was in-built Scopus instruments, Bibliometrix R package and Biblioshiny App, InfraNodus. The study includes two sections, namely, time section (compares publications for the entire period of the Russian armed aggression against Ukraine (2014–2023), as well as before and after the full-scale invasion (2020–2021 and 2022–2023), and geographical section (compares publications of international and Ukrainian scientific communities). The dynamics of publications, their structure by subject areas, countries, affiliations, authors, and sponsors were analyzed. According to the results of cluster, sentiment and narrative analysis, there is a shift in substantive emphasis after February 24, 2022 towards the interpretation of events as a full-scale war (52% of publications as a whole and 60% of publications by authors with Ukrainian affiliation), taking into account the consequences for the global energy, food, and other types of security. The identified structural gaps in the analyzed works create the basis for developing directions for overcoming the consequences of the war in various areas and post-war reconstruction of Ukraine.

Keywords: aggression, invasion, Ukraine, war, research mapping, bibliometric analysis.

JEL Classification: I20, O30, N40, Y50

1. INTRODUCTION

Russia's war against Ukraine has catastrophic consequences. According to preliminary estimates, investment support in the amount of more than 750 billion dollars is needed to restore the country (URC 2022). It is estimated that the amount of damage caused by the aggression to Ukraine's infrastructure reaches almost 136 billion US dollars, of which 8.2 billion, or 6%, is the damage caused to the educational infrastructure.

As of the 300th day after the full-scale invasion, 361 educational institutions were destroyed and another 2,556 were damaged. Most of the institutions of higher and professional pre-higher education were destroyed in Zaporizhzhia and Donetsk regions, and damaged – in the Kharkiv region. According to preliminary estimates, 665,000 students and school pupils (16% of the total number) and 25,000 teachers (6% of the total number) left Ukraine. In addition to the reduction in human and intellectual capital, significant organizational changes took place due to the relocation of 43 higher education institutions with 6,900 teachers and 53,600 students. Among such universities, there are even 10 "twice displaced", which were already forced to leave the occupied territories in 2014 (Nikolaiev, Riü, & Shemelynets, 2023).

There have been significant reductions in budgetary support for higher education and science in Ukraine. According to the budget program 2201060 "Training of personnel by institutions of higher education and ensuring the operation of their practice bases", in 2022 the amount of funding was reduced by 2.113 billion UAH from the general fund and 3.697 billion UAH from the special fund. Therefore, the total decrease in funding in 2022 amounted to 5.810 billion UAH, which is 16.5% of the total amount (Ministry of Education and Science of Ukraine, 2023). At the same time, the amount of funding under this

budget program in accordance with the Law of Ukraine "On the State Budget of Ukraine for 2023" from the general fund was reduced in 2023 by another 1.890 billion UAH, i.e. the reduction of funding is another 10% compared to the actual figure of 2022 and 19% compared to the planned indicator for the beginning of 2022 (The Verkhovna Rada of Ukraine, 2023).

It should be noted that even under such conditions, Ukrainian teachers and researchers find resources and opportunities to engage in scientific projects. In particular, this happens thanks to the support from the world university community, publishers of scientific journals, and various foundations and sponsors.

Ukrainian scientists, for obvious reasons, devote many scientific studies to the topic of war, its causes, consequences, possible development of events, post-war reconstruction, etc. Institutions and researchers from other countries of the world do not ignore this topic.

2. LITERATURE REVIEW

Military conflicts, and even more so full-scale wars, cause demographic, man-made and humanitarian disasters. Such events encourage scientists from different countries of the world to investigate their socio-economic and historical prerequisites, assess the consequences, propose scenarios for a peaceful settlement, etc.

For example, even in the context of the Russian-Ukrainian war, one can pay attention to how the military operations in the South Caucasus are covered. Thus, scientists explore: the history and chronology of the conflict in Nagorno-Karabakh between Armenia and Azerbaijan, the main ways to overcome it, as well as the effectiveness of UN resolutions and OSCE mediation efforts to resolve this conflict (Askerov, 2015; 2020); economic consequences of the Karabakh war (Nesirova, 2022); causes and consequences of Russia's military aggression against Azerbaijan from the international legal position (Rahimli, 2023); Ukrainian discourse on the Armenian-Azerbaijani conflict, media perception of the Armenian-Azerbaijani clashes (Korzeniowska-Bihun, 2020); Russian policy in the near abroad with an emphasis on the interstate conflict between Azerbaijan and Armenia over Nagorno-Karabakh in terms of its hegemonic ambitions (Shirinov et al., 2012); features of positioning the geopolitical status of Ukraine in the media discourse of the countries of the Caucasus region on the example of Azerbaijan, the geopolitical prospects of Ukraine and the problems of its relations with Russia as an aggressor country on the periphery of the Azerbaijani media discourse (Rotar, 2018); the Russian-Georgian war and the internal policy accompanying it, in particular the policy of unrecognized states, using the example of Georgia and Azerbaijan (Hirose, 2014); the economic damage caused by the Russian-Georgian war in the South Caucasus and its consequences for regional security (Kakachia, 2011). In this scientific context, it is worth noting the results of the joint research work of scientists from Ukraine, Azerbaijan, and Georgia on the security factors of the Black Sea, which describes the views of local foreign policy communities in Ukraine, Azerbaijan, and Georgia regarding the future of the Black Sea region and broader European security after the full-scale Russian invasion of Ukraine. The relevant research findings, based on extensive expert survey and interviewing, point to both some differences in views between the three countries and significant potential and opportunities for greater interaction and cooperation in the Black Sea region.

The International Crisis Group, an independent organization dedicated to preventing wars and shaping policies to build a more peaceful world (2023), has proposed a ranking of armed and political conflicts in 2023, in which the first place is occupied by Russia's war against Ukraine.

The open armed aggression against Ukraine caused horror, anxiety, worry and concern on the part of the entire world community, as evidenced by the analysis of dynamics in the search query "Ukraine" according to Google Trends (2022). If one evaluates the popularity of the specified search query after the start of a full-scale invasion at 100 points, then in 2013 it was estimated at 4 points, in 2014 this indicator

increased 5 times and amounted to 20 points, in 2015 it fell again to 8, and during 2016–2021 it fluctuated within 5-8 points.

A similar trend is observed in the number of scientific publications devoted to the Russian-Ukrainian war, both by Ukrainian authors and authors from other countries. A big jump in the number of such scientific studies (publications) is undoubtedly explained by the unprecedented, unexpected, and inhuman actions of the Russian aggressor, which destroy all world values and endanger the existence of the world itself (Horská et al., 2023; Backer, 2021). The emergence of such trend as the formation of thematic special issues of journals about the Russian-Ukrainian war should be noted.

Among special editions, it is worth highlighting the publication with a British affiliation, namely, "The Ukraine Conflict: Security, Identity and Politics in the Wider Europe" (published by the University of Glasgow), exploring the complex causes of the Ukrainian crisis and the consequences for Ukrainian statehood, Ukraine's relations with Russia, Russia's internal governance and Russia's relations with Europe (2019); "Russia, the West, and the Ukraine Crisis: Three Contending Perspectives" (Routledge publishing house) – the purpose was to examine the international dimension of the Ukrainian crisis (2019); "Post-Soviet Affairs" journal (Taylor & Francis Group), annually, starting from 2018, publishes issues directly or indirectly related to the Russian-Ukrainian war, which includes "Identity Politics in Times of Crisis: Ukraine as a Critical Case" (2018), "Conversations within the Field: Russia's War against Ukraine and the Future of Russian Studies" (2023), etc.; "Europe-Asia Studies" journal (Taylor & Francis Group), annually, since 2014, publishes issues, including "The Ukrainian Crisis and the Post-Post-Cold War Europe" (2016), "Post-Soviet Conflict Potentials" (2020), "War and Displacement: The Case of Ukraine" (2020), etc.

Starting from 2022, a number of scientific publications have announced a set of special editions dedicated to the Russian-Ukrainian war. The Journal of Applied History released a special double edition "Weaponizing History in the Russo-Ukrainian War" (2022), which is devoted specifically to the Russo-Ukrainian war. The Journal of Risk Finance devoted a special issue to implications of the Russia-Ukraine Conflict on the Global Financial Markets (2023). The Journal of European Integration devoted a special edition to the transformation of Europe after Russia's Attack on Ukraine (2023). To form a more complete understanding of the roots of Russia's invasion on the territory of Ukraine in 2022, Cambridge University Press published the monograph "Russian and East European Government, Politics and Policy, Politics and International Relations, Comparative Politics" (Arel & Driscoll, 2022). In 2023, a special edition of the Journal of International Women's Studies entitled "The Russia-Ukraine War and its Impact on Global Affairs: Masculinity, Patriarchy, and Gendered Realities" was released, which aims to explore the root causes of the war on the territory of Ukraine, the influence of military events on the socio-economic and political system in Ukraine, the consequences of the war for the international community.

In December 2022, the Ukrainian magazine "Access to Justice in Eastern Europe" published a special edition in which the current issues related to the realities of the war in Ukraine are investigated, using the experience of other military conflicts, modern doctrines, and new approaches.

In 2023, the Ukrainian journal "Problems and Perspectives in Management" published a special edition dedicated to academic management in war, which contains 18 articles, the authors of which are united by the desire to talk about their own management experience in critical conditions. The vast majority of articles in this edition are devoted to the chronology of the destructive impact of hostilities on the life and functioning of specific universities, the analysis of resistance of university teams to external challenges, the generalization of management experience aimed at the survival of the university, the preservation of human capital, the implementation of volunteer activities and humanitarian aid (Kozmenko et al., 2023): universities relocated from the cities of Berdiansk and Melitopol to territories controlled by the legitimate authorities of Ukraine (Lopatina et al., 2023; Falko & Zhukov, 2023); Kherson University in times of war under temporary Russian occupation of Kherson city and the university displacement (Spivakovsky et al., 2023); Volodymyr

Dahl East Ukrainian National University and Donetsk National Technical University, which had to change their location twice (Porkuian et al., 2023; Zakharova & Prodanova, 2023); institutions in Chernihiv and Sumy, which worked during terrorist missile bombings and encirclement (Novomlynets et al., 2023; Nifatova et al., 2023; Karpusha et al., 2023); the resistance of the capital's university, which was at the epicenter of terrorist missile attacks several times (Bugrov et al., 2023); aid and volunteering of universities located hundreds of kilometers from the front line (Nestulya et al., 2023; Kaplenko et al., 2023; Tsos et al., 2023); online learning projects acquired during the COVID-restrictions and even more important in wartime (Kuzheliev et al., 2023; Kvyetnyy et al., 2023; Gresha et al., 2023); organizing the work of a scientific library in the front-line Dnipro (Kolesnykova, 2023); acquired by scientists during emigration and continuation of scientific research (Polishchuk et al., 2023), etc. In the article by Petrushenko et al. (2023) from this special edition, a bibliometric analysis of publications on the management of higher education institutions in wartime conditions is presented, in which the lack of conceptual studies devoted to the role of universities in the war and post-war reconstruction of the State of Ukraine is noted.

In addition to the publications listed above, a number of scientific journals at the time of writing this article announced a set of articles for special editions devoted to the Russian-Ukrainian war, including: *Peace Review*, Special Issue “Russo-Ukrainian War/Russian aggression against Ukraine” – to explore different aspects of the war, including its root causes and implications, as well as peacebuilding and conflict transformation strategies (2023); *Journal of Risk and Financial Management*, Special Issue “Financial Markets Reaction to Russo-Ukrainian War” – to foster and promote state-of-the-art research on the impact of the Russia-Ukraine conflict on financial markets (2023); *Journal of Illicit Economies and Development*, Special Issue “The war in Ukraine and its impact on transnational organized crime in the region” – to explore how the war in Ukraine which started with the illegal annexation of Crimea by Russia in 2014 and entered a new phase with Russia’s full-scale invasion on February 24, 2022 has altered the criminal landscape in the region (2023); *De Europa: European and Global Studies Journal*, Special Edition “The Russian War in Ukraine” – to frame the Russian-Ukrainian conflict theoretically and historically within analytical dimensions consolidated in the scientific literature, which allow studying the phenomenon to be addressed diachronically and in a comparative perspective (2023).

Unlike the sources analyzed above, which focus mainly on one dimension of the war (conflict), the aim of the current study is to map the scientific landscape on the topic of the Russian-Ukrainian war, to identify the main trends of its development at the world and national (Ukrainian) level until the beginning (2020–2021) and after the start of a full-scale invasion (2022–2023) through bibliometric analysis.

3. DATA AND METHODOLOGY

To conduct the analysis in this article, various bibliometric and meta-analysis instruments were used, which made it possible to analyze and assess the existing scholarly literature and conduct systematic reviews, in particular in-built Scopus instruments, Bibliometrix R package and Biblioshiny App, InfraNodus.

Scopus comprehensive bibliographic database by Elsevier as one of the largest abstract and citation databases, covering a vast range of academic disciplines, was chosen as a database for bibliometric research. This database is very important for scientific works originating from Ukraine (Mryglod et al., 2021). However, unlike the toolkit and information base in other studies with other topics, such as in Mryglod et al. (2021) and Mryglod et al. (2022), where the focus is on the bibliometrics of the works of Ukrainian economists, in this study all subject areas are considered using other tools.

2014–2023 was chosen as the time period of this study for a generalized characterization of the main trends in the development of research on the topic of the Russian-Ukrainian war, and 2020–2021 and 2022–

2023 – for more meaningful comparison of trends for the year before and after the start of the full-scale invasion. The methodology of this study is summarized in Figure 1.

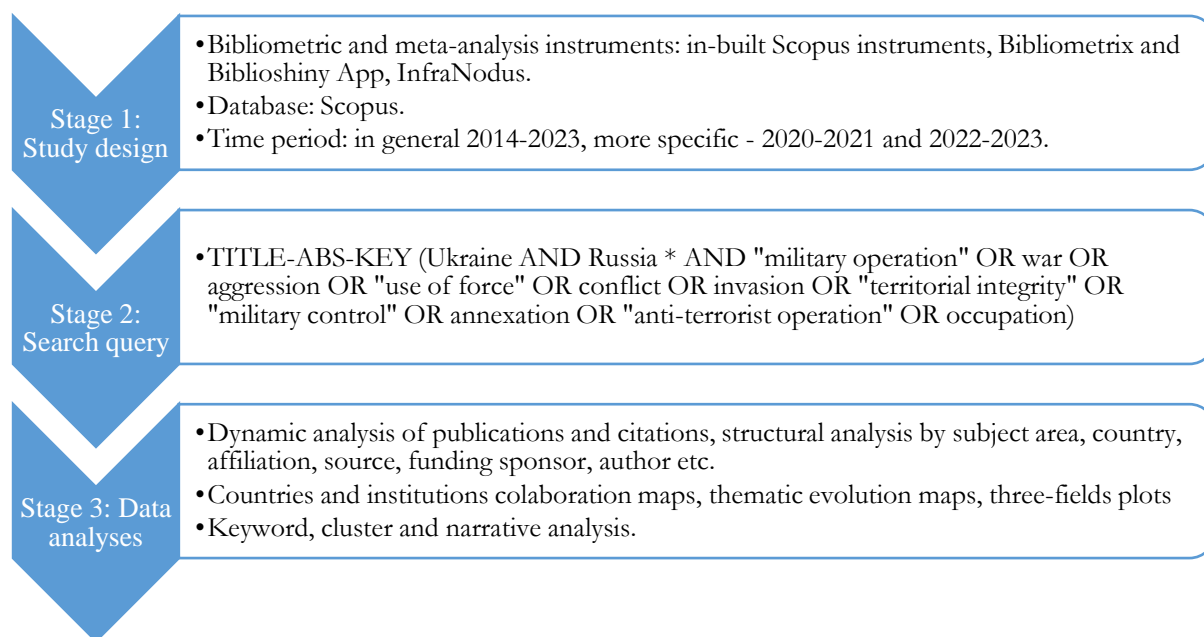


Figure 1. Research methodology

In order to form meaningful and effective search queries that will allow accumulating the necessary bibliometric information for further processing, international documents devoted to individual manifestations of the Russian-Ukrainian war were analyzed, in particular, UN General Assembly Resolution A/RES/68/262 “Territorial integrity of Ukraine” (UN, 2014), ES-11/1 “Aggression against Ukraine” (UN, 2022a), ES-11/2 “Humanitarian consequences of the aggression against Ukraine” (UN, 2022b), ES-11/3 “Suspension of the rights of membership of the Russian Federation in the Human Rights Council” (UN, 2022c), ES-11/4 “Territorial integrity of Ukraine” (UN, 2022d), ES-11/5 “Furtherance of remedy and reparation for aggression against Ukraine” (UN, 2022e), ES-11/6 “Principles of the Charter of the United Nations underlying a comprehensive, just and lasting peace in Ukraine” (UN, 2023), etc. Based on this, a search query was formed, built in accordance with the basic rules of the Scopus database syntax:

- TITTLE-ABS-KEY (Ukraine AND Russia* AND “military operation” OR war OR aggression OR “use of force” OR conflict OR invasion OR “territorial integrity” OR “military control” OR annexation OR “anti-terrorist operation” OR occupation).

Separate filters for more specific information were time periods and countries.

4. RESULTS AND DISCUSSION

The trends presented in Table 1 were revealed based on the analysis of the number of scientific publications and citations in the Scopus database, devoted to the topic of the Russian-Ukrainian war. The beginning of Russia's open aggression, including the armed aggression, in 2014 did not provoke the appearance of a significant number of scientific studies related to these events and their consequences (196 published scientific works in 2015 worldwide and 16 by Ukrainian scientists). Their considerable growth both at the level of the world scientific community and among Ukrainian researchers occurred only in 2022. Their growth rate in 2022 compared to 2021 was 579,6% on the global scale and 413,7% at the level of Ukraine. At the same time, there is a positive trend in the dissemination of scientific results on this topic,

which confirms its importance. As of July 30, 2023, the total number of scientific publications in the Scopus database with the affiliation of Ukrainian scientists is 748 works with an average growth rate for the period 2014–2022 of 79,5% and a total of 4,661 works (average growth rate 82.2%).

Table 1

Dynamic analysis of the number of scientific publications and citations on the topic
of the Russian-Ukrainian war for 2014–2023 as of July 31, 2023

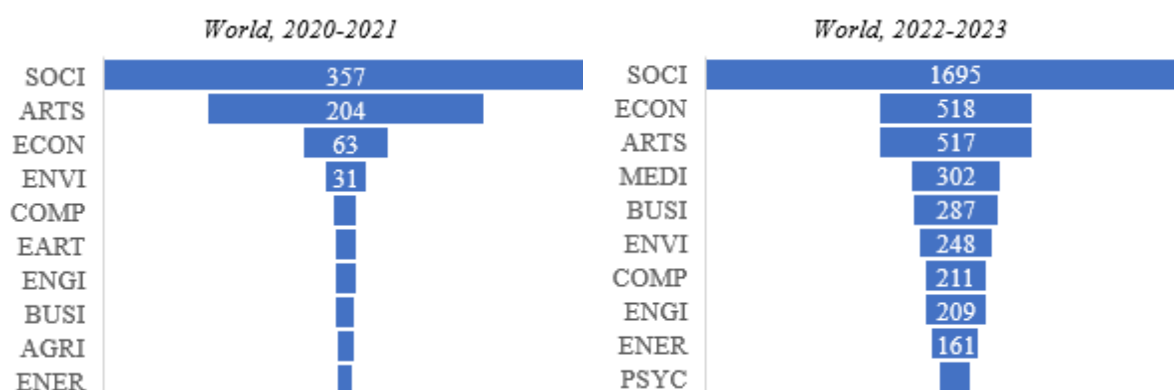
Affiliation	In total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*
World											
Documents	4,661	123	196	245	212	210	240	233	226	1,536	1,440
GR, %	82.2**	x	59.3	25.0	-13.5	-0.9	14.3	-2.9	-3.0	579.6	-6.3
Citations	21,348	45	471	1,321	1,709	1,863	2,027	2,130	2,390	3,820	5,521
Ukraine											
Documents	748	10	16	19	14	25	44	48	51	262	259
GR, %	79.5**	x	60.0	18.8	-26.3	78.6	76.0	9.1	6.3	413.7	-1.1
Citations	6930	2	312	886	994	917	824	750	706	832	706

Note: GR – Growth Rate. * – data for half a year as of July 31, 2023; ** – Average Growth Rate for the period 2014–2022.

Source: Scopus by Elsevier

For the comparability and proportionality of the results, further analysis was carried out for two time periods: before the full-scale invasion – 2020–2021 and after the invasion – 2022–2023.

Figure 2 shows how the topics of scientific research in subject areas have changed both in the world as a whole and for Ukrainian researchers.



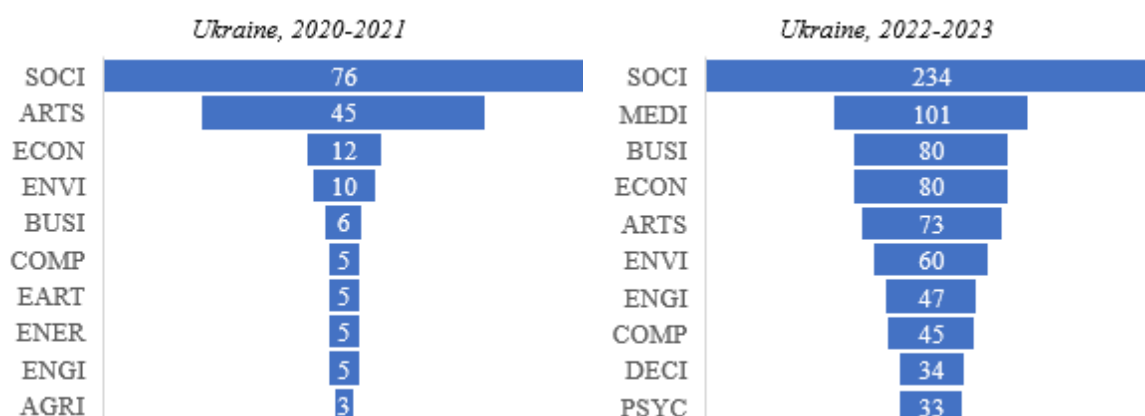


Figure 2. Structural analysis of scientific publications on the topic of the Russian-Ukrainian war by subject area for 2020–2021 and 2022–2023 as of July 31, 2023

Note: * where SOCI – Social Sciences; ARTS – Arts and Humanities; ECON – Economics, Econometrics and Finance; ENVI – Environmental Science; COMP – Computer Science; EART – Earth and Planetary Sciences; ENGI – Engineering; BUSI – Business, Management and Accounting; AGRI – Agricultural and Biological Sciences; ENER – Energy; MEDI – Medicine; DECI – Decision Sciences; PSYC – Psychology.

Source: Scopus by Elsevier

Before the full-scale invasion, social and humanitarian topics prevailed among all scientific publications, and a significant proportion of research was also devoted to economic and ecological subject areas. In the period 2022–2023, the subject structure of research has undergone certain changes, namely, after social sciences, economic (in particular, Economics, Econometrics and Finance), humanitarian and medical subject areas have become priority areas. At the same time, the volume of such research, as already noted, has increased significantly.

There have also been some noticeable changes in the research of Ukrainian scientists. If in 2020–2021 the majority of scientific papers dealt with social, humanitarian, economic and environmental issues, then in 2022–2023 social, medical and economic research prevailed (the economic one included Business, Management and Accounting, Economics, Econometrics and Finance).

The breakdown of the number of analyzed publications by geographic feature is shown in Figure 3, with an additional selection of single country and multi country publications. In 2020–2021, the largest number of publications was observed by authors from Ukraine, the USA, Great Britain, Germany and Poland, and at the same time single country publications significantly prevailed. In the period of 2022–2023, the USA, Ukraine, Great Britain, China and Germany were the most active in the scientific field.

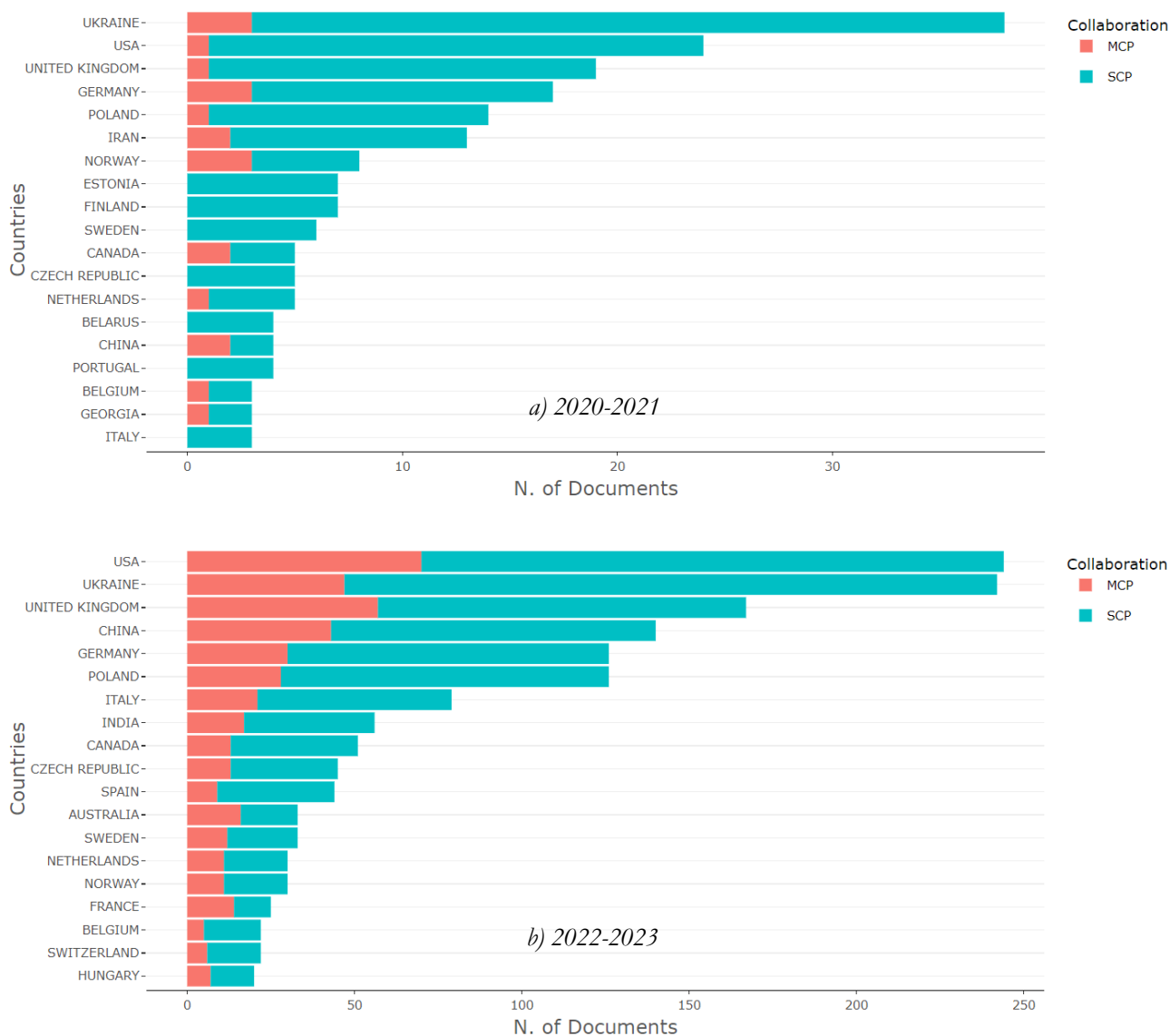


Figure 3. Structural analysis of scientific publications on the topic of the Russian-Ukrainian war according to the geographical area for 2020–2021 and 2022–2023 as of July 31, 2023

Note: * where MCP – Multi Country publications; SCP – Single Country Publications.

Source: biblioshiny

Since 2022, the areas of collaboration between Ukrainian scientists and colleagues from other countries have significantly strengthened and diversified. The collaboration network in general by thematic publications is shown in Figure 4. Ukraine has become a key node in this map, which unites numerous scientific studies from around the world. The formation of two powerful clusters is noted: the first is headed by Ukraine, the USA, Great Britain and mainly European countries, the countries of North and South America, China and Japan, etc., the second is from the countries of Asia and Africa.

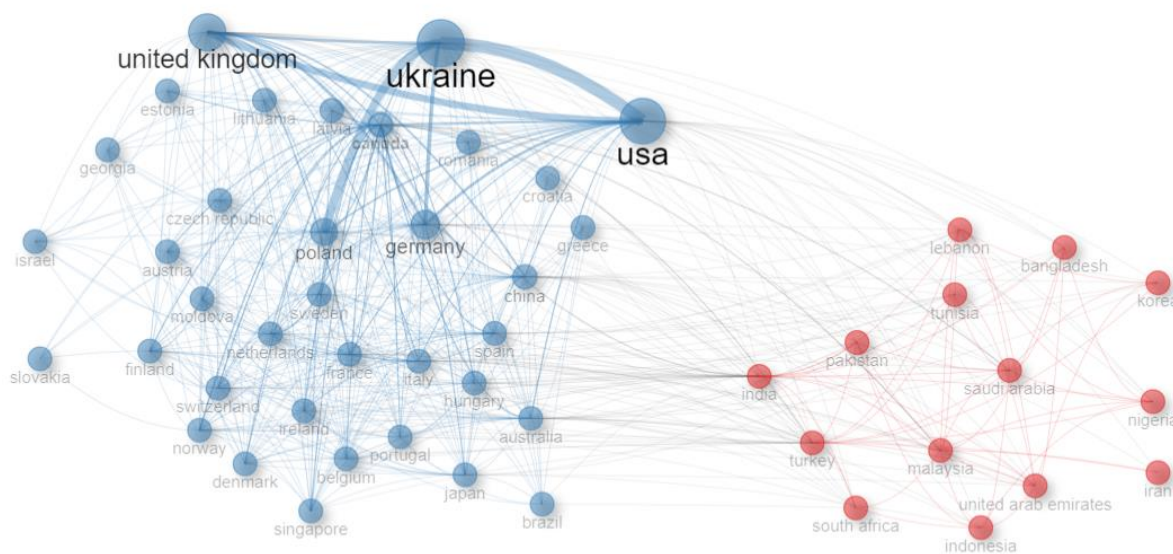


Figure 4. Collaboration network of countries for research on the Russian-Ukrainian war in the period 2022–2023 as of July 31, 2023

Source: biblioshiny

Given Ukraine’s central position in the topic of the Russian-Ukrainian war, further analysis is focused on the work of Ukrainian researchers.

Information on the number of publications on the researched scientific issues made in a particular university of Ukraine is given in Table 2. The structure of educational institutions has changed little over the two analyzed periods.

Table 2

Structural analysis of scientific publications on the Russian-Ukrainian war according to the top Ukrainian institutions for 2020–2021 and 2022–2023 as of July 31, 2023

Institutions	Documents 2020–2021	Webometrics Ranking in 2020	Institutions	Documents 2022–2023	Webometrics Ranking in 2023
National Academy of Sciences in Ukraine	12	–	Taras Shevchenko National University of Kyiv	65	2281
Taras Shevchenko National University of Kyiv	10	1,147	National Academy of Sciences in Ukraine	58	–
National University of Kyiv-Mohyla Academy	6	3,466	Lviv Polytechnic National University	38	3,024

V. N. Karazin Kharkiv National University	4	2,258	Ivan Franko National University of Lviv	19	3,067
National Academy for Public Administration under the President of Ukraine	4	19,283	Sumy State University	18	1,437
Petro Mohyla Black Sea National University	4	9,034	National University of Kyiv-Mohyla Academy	17	4,923
Yaroslav Mudryi National Law University	4	58,743	National Academy of Medical Sciences of Ukraine	17	–
Yuriy Fedkovych Chernivtsi National University	3	3,924	V. N. Karazin Kharkiv National University	16	2,868
West Ukrainian National University	3	2,422	Interregional Academy of Personnel Management	16	6,615
Mariupol State University	3	9,106	Bogomolets National Medical University	13	5,281

Source: Scopus by Elsevier

Higher educational institutions of Ukraine, whose employees have publications on the researched issues, form 12 clusters within the collaboration network of institutions (Fig. 5), which indicates a high level of cooperation between scientists not only at the national level, but also with colleagues from other countries and joining efforts for better dissemination of results. The biggest clusters include: The first cluster (brown) – Taras Shevchenko National University of Kyiv, National Aviation University, Mukachevo State University, Dnipropetrovsk State University of Internal Affairs, etc.; the second cluster (green) – Lviv Polytechnic National University, Bogomolets National Medical University, National University of "Kyiv-Mohyla Academy", etc.

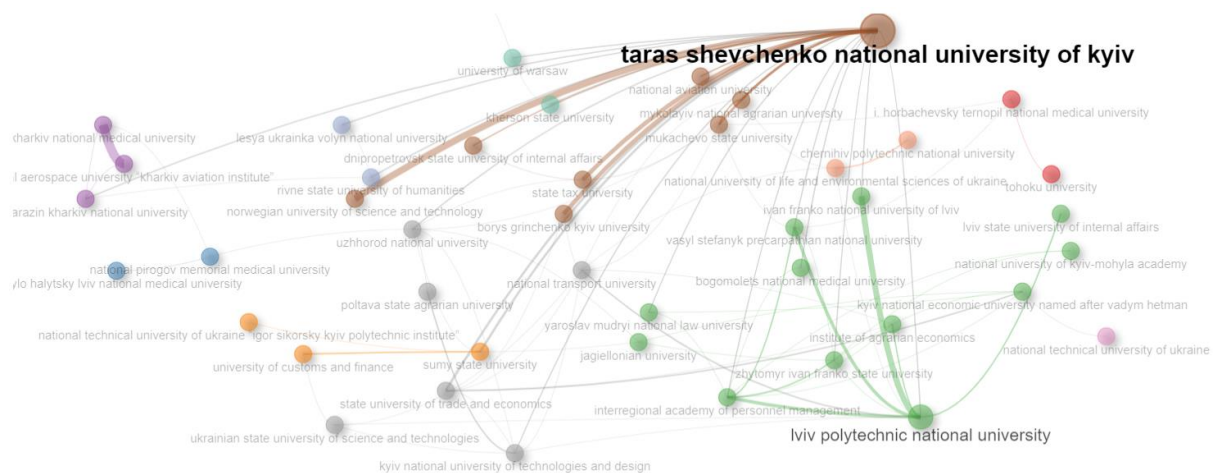


Figure 5. Collaboration network of institutions for research on the Russian-Ukrainian war in Ukraine in the period 2022–2023 as of July 31, 2023

Source: biblioshiny

The main areas of research of these universities and their affiliation with individual scientists can be conveniently considered using the Three-Field Plot. Based on the obtained data regarding the relationship between the most active institutions of higher education in Ukraine, their scientists and keywords characterizing their research (Figure 6), the following results were obtained. Most of the studies focus on the problems and consequences of the war in the country, in particular, the issues of refugees and forced mass migration, public and mental health, threats to food security.

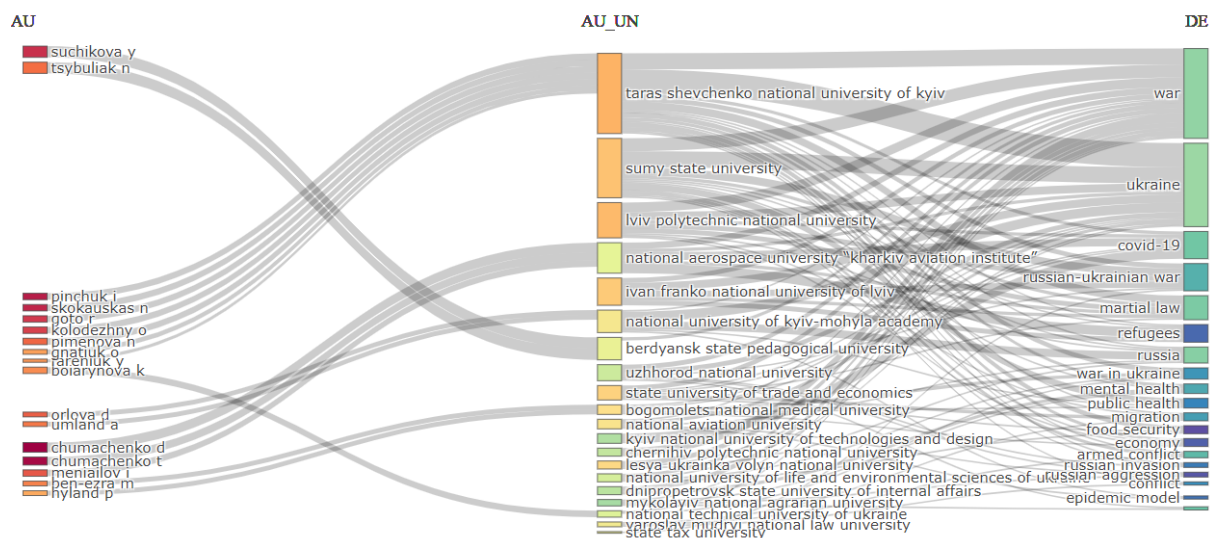


Figure 6. Three-Field Plot of authors (AU), institutions (AU_UN) and keywords (WE) on the topic of the Russian-Ukrainian war in Ukraine for 2022–2023 as of July 31, 2023

Source: biblioshiny

The analysis shows that the number of studies funded by various institutions has increased. In particular, in 2020–2021, only 3 studies were financed by the Ministry of Education and Science of Ukraine, 3 – Arts and Humanities Research Council (United Kingdom), and 2 more by the Canadian Institute of Ukrainian Studies. In 2022–2023, the situation changed significantly because of active funding and support

for research. The leading funding sponsors include the European Commission (15 studies), the Ministry of Education and Science of Ukraine (11), the National Research Foundation of Ukraine (7), and various organizations from Finland, the United States, Norway, etc.

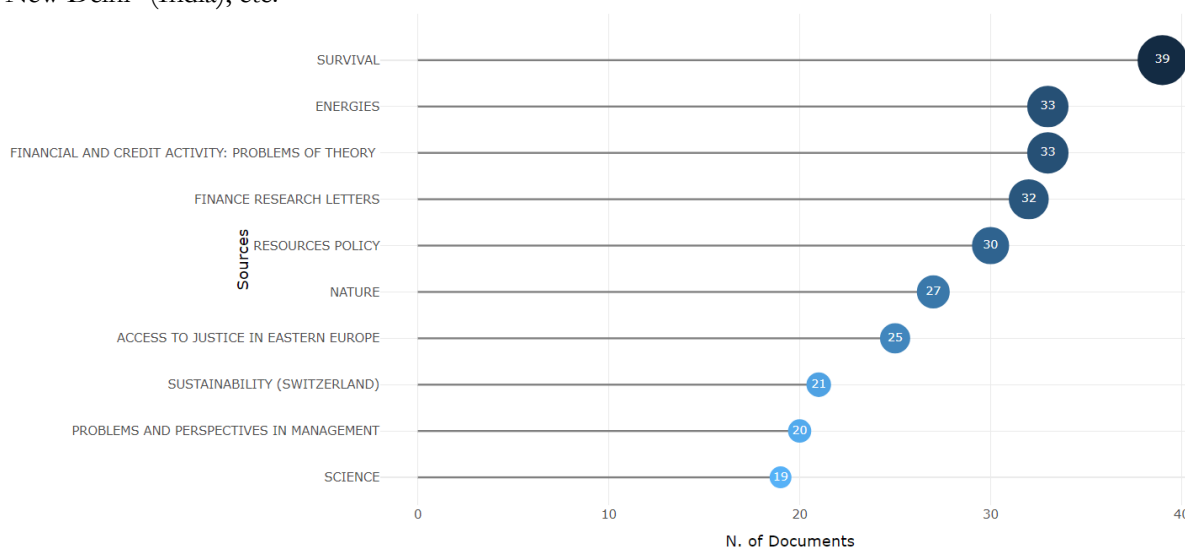
Table 3

Structural analysis of scientific publications on the topic of the Russian-Ukrainian war according to the main funding sponsors for 2020–2021 and 2022–2023 as of July 31, 2023

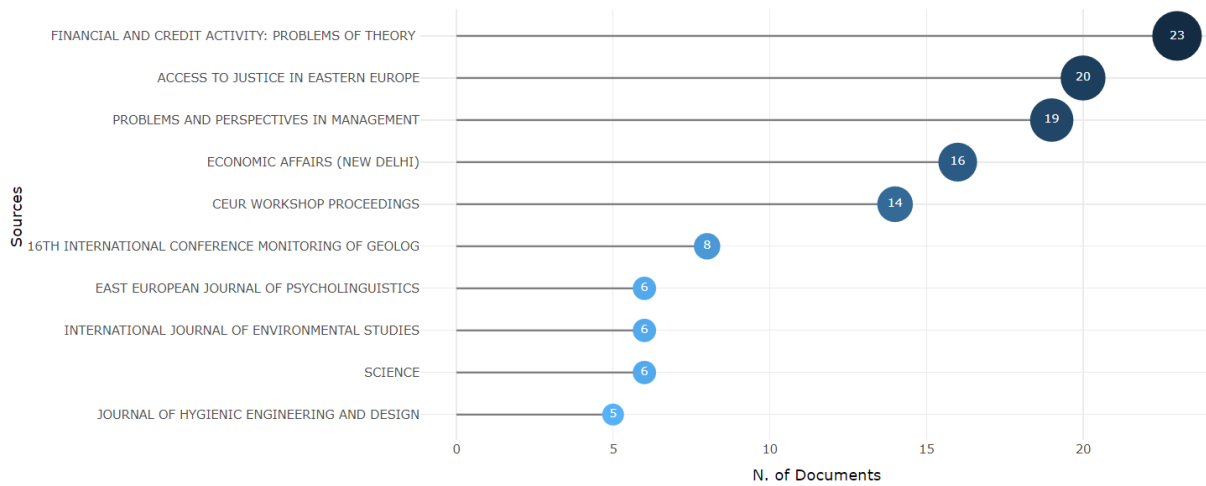
Funding sponsor	Documents	Funding sponsor	Documents
2020–2021		2022–2023	
Ministry of Education and Science of Ukraine	3	European Commission	15
Arts and Humanities Research Council	2	Ministry of Education and Science of Ukraine	11
Canadian Institute of Ukrainian Studies, University of Alberta	2	National Research Foundation of Ukraine	7
Akademie Věd České Republiky	1	Academy of Finland	3
British Academy	1	Erasmus+	3
China University of Mining and Technology	1	National Institute on Drug Abuse	3
Debreceni Egyetem	1	Norges Forskningsråd	3
Deutscher Akademischer Austauschdienst	1	North Atlantic Treaty Organization	3
Doctoral Program Foundation of Institutions of Higher Education of China	1	Volkswagen Foundation	3
Economic and Social Research Council	1	British Academy	2

Source: Scopus by Elsevier

The most significant publications publishing articles on the topic of the Russian-Ukrainian war are presented in Figure 7a, including Ukrainian publications in Figure 7b. The following publications are worth noting: "Survival" (United Kingdom), "Energies" (Switzerland), "Financial and credit activity problems of theory and practice", (Ukraine), "Finance Research Letters" (Netherlands), "Access to Justice in Eastern Europe practice" (Ukraine), "Problems and perspectives in management" (Ukraine), "Economic Affairs New Delhi" (India), etc.



a) World



b) Ukraine

Figure 7. The most relevant sources of publications on the Russian-Ukrainian war in the world and Ukraine for 2022–2023 as of July 31, 2023

Source: biblioshiny

Based on the data obtained, the analysis of the relationship between keywords of the most important studies, Ukrainian authors and sources of publications was carried out (Figure 8). The built Three-Field Plot makes it possible to ascertain that the issue of the war in Ukraine is considered from different angles in all analyzed sources of publications, having either a political or a socio-economic context.

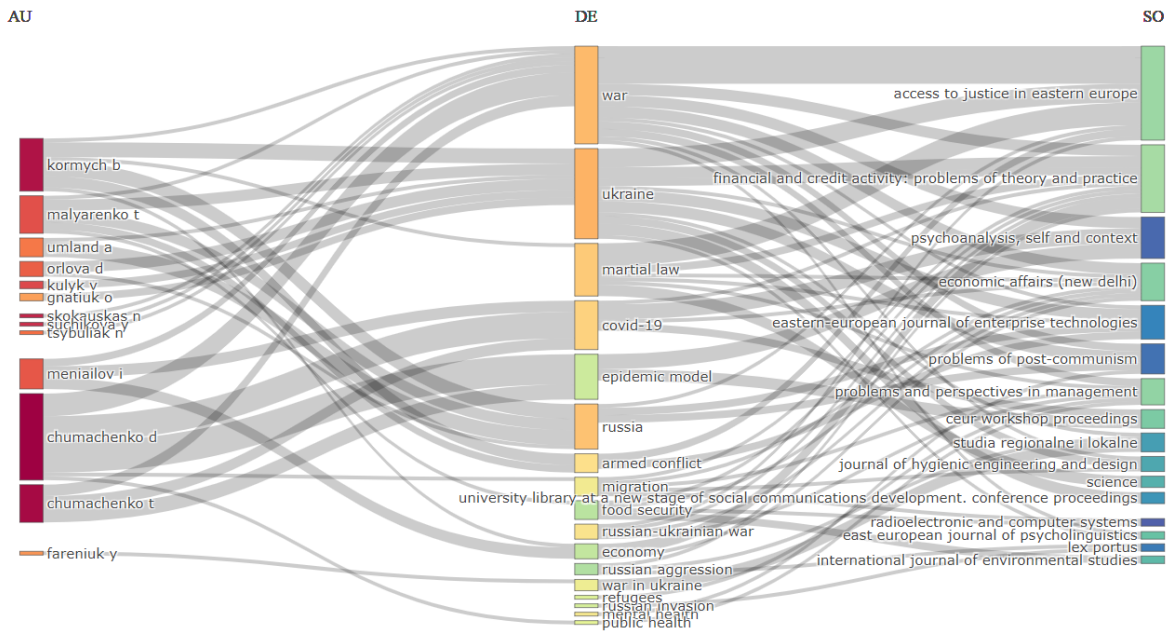


Figure 8. Three-Field Plot of authors (AU), keywords (DE) and sources (SO) on the Russian-Ukrainian war in Ukraine for 2022–2023 as of July 31, 2023

Source: biblioshiny

The most productive authors whose publications are devoted to the Russian-Ukrainian war in 2022–2023 as of July 31, 2023 are listed in Table 4. The largest number of publications belong to Chumachenko, D. from the Kharkiv Aviation Institute (Ukraine), as well as scientists from Israel (Ben-Ezra M.), India (Pandey D. K.), Ireland (Hyland P.), and others. In Ukraine, the most active scientists are Chumachenko T., Kormych B., Pinchuk I., Suchikova Y., and others.

Table 4

Top-10 authors on the topic of the Russian-Ukrainian war in 2022–2023 as of July 31, 2023

N	Author	Institution, country	Documents
World			
1	Chumachenko, D.	National Aerospace University “Kharkiv Aviation Institute”, Kharkiv, Ukraine	9
2	Ben-Ezra, M.	Ariel University, Ariel, Israel	7
3	Pandey, D. K.	Magadh University, Bodh Gaya, India	7
4	Hyland, P.	Maynooth University, Maynooth, Ireland	6
5	Skokauskas, N.	World Psychiatric Association, Thonex, Switzerland	6
6	Chumachenko, T.	Kharkiv National Medical University, Kharkiv, Ukraine	5
7	Goodell, J.W.	University of Akron, Akron, United States	5
8	Goto, R.	The University of Tokyo Hospital, Tokyo, Japan	5
9	Ha, L.T.	National Economics University Hanoi, Hanoi, Viet Nam	5
10	Karatzias, T.	Edinburgh Research & Innovation Centre for Complex and Acute Mental Health Problems, Edinburgh, United Kingdom	5
Ukraine			
1	Chumachenko, D.	National Aerospace University “Kharkiv Aviation Institute”, Kharkiv, Ukraine	9
2	Chumachenko, T.	Kharkiv National Medical University, Kharkiv, Ukraine	5
3	Kormych, B.	National University “Odessa Law Academy”, Odesa, Ukraine	5
4	Pinchuk, I.	Taras Shevchenko National University of Kyiv, Kyiv, Ukraine	5
5	Suchikova, Y.	Berdiansk State Pedagogical University, Berdyansk, Ukraine	5
6	Kolodezhny, O.	Taras Shevchenko National University of Kyiv, Kyiv, Ukraine	5
7	Kulyk, V.	Kuras Institute of Political and Ethnic Studies of the National Academy of Sciences of Ukraine, Kyiv, Ukraine	4
8	Malyarenko, T.	National University “Odessa Law Academy”, Odesa, Ukraine	4
9	Meniailov, I.	V. N. Karazin Kharkiv National University, Kharkiv, Ukraine	4
10	Orlova, D.	National University of Kyiv-Mohyla Academy, Kyiv, Ukraine	4

Source: Scopus by Elsevier

It is important to establish the closeness of the relationship between keywords, clustering arrays of scientific publications by the level of closeness, highlighting key ideas, structural gaps using InfraNodus software integrated with artificial intelligence.

The most significant ideas (clusters of nodes) within the studied mass of publications in terms of scientists in general and Ukrainian ones were considered as in the case of Scopus and Bibliometrix instruments for the period 2020–2021 and 2022–2023 as of July 31, 2023 (Figures 9, 10).

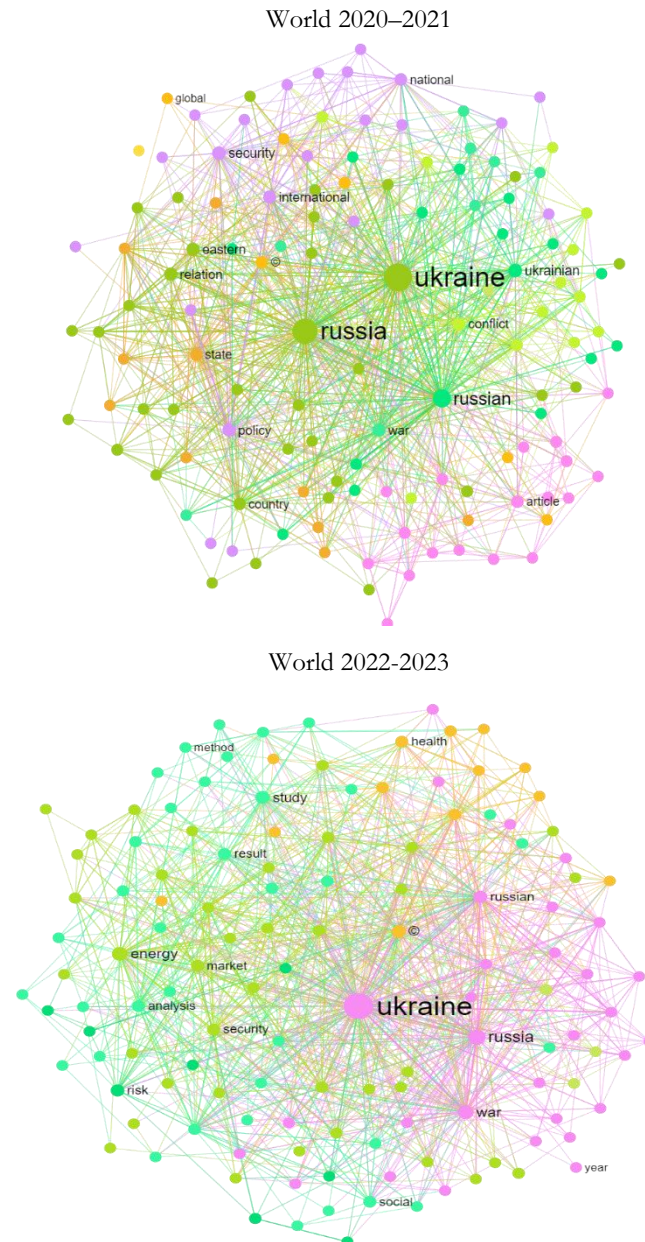


Figure 9. Worldwide publications on the topic of the Russian-Ukrainian war: qualitative analysis of abstracts and keywords on the mind map in 2020–2021 and 2022–2023 as of July 31, 2023

Source: InfraNodus tools

During the two analyzed periods by publications in general (2020–2021, 2022–2023), there is a shift in keywords, the closeness between them (co-occurrence) and the prevailing cluster. In general, the emphasis is shifted from the application of the concept of military conflict to the designation of events as a full-scale war and security issues by types of security. The emphasis was similarly shifted in the works of Ukrainian

scientists. If before the start of a full-scale invasion, keywords such as aggression, armed conflict, hybrid war prevailed, then in 2022–2023 the concept of war (war, war crimes, martial law) and issues related to disinformation, national identity, geopolitical aspects of the war, became widely used.

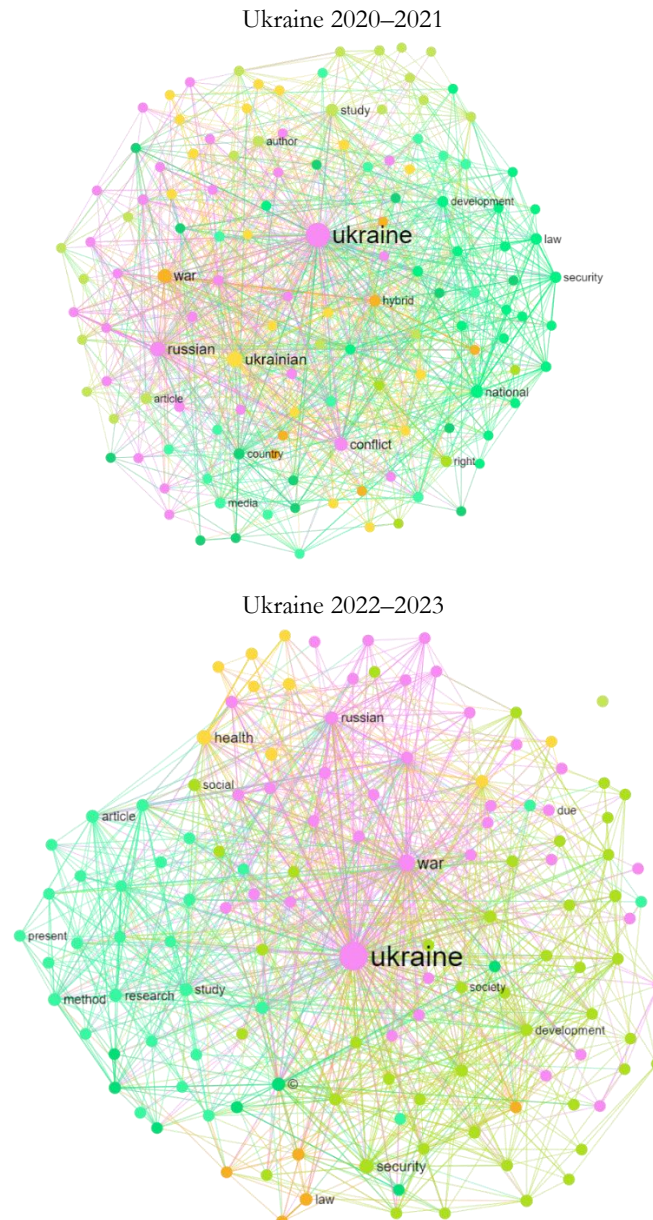


Figure 10. Ukrainian publications on the Russian-Ukrainian war: qualitative analysis of abstracts and keywords on the mind map in 2020–2021 and 2022–2023 as of July 31, 2023

Source: InfraNodus tools

A peculiar feature in the formation of the specified clusters of publications (Table 5) when importing arrays of publications indexed in Scopus is the preliminary cleaning of these graphs from the most influential nodes, such as Ukraine (Ukrainian) and Russia (Russian), which allows identifying latent clusters and publication ideas. In addition, unlike Biblioshiny, the analysis carried out using InfraNodus includes

mechanisms for extracting key nodes and filtering arrays of publications by keywords (author's and automatic, added during indexing), and, most importantly, by abstracts (annotations) of articles.

Quantitative characteristics of clusters measured by the indicators of influence, the number of nodes and the share of connections between them, testify in favor of the results presented on the mind map.

Before the full-scale invasion of Russian troops into Ukraine, clusters of studies of the Russian-Ukrainian conflict (23% of influence), in the context of international politics, collaboration and threats to international security (20%), as well as EU and NATO policies, sanctions (19%), were dominant in world science. The issue of strategic directions of Russian-Ukrainian relations, and the language issue were not as important as the interpretation of the conflict as a hybrid war (Pacek & Truszczyński, 2020), the consequences of the annexation of Crimea and the post-Soviet context.

Table 5

Cluster analysis of publications on the topic of the Russian-Ukrainian war in 2020–2021 and 2022–2023 as of July 31, 2023

Topical Cluster	Influence %	Total nodes	% of Entries	Category	Keywords
World 2020–2021					
1	23%	17	12%	Conflict	conflict, political, media, conflict political, economic, military, media, social, crisis, activity, view, action, group, situation, process, remain, force, change, development, armed conflict
2	20%	21	11	Security and international policy	security, international policy, national, relation, law, information, community, legal, support, cooperation, identity, interest, level, challenge, order, threat, system
3	19%	24	23	European and NATO policy	policy, European, country, eastern, union, EU, central, energy, Europe, western, sanction, gas, Poland, territory, NATO, border, government
4	11%	16	24%	Strategic relation and language	Ukraine-Russia relation, state, region, united, strategic, role, important, power, factor, influence, lead, narrative, population, position, language
5	10%	14	7%	Hybrid War, and Crimea	war, soviet, post, republic, world, hybrid, Crimea, people, Belarus, Georgia, event, period
World 2022–2023					
1	59%	31	10%	Russian-Ukrainian war	war, change, population, aggression, threat, crime, large, invasion, sanction, society, government, support, refugee, world, federation, effect, context, military, February, conflict
2	15%	39	7%	Energy and Food Market Security	energy, market, security, policy, gas, crisis, nuclear, system, price, global, oil, food, increase, trade, financial, EU, management, current, interest, China, strategy, future, supply, western, power
3	8%	13	3%	Human Rights, and Health	health, international, right, human, law, reserved, relation, problem, public, resource, potential
Ukraine 2020–2021					
1	52%	34	44%	Russian-Ukrainian military conflict	conflict, part, political, event, region, case, crisis, armed, economic, Crimea, aggression, occupation, military, discourse, territory, potential, force, significant, Donbas, eastern, east, territorial

Topical Cluster	Influence %	Total nodes	% of Entries	Category	Keywords
2	12%	18	14%	Ukrainian community and language	historical, community, policy, state, population, memory, relation, society, revolution, language, people, narrative, life
3	12%	22	17%	National security, cultural and legal issue	national, security, law, development, cultural, legal, information, education, government, public, problem, threat, challenge
4	9%	7	3%	Hybrid war	war, hybrid, influence, context, world, warfare
Ukraine 2022–2023					
1	60%	37	49%	Russian-Ukrainian war	war, invasion, aggression, military, martial law significant, increase, territory, armed, covid, population, people, community, world, conflict, scale, challenge, impact, period, post, create, cause
2	13%	43	26%	Security and crisis	security, economic, level, social, ensure, food, management, energy, national, policy, crisis, environmental, effective, enterprise, water, , potential, function, current, implementation, context, threat, resource, activity, strategy, society, economy, sector, political, media, including, global, situation, information, business, support, financial

A significant change in the influence of clusters occurred after the start of the full-scale invasion: in the international and Ukrainian publications in 2022–2023 the corresponding cluster covers the majority of entries and also has a significantly higher percentage of the cluster weight than the year before – 52% for the world and 60% for Ukraine.

The trend for the second cluster is similar. For both sets of publications it concerns security issues, primarily energy and food, crises in supply chains and international politics (15% in both cases). The only difference is a detailed analysis of human rights and health issues in all publications in general (8%), which do not have such a significant impact in the scientific sources of Ukrainian authors. This is explained by the fact that scientific publications by Ukrainian authors are mainly focused on finding ways to end the war and various types of support for Ukraine (financial, informational, cultural).

The analysis of structural gaps (latent ideas that bring together the most distant nodes and clusters) for each of the arrays of publications (the world and Ukraine 2020–2021; 2022–2023) shows the need to develop effective solutions to end the Russian-Ukrainian war and overcome its consequences:

- 1) stabilization of contours of international security and politics (publications in general, 2020–2021);
- 2) termination of the hybrid war and the European integration policy (publications of Ukrainian authors, 2020–2021);
- 3) ending the Russian-Ukrainian war and overcoming its economic and security consequences at the global level (publications in general, including Ukrainian authors, 2022–2023).

The identified gaps as important points of change in the narrative can be the basis for the further work of scientists in the direction of the post-war reconstruction in Ukraine.

The analysis of narratives as methods for the interpretation of ideas presented by scientists in the array of publications in general and publications by Ukrainian authors (Fig. 11) by means of Detrended Fluctuation Analysis of Narrative Influence Propagation indicates a transition to a clear understanding of the essence, limits, and consequences of the Russian-Ukrainian war. This transition is accompanied by the crystallization of relevant thematic lemmas (as automatic units in the linguistic corpus – stable concepts).

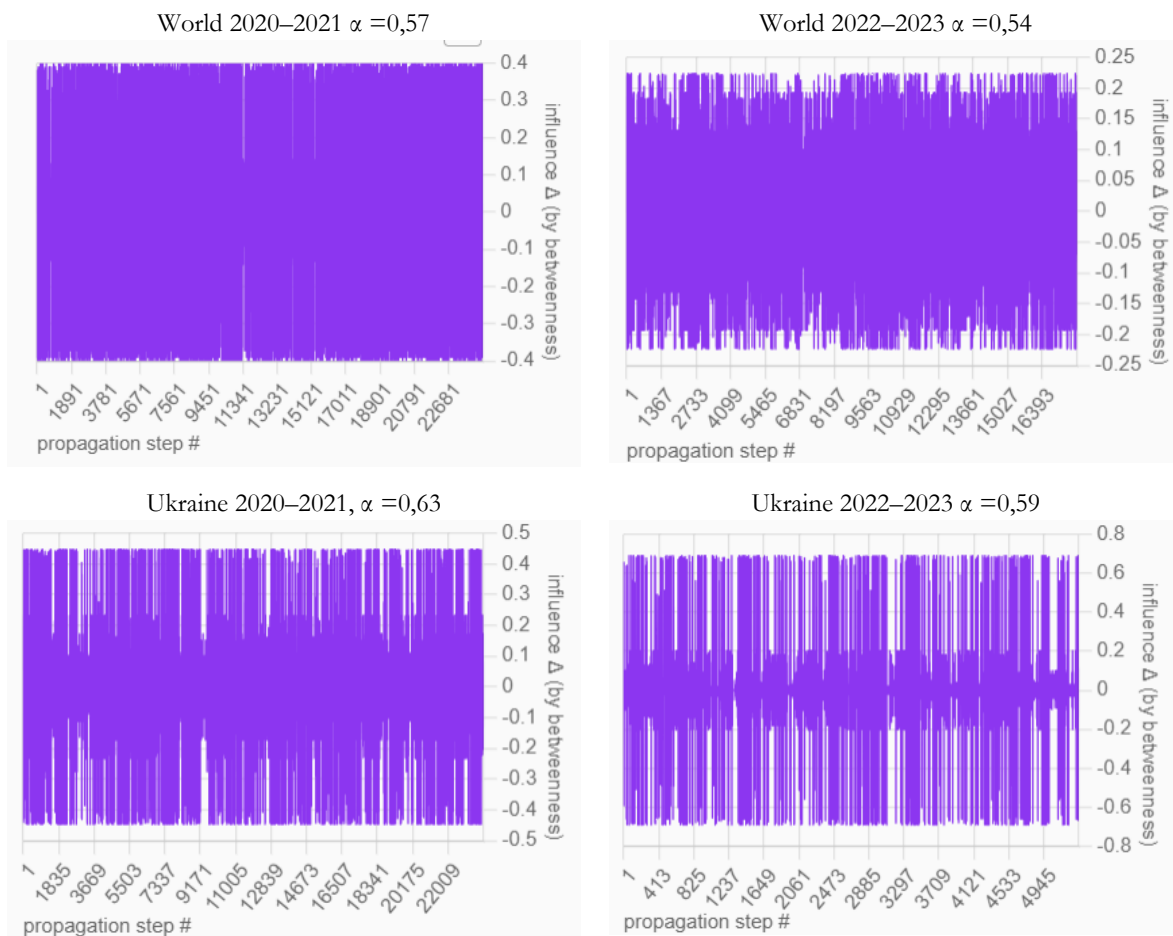


Figure 11. Narrative Influence Propagation in scientific publications on the topic of the Russian-Ukrainian war in 2020–2021 and 2022–2023 as of July 31, 2023

Source: InfraNodus

These graphs are designed to analyze the spread in the influence of narratives according to the relevant arrays of publications and to show how the influence changes its significance (axis Y) according to the chronology of the array of lemmas (step by step within the array). The more even and rhythmic this distribution is, the stronger is the central idea expressed by scientists. The measure of this variability is the correspondence index α , (identical in interpretation to the Hurst exponent in fractal analysis), the critical value of which must be $\alpha \leq 0,5$ or less). If the inequality $\alpha \geq 0,5$ holds, the higher the value of α exceeds 0,5, the smaller the reliance on key concepts and the greater the role of minor thematic clusters in the narrative.

CONCLUSIONS

The paper examines the main trends in the formation of the scientific landscape of the international and Ukrainian scientific works devoted to the topic of the Russian-Ukrainian war in the context of the unprecedented growth of support for Ukrainian researchers from the global scientific community and increased attention of this community to the topic of war.

Different emphases and thematic focus, as well as a significant increase in both special issues of scientific journals and individual scientific publications, emphasize the need for bibliometric analysis. The methodological toolkit includes in-built Scopus instruments, Bibliometrix R package and Biblioshiny App, InfraNodus. The key feature in the formation of search queries in the Scopus database for 2014–2023 is the consideration of international documents devoted to certain manifestations of war.

The analysis of publications indicates an increase in the number of publications related to this war after February 24, 2022; the structural analysis shows the prevalence of publications from social, medical, and economic sciences. The study of areas of institutional cooperation shows the strengthening of external sponsorship support and the diversification of the ways of collaboration between Ukrainian scientists and colleagues from other countries with the formation of two powerful clusters: the first is headed by Ukraine, the USA, Great Britain and mainly the EU countries, the second – with the countries of Asia and Africa.

The thematic analysis confirms the focus of research on the problems and consequences of war, in particular, the issues of refugees and forced mass migration, threats to food security, life and health of the population.

The results indicate a growing interest in the problems of the Russian-Ukrainian war in the writings of not only Ukrainian scientists, but also researchers from other countries. At the same time, the periods 2020–2021 and 2022–2023 are characterized by a significant shift in focus from the interpretation of the studied events as a conflict towards their understanding as a full-scale war. This fact is confirmed by the results of cluster analysis as well as the analysis of narratives and sentiments.

Ending the Russian-Ukrainian war, overcoming its devastating consequences and finding effective ways of post-war reconstruction in all spheres of life in Ukraine, increasing guarantees of international security and minimizing threats to energy and food security at the global level are the basis for eliminating structural gaps in scientific research.

The prospect of further research in this field is to use as a basis for bibliometric analysis not only articles indexed in the Scopus database, but also the inclusion of other research sources.

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