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The Scientometric Overview of the Economics Disciplines Publications in Kazakhstan in 1997-2022

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ABSTRACT

This article gives an overview of the economics disciplines publications in Kazakhstan indexed in the Scopus database in the period from 1997 to 2022. The literature provides an outlook on scientometrics research that can be used for the analysis of specific research fields. Scientometrics methods used in this article identify the state of the research in economics disciplines in Kazakhstan, explicitly focusing on descriptive analysis such as distribution by number of articles, number of journals, number of authors per article, number of citations, number of citations per article and distribution of articles across journals. By using the network analysis and VosViewer software, links and connections within economics discipline publications were identified. Descriptive results of the study identify that across all economics disciplines "Economics, Econometrics, and Finance" has the largest number of publications. In contrast "Business, Management, and Accounting" has the most significant number of authors. The network analysis demonstrated weaker links in "Decision sciences" while in "Economics, Econometrics, and Finance" and "Business, Management, and Accounting" the relationship is closer and more interconnected in the subject areas. The analysis of scientific journals identified the quality of publications and type of journals where papers are published as well as the highest cited papers in the economic disciplines affiliated with Kazakhstan. Conclusions and recommendations suggest that internal processes and scientific infrastructure at universities aimed to improve the quality of publications will increase the interest in research published in Kazakhstan in the global scientific community and have practical implications for the economy.

KEYWORDS: Economy, Scientometrics, Descriptive Statistics, Economics Discipline, Scientific Infrastructure, Network Analysis

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ТҮЙІН

Бұл мақалада 1997 жылдан 2022 жылға дейін Scopus деректер базасында индекстелген Қазақстандағы экономикалық пәндер бойынша жарияланымдарға шолу жасалды. Әдебиеттерді шолу белгілі бір аймақтарды талдау үшін пайдаланылуы мүмкін ғылымиметриялық зерттеулер туралы ақпаратты береді. Осы мақалада қолданылған ғылымиметриялық әдістер мақалалар саны, журналдар саны, мақалалар саны бойынша үлестірілуі, бір мақаладағы авторлар саны, бір мақалаға жасалынған сілтемелер саны және журналдар бойынша мақалалардың талдауға назар аудара отырып, Қазақстандағы экономикалық пәндер бойынша зерттеулердің жағдайы анықталды. Желілік талдау және VosViewer бағдарламалық құралын пайдалану арқылы экономикалық пәндер бойынша жарияланымдардың өзара байланысы табылды. Зерттеудің сипаттамалық нәтижелері барлық экономикалық пәндердің ішінде «Экономика, эконометрика және қаржы» ең көп жарияланымдарға ие, ал «Бизнес, менеджмент және есеп» ең көп авторлар санына ие екенін көрсетті. Ғылыми журналдарды талдау мақалалар сапасы мен журналдардың түрін, сондай-ақ Қазақстанға қатысты экономикалық пәндер бойынша ең көп сілтеме жасалған мақалаларды анықтады. Қорытынды мен ұсынымдар басылымдардың сапасын арттыруға бағытталған университеттердің ішкі процестері мен ғылыми инфрақұрылымы Қазақстанда жарияланған зерттеулерге әлемдік ғылыми қоғамдастықта қызығушылықты арттырып, экономика үшін практикалық маңызы бар екенін көрсетеді.

ТҮЙІН СӨЗДЕР: экономика, ғылымиметрия, сипаттамалық статистика, экономикалық пәндер, ғылыми инфрақұрылым, желілік талдау

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Наукометрический обзор публикаций по экономическим дисциплинам в Казахстане в 1997-2022 гг.

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АННОТАЦИЯ

В данной статье представлен обзор публикаций по экономическим дисциплинам в Казахстане, индексируемых в базе данных Scopus в период с 1997 по 2022 год. В литературном обзоре представлена информация по наукометрическим исследованиям, которые могут быть использованы для анализа конкретных областей. Методы наукометрии, использованные в данной статье, определяют состояние исследований по экономическим дисциплинам в Казахстане, уделяя особое внимание описательному анализу, такому как распределение по количеству статей, количеству журналов, количеству авторов на статью, количество цитирований, количество цитирований на статью и распределение статей по журналам. С помощью сетевого анализа и программного обеспечения VosViewer были выявлены связи в публикациях по экономическим дисциплинам. Описательные результаты исследования показывают, что среди всех экономических дисциплин «Экономика, эконометрика и финансы» имеет наибольшее количество публикаций, а «Бизнес, менеджмент и бухгалтерский учет» имеет наибольшее количество авторов. Сетевой анализ показал более слабые связи в «Науках о принятии решений», тогда как в «Экономике, эконометрике и финансах» и «Бизнесе, менеджменте и бухгалтерском учете» связь более тесная и взаимосвязана в предметных областях. Анализ научных журналов определил качество публикаций и тип журналов, в которых публикуются статьи, а также наиболее цитируемые статьи по экономическим дисциплинам, связанные с Казахстаном. Выводы и рекомендации свидетельствуют о том, что внутренние процессы и научная инфраструктура университетов, направленная на повышение качества публикаций, повысят интерес к исследованиям, опубликованным в Казахстане, в мировом научном сообществе и будут иметь практическое значение для экономики.

КЛЮЧЕВЫЕ СЛОВА: экономика, наукометрия, описательная статистика, экономические дисциплины, научная инфраструктура, анализ сети

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Introduction

The development of scientometrics as a research field enabled the use of its approaches to evaluate the level of scientific development in various research fields. This helped to assess research publications, demonstrate the growth or decline of research fields, and predict possible development scenarios to create a comprehensive approach towards evaluating the science and scientific potential of certain research areas separately and as a whole science system. The growth of publication activity and science development is closely associated with the country's economy, especially research in the economics disciplines that are directly related to the economy and economic activities. In this case, scientometric analysis as a tool that is aimed to analyze research areas is targeted not only at studying the areas but also towards identifying areas that have the most potential for further development with further implications to the country's economy.

Since joining the Bologna process, especially in recent years, the development of science in Kazakhstan has been a priority. Scientometric study on Kazakhstan science is essential and aligns with the government's goals. This is reflected in government policies and programs such as "The concept of development of higher education and science in the Republic of Kazakhstan for 2023-2029", which focuses on the development of science and growth of publication activities with further potential to commercialise the results for country's economic growth. While research in the economics disciplines publications is essential to understand the trends in research, it could also be used in the economy of a country for deeper economic analysis and identification of strategic trends and topic. Various scientometrics methods such as descriptive statistics, network analysis help to investigate and define the current state of the research, and develop understanding and trends of research on several levels.

The scientific significance of this research lies in a detailed analysis of economics disciplines using the Scopus database and scientometrics tools to review subject areas from 1997 till 2022. The research aims to give an overview and investigate current trends and perspectives on the development of economic disciplines in Kazakhstan for its further contribution to the country's economy. Firstly, it is beneficial for understanding notions and trends in the subject area. Secondly, scientometric tools help define the quality of a relationship within the subject area. Thirdly, research in economics disciplines might have potential economic implications on a country's economy.

Literature review

Scientometrics as a field was developed in 1969 by the research of Nalimov and Mulchenko (1969). Several researchers identified scientometrics as a tool that helps identify the relationship in research fields (Zhu et al., 2021). Scientometrics allows to demonstrate the evidence of scientific development in a particular field and evaluate its current state (Narbaev & Amirbekova, 2021). Moreover, several studies identified that scientometric analysis as a useful in providing general and broad overview of the research field to gather important data on the structure and trends that exist (Darko et al., 2019).

This perspective allows the use of scientometrics to evaluate in-depth the trends of development in a particular research field. Scientific development in the country is directly related to the economic development and advancements. In this regard, economics research not only demonstrates the overall trends in a particular research area but also explains the notions and topics that are relevant to the country.

In the current study, it is essential to give an overview of scientometrics tools that can be used to evaluate the state of economics disciplines in Kazakhstan. Dragos et al. (2014) used a scientometric approach to evaluate the productivity of science in economics and business. Zhao et al. (2016) evaluated the field of economics by applying scientometrics and network analysis methods to identify funding and collaboration. Previous studies on Kazakhstan used Lotka's law to evaluate the maturity level of Kazakhstan science (Narbaev & Amirbekova, 2021). The scientometric analysis to evaluate specific research fields could be performed using CiteSpace or VosViewer. Several studies used such tools to visually demonstrate the network's density and perform co-word analysis and cluster analysis of the research field for detailed understanding and evaluation. In the study of the financial sector Lopez-Medina et al. (2022) performed an analysis of financial behavior using the VosViewer software. In the study of solar energy research in business economics Noor et al. (2023) applied scientometrics methods to investigate trends in the field, identify publication and citation trend, top countries by publication in the field, perform co-citation analysis, cluster analysis, top authors in the field. Scientometrics as a tool allows the execution of detailed citation analysis across the field. Kapeller et al. (2017) performed an analysis of citation pat-

terns in economics by evaluating citation networks across journals.

In Kazakhstan, scientific research was conducted by several authors. Suluimanov et al. (2009) evaluated international publications of scientists from Kazakhstan in 1991-2008. It was identified that the citation rate across all fields significantly increased between 1996-2000, with the most considerable number of publications in physics and chemistry. Kuzhabekova and Lee (2018) evaluated the contribution of international faculty to the local research capacity in Kazakhstan. The findings identified that international faculty extend and broaden the research network and help integrate universities into global science. Smagulov et al. (2018) evaluated publication activity of authors from Kazakhstan and identified an average citation of a journal article, publication in conference proceedings and other types of publications across Kazakhstan scientists. Moreover, this paper mentioned the problem of predatory journals that existed in the mid-2010s. The research by Sultangazin et al. (2018) identified publication trends by research areas, collaborating countries in Kazakhstan science in 2012-2016 based on the Scopus database. Focusing on higher education as a contributor to publications and scientific activities, research by Kudaibergenova et al. (2021) and Abdramanova et al. (2019) focused on universities. An in-depth analysis of publications in KazNU named after al-Farabi was performed in a study by Kudaibergenova et al. (2021). The study examines the case of the publication management system at the university and the mechanisms that stimulated the research activity. In contrast, Abdramanova et al. (2019) focus on the entrepreneurial education, which is linked to the development of business on a country level and highlights the importance of the further development of research within the university.

Since gaining independence, the importance of science was highlighted at the government level. Bologna process reforms and the introduction of Ph.D. degrees, requirements for scientific degrees and awards, grant funding requirements all of this contributes to the growth in publication activity (Amirbekova et al., 2022). Recent changes happening on the country level bring focus on research such as creation of the separate ministry for Science and Higher Education, new role of the Academy of Science, and government program such as "The concept of development of higher education and science in the Republic of Kazakhstan for 2023-2029" and introduction of 500 scholars fellowship program for scientists. According to the "The Concept of development of higher education and science in the Republic of Kazakhstan for 2023-2029", creation of the favorable conditions for scientists is a priority and goal to stimulate the effectiveness of national science.

However, there is a research gap in the economics fields of Kazakhstan. As a country's economy plays an important role, it is vital to evaluate science potential in this area too. The research in the economics field is becoming more important and should be relevant in today's challenging economic time.

Methodology

To identify the current state of the economic disciplines based on scientometric data we used descriptive statistics and network analysis. The data was collected using the Scopus database. Statistical descriptive analysis was used to get an overview of the main quantitative characteristics associated with research papers. In order to visualize the current state of economic discipline, the VosViewer was used as a tool that demonstrates networks in studied research fields. We identified economics disciplines from three subject areas of the Scopus database such as "Economics, Econometrics and Finance" (EEF), "Business, Management and Accounting" (BMA), and "Decision Sciences" (DS).

The data for analysis was collected from Scopus using an advanced query tool, limiting the search country to Kazakhstan, document type to article, source type to journal, article language to English, year of publication till 2022 and selecting those mentioned above three subject areas. The following query has been used:

AFFILCOUNTRY (KAZAKHSTAN) AND PUBYEAR > 1999 AND PUBYEAR < 2023 AND (LIMIT-TO (SUBJAREA , "ECON")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j"))

AFFILCOUNTRY (KAZAKHSTAN) AND PUBYEAR > 1996 AND PUBYEAR < 2023 AND (LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j"))

AFFILCOUNTRY (KAZAKHSTAN) AND PUBYEAR > 1996 AND PUBYEAR < 2023 AND (LIMIT-TO (SUBJAREA , "DECI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")).

The raw data was retrieved from Scopus, and then imported from CSV format to Excel for

further analysis. A total of 4,676 documents were retrieved: 2,194 documents in EEF, 2,052 documents in BMA, 430 documents in DS. To calculate the number of authors the data from Author(s) IDs were used. Using text to columns tool, each author(s) IDs was separated into individual cells and using a formula based on the FREQUENCY and SUM functions, unique author(s) IDs were counted.

As per network analysis, we used VosViewer software to visualize the network in local articles by subject area. A map was created based on bibliographic data from a Scopus database file. A co-occurrence type of analysis was conducted based on author keywords with a complete counting method. The default value of five occurrences was chosen.

Table 1 describes the research steps by summarizing actions taken and results.

Table 1 - Research approach summary

Step	Actions and Results
1. Data collection	Action: source articles from Scopus in subject areas: EEF, BMA and DS that are affiliated with Kazakhstan, published in English, in journals and from 1991 to 2022 Results: 4,676 documents were retrieved: 2,194 documents in EEF, 2,052 documents in BMA, 430 documents in DS
2. Descriptive analysis	Action: Present articles by year of publication. Analyse their distribution by number of articles, number of journals, number of authors per article, number of citations and number of citations per article. Analyse the distribution of articles across journals. Results: The distribution of articles published during 2012–2022, 2,194 EEV articles published during 2000–2022, 2,052 BMA articles published during 1997–2022, 430 DS articles published during 1997–2022 (Figure 1); the distribution of the articles, authors, and citations across all subject areas (Table 2); the top 10 primarily published journals for each subject area (Table 3);
3. Network analysis	Action: Create a keyword co-occurrence network for all subject areas VosViewer. Define their critical attributes, including the number of keywords, links, clusters, and most representative keywords. Results: A keyword co-occurrence network for all three subject areas (see Figures 2, 3, 4)

Note: compiled by authors

Results and discussion

The beginning of publication activity in economics disciplines by authors affiliated with Kazakhstan fell in 1997. The first article, "Business Education in Kazakhstan: Ramifications under Transition" was featured in the Journal of East-West Business. According to distribution over time, a significant number of contributions have been published in 2018 and 2022 (721 and 690 papers, respectively). Prior to 2012, a limited number of articles had been written, precisely only 20 papers. Publication trends in Economics, Econometrics and Finance (EEF) have started to rise since 2012, while Business, Management and Accounting (BMA) has seen a similar trend since 2016, and Decision Sciences (DS) has seen growth, starting from 2017. The distribution of articles affiliated with Kazakhstan in the Scopus database is presented in Figure 1.

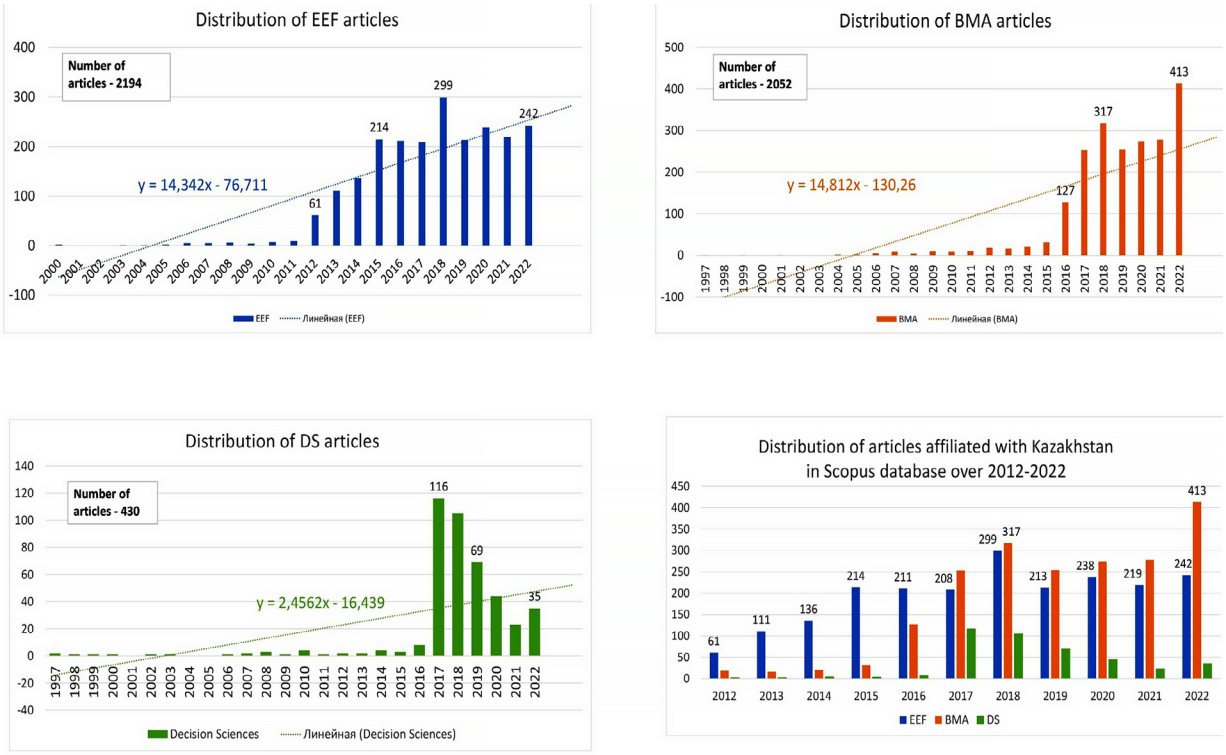

Figure 1 - Distribution of articles affiliated with Kazakhstan in Scopus database over time

Note: compiled by authors

All three subject areas have positive trendlines indicating research growth in respective fields. This growth trend in publication activity can be explained by the accession of Kazakhstan to the Bologna Process in 2010, which in turn triggered internationalization of education and science in the country. Reforms in the structure of degrees (bachelor, master and PhD studies) demanded more attention to research and scientific activity, contributing to the creation of an environment in which faculty and students were interested and needed to publish in international journals. When comparing the slopes, publication activity in EEF and BMA areas show similar growth patterns, with both areas experiencing consistent and relatively rapid growth over time. On the other hand, the trendline of DS has a much flatter slope, indicating a slower growth rate. This discrepancy suggests that EEF and BMA might attract greater research interest and engagement from Kazakhstani authors compared to DS. The peak number of articles in the field of DS was observed in 2017, but after that, publication activity decreased over the next five years. This might signal a lack of substantial interest in its development from the country's scientific community. It can also be explained by challenges associated with publication due to the lower availability of journals in this field. As of 2022 metrics, the Scopus database lists 1,381 journals in EEF, 1,835 journals in BMA and 519 journals in DS.

Table 2 provides a summary of descriptive analysis for three subject areas.

Table 2 - Distribution of the number of articles, authors, and citations, by subject areas

No.	Subject area	Number of articles	Number of journals	Number of authors	Number of authors per article	Number of citations	Number of citations per article
1	Economics, Econometrics and Finance	2194	281	4921	3,59	7591	3,46
2	Business, Management and Accounting	2052	331	5977	4,33	10271	5
3	Decision Sciences	430	95	1593	4,35	2711	6,3

Note: compiled by the authors

Most papers are published in EEF and BMA, about 46.92% and 43.88% of all papers in the dataset, respectively. The publication rates in EEF and BMA are almost identical. However, the overall number of authors and number of citations are the highest in BMA. The number of authors per article shows the intensity of collaboration between authors. This indicator is almost identical in DS (4.35) and BMA (4.33). The intensity is increased due to the articles with 144 co-authors in BMA and 105 co-authors in DS. The number of citations reveals the subject area with the most significant impact (Gasparyan et al., 2018). BMA has the highest number of citations, but DS has the highest number per article (6.3). These indicators are skewed in comparison to EEF, which has the lowest number of citations and number of citations per article, because of the articles with 730 citations in BMA and 612 citations in DS. If we exclude the two most cited articles, the number of citations per article in BMA and DS decreases to 4.65 and 4.89, respectively.

Table 3 - delves into the most cited papers with over 100 citations.

Table 3 - Most cited papers (more than 100 citations in Scopus)

Subject area	Title	Year	Source title (Subject area)	Cited by	Affiliations with Kazakhstan
Business, Management and Accounting	Culture-specific and cross-culturally generalizable implicit leadership theories: Are attributes of charismatic/transformational leadership universally endorsed?	1999	Leadership Quarterly (multidisciplinary)	730	University of Nebraska-Lincoln, Kazakhstan
Decision Sciences	Smoothing Parameter and Model Selection for General Smooth Models	2016	Journal of the American Statistical Association (multidisciplinary)	612	Nazarbayev University; KIMEP University;
Business, Management and Accounting	Determinants of the Attempting and Outcome of Coups d'état	2012	Journal of Conflict Resolution (multidisciplinary)	188	Nazarbayev University
Economics, Econometrics and Finance	Threat and imposition of economic sanctions 1945–2005: Updating the TIES dataset	2014	Conflict Management and Peace Science (multidisciplinary)	172	Nazarbayev University
Business, Management and Accounting	Sustainable production of pure silica from rice husk waste in Kazakhstan	2019	Journal of Cleaner Production (multidisciplinary)	118	Nazarbayev University; Al-Farabi Kazakh National University
Business, Management and Accounting	Corporate social responsibility strategy and corporate environmental and social performance: The moderating role of board gender diversity	2020	Corporate Social Responsibility and Environmental Management (multidisciplinary)	113	KIMEP University, Al-Farabi Kazakh National University

Note: compiled by authors

The most cited paper is "Culture specific and cross-culturally generalizable implicit leadership theories: Are attributes of charismatic/transformational leadership universally endorsed?" that was published in 1999 in the "Leadership Quarterly" journal. This article with 144 co-authors is affiliated with Kazakhstan via authors from the University of Nebraska-Lincoln. The next article that has received notable attention with 612 citations is "Smoothing Parameter and Model Selection for General Smooth Models" (2016). The abstract suggests that it is distantly related to Decision Sciences, and most likely should be excluded from calculation. "Journal of the American Statistical Association" is a multidisciplinary journal that covers subjects in Mathematics: Statistics and Probability and Decision Sciences: Statistics, Probability and Uncertainty. Thus, the true picture of articles of local authors with the most significant impact are placed between 3rd and 6th places in the table with an average citation of 100-200. "Determinants of the Attempting and Outcome of Coups d'état" (2012) in the "Journal of Conflict Resolution" has an affiliation with Nazarbayev University. "Sustainable production of pure silica from rice husk waste in Kazakhstan" (2019) published in the "Journal of Cleaner Production" indicates the involvement of Nazarbayev University and Al-Farabi Kazakh National University. "Corporate social responsibility strategy and corporate environmental and social performance: The moderating role of board gender diversity" (2020) in the "Corporate Social Responsibility and Environmental Management" journal highlights the collaborative efforts of KIMEP University and Al-Farabi Kazakh National University in examining the relationship between corporate strategies and environmental performance. The research titled "Threat and imposition of economic sanctions 1945–2005: Updating the TIES dataset" (2014) published in the "Conflict Management and Peace Science" journal is affiliated with Nazarbayev University.

Another important aspect of statistical descriptive analysis is the assessment of the prominence of the journals in which articles are published. By quantifying the frequency of papers appearing in various journals, we understand where researchers prefer to send their works. 2,194 papers within the subject area of EEF were published across 281 journals. Similarly, 2,052 papers on the subject area BMA were featured in 331 journals, and 430 papers in the domain of DS found publication in 95 journals.

Table 4 presents a list of journals with the distribution of journals by the largest number of published articles.

Table 4 - Paper distribution by journals

No.	Subject area: Economics, Econometrics and Finance	# articles	Coverage from	Coverage till	Journal's subject area	CiteScore 2022	Citations 2019-2022
1	Journal of Advanced Research in Law and Economics	409	2011	2020	Multidisciplinary		
2	Actual Problems of Economics	275	2008	2016	Single disciplinary		
3	Journal of Environmental Management and Tourism	173	2013	Present	Multidisciplinary	1,9	1598
4	Mediterranean Journal of Social Sciences	98	2010,2012	2015	Multidisciplinary		
5	International Journal of Energy Economics and Policy	87	2011	Present	Multidisciplinary	3,9	5556
6	Entrepreneurship and Sustainability Issues	85	2017	2020	Multidisciplinary		
7	Asian Social Science	80	2011	2015	Multidisciplinary		
8	Journal of Applied Economic Sciences	55	2009	2018	Multidisciplinary		

9	International Journal of Economic Perspectives	52	2009	2018	Single disciplinary		
10	Public Policy and Administration	41	2011	Present	Multidisciplinary	1	225
	Subject area: Business, Management and Accounting	**# articles**	**Coverage from**	**Coverage till**	**Journal's subject area**	**CiteScore 2022**	**Citations 2019-2022**
1	Espacios	226	2007	2019	Multidisciplinary		
2	Journal of Environmental Management and Tourism	222	2013	Present	Multidisciplinary	1,9	1598
3	Eastern-European Journal of Enterprise Technologies	216	2013	Present	Multidisciplinary	2,1	4576
4	Journal of Advanced Research in Law and Economics	203	2011	2020	Multidisciplinary		
5	World Journal on Educational Technology: Current Issues	109	2018	2022	Multidisciplinary		
6	Entrepreneurship and Sustainability Issues	85	2017	2020	Multidisciplinary		
7	Journal of Applied Economic Sciences	55	2009	2018	Multidisciplinary		
8	Rivista di Studi sulla Sostenibilita	35	2011	Present	Multidisciplinary	1,4	192
9	European Research Studies Journal	32	2008	2018	Multidisciplinary		
10	International Journal of Supply Chain Management	29	2012	2020	Multidisciplinary		
	Subject area: Decision Sciences	**# articles**	**Coverage from**	**Coverage till**	**Journal's subject area**	**CiteScore 2022**	**Citations 2019-2022**
1	Espacios	226	2007	2019	Multidisciplinary		
2	International Journal of Supply Chain Management	29	2012	2020	Multidisciplinary		
3	Problems and Perspectives in Management	21	2003	Present	Multidisciplinary	2,4	1648
4	Journal of Loss Prevention in the Process Industries	5	1988	Present	Multidisciplinary	6,7	6334
5	Management Decision	5	1967	Present	Multidisciplinary	10,3	6379
6	Optimization	5	1985	Present	Multidisciplinary	4	2060

Note: compiled by authors

Most articles are affiliated with authors from L.N. Gumilyov Eurasian National University, Al Farabi Kazakh National University and Narxoz University. First, it can be explained by their status as long-standing national universities of Kazakhstan. Being a multidisciplinary university and working for a more extended period than other universities, these universities have had enough time to foster interdisciplinary research collaborations, strong research networks, supportive environments and academic traditions to facilitate research activities.

As per network analysis, we used VosViewer software to visualize the network of keywords in local articles by subject area. A map was created based on bibliographic data from the Scopus database file. A co-occurrence type of analysis was conducted based on author keywords with a complete counting method. Within the EEF subject area, the network has 6,980 keywords, of which 295 items meet the requirement of 5 occurrences indicating interconnection and pairing within the network. The keywords not relevant to the subject area were excluded, as a result, 207 keywords were selected. Within the BMA subject area, the network has 7,270 keywords, out of which 253 items meet the requirement of 5 occurrences, as a result of the exclusion of unrelated keywords, 174 items are left. Within DS the network has 1,996 keywords, out of which 23 items meet the requirement of 5 occurrences. As a result of the exclusion of unrelated keywords, 174 items are left.

VosViewer software created a visual map of the co-occurrence network with 207 author keywords from EEF articles (Figure 2).

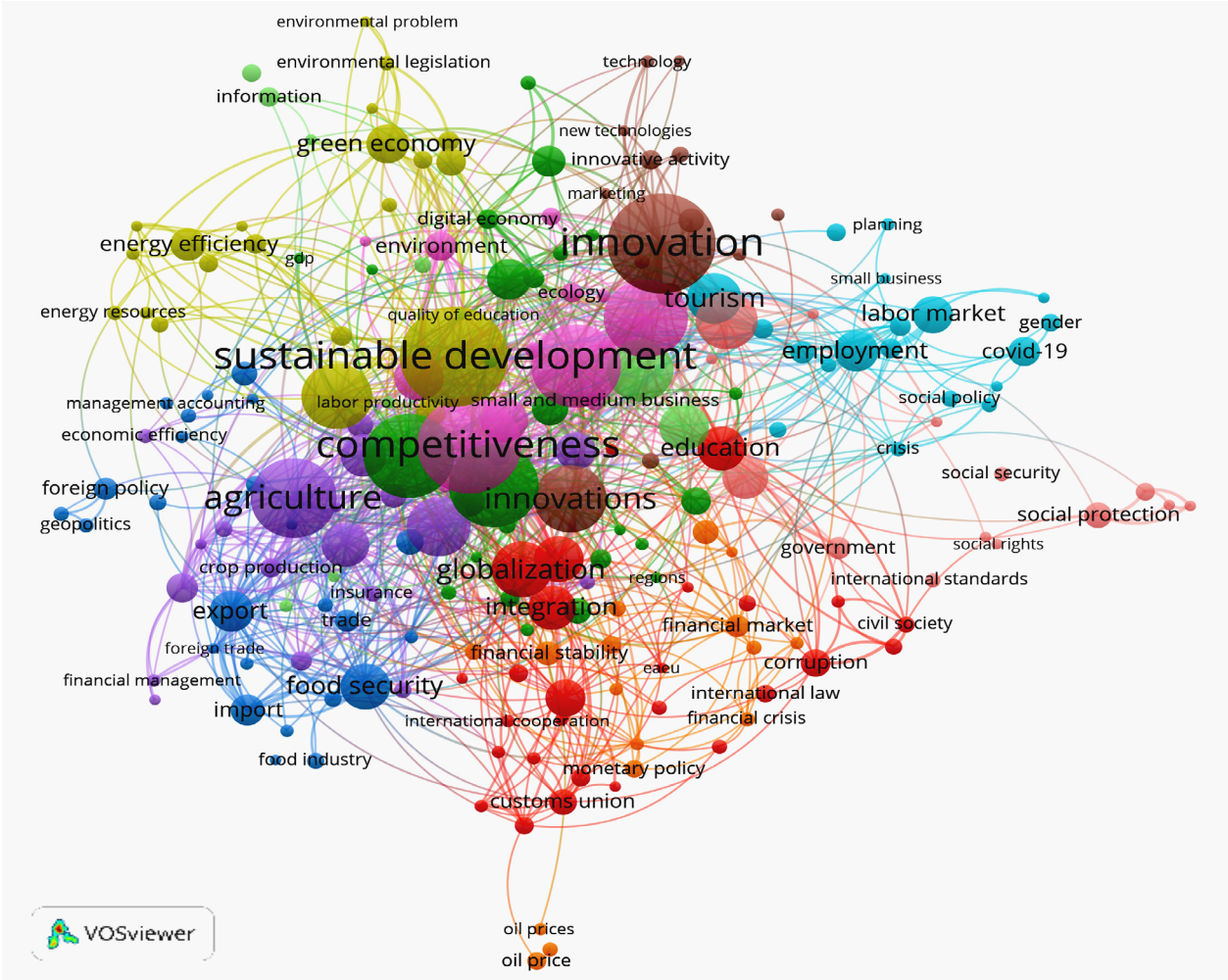

Figure 2 - A keywords co-occurrence network for Economics, econometrics, and finance

Note: compiled by the authors

Each circle represents a term, the larger the circle the more frequent the term occurs as an author's keyword in publications. Lines between items represent links, the thicker the line the stronger the link between two items. Notably, when terms co-occur a lot, the corresponding clusters of circles are positioned closer to each other. From the below figure, we can see that 11 clusters are closely located, suggesting strong co-occurrence patterns. Colors represent different clusters (red, green, blue, yellow, purple, light blue, orange, brown, pink, coral, light green). In the central area of the visualization, the pink cluster consists of terms related to competitiveness, management and entrepreneurship. The yellow and brown clusters located in the upper left and right areas respectively, cover terms related to sustainable development and innovation. The term sustainable development has links to energy efficiency and green economy. The cluster shaded in purple, positioned in the lower left section of the visualization, encompasses terms associated with agriculture. Additionally, the red cluster, situated closer to the centre of the lower area, covers terms related to globalization and integration. Moving to the central region, a green cluster is about economic growth that is closely linked with investment, digitalization, innovative activity and new technologies.

Figure 3 shows a visualization of the overlay of keywords in BMA. The network has 174 connected keywords that create 13 clusters that have 1145 links.

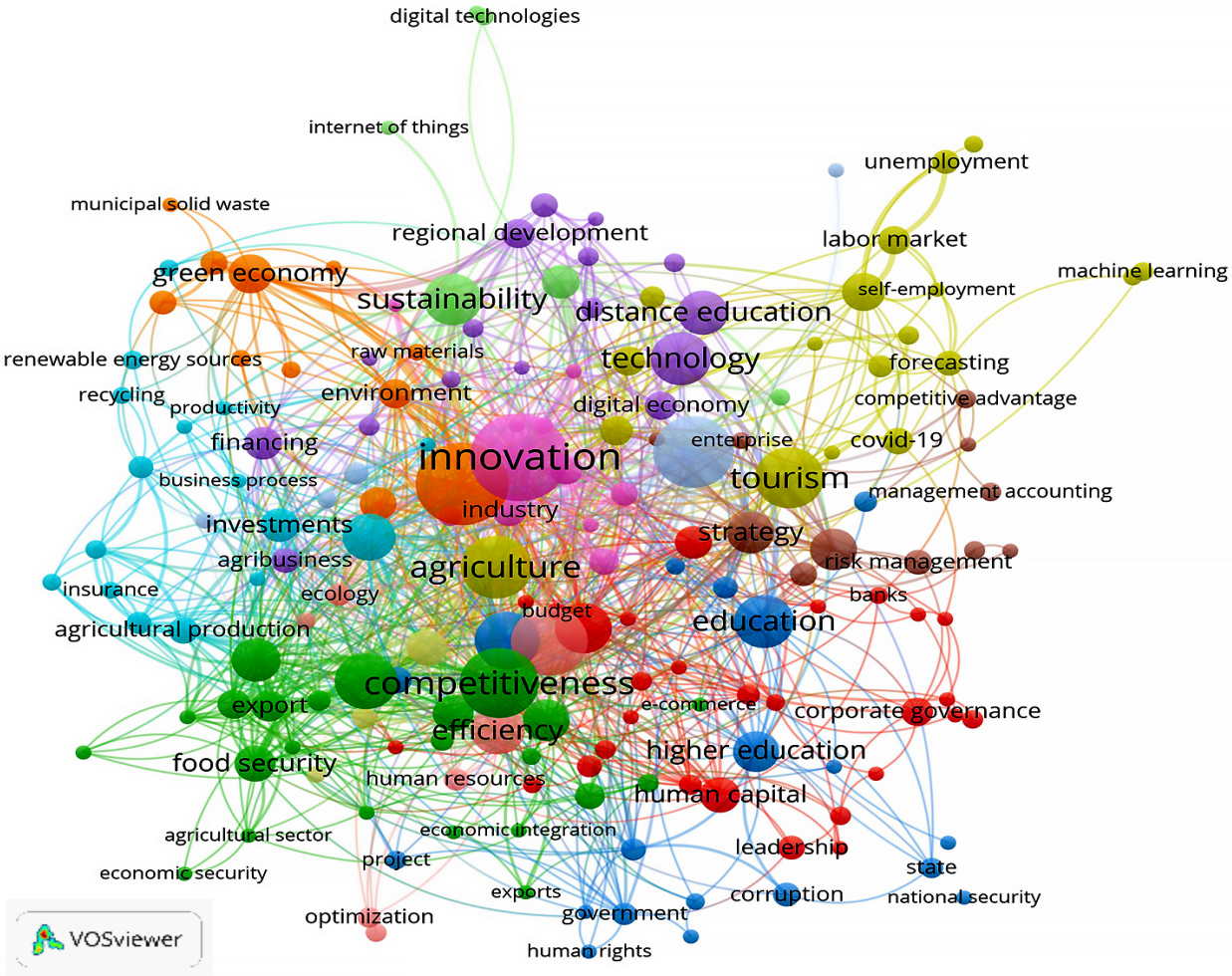

Figure 3 - A keywords co-occurrence network for BMA

Note: compiled by authors

Innovation, Sustainable Development, Entrepreneurship Competitiveness, and Management are major developing areas. This means that these topics in the 1997-2022 period were the most investigated by researchers. Similarly, as in the EEF co-occurrence network, clusters of keywords are located close to each other. The visualization confirms the increased popularity of the topic of distance education for research after the onset of the COVID-19 period (Table 5).

Table 5 - Summary of the network analysis by subject areas

No.	Subject Area	Time periods	The most representative keywords by years (Top 10 occurrences)	Keywords	Links	Clusters
1	Economics, Econometrics, and Finance	2017-2019	Investment, Competitiveness, Innovation, Sustainable Development, Agriculture, Entrepreneurship, Management, Economic Growth, Agro-Industrial Complex, Infrastructure	65	281	7
		2020-2022	Sustainable Development, Economic Growth, Innovation, Digitalization, Entrepreneurship, Sustainability, Management, Tourism Industry, Agriculture, Covid-19	70	330	10
		2000-2022	Innovation, Sustainable Development, Competitiveness, Economic Growth, Investment, Management, Agriculture, Entrepreneurship, Efficiency, Human Capital	207	1450	11
2	Business, Management, and Accounting	2017-2019	Competitiveness, Sustainable Development, Innovation, Agriculture, Investment, Entrepreneurship, Management, Tourism, Development, Economic growth	66	301	8
		2020-2022	Innovation, Sustainable Development, Technology, Entrepreneurship, Management, Distance education, Sustainability, Tourism, Education, Tourism industry	77	363	10
		1997-2022	Innovation, Sustainable Development, Entrepreneurship Competitiveness, Management, Agriculture, Tourism, Investment, Education, Technology	174	1145	13
3	Decision Sciences	2017-2019	Competitiveness, Supply Chain Management, Innovation, Development, Competence, Agriculture, Education, Innovative development, Efficiency, Integration	9	10	3
		2020-2022	Supply Chain Management, Covid-19, Supply Chain, Supply Chain Strategy	4	1	3
		1997-2022	Supply Chain Management, Competitiveness, Innovation, Development, Agriculture, Economic Growth, Competence, Efficiency, Education, Supply Chain Strategy	19	31	6

Note: compiled by authors

In comparison to EEF and BMA networks, the relationship between keywords and clusters in DS is rare (Figure 4).

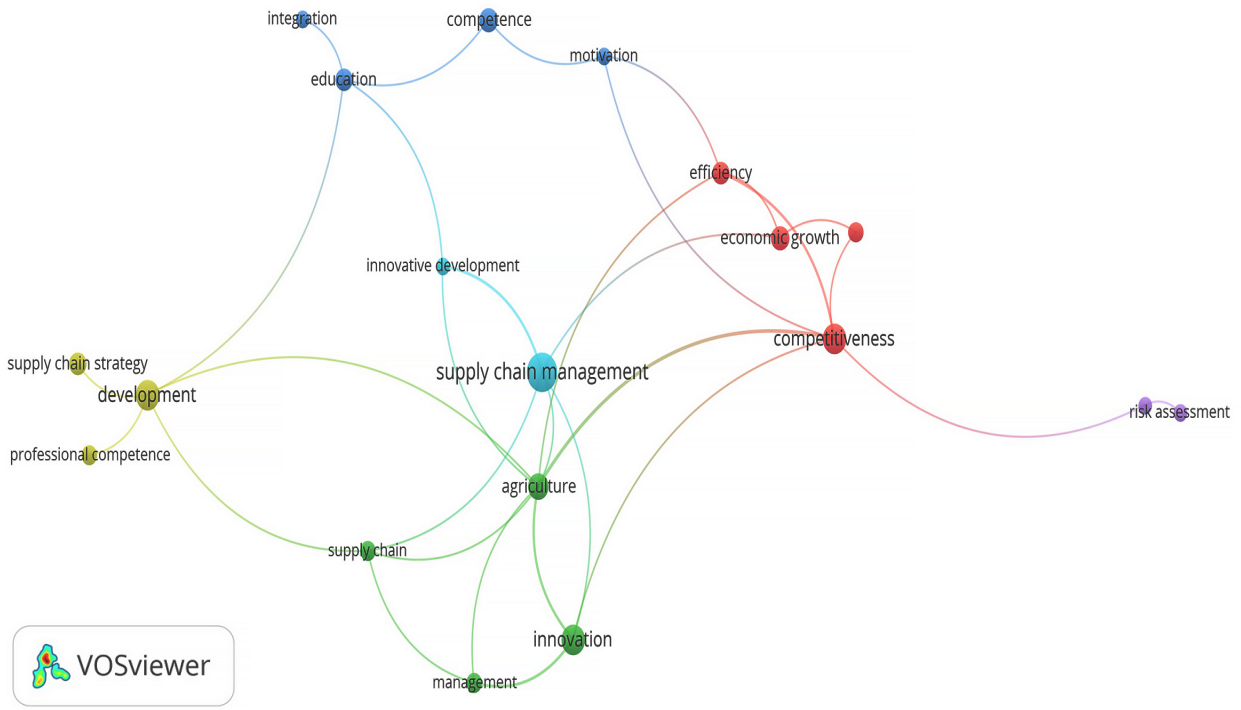

Figure 4 - A keywords co-occurrence network for DS

Note: compiled by the authors
Source: VosViewer

This suggests that the development of research in DS in Kazakhstan is in its early stages. Supply chain management is a primary topic of decision science. It is important to support scientists and increase publications in this area.

Table 5 provides an insightful perspective on the evolution of representative terms across different periods, identifying emerging trends and patterns in research in the chosen area. For example, between 2020-2022 the topics related to Covid-19, Digitalization, Sustainability and Tourism Industry gained popularity in EEF. And BMA has witnessed a surge in interest in research in Education, Distance Education, Technology since 2020. Research in DS was broader during the 2017-2019 period, yet the number of publications has decreased in subsequent years. Furthermore, it was accompanied by a shift towards more concentrated research on the topic of supply chain management.

Conclusion

The analysis of economics disciplines articles published in the Scopus database and affiliated with Kazakhstan allowed us to draw several conclusions:

1. The growth in the number of publications in recent years is explained by changes that happened at the country level, policy changes related to joining the Bologna process, new requirements for PhD students and the awarding of scientific degrees. This drastically impacted the number of publications in recent years, although the quality of publications still matters.
2. The distribution of articles affiliated with Kazakhstan demonstrates that the most significant number of papers are published in EEF in total 2,194, compared to BMA - 2,052, with the lowest number of publications in DS - 430. However, the publication growth rate is slightly higher in BMA than in EEF, even though more substantial publication activity commenced later. Comparatively, DS exhibits a slower growth rate, indicating that it might be less popular or comparatively less developed within the scope of the studied subject areas. However, it allows new authors to conduct research with potentially less competition. On the other hand, the higher growth observed in EEF and BMA areas may indicate a greater volume of research, providing more opportunities for collaboration among researchers.
3. The analysis of paper distribution by top journals in EEF, BMA, and DS identified that the

majority of papers were published in journals that are discontinued from the Scopus database, and this has created a negative impact on the quality and reputation of research papers published in Kazakhstan in economic disciplines.

4. The analysis of authors who publish in economic disciplines demonstrated that the majority of the papers are affiliated with the largest universities in Kazakhstan, such as Al Farabi Kazakh National University, L.N. Gumilyov Eurasian National University and the oldest economic university in the country – Narxoz University.

5. The analysis of the most cited paper demonstrates that the top cited affiliations are Nazarbayev University, KIMEP University, and Al Farabi Kazakh National University. This demonstrates the quality of research in these universities and indicates the scientific community's interest.

6. Performed network analysis demonstrated that EEF has 207 keywords, 1450 links and 11 clusters, while BMA – 174 keywords, 1145 links and 13 clusters, DS – 19 keywords, 31 links and 6 clusters. This demonstrates the level and quality of relationships in subject areas and shows that some areas are less developed than others, meaning that research areas have not reached a higher level of productivity. Keywords analysis shows how links have developed, and new clusters have evolved. The terms that repeatedly appear over periods confirm that their importance has increased. The clusters with new key terms suggest the emerging areas of research. Moreover, vice versa, the terms that were displaced from the top in the subsequent years show that their relevance has diminished.

7. It is important to note that the quality of journals where research is being published number of citations demonstrate the quality level of science in a particular research field. Therefore, the quality of research is characterized by a quality set at the institutional level. Global practice of academic research ethics committees at universities targets issues related to the ethical principles of conducting research, publishing data, and mitigating any risks related to the publication. It is suggested to apply principles of academic research ethics committees at various university levels to ensure that quality research is being published and researchers minimise any risks when publishing their research in predatory or discontinued journals.

In summary, scientometric overviews of publications such as this paper are critical because they helps to assess the research landscape of specific economics disciplines such as Economics, Econometrics and Finance (EEF), Business, Management and Accounting (BMA) and Decision Sciences (DS). It provides valuable insights into trends in research, growth patterns, collaboration opportunities, and potential areas for further development.

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