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RESEARCH PRODUCTIVITY AND MAIN PUBLISHING INSTITUTIONS IN KAZAKHSTAN

Abstract: Research productivity plays a vital role in advancing knowledge, strengthening academic institutions, and bolstering national development. In Kazakhstan, the research and publishing landscape is undergoing significant changes, shaped by institutional dynamics and external pressures. This study assesses the current state of research productivity in Kazakhstan, focusing on key contributing institutions. A quantitative methodology was employed, leveraging data from academic databases Scopus to analyze citation metrics, publication outputs, and institutional contributions. SciVal analytical tool was used to access the research performance of Kazakhstan and Kazakhstani universities. The findings reveal a notable rise in Kazakhstan's research output in recent years, driven by contributions from leading universities. Despite this progress, challenges such as insufficient funding, inadequate research infrastructure, and limited international collaboration hinder further advancement. This article also identifies and examines the pivotal role of key publishing institutions in shaping the nation's academic productivity. The insights provided aim to inform policy strategies for fostering a more robust and competitive research ecosystem in Kazakhstan.

Keywords: research productivity, publications, Scopus, Scival, institutions, Kazakhstan.

Introduction

Research productivity is a critical indicator of a nation's intellectual and innovative capabilities, reflecting its commitment to advancing knowledge and contributing to global scientific discourse. Focusing on enhancing research output and establishing the country as a regional academic hub led Kazakhstan's higher education sector to significant developments in recent years. The government's strategic initiatives have played a pivotal role in this transformation. Policies supporting the growth of the publishing industry through subsidies and grants have been instrumental in promoting local content, thereby stimulating market demand. Additionally, establishing foreign university branches, such as De Montfort University and Coventry University, has introduced advanced teaching methodologies and research capabilities, reshaping Kazakhstan's education system and enhancing its global academic standing (The Astana Times, 2024).

Despite these advancements, challenges persist. The economic slowdown in the first half of 2024, with a growth rate of 3.2% compared to 5.3% in the previous year, has highlighted weaknesses in investment and government spending, potentially impacting funding for research and development (The World Bank, 2024). Moreover, the ongoing efforts to build a customer-centric, open, and competitive digital economy underscore the need for a robust digital infrastructure to support research activities.

This article analyzes the trends in research productivity in Kazakhstan during 2022–2024, identifies the leading publishing institutions contributing to this output, and assesses their impact on the country's national and international research visibility. By examining these aspects, the research paper seeks to provide insights into the effectiveness of current policies and initiatives and offer recommendations for sustaining and enhancing research productivity in Kazakhstan.

Literature Review

Research productivity is a key indicator of academic and institutional performance, reflecting the capacity of researchers to generate impactful scientific contributions. Scientometric analysis, which quantitatively assesses research output using bibliometric indicators such as citation impact, H-index, and international collaboration metrics, has become an essential tool for evaluating research performance at national and institutional levels (Moed, 2022; Sugimoto and Lariviere, 2023). Nations with strong research ecosystems demonstrate higher economic competitiveness and innovation capacity while developing countries often face structural barriers that hinder research productivity (Leydesdorff and Wagner, 2022).

Kazakhstan's higher education system has undergone notable reforms aimed at aligning with international standards, including integration into the European Higher Education Area through the Bologna Process (OECD, 2017). These reforms have emphasized the importance of research output, resulting in a steady increase in the number of publications indexed in international databases like Scopus and Web of Science (Abenova et al., 2022). Despite these gains, scientometric studies suggest that Kazakhstan's research impact, as measured by citation rates and H-index, remains relatively low compared to leading research nations (Kozhamkulova and Karazhan, 2020).

Bibliometric analyses indicate that Kazakhstan's international research collaboration has played a crucial role in enhancing publication visibility. Co-authorship with researchers from Europe, China, and Russia has led to higher citation counts and increased participation in high-impact journals (Glanzel and Schubert, 2022). However, local challenges such as language barriers, a preference for publishing in non-indexed national journals, and insufficient research incentives continue to limit overall impact (Kassymova et al., 2021). Moreover, the COVID-19 pandemic disrupted research activities globally, including in Kazakhstan, temporarily reducing publication rates and delaying research projects.

Publishing institutions, particularly universities and research centers, serve as Kazakhstan's primary drivers of scientific output. Leading institutions such as Al-Farabi Kazakh National University and Nazarbayev University have significantly contributed to the country's publication volume and citation impact (Yessimova et al., 2023). These institutions have actively fostered research cultures by supporting grant-funded projects, hosting international conferences, and encouraging interdisciplinary collaboration. However, smaller institutions often face challenges such as insufficient funding and limited access to global research networks, resulting in unequal contributions to the country's overall productivity. While previous studies have provided valuable insights into Kazakhstan's research productivity, there is a lack of comprehensive scientometric analyses tracking institutional contributions over time. This study aims to address this gap by analyzing research productivity trends from 2022 to 2024, identifying the top publishing institutions, and assessing their impact on the national and international research landscape.

Methodology

The study employs a bibliometric analysis to examine research productivity and the contributions of publishing institutions in Kazakhstan during the period 2022–2024. Bibliometric analysis is a quantitative method used to evaluate research output, trends, and institutional performance based on publication data (Zhao et al., 2020). This approach is suitable for identifying patterns in research activity and assessing the impact of publishing institutions. The data for this study were collected from the Scopus database one of the largest abstract and citation databases of peer-reviewed literature, used to verify research output and institutional affiliations. The study focused on publications that published between January 1, 2022, and December 4, 2024, authored by researchers affiliated with institutions in Kazakhstan and covered all disciplines. Data for analysis included all types of publications – articles,

reviews, conference papers, and book chapters. All data used in this study were obtained from publicly available sources or through authorized tools like SciVal. The study did not involve human participants, and no confidential information was accessed.

For the data analysis variables and metrics such as number of publications, citation metrics, institutional rankings and collaboration metrics were considered to evaluate research productivity and institutional performance:

− Number of publications is total research output by Kazakhstani institutions during the study period.

− Citation metrics are average citations per publication to measure the quality and impact of the research.

− Institutional rankings are contributions of leading institutions based on their research output.

− Collaboration metrics are Proportion of publications involving international and domestic co-authorship.

The data collected were analyzed using bibliometric tool - statistical software SciVal. SciVal is an advanced analytics tool that provides comprehensive insights into research performance based on Scopus data. SciVal was used to analyze institutional contributions, research trends, and collaboration networks.

SciVal's benchmarking module was used to compare the performance of Kazakhstani institutions across key metrics such as publication volume, citation impact, and collaboration rates. The research trends module provided insights into emerging research areas and disciplines with high productivity. Collaboration metrics, including co-authorship networks and institutional partnerships, were visualized.

Results and Discussion
Publication and citation

The Scopus database published 65512 articles affiliated with the universities of Kazakhstan for the entire period. For the last 3 years, this indicator is 21451 (Figure 1). Between 2022 and 2024, research output in Kazakhstan demonstrated steady growth. The total number of publications indexed in Scopus increased by approximately 15%, from 6525 publications in 2022 to 7620 publications in 2024. The significant growth was observed in 2023, with a 12% increase in publications compared to 2022, reflecting a post-pandemic recovery in research activity. In 2024, scholarly output further increased to 7,620, which is a 4.3% growth compared to 2023.

Figure 1
Research Productivity Trends (2022–2024)
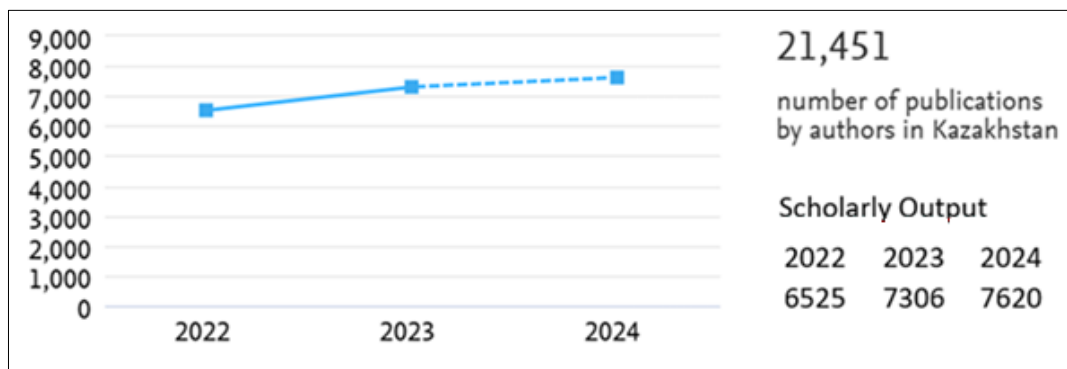
The data in Figure 1 shows a steady upward trend in scholarly output over the three years. The growth rate was higher between 2022 and 2023 (12%) than between 2023 and 2024 (4.3%), indicating a slight slowdown in the pace of growth. The consistent increase in scholarly output suggests a sustained focus on academic productivity. However, the decreasing growth rate may highlight the need for targeted interventions, such as enhanced research support systems, funding opportunities, or collaborations to maintain or accelerate growth.

Figure 2
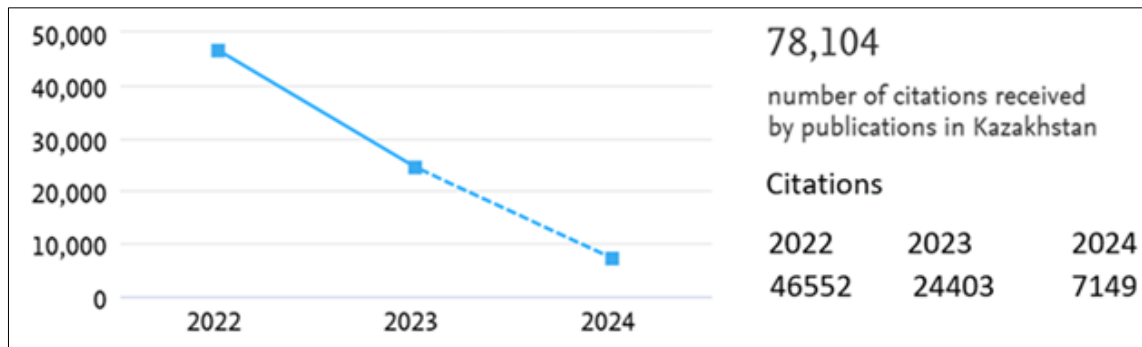*Citation number by publications in Kazakhstan*

Figure 2 presents citation data for 2022, 2023, and 2024. It is important to note that 2024 is an incomplete year, and the citation count for this year may still increase as the year progresses. In 2022 citations were 46 552, the highest among the three years, reflecting the continued impact of previously published research. In 2023 citations decreased to 24 403, marking a 47.6% decline compared to 2022. This could be attributed to newer publications not yet achieving significant visibility or citation results. In 2024 citations so far stand at 7 149. Since 2024 is still incomplete, this number is expected to rise by the end of the year as publications gain more exposure.

While scholarly output steadily increased from 6 525 in 2022 to 7 620 in 2024, citations show a delayed impact. This is common because citations tend to accumulate over time, and newer publications (especially those from 2023 and 2024) may not yet have had sufficient time to be cited widely.

The high citation count in 2022 likely reflects the impact of research published in earlier years. The sharp drop in citations in 2023 and 2024 may not necessarily indicate a decline in quality but rather a time-lag effect - it takes time for publications to be cited, particularly in high-impact journals. For 2024, since the year is incomplete, the current citation count (7,149) is not a definitive measure of the year's impact.

While scholarly output has shown consistent growth, citations for recent years appear lower due to the natural time lag in citation accumulation. Moving forward, it will be essential to track citation trends for 2023 and 2024 publications over the next few years to assess their long-term impact.

Publication sources
Publication sources are journals, books and book chapters indexed in the databases. However, only journals indexed in Scopus are ranked by quartiles. Figure 3 provides a breakdown of Kazakhstani publications by percentile rankings in Scopus Sources (CiteScore Percentiles) from 2022 to 2024. It highlights both the absolute publication numbers and the percentage of total publications. CiteScore is a simple way of measuring the citation impact of serial titles such as journals.

Figure 3
Publications in Kazakhstan in the top 10% of journals
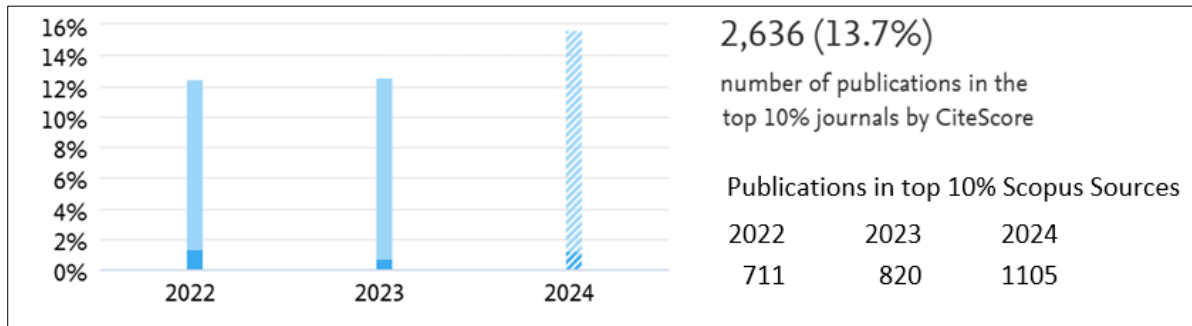
In three years overall 2636 publications (13.7%) by Kazakhstan scholars were published in the top 10% Scopus sources. In 2022 publications in 711 (12.5%) sources, in 2023 in 820 (12.6%) journals, and in 2024 articles were published in 1105 (15.7%) top 10% Scopus sources. The percentage of publications in the top 10% of journals shows a steady upward trend, with a significant increase in 2024. This indicates a continued push toward publishing in high-quality journals. The rising trend in publishing within higher-ranked journals reflects a concerted effort to improve the quality and visibility of research output in Kazakhstani universities.

Table 1
Publications by Kazakhstan in Scopus journals

Scopus CiteScore quartile	Overall	2022	2023	2024
Q1	7220	1878	2260	3082
Q2	4968	1319	1736	1913
Q3	4223	1494	1476	1253
Q4	2841	998	1057	786
Total	19252	5689	6529	7034

Table 1 above categorizes publications from 2022 to 2024 into CiteScore quartiles, offering insights into their placement in journals ranked by quality. Quartiles range from Q1 to Q4, with the total publications provided for each year.

Overall, 7220 articles (37.5% of the total) were published in Q1 journals (Figure 4). Publications in Q1 journals show a strong upward trend, with a significant increase in 2024, reaching nearly 44% of total publications. This indicates a strategic focus on publishing in high-quality impactful journals.

Figure 4

Share of publications per journal quartile
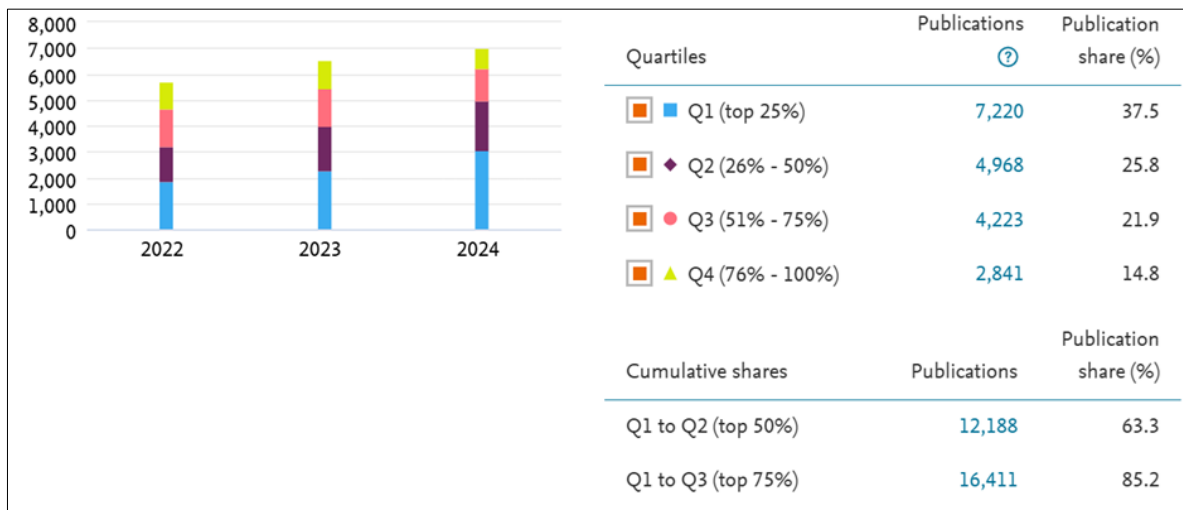
Publications in Q2 journals are also steadily increasing. The percentage of Q2 publications grew from 23.2% in 2022 to 27.2% in 2024, showing broader engagement with medium-to-high-quality journals. Publications in Q3 journals are declining, both in absolute numbers and percentages. In 2024, only 17.8% of publications appeared in Q3 journals, compared to 26.3% in 2022, suggesting a shift toward higher-quality journals (Q1 and Q2). Publications in Q4 journals are declining significantly, dropping from 17.5% in 2022 to only 11.2% in 2024. This reflects a clear focus on avoiding lower-tier journals.

The total number of publications increased steadily from 2022 to 2024, with a notable emphasis on Q1 and Q2 journals, driving up the overall research quality. Publications in Q1 journals saw a significant increase from 33% in 2022 to 43.8% in 2024, reflecting a clear prioritization of publishing in top-tier journals. Publications in Q3 and Q4 journals decreased significantly, showing a deliberate move away from lower-tier journals. The overall number of research productivity (publications) increased each year, with a simultaneous improvement in journal quality.

Publications by subject area

Publications by Kazakhstani universities were published across various subject areas introduced in Table 2 and Figure 5 focusing on scholarly output, citations, authorship dynamics, and impact metrics (citations per publication and field-weighted citation impact). Top three subject areas with high scholarly output are engineering: 1015 publications (declined by -8.2%); physics and astronomy: 1005 publications (declined by -13.4%); and computer science: 873 publications (grew by 8.3%).

Despite being the leading areas by volume, engineering, physics and astronomy experienced declines in output, while computer science showed moderate growth.

Pharmacology, toxicology, and pharmaceutics: 161.1% growth (138 publications), biochemistry, genetics, and molecular biology: 56.5% growth (371 publications), arts and humanities: 58.1% growth (306 publications), agricultural and biological sciences: 48.1% growth (518 publications); economics, econometrics, and finance: 45.9% growth (212 publications) are rapidly growing subject areas. strong growth in life sciences and social sciences suggests a shift in research focus to areas with societal relevance and multidisciplinary appeal. The rise in arts and humanities (58.1%) highlights increasing attention to these fields, often underrepresented in publication metrics.

Subject areas with the highest citations per publication are dentistry: 20.5 citations per publication (10 publications); medicine: 20.8 citations per publication (471 publications); multidisciplinary: 10.5 citations per publication (100 publications); pharmacology, toxicology, and pharmaceutics: 7.8 citations per publication (138 publications). Medicine demonstrates the strongest overall impact due to both high scholarly output and exceptional citation rates. Dentistry, though small in volume, achieves high citation visibility.

Areas with High Field-Weighted Citation Impact (FWCI) are Economics, Econometrics, and Finance: FWCI = 1.28; Multidisciplinary: FWCI = 1.22; Neuroscience: FWCI = 1.89; health professions: FWCI = 1.1; Neuroscience and Economics stand out as highly impactful areas, even with modest publication volumes. Multidisciplinary research demonstrates significant global impact, emphasizing its importance in high-citation journals.

Table 2

Subject areas of Kazakhstan publications

Subject Area	Scholarly Output	Scholarly Output (growth %)	Citations	Authors	Authors (growth %)	Citations per Publication	Field-weighted Citation Impact
Engineering	1015	-8,2	5042	1077	18,2	5	0,75
Physics and Astronomy	1005	-13,4	5457	931	1,2	5,4	0,77
Computer Science	873	8,3	2768	938	22	3,2	0,66
Social Sciences	859	16	2292	1098	25,8	2,7	0,76
Mathematics	760	0	2607	745	14,3	3,4	0,69
Materials Science	708	-5,5	4721	746	31,7	6,7	0,72
Environmental Science	563	29	3056	757	54,5	5,4	0,93
Chemistry	544	8,8	3789	714	40	7	0,69
Agricultural and Biological Sciences	518	48,1	1629	697	22,5	3,1	0,66
Medicine	471	0	9786	454	26,4	20,8	3,99
Energy	454	-11,3	3352	674	21,4	7,4	0,95
Chemical Engineering	436	-10,8	2507	607	31,7	5,8	0,61
Biochemistry, Genetics and Molecular Biology	371	56,5	2694	532	91,7	7,3	0,87
Arts and Humanities	306	58,1	281	414	53,3	0,9	0,56
Earth and Planetary Sciences	281	14,5	1134	373	12,6	4	0,9
Economics, Econometrics and Finance	212	45,9	1199	242	89,7	5,7	1,28
Business, Management and Accounting	203	35,9	975	283	47,5	4,8	0,67
Pharmacology, Toxicology and Pharmaceutics	138	161,1	1072	215	138,5	7,8	0,91
Decision Sciences	136	12,9	276	221	52,9	2	0,87
Multidisciplinary	100	16,7	1046	207	17	10,5	1,22

Immunology and Microbiology	87	-4,8	483	123	-18,9	5,6	0,63
Psychology	79	100	171	124	44	2,2	0,96
Neuroscience	38	0	252	56	-15,4	6,6	1,89
Health Professions	38	75	132	75	0	3,5	1,1
Veterinary	29	-25	141	34	-54,5	4,9	0,91
Nursing	19	0	30	25	-	1,6	0,7
Dentistry	10	-50	205	10	50	20,5	1,84

Veterinary and Dentistry are experiencing steep declines in scholarly output, reflecting decreased research activity in these areas. Declines in traditional STEM fields like Physics and Engineering might be due to shifts toward applied and multidisciplinary research areas.

Figure 5
Share of Kazakhstani publications by subject areas
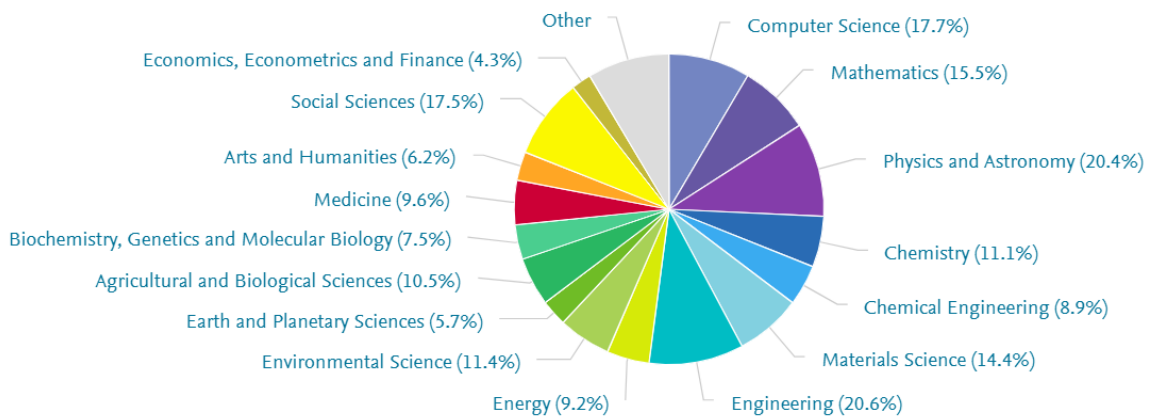
Subject areas such as Pharmacology, Toxicology, and Pharmaceutics: 161.1% growth in authors and 138.5% growth in publications; psychology: 100% growth in scholarly output (79 publications); and Health Professions: 75% growth (38 publications) emerged with high growth. Significant growth in health-related fields and psychology reflects global research trends focusing on mental health, public health, and pharmacological innovation.

High growth in fields like Pharmacology, Biochemistry, and Multidisciplinary research reflects a strategic shift toward impactful and collaborative studies. Decreases in Engineering, Physics, and Veterinary sciences indicate a potential redirection of research priorities or funding. Medicine and Dentistry maintain high citations per publication, signaling strong global relevance. Fields like Environmental Science (54.5%) and Chemistry (40%) show substantial growth in author participation, indicating increased collaborations and research engagement.

Kazakhstan's Collaborations
Kazakhstan scholars collaborate extensively worldwide, reflecting strong international research engagement. Kazakhstan's collaboration in research through co-authored publications across different world regions is presented in the Table 3 and Figure 6. Kazakhstan in recent three years collaborated with 190 countries publishing 21 153 articles in co-authorship.

Europe is the leading region for Kazakhstan's research partnerships, contributing the highest number of co-authored publications (68% of the total). This dominance may result from

geographic proximity, historical ties, and strong academic networks. Asia Pacific (39 countries, 6,189 publications) ranks second, likely due to Kazakhstan's location in Central Asia and its strategic partnerships within the Asia-Pacific. Middle Eastern countries are significant collaborators, possibly driven by shared research interests in energy and natural resources.

Figure 6
Distribution of Kazakhstan publications worldwide

North America, especially the U.S. and Canada, likely provides advanced research collaboration opportunities, despite fewer partnerships than Europe or Asia-Pacific. Africa ranks lower despite having the highest number of collaborating countries, suggesting partnerships may be more scattered or less intensive. South America shows the least collaboration, likely due to geographic distance and fewer shared research priorities.

Table 3
Kazakhstan's collaboration with world regions

Region totals	Collaborating Regions	Co-authored publications
Worldwide	190	21153
Africa	51	1249
Asia Pacific	39	6189
Europe	45	14408
Middle East	18	3632
North America	24	2658
South America	13	553

Kazakhstan's strongest partnerships are with Europe and Asia-Pacific, driven by geographic proximity and historical ties. Despite collaborating with 51 African countries, research output remains relatively low, indicating potential for deeper partnerships. Expanding collaboration with underrepresented regions like South America and Africa could enhance global research integration.

Table 4 below highlights Kazakhstan's top 10 collaborating countries based on co-authored publications, showing growth trends and institutional involvement. The highest research output of the co-authorship of Kazakhstan is with Russia (7,327). Longstanding academic ties explain this leading position despite moderate growth (11.2%).
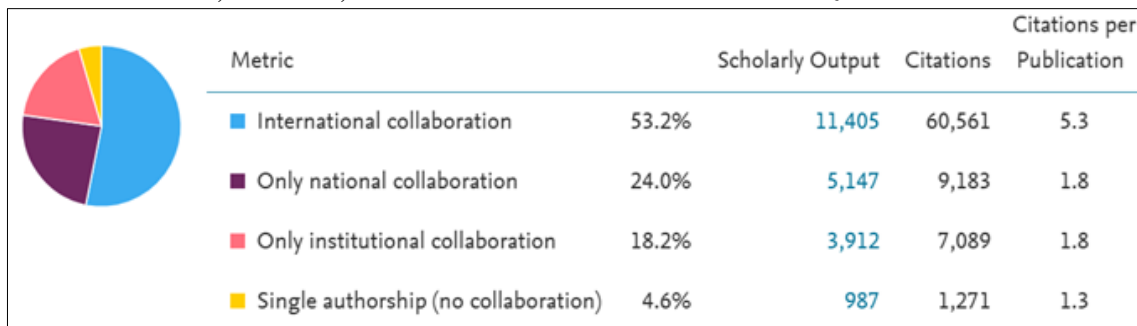
Table 4
Top 10 collaborated countries

Country/ Region	Co-authored publications	Co-authored publications (growth %)	Co-authors in Kazakhstan	Co-authors in Kazakhstan (growth %)	Institutions
Russian Federation	7327	11,2	8488	22,4	679
United States	2269	41,7	2899	60,7	935
China	1935	46,8	1725	89	623
Ukraine	1818	6,9	1699	72,4	206
Poland	1500	-8,8	1772	79,5	190
United Kingdom	1468	39,6	1597	57,2	513
Turkey	1361	102,2	1828	116,8	271
Germany	1193	20,4	1576	25,8	353
India	1133	100,9	943	69,1	512
Italy	1018	43,9	1071	65	294

Kazakhstan has rapidly growing partnerships with research powerhouses such as the United States (2,269, +41.7%) and China (1,935, +46.8%). Collaboration with Saudi Arabia (+254.5%) and Uzbekistan (+166.7%) resulted in the fastest growth, possibly linked to recent agreements or shared research projects.

In the collaboration of Kazakhstan with other countries, the most institutions involved in this partnership from the United States (935), Russia (679), and Germany (353). This suggests extensive institutional networks of Kazakhstani universities with leading research hubs.

Kazakhstan's collaboration landscape reflects historical ties (Russia, Ukraine), emerging partnerships (China, India), and strategic expansions (Saudi Arabia, Pakistan). Rapid growth with countries like Iran, Pakistan, and Saudi Arabia could be driven by shared interests in technology, energy, and STEM fields. Collaborations with Europe, the US, and China yield the highest citation impacts, emphasizing the global significance of these research projects.

Figure 7
International, national, and institutional collaboration in Kazakhstan

Metric		Scholarly Output	Citations	Citations per Publication
International collaboration	53.2%	11,405	60,561	5.3
Only national collaboration	24.0%	5,147	9,183	1.8
Only institutional collaboration	18.2%	3,912	7,089	1.8
Single authorship (no collaboration)	4.6%	987	1,271	1.3

Kazakhstan's research collaboration patterns are based on four collaboration types: international collaboration, national collaboration, institutional collaboration, and single authorship (Figure 7). International collaboration in Kazakhstan takes 53.2% of research productivity. International collaboration generates the highest scholarly output and citations,

reflecting the significant impact of global partnerships. Kazakhstan's international research is cited 49% more than the global average, emphasizing quality and visibility.

National collaborations produce fewer publications (24.0%) and receive relatively low citations per publication (1.8). These papers are cited less frequently than the global average, suggesting limited international reach or niche research fields. Institutional-level collaboration has moderate output (18.2%) and citation impact.

Single-author publications produce the least output (987) and have limited citation impact (Figure 8). Single-author work may lack the visibility and collaborative benefits of multi-authored publications.

Figure 8
International, national, and institutional collaboration over time

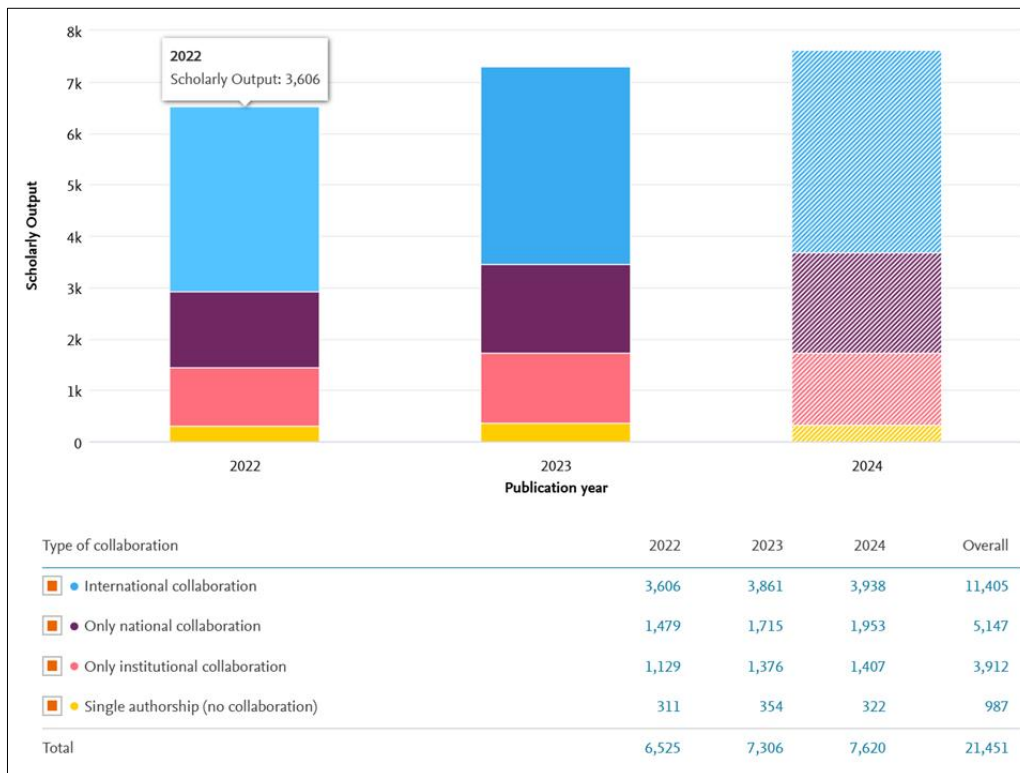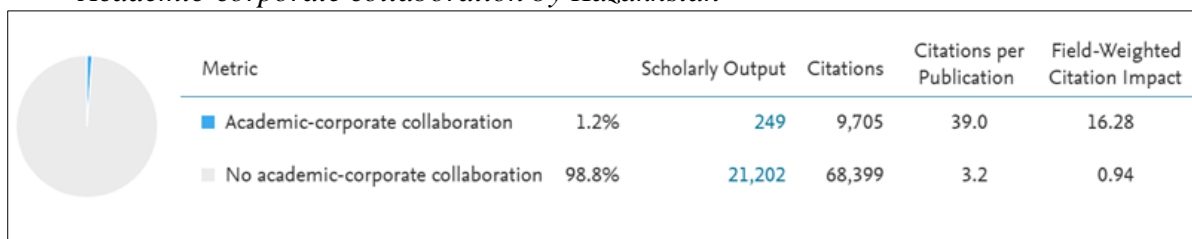| Type of collaboration	2022	2023	2024	Overall
International collaboration	3,606	3,861	3,938	11,405
Only national collaboration	1,479	1,715	1,953	5,147
Only institutional collaboration	1,129	1,376	1,407	3,912
Single authorship (no collaboration)	311	354	322	987
Total	6,525	7,306	7,620	21,451

Figure 9 highlights the impact of academic-corporate collaboration on research in Kazakhstan compared to research without such collaboration. Despite contributing only 1.2**%** of total research output, academic-corporate collaboration generates exceptionally high citations. These papers are cited 12 times more frequently than non-corporate collaborations, indicating groundbreaking or industry-relevant research.

Figure 9
Academic-corporate collaboration by Kazakhstan

Metric		Scholarly Output	Citations	Citations per Publication	Field-Weighted Citation Impact
Academic-corporate collaboration	1.2%	249	9,705	39.0	16.28
No academic-corporate collaboration	98.8%	21,202	68,399	3.2	0.94

The bulk of research output comes from non-corporate academic collaborations, 21,202 (98.8%). Citations per Publication (3.2) are considerably lower, indicating average research visibility on a global scale.
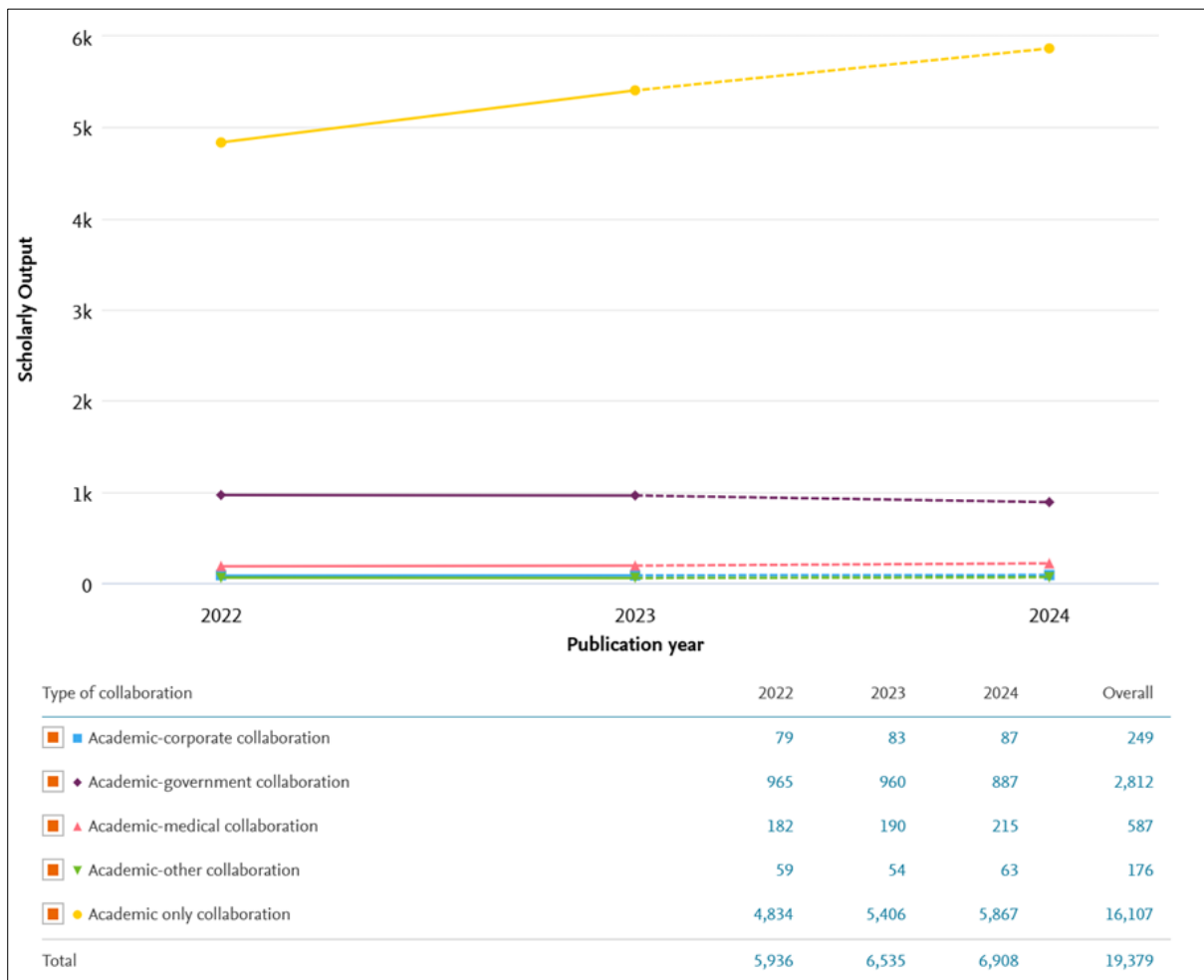
Although academic-corporate collaboration is rare, these partnerships yield significantly higher-impact research. Expanding such collaborations could boost Kazakhstan's global research standing and drive innovation. Encouraging more partnerships with corporations, especially in the technology, energy, and engineering sectors, could improve overall research productivity.

Various types of research collaborations in Kazakhstan over the years 2022, 2023, and 2024, with the total number of collaborations in each category for each year and overall are presented in Figure 10.

Academic-corporate collaborations have shown a steady increase over the years. The growth from 79 in 2022 to 87 in 2024 indicates a moderate upward trend. Corporate partnerships with academia may be becoming more common, suggesting a growing focus on research and development collaboration or industry-academic knowledge transfer.

Figure 10
Collaboration of Kazakhstan with different sectors over time

Type of collaboration	2022	2023	2024	Overall
■ Academic-corporate collaboration	79	83	87	249
♦ Academic-government collaboration	965	960	887	2,812
▲ Academic-medical collaboration	182	190	215	587
▼ Academic-other collaboration	59	54	63	176
● Academic only collaboration	4,834	5,406	5,867	16,107
Total	5,936	6,535	6,908	19,379

Academic-government collaboration category shows a slight decline over the years, with a reduction from 965 in 2022 to 887 in 2024. While the number remains high compared to other types of collaborations, there is a noticeable decrease, particularly from 2022 to 2024.

Government-academic collaboration remains significant but is on a slight downward trajectory. This could indicate changes in funding or government priorities, or possibly a shift towards different types of collaborations.

The number of academic-medical collaborations shows consistent growth, increasing from 182 in 2022 to 215 in 2024. This suggests a positive trend in partnerships between academia and the medical sector. The rise in academic-medical collaborations could be indicative of greater attention to medical research, healthcare innovations, or increased funding for biomedical research.

Academic-other collaboration fluctuates slightly, with a decrease in 2023 followed by an increase in 2024. The overall number is relatively small compared to other categories. "Other" collaborations could refer to a wide range of non-corporate, non-government, and non-medical partnerships. The variability in this category might reflect changes in non-traditional academic partnerships or projects.

Academic-only collaboration shows a strong and consistent increase year over year, with a significant rise from 4834 in 2022 to 5967 in 2024. Academic-only collaborations (likely referring to inter-institutional collaborations, internal academic projects, or purely academic research) dominate the data. The significant growth in this category suggests that universities and research institutions are increasingly engaging in internal or academic-only research projects.

The total number of collaborations has steadily increased over the years, with a noticeable rise from 5936 in 2022 to 6908 in 2024. The total collaborations reflect the increasing trend across all categories, indicating a general growth in academic collaboration.

Analysis of collaboration with different sectors over time highlights the dynamic nature of academic collaborations and the varying trends across different sectors. Further investigation could help to understand the underlying causes of these trends, such as funding patterns, policy shifts, or institutional strategies.

Leading Publishing Institutions

The world of publishing is vast and dynamic, encompassing a rich network of institutions that shape the flow of ideas, culture, and knowledge. At the heart of this industry lie the leading publishing institutions - organizations that play a pivotal role in bringing books, journals, research, and other forms of written content to readers worldwide. These institutions, ranging from well-established conglomerates to specialized independent publishers, are integral to the distribution of both mainstream and niche literature, as well as scholarly work.

The top 10 institutions in the Kazakhstan contributing to research productivity during the last three years period are Al Farabi Kazakh National University, Nazarbayev University, L.N. Gumilyov Eurasian National University, Satbayev University, Abay Kazakh National Pedagogical University, Kazakh National Agrarian University, Kazakh National Medical University, Buketov Karaganda State University, Kazakh British Technical University, South Kazakhstan State University.

Table 5
Major institutions contributing to research productivity in 2022-2024

Universities in Kazakhstan	Overall	2022	2023	2024
Al Farabi Kazakh National University	3750	1170	1201	1379
Nazarbayev University	3695	1211	1211	1273
L.N. Gumilyov Eurasian National University	2551	716	895	940
Satbayev University	1605	433	557	615
Abay Kazakh National Pedagogical University	853	278	245	330
Kazakh National Agrarian University	750	215	282	253

Kazakh National Medical University	639	156	208	275
Buketov Karaganda State University	631	208	231	192
Kazakh-British Technical University	602	184	181	237
South Kazakhstan State University (SKSU)	599	176	205	218

Table 5 lists the leading publishing universities in Kazakhstan, showing their overall scholarly output and annual publication counts from 2022 to 2024. These 10 universities could be divided into three groups by their scholarly output.

1. Top Performers by overall output:

- Al-Farabi Kazakh National University (3,750 publications) is consistent in yearly growth from 1,170 (2022) to 1,379 (2024). The top research institution, benefiting from diverse academic disciplines and established international collaborations.

- Nazarbayev University (3,695 publications) has a steady output, averaging over 1,200 publications yearly. Focus on cutting-edge research in science, engineering, and technology boosts its global visibility.

- L.N. Gumilyov Eurasian National University (2,551 publications) shows a remarkable increase from 716 (2022) to 940 (2024). Rapid growth suggests expanding research programs and strengthening global partnerships.

2. Emerging Universities with moderate growth:

- Satbayev University (1,605 publications) shows a steady increase from 433 (2022) to 615 (2024), likely driven by engineering and technical research expansion.

- Abay Kazakh National Pedagogical University (853 publications) displays a recovery from a slight decline in 2023 to a strong rebound in 2024 (330 publications).

- Kazakh National Agrarian University (750 publications) shows fluctuating output with a slight dip in 2024 (253), which is driven by research in agriculture, food security, and sustainability.

Top 10 Kazakhstani institutions scholarly output trend in 2022-2024 years presented in figure 11. The trend shows that most universities (6) are at the same level scholarly output for three years. Leaders maintain their positions over the years.

Figure 11
Scholarly output trend of Top 10 Kazakhstani institutions in 2022-2024
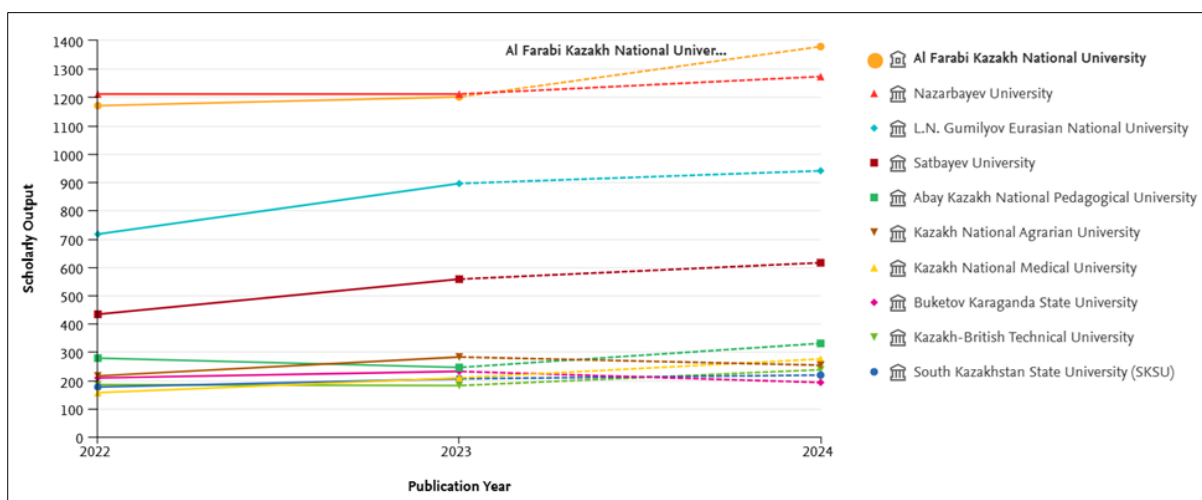
Niche Institutions

Kazakh National Medical University (639 publications) has consistent yearly growth, reaching 275 in 2024, reflecting increased medical and health research after the pandemic.

Buketov Karaganda State University (631 publications) shows a slight decline from 231 (2023) to 192 (2024). Academic diversification and improved partnerships could boost future performance of the university.

Kazakh-British Technical University (602 publications) has a strong rebound in 2024 (237 publications), likely strengthened by industry-focused research in technology and energy.

South Kazakhstan State University (599 publications) displays a steady increase from 176 (2022) to 218 (2024). Potential growth areas of the university are applied sciences and engineering.

Al-Farabi Kazakh National University and Nazarbayev University dominate, driven by international collaboration and multidisciplinary research. L.N. Gumilyov Eurasian National University and Satbayev University show significant upward trajectories. Universities like Buketov Karaganda State and Kazakh National Agrarian University could benefit from targeted research funding and international partnerships.

Conclusion

This study analyzed the research productivity and contributions of leading publishing institutions in Kazakhstan from 2022 to 2024. The findings reveal substantial growth in research output, driven by strategic reforms, increased funding, and international collaborations. Al-Farabi Kazakh National University and Nazarbayev University have played pivotal roles in shaping the nation's research landscape. However, the slightly below-average Field-Weighted Citation Impact (FWCI) highlights the need to focus not only on quantity but also on the quality and global relevance of research. International collaborations have been instrumental in enhancing visibility and impact, but the limited domestic collaboration network suggests an opportunity to strengthen national research integration. While Kazakhstan has made commendable progress, challenges such as language barriers, low representation in high-impact journals, and underdeveloped domestic research networks must be addressed to achieve sustainable and globally competitive research outcomes.

This study has certain limitations. Firstly, SciVal relies on Scopus data, which may exclude publications not indexed in Scopus, potentially underrepresenting research output in certain disciplines or local journals. Second, the focus on quantitative metrics may overlook qualitative aspects of research, such as societal impact or innovation. Thirdly, institutional affiliations in publications were self-reported, which could introduce inaccuracies in attribution.

Future studies could investigate the long-term effects of institutional reforms, such as changes in funding structures, research policies, and academic governance, on the research output and quality in Kazakhstan. This could include examining how specific reforms impact different academic disciplines and institutional types. Although this study highlights the importance of international collaborations, a deeper analysis of domestic collaboration networks is needed. Future research could explore how intra-national collaborations influence research productivity and identify barriers to greater cooperation among Kazakhstani institutions. Comparative research on research productivity in Kazakhstan and other Central Asian countries could provide regional insights and best practices. This could help identify common challenges, regional disparities, and opportunities for collaboration in the Central Asian academic landscape. These directions for future research could provide a deeper and more comprehensive understanding of Kazakhstan's research environment and help refine policies and strategies to enhance research productivity and impact.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Author contributions

The author confirms the sole responsibility for the conception of the study, presented results and manuscript preparation.

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