







“Generational differences in adapting to international publication standards: Evidence from Kazakhstan”

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ARTICLE INFO	Renata Kudaibergenova, Sandugash Uzakbay, Kuanysh Abeshev and Kadyrzhan Smagulov (2026). Generational differences in adapting to international publication standards: Evidence from Kazakhstan. <i>Knowledge and Performance Management</i> , 10(2), 166-178. doi: 10.21511/kpm.10(2).2026.10
DOI	http://dx.doi.org/10.21511/kpm.10(2).2026.10
RELEASED ON	Friday, 19 June 2026
RECEIVED ON	Friday, 13 March 2026
ACCEPTED ON	Monday, 08 June 2026
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Knowledge and Performance Management"
ISSN PRINT	2543-5507
ISSN ONLINE	2616-3829
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	Sp. z o.o. Kozmenko Science Publishing



NUMBER OF REFERENCES

53



NUMBER OF FIGURES

2



NUMBER OF TABLES

0

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BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Type of the article: Research Article

Received on: 13th of March, 2026

Accepted on: 8th of June, 2026

Published on: 19th of June, 2026

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Conflict of interest statement:

Author(s) reported no conflict of interest

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GENERATIONAL DIFFERENCES IN ADAPTING TO INTERNATIONAL PUBLICATION STANDARDS: EVIDENCE FROM KAZAKHSTAN

Abstract

This study is relevant given the growing reliance of post-Soviet higher education systems on bibliometric indicators to evaluate academic performance and allocate research funding. The purpose of the study is to examine whether generational cohorts of productive scientists in Kazakhstan differ in their publication patterns under the transition to bibliometric-based research evaluation. The study is based on a bibliometric analysis of 220 highly productive authors across 22 subject areas using Scopus and SciVal data for 2018–2023, with correlation analysis applied across three age cohorts (under 40, 41–55, and 56+). The results reveal significant generational differences in publication strategies. Among researchers under 40, a very strong correlation is observed between total publications and Q1 journal output ($r = 0.95$), and between publication activity and international collaboration ($r = 0.98$). This cohort also demonstrates higher publication activity in internationally co-authored papers and stronger alignment with formal bibliometric indicators. In contrast, the 41–55 cohort shows the weakest relationship between publication output and Q1 publications ($r = 0.40$), lower levels of leading authorship, and less pronounced integration into international publication networks. Researchers aged 56+ occupy an intermediate position but demonstrate the highest share of publications in journals later excluded from Scopus, indicating greater exposure to potentially problematic publication practices during earlier stages of Kazakhstan's research system transformation. The findings suggest that highly productive scientists from different generational cohorts respond differently to formal bibliometric evaluation requirements. The presence of publications in journals later excluded from Scopus across all cohorts suggests that bibliometric-based evaluation systems may encourage strategic responses to performance criteria.

Keywords

scientometrics, bibliometrics, generations, productivity, Kazakhstan, publications, collaboration, predatory journals

JEL Classification

I23, I28

INTRODUCTION

The integration of post-Soviet countries into the global system of scientific knowledge production has been accompanied by major institutional transformations in higher education and research. In Kazakhstan, this process included the transition to international publication standards and the growing use of bibliometric indicators in research evaluation. Publications in journals indexed by Scopus and Web of Science have become key requirements for obtaining academic degrees, securing research funding, and advancing academic careers (Moldashev et al., 2020). At the same time, reforms associated with the Bologna Process and the internationalization of higher education strengthened the orientation of universities and researchers toward global academic standards.

The institutional environment also actively supported the development of a new generation of researchers trained within the interna-

tional academic system. Programmes such as Bolashak, international research internships, and reforms in doctoral education expanded access to academic mobility, international collaboration, and publication practices in international journals. As a result, younger researchers generally entered academia with greater exposure to international standards, stronger English proficiency, and higher familiarity with international publication requirements. By contrast, many researchers whose academic careers were formed during the Soviet period or the early years of independence had limited experience publishing internationally and less familiarity with academic writing and research ethics in line with international standards (Berekeyeva et al., 2024). Thus, different generations of scientists developed within substantially different institutional and academic environments.

At the same time, the expansion of bibliometric evaluation systems created new pressures on academic work. While these policies aimed to increase research productivity and international visibility, they also strengthened incentives to comply with quantitative publication requirements. In Kazakhstan, this process has been accompanied by growing concerns regarding publications in predatory or potentially low-quality journals, purchased co-authorship, and other forms of strategic adaptation to formal evaluation requirements (Abalkina, 2023; Marina & Sterligov, 2021; Kaztayeva, 2023). The pressure to meet publication requirements within limited timeframes may encourage researchers to prioritize publication speed over research quality.

The transition to bibliometric-based evaluation systems may affect researchers differently depending on the academic and institutional environment in which their careers were formed. In Kazakhstan, different generations entered academia under unequal conditions, including varying levels of exposure to international publication standards, English-language academic writing, and global research networks. At the same time, all researchers are currently evaluated according to the same formal publication requirements and performance indicators. The rapid internationalization of Kazakhstan's research system, combined with the institutionalization of publication-based evaluation, therefore creates conditions in which generational differences may be reflected in publication patterns and their associations with formal evaluation criteria. The above-mentioned suggests that the transition to bibliometric-based evaluation systems in Kazakhstan should be considered not only as a mechanism for increasing international research visibility, but also as a factor shaping researchers' publication behavior and academic strategies. In the context of unequal generational exposure to international publication standards, academic writing practices, and global research networks, the same formal evaluation requirements may affect different cohorts of researchers in different ways. Therefore, understanding generational differences in publication behavior becomes important for assessing the broader institutional consequences of publication-based research evaluation systems.

1. LITERATURE REVIEW

Kazakhstan continues to occupy a peripheral position in the global system of scientific knowledge production, despite ongoing institutional reforms and increasing public investment in research and development. This is reflected in publication activity indicators indexed in the Web of Science and Scopus databases. In this respect, Kazakhstan shares several characteristics with countries of the Global South, to which it is often compared in comparative studies of science systems and higher education (Schöpf, 2020; Bayanbayeva, 2025). Research on countries of the Global South high-

lights a range of structural constraints affecting scientific productivity, including resource-scarce environments, limited research expertise, reduced capacity for active participation in research and publication activities, restricted access to international academic networks, and asymmetric integration into the global scientific system (Collyer, 2016; Gomez et al., 2022; Obuku et al., 2018; Heng et al., 2020).

At the individual level, existing studies consistently identify researchers' age and career stage as key determinants shaping patterns of scientific productivity (Gingras et al., 2008; Bonaccorsi

& Daraio, 2003; Nafukho et al., 2019; Mishra & Smyth, 2012; Bentley, 2012). These patterns are further elaborated in studies examining generational differences in scientific productivity. Empirical evidence suggests that senior researchers tend to demonstrate higher levels of accumulated output, reflecting longer career trajectories and greater access to scientific capital (Gingras et al., 2008; Kyvik & Olsen, 2008; Mishra & Smyth, 2012; Abramo et al., 2015; Dubois et al., 2014; Milojević, 2012). In contrast, early-career researchers, operating under conditions of limited resources and institutional pressure, often adopt more strategic publication behaviours, prioritising high-impact journals as a means of academic legitimisation and career advancement (Bonaccorsi & Daraio, 2003). At the same time, these cohorts appear to be particularly vulnerable to research misconduct, given their limited experience and the pressures associated with “publish or perish” regimes embedded in formalised research governance systems (Kurt, 2018; Xia et al., 2015; Eshchanov et al., 2021; Tang & Jia, 2021).

Research on international scientific collaboration further suggests that different generations of scientists possess distinct advantages. Senior researchers often rely on extensive international networks accumulated throughout their academic careers (Kwiek, 2020; Jung et al., 2014; Rostan & Ceravolo, 2015), while younger scientists may demonstrate comparable or even higher levels of international engagement due to greater academic mobility, international training, and a stronger orientation toward international publication standards (Costas et al., 2010).

At the institutional level, publication activity patterns are increasingly shaped by national science policy through regulatory frameworks and qualification requirements linked to bibliometric indicators (Moldashev et al., 2018; Köbli et al., 2024). The growing reliance on quantitative and formalised metrics significantly influences researchers’ publication strategies, including journal selection, co-authorship patterns, and the tempo of publication activity. These dynamics are particularly pronounced in countries with catch-up scientific development, where the adoption of international research evaluation standards occurs in contexts of limited institutional resources and

a strong dependence of academic careers on formal performance metrics (Adambekov et al., 2016; Kudaibergenova et al., 2022; Demir, 2018).

Furthermore, the increasing emphasis on bibliometric indicators may provoke both resistance and strategic adaptation in researchers’ publication practices (Moldashev et al., 2020). While publication-oriented policies are associated with increased research output, they also generate unintended consequences, including a rise in publications in predatory journals (Kuzhabekova & Ruby, 2018; Abalkina, 2023; Marina & Sterligov, 2021; Kaztayeva, 2023; Shah et al., 2024).

These dynamics become particularly visible in post-Soviet and catch-up research systems. The integration of Central Asian countries, including Kazakhstan, into the global scientific system has exposed persistent challenges related to research capacity, including insufficient funding, limited English-language proficiency, a shortage of high-level research centres and internationally indexed journals, and limited experience in publishing in high-impact outlets (Alimova & Brumshteyn, 2020; Chankseliani et al., 2021; Kocyigit et al., 2023). These challenges were further intensified by the economic crisis of the 1990s, which led to a sharp contraction in research funding, the erosion of scientific schools, and a large-scale outflow of researchers from academia (Naumova, 2012; Allahverdyan, 2018). In addition, the transition to international publication standards has posed particular difficulties for researchers in the social sciences and humanities, whose research and publication practices have historically been less aligned with international publication requirements (Moldashev et al., 2020; Kurambayev & Freedman, 2020; Köbli et al., 2024).

However, despite extensive research on scientific productivity, institutional regulation, and publication strategies, the interaction between generational differences and institutional transformation remains insufficiently examined. In particular, little is known about how the transition to international publication standards affects researchers trained under different scientific and regulatory conditions.

While previous studies primarily focus on bibliometric indicators and policy effects (Wahid et al., 2024; Guns et al., 2019), they tend to overlook how different generational cohorts respond to these changes. This gap is particularly relevant in the context of Kazakhstan, where researchers from different generations developed under substantially different institutional, linguistic, and academic conditions.

The objective of this study is to examine whether different generational cohorts of highly productive scientists in Kazakhstan demonstrate distinct patterns of publication activity and adaptation to formal research evaluation criteria.

2. METHODS

The study is based on bibliometric data on Kazakhstani authors retrieved from the SciVal analytical platform (Elsevier), which is based on Scopus. These databases were selected because of their broad coverage of scholarly publications and their capacity to analyze scientific productivity and citation impact. The observation period covered 2018–2023, which made it possible to assess recent scientific activity and minimize distortions associated with citation accumulation over longer time spans. Data on publication activity were collected from SciVal as of March 27, 2024. The dataset used in this study is publicly available at <https://data.mendeley.com>. The unit of analysis in this study is the publication activity of Kazakhstani authors, operationalized through their publication and citation records indexed in Scopus.

Publications by Kazakhstani authors were classified by subject area using the All Science Journal Classification (ASJC), SciVal. To ensure sufficient publication volume, only subject areas with at least 1,000 publications by Kazakhstani authors during 2018–2023 were included. As a result, 22 out of 27 ASJC subject areas were selected. Five areas – Nursing, Neuroscience, Multidisciplinary, Dentistry, and Decision Sciences - were excluded due to having fewer than 1,000 publications during the study period.

Using the Benchmarking module in SciVal, the Authors metric was selected with the country filter

set to “Kazakhstan.” For each of the 22 subject areas, the top 10 Kazakhstani authors with the highest number of publications in 2018–2023 were identified as highly productive researchers. Only authors affiliated with Kazakhstani institutions were included; foreign researchers listing Kazakhstani affiliations were excluded. This procedure resulted in a sample of 220 authors, grouped into 22 subject areas with 10 authors in each group. In cases where an author appeared among the top 10 researchers in more than one ASJC subject area, the author was included only once in the final dataset to ensure that the sample consisted of 220 unique individuals.

The selection strategy was designed as follows:

- 22 subject areas were included to ensure broad cross-disciplinary coverage;
- a fixed number of authors (top-10 per area) was selected to ensure comparability across disciplines and to avoid the dominance of large areas (e.g., medicine, engineering) over smaller ones;
- authors were selected based on their high scientific productivity within each subject area.

Thus, the sample represents a targeted group of highly productive authors, rather than the full population of Kazakhstani researchers. This approach allows for meaningful comparison across disciplines while maintaining analytical balance.

To maintain confidentiality, all authors were anonymized and coded in the dataset (Author 1, Author 2, etc.). The authors were divided into three age groups: Group 1 (under 40 years), Group 2 (41–55 years), and Group 3 (56 years and older). This classification reflects the institutional context of Kazakhstan’s research system, where scholars aged 40 and under are formally defined as “young scientists” in national science policy documents (MSHE, 2024). The second group (41–55) represents researchers whose early careers coincided with the period following Kazakhstan’s independence in 1991, when the national scientific system was undergoing major institutional transformations. The third

group includes senior-generation researchers whose careers were formed largely during the Soviet period. Information on authors' ages was obtained from publicly available sources on the internet as of April 18, 2024.

Bibliometric indicators for each author were extracted from SciVal and compiled in an Excel dataset. The following indicators were collected:

- total number of publications;
- distribution of publication types (articles, reviews, books, book chapters, conference papers);
- journal quartiles according to the CiteScore percentile;
- number and share of publications involving international collaboration;
- total citations;
- citations per publication;
- h-index;
- number of publications where the author is listed as first author; and
- number of publications where the author is listed as the corresponding author.

Additional indicators were calculated manually using Microsoft Excel due to the absence of certain analytical filters in SciVal. These included the share of first-author publications relative to the total number of publications, the share of corresponding-author publications, and citation metrics for publications involving international collaboration. For internationally co-authored publications, the total number of citations and the average citation rate were also calculated.

Journal-level metrics were obtained from the Scopus database as of July 9, 2024. CiteScore percentile and SCImago Journal Rank (SJR) values were used as indicators of journal impact. When journals were classified into multiple subject areas with different percentile values, the

highest percentile value was used for analysis. In addition, the cumulative SJR score for each author was calculated by summing the SJR values of the journals in which their publications appeared.

Scopus data were also used to identify publications in open-access journals. Journal titles were entered into the Sources section of Scopus, where their open-access status was verified. To identify publications by Kazakhstani authors in journals that had been subsequently excluded from Scopus, the procedure proposed by Kenessov (2020) was applied.

The Hirsch index was recalculated for each author after excluding publications in journals that had been removed from the Scopus database. For this purpose, a list of such publications and their citation counts was compiled for each author, and the h-index was recalculated based on the standard definition (an author has an h-index of n if n of their publications have received at least n citations). Additional h-index calculations were performed considering only publications where the author was listed as first author or corresponding author.

The collected data were processed and analysed using Python and Microsoft Excel. Correlation analysis was conducted using Pearson's correlation coefficient. Statistical significance was evaluated at the $p \leq 0.05$ level, corresponding to a 95% confidence interval. For interpretative purposes, correlations with coefficients above $r = 0.4$ were considered substantively meaningful. The results of the analysis were visualized using charts and diagrams generated in MS Office.

Several limitations of this study should be noted:

- The sample is not representative of the entire population of researchers, as it focuses on highly productive authors.
- Academic age is estimated indirectly, which may introduce measurement bias.
- Correlation analysis does not imply causation; therefore, identified relationships should be interpreted with caution.

3. RESULTS

We first examined generational differences in publication activity across cohorts of highly productive scientists in Kazakhstan.

The results of the correlation analysis reveal clear differences in publication patterns across the three age cohorts (under 40, 41-55, and 56+). The relationship between total publication output and publications in Q1 journals varies substantially across cohorts. The strongest correlation is observed among researchers under 40 ($r = 0.95$). Among researchers aged 56+, the correlation remains positive but is lower ($r = 0.67$). The 41-55 cohort demonstrates the weakest association ($r = 0.40$).

International collaboration is strongly associated with publication output across all age groups. The correlation between total publications and internationally co-authored papers is highest among researchers under 40 ($r = 0.98$). The corresponding values for the 41-55 and 56+ cohorts are $r = 0.82$ and $r = 0.87$, respectively.

Differences are also observed in authorship roles. Among researchers under 40, the number of first-author publications shows a strong correlation with total output ($r = 0.79$). This relationship is weaker in the 41-55 cohort ($r = 0.38$) and among researchers aged 56+ ($r = 0.35$).

A similar pattern is observed for corresponding authorship. The strongest correlation is found among researchers under 40 ($r = 0.74$), compared to $r = 0.44$ in the 41-55 cohort and $r = 0.38$ among researchers aged 56+.

Overall, the results indicate consistent differences across age groups of highly productive scientists in the relationship between publication output, journal quality, international collaboration, and authorship roles.

We then analysed publication activity in Scopus-indexed journals with CiteScore percentiles of ≥ 35 and ≥ 50 , as these thresholds constitute key “entry” requirements for academic careers and access to research funding in Kazakhstan. Across all age groups, a strong positive correlation is observed between total publication output and publications in journals with a percentile of ≥ 35 . The correlation is highest among researchers under 40 ($r = 0.987$), followed by the 56+ cohort ($r = 0.878$) and the 41-55 cohort ($r = 0.802$).

A similar pattern is observed for publications in journals with a percentile of ≥ 50 . The correlation is highest among researchers under 40 ($r = 0.979$), followed by the 56+ cohort ($r = 0.755$), and is lower among researchers aged 41-55 ($r = 0.527$).

The share of publications in journals later excluded from Scopus differs across age groups. The highest

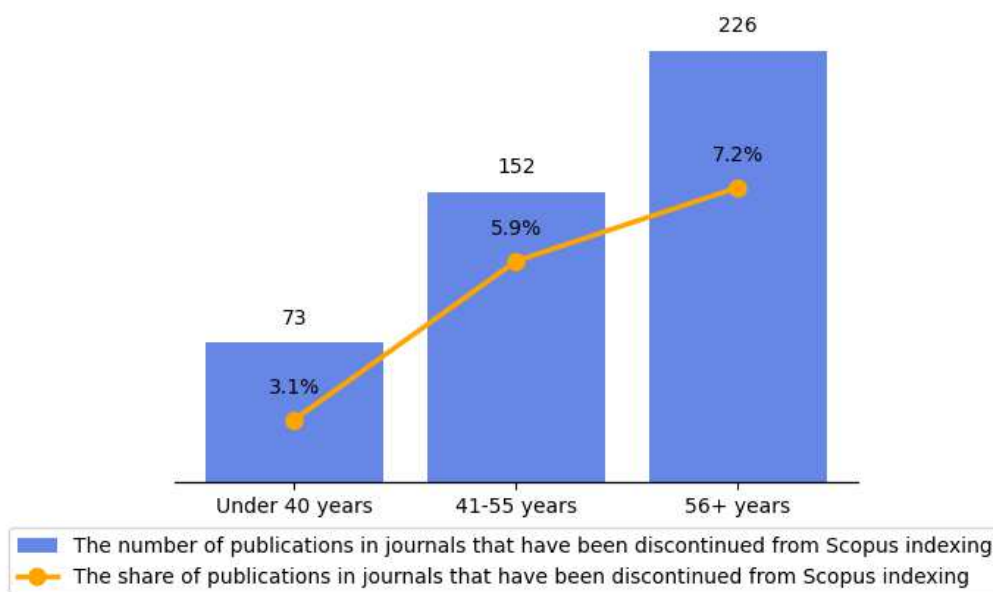


Figure 1. Number and share of publications in journals excluded from Scopus by age group

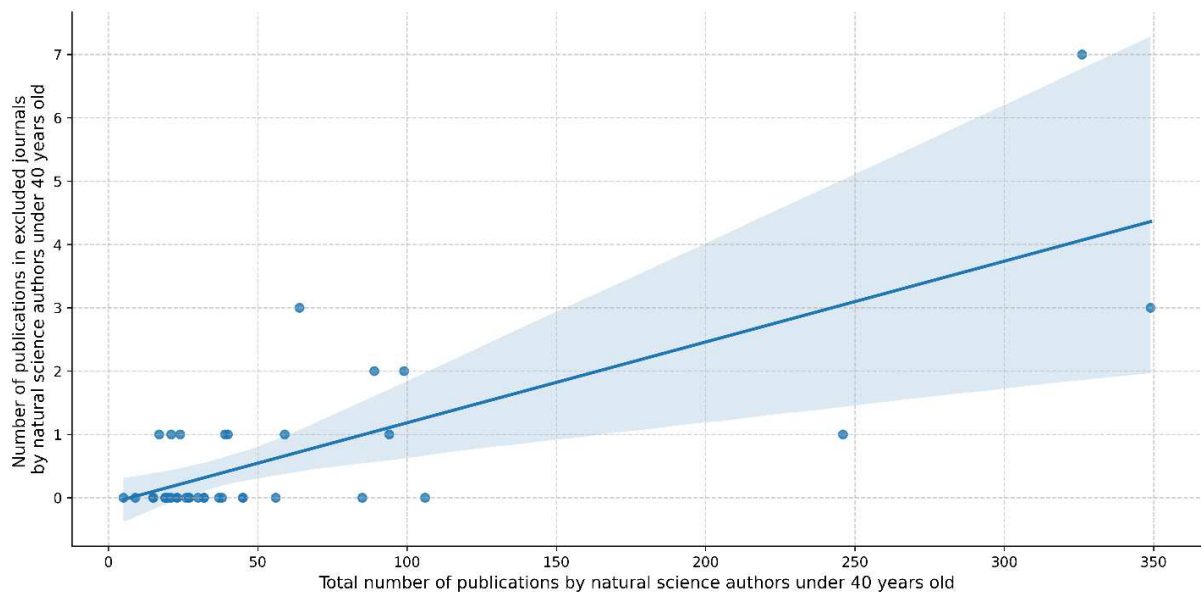


Figure 2. Number of publications by authors in the natural sciences, aged under 40, in journals excluded from Scopus, relative to the total number of publications by these authors

proportion is observed among researchers aged 56+ (7.2%), followed by the 41-55 cohort (5.9%) and researchers under 40 (3.1%) (Figure 1).

Disciplinary differences are also observed. On average, authors in natural sciences (STEM) have 1.35 publications in journals later excluded from Scopus, compared to 4.44 publications among authors in the social sciences and humanities (SSH). Among the 50 SSH authors analysed, 30 (60%) have at least one publication in journals excluded from Scopus. Of these, 13 (43.3%) belong to the 56+ cohort, 11 (36.7%) to the 41-55 cohort, and 6 (20%) are under 40.

Correlation analysis by subject area reveals variation across cohorts. Among researchers under 40 in natural sciences, a positive correlation is observed between total publications and publications later excluded from Scopus ($r = 0.75$). For the 41-55 and 56+ cohorts, the corresponding relationships are negative (Figure 2).

The relationship between h-index values and publications in journals excluded from Scopus also varies across cohorts. For researchers under 40 and those aged 56+, the correlation between h-index and such publications is weak and not statistically significant ($r = 0.165$, $p = 0.284$; $r = 0.124$, $p = 0.213$, respectively). For the

41-55 cohort, a statistically significant correlation is observed ($r = 0.300$, $p = 0.009$).

Differences across subject areas are also evident. Among authors in the natural sciences, the correlation between h-index and citations from journals excluded from Scopus is weak ($r = 0.215$, $p = 0.005$), whereas among authors in the social sciences and humanities, the correlation is stronger ($r = 0.43$, $p = 0.002$).

At the individual level, 23 out of 50 SSH authors show an increase in h-index values due to citations from journals excluded from Scopus. In two cases, the h-index is fully dependent on such citations. In several cases, recalculation results in substantial decreases in h-index values (e.g., from 18 to 8, from 18 to 7, and from 11 to 3).

Overall, the findings suggest that publication patterns and responses to bibliometric evaluation systems differ across generational cohorts of highly productive scientists. Among researchers under 40, the strong association between total output and publications in journals meeting key percentile thresholds (≥ 35 and ≥ 50) indicates a high degree of alignment with formal performance requirements. In contrast, the weaker correlations observed among the 41-55 cohort point to a more uneven adaptation to these criteria. The 56+ co-

hort demonstrates a mixed pattern, combining relatively strong engagement with high-impact journals with a higher reliance on publications later excluded from Scopus. These differences may be associated with variations in academic trajectories, institutional experiences, and disciplinary contexts across generations of highly productive researchers.

4. DISCUSSION

The findings of this study suggest that generational differences in publication behaviour among highly productive scientists in Kazakhstan are systematic and closely related to the institutional configuration of the research evaluation system. Among the highly productive scientists analysed in this study, generational cohorts demonstrated distinct patterns of publication activity, including differences in journal quality, international collaboration, and authorship roles. The findings further indicate that these differences are associated with varying degrees of adaptation to formal bibliometric evaluation criteria.

The analysis shows that highly productive researchers under 40 demonstrate the strongest alignment with key bibliometric indicators, including publications in Q1 journals, international collaboration, and leading authorship roles. This pattern is not solely a function of career stage (Bonaccorsi & Daraio, 2003). It is also associated with differences in training conditions. This cohort has been formed within a system that includes international doctoral supervision, research internships abroad, targeted grant programmes (e.g., *Zhas Galym*), and higher levels of English-language proficiency. These factors provide more direct access to international academic networks and facilitate publication in high-ranking journals. As a result, highly productive younger researchers are better integrated into the current evaluation system, as their academic trajectories have developed within its framework.

In contrast, the 41-55 cohort demonstrates weaker alignment with Q1 publications, international collaboration, and authorship positions. According to the results, this group shows the lowest correlation with high-impact journals and comparatively weaker links to leading authorship roles. These

patterns may be related to the historical and institutional context in which many members of this cohort developed their academic careers, including the post-Soviet transformation of the research system, economic instability during the 1990s, and subsequent changes in publication and evaluation practices. In addition, this cohort was required to adapt to new publication and evaluation standards later in their careers, which may have limited their integration into the current system. This finding is consistent with previous studies suggesting that mid-career researchers often face heavier teaching and administrative workloads, which reduce the time available for research (Kyvik & Olsen, 2008; Kurambayev & Freedman, 2020).

Highly productive researchers aged 56+ demonstrate an intermediate position. On the one hand, they maintain relatively strong engagement with international collaboration and Q1 publications. These findings are consistent with previous studies by Kwiek (2020), Jung et al. (2014), and Rostan and Ceravolo (2015), which emphasize the positive influence of longer research careers and accumulated academic networks on international scientific collaboration. On the other hand, this cohort shows the highest share of publications in journals later excluded from Scopus. This combination reflects a mixed pattern of publication behaviour, where established academic networks and accumulated experience coexist with publication practices formed under earlier institutional conditions. The strong association between authorship roles and total output in this group also reflects their supervisory and organisational roles within research teams (Gingras et al., 2008). At the same time, while previous studies on publications in predatory journals primarily focused on early-career researchers and publication pressure among younger cohorts (Kurt, 2018; Xia et al., 2015; Eshchanov et al., 2021; Tang & Jia, 2021), the present findings suggest that such publication practices may also persist among highly productive senior researchers shaped by earlier institutional and academic environments.

The findings suggest that, among the highly productive scientists included in this study, generational cohorts differ in the extent to which their publication patterns are associated with formal bibliometric evaluation criteria. Highly productive younger

researchers show a high degree of alignment with formal performance indicators, particularly in relation to publications in journals meeting key percentile thresholds, whereas the 41-55 cohort demonstrates weaker and less consistent associations with these indicators. The 56+ cohort of highly productive researchers exhibits a hybrid pattern, combining engagement with high-impact journals and a higher reliance on publications later excluded from Scopus. Overall, publication patterns appear to differ across cohorts and may be associated with prior academic trajectories and disciplinary contexts.

The observed generational differences in publication patterns among the highly productive scientists analysed in this study, particularly the strong alignment of younger researchers with Q1 publications and CiteScore thresholds, suggest the influence of formal research evaluation requirements in Kazakhstan. These findings are consistent with the earlier study by Kudaibergenova et al. (2022), which demonstrated the growing role of bibliometric indicators in shaping publication strategies and academic trajectories within Kazakhstan's research system. Current regulatory frameworks connect doctoral defence, academic titles, and access to research funding to publications in journals indexed in Scopus and Web of Science, with emphasis on Q1 journals and defined CiteScore thresholds (MES, 2011a, 2015, 2021; MSHE, 2023). In addition, publications in journals meeting percentile thresholds of 35 and 50 are embedded in criteria for academic promotion and research funding (MSHE, 2024; MES, 2011b). This institutional configuration may help explain the publication patterns observed among the highly productive scientists included in this study.

At the same time, the presence of publications in journals later excluded from Scopus among highly productive scientists across all age groups suggests that not all publication practices are fully aligned with current evaluation standards. Such patterns may reflect responses to time constraints and performance requirements, including the prioritisation of faster publication channels. Similar dynamics have been documented in the literature on performance-based research systems (Demir, 2018).

Differences across subject areas further shape these patterns. The results show a higher prevalence of

publications in journals later excluded from Scopus within the Social Sciences and Humanities fields included in this study, as well as a stronger dependence of citation indicators on such publications. These findings may reflect structural constraints affecting researchers in these fields, including challenges related to adaptation to international research standards and publishing practices, which is consistent with the findings reported by Kurambayev and Freedman (2020) and Köbli et al. (2024). By contrast, the natural science fields included in this study demonstrated stronger integration into international publication systems.

Following the introduction of evaluation systems based on publications indexed in Scopus and Web of Science, some of the social sciences and humanities fields included in this study appear to have faced difficulties adapting to international publication standards. In such contexts, alternative publication channels, including predatory journals and other low-quality infrastructures, may serve as mechanisms for formally meeting quantitative requirements (Abalkina, 2023; Abalkina & Bishop, 2023; Smagulov & Teixeira da Silva, 2025). This may help explain the observed dependence of bibliometric indicators on citations from journals later excluded from Scopus.

At the same time, the relatively low share of such publications among the youngest cohort of highly productive scientists (3.1%) should be interpreted with caution. Since this study focuses on highly productive scientists, these results cannot be generalised to early-career researchers more broadly. Previous studies suggest that younger researchers, particularly in the Global South, may be more vulnerable to predatory publishing due to limited experience and structural constraints (Xia et al., 2015). The lower prevalence observed in this study may therefore reflect the specific characteristics of the sample rather than a general pattern.

The study shows that, among the highly productive scientists analysed, generational cohorts differ not only in their publication outcomes but also in the extent to which their publication patterns are associated with formal bibliometric evaluation criteria, suggesting that a common evaluation system may be linked to different publication patterns across generations.

CONCLUSION

The purpose of this study was to examine whether different generational cohorts of highly productive scientists in Kazakhstan demonstrate distinct patterns of publication activity and differing relationships with formal research evaluation criteria.

The findings confirm that generational cohorts of highly productive scientists analyzed in this study demonstrate different publication patterns and research trajectories shaped by the institutional and socio-economic conditions in which their academic careers developed. Among the highly productive scientists included in this study, younger researchers exhibited higher alignment with formal bibliometric performance indicators, whereas mid-career and senior cohorts demonstrated more heterogeneous publication patterns and weaker associations with these indicators. The results also indicate that publication-based evaluation systems may encourage publication behaviours indicative of strategic responses to formal performance criteria.

The study suggests that the publication behaviour observed in this sample may be shaped not only by career stage but also by differences in access to international publication standards, academic networks, and institutional support across generations of researchers. Overall, the findings highlight the importance of considering institutional context and generational differences when designing research evaluation policies in rapidly transforming research systems.

DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

In preparing this manuscript, the authors used DeepL to translate the original text into English and ChatGPT (OpenAI) solely to improve the clarity and readability of the text, including language editing and refinement of phrasing. The authors reviewed and edited all outputs and take full responsibility for the content of the publication.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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ACKNOWLEDGMENT

This research was funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant No. BR21882373).

REFERENCES

1. Abalkina, A. (2023). Publication and collaboration anomalies in academic papers originating from a paper mill: Evidence from a Russia-based paper mill. *Learned Publishing*, 36(4), 689-702. <https://doi.org/10.1002/leap.1574>
2. Abalkina, A., & Bishop, D. V. M. (2023). Paper mills: A novel form of publishing malpractice affecting psychology. *Meta-Psychology*, 7, 1-10. <https://doi.org/10.15626/MP.2022.3422>
3. Abramo, G., D'Angelo, C. A., & Murgia, G. (2015). The combined effects of age and seniority on research performance of full professors. *Science and Public Policy*, 43(3), 301-319. <https://doi.org/10.1093/scipol/scv037>
4. Adambekov, S., Askarova, S., Welburn, S. C., Goughnour, S. L., Konishi, A., LaPorte, R., & Linkov, F. (2016). Publication productivity in Central Asia and countries of the former Soviet Union. *Central Asian Journal of Global Health*, 5(1), Article 261. <https://doi.org/10.5195/cajgh.2016.261>
5. Alimova, N., & Brumshteyn, Y. (2020). Russia and post-Soviet countries compared: Coverage of papers by Scopus and Web of Science, languages, and productivity of researchers. *European Science Editing*, 46, e53192. <https://doi.org/10.3897/ese.2020.e53192>
6. Allahverdyan, A. G. (2018). Dinamika razvitiya rossiyskoy nauki: kadrovyy i geograficheskiy analiz [Dynamics of the development of Russian science: Personnel and gender analysis]. *Science Studies*. (In Russian). Retrieved from <https://cyberleninka.ru/article/n/dinamika-razvitiya-rossiyskoy-nauki-kadrovyy-i-gendernyy-analiz>
7. Bayanbayeva, A. (2025). Global university rankings and the dissemination of the Western university model: Balancing global influence and national priorities in Kazakhstan. *Globalisation, Societies and Education*, 1-15. <https://doi.org/10.1080/14767724.2025.2515492>
8. Bentley, P. (2012). Gender differences and factors affecting publication productivity among Australian university academics. *Journal of Sociology*, 48(1), 85-103. <https://doi.org/10.1177/1440783311411958>
9. Berekeyeva, A., Sharplin, E., Courtney, M., & Sagitova, R. (2024). Ethical human participant research in Central Asia: A quantitative analysis of attitudes and practices among social science researchers based in the region. *Research Ethics*, 20(2), 304-330. <https://doi.org/10.1177/17470161231202232>
10. Bonaccorsi, A., & Daraio, C. (2003). Age effects in scientific productivity. *Scientometrics*, 58, 49-90. <https://doi.org/10.1023/A:1025427507552>
11. Chankseliani, M., Lovakov, A., & Pisyakov, V. (2021). A big picture: Bibliometric study of academic publications from post-Soviet countries. *Scientometrics*, 126, 8701-8730. <https://doi.org/10.1007/s11192-021-04124-5>
12. Collyer, F. M. (2016). Global patterns in the publishing of academic knowledge: Global North, global South. *Current Sociology*, 66(1), 56-73. <https://doi.org/10.1177/0011392116680020>
13. Costas, R., Van Leeuwen, T. N., & Bordons, M. (2010). A bibliometric classificatory approach for the study and assessment of research performance at the individual level: The effects of age on productivity and impact. *Journal of the Association for Information Science and Technology*, 61(8), 1564-1581. <https://doi.org/10.1002/asi.21348>
14. Demir, S. B. (2018). Predatory journals: Who publishes them and why? *Journal of Informetrics*, 12(4), 1296-1311. <https://doi.org/10.1016/j.joi.2018.10.008>
15. Dubois, P., Rochet, J. C., & Schlenker, J. M. (2014). Productivity and mobility in academic research: Evidence from mathematicians. *Scientometrics*, 98(3), 1669-1701. <https://doi.org/10.1007/s11192-013-1112-7>
16. Eshchanov, B., Abduraimov, K., Ibragimova, M., & Eshchanov, R. (2021). Efficiency of “publish or perish” policy – Some considerations based on the Uzbekistan experience. *Publications*, 9(3), Article 33. <https://doi.org/10.3390/publications9030033>
17. Gingras, Y., Larivière, V., Macaluso, B., & Robitaille, J.-P. (2008). The effects of aging on researchers' publication and citation patterns. *PLOS ONE*, 3(12), e4048. <https://doi.org/10.1371/journal.pone.0004048>
18. Gomez, C. J., Herman, A. C., & Parigi, P. (2022). Leading countries in global science increasingly receive more citations than other countries doing similar research. *Nature Human Behaviour*, 6, 919-929. <https://doi.org/10.1038/s41562-022-01351-5>
19. Guns, R., Eykens, J., & Engels, T. C. E. (2019). To what extent do successive cohorts adopt different publication patterns? Peer review, language use, and publication types in the social sciences and humanities. *Frontiers in Research Metrics and Analytics*, 3, Article 38. <https://doi.org/10.3389/frma.2018.00038>
20. Heng, K., Hamid, M. O., & Khan, A. (2020). Factors influencing academics' research engagement and productivity: A developing countries perspective. *Issues in Educational Research*, 30(3), 965-987. Retrieved from <http://www.iier.org.au/iier30/heng.pdf>
21. Jung, J., Kooij, R., & Teichler, U. (2014). Internationalization and the New Generation of Academics. In F. Huang, M. Finkelstein, & M. Rostan (Eds.), *The Internationalization of the Academy. The Changing Academy - The Changing Academic Profession in International Comparative Perspective* (vol 10, pp. 207-236). Dordrecht: Springer. https://doi.org/10.1007/978-94-007-7278-6_10
22. Kaztayeva, S. (2023). Osobennosti izdatelskoy praktiki v khishchnicheskikh zhurnalakh [Features of publishing practice in predatory

- journals]. *Journal of Educational Sciences*, 76(3), 29-39. (In Russian). <https://doi.org/10.26577/JES.2023.v76.i3.03>
23. Kenessov, B. (2020). Percentage of articles and reviews by countries in sources discontinued by Scopus [Data set]. *Mendeley Data*. Retrieved from <https://data.mendeley.com/datasets/k8pvz45gp2/2>
 24. Köbli, N. A., Leisenheimer, L., Achter, M., Kucera, T., & Schadler, C. (2024). The game of academic publishing: A review of gamified publication practices in the social sciences. *Frontiers in Communication*, 9, Article 1323867. <https://doi.org/10.3389/fcomm.2024.1323867>
 25. Kocyigit, B. F., Akyol, A., Gulov, M. K., & Yessirkepov, M. (2023). Comparative analysis of Central Asian publication activity using SCImago Journal & Country Rank data in 1996–2021. *Journal of Korean Medical Science*, 38(14), e104. <https://doi.org/10.3346/jkms.2023.38.e104>
 26. Kudaibergenova, R., Uzakbay, S., Makanova, A., Ramadinkyzy, K., Kistaubayev, E., Dussekeev, R., & Smagulov, K. (2022). Managing publication change at Al-Farabi Kazakh National University: A case study. *Scientometrics*, 127, 453-479. <https://doi.org/10.1007/s11192-021-04139-y>
 27. Kurambayev, B., & Freedman, E. (2020). Publish or perish? The steep path for Central Asia journalism and mass communication faculty. *Journalism & Mass Communication Educator*, 76(2), 228-240. <https://doi.org/10.1177/1077695820947259>
 28. Kurt, S. (2018). Why do authors publish in predatory journals? *Learned Publishing*, 31(2), 141-147. <https://doi.org/10.1002/leap.1150>
 29. Kuzhabekova, A., & Ruby, A. (2018). Raising research productivity in a post-Soviet higher education system: A case from Central Asia. *European Education*, 50(3), 266-282. <https://doi.org/10.1080/10564934.2018.1444942>
 30. Kwiek, M. (2020). Internationalists and locals: International research collaboration in a resource-poor system. *Scientometrics*, 124, 57-105. <https://doi.org/10.1007/s11192-020-03460-2>
 31. Kyvik, S., & Olsen, T. B. (2008). Does the aging of tenured academic staff affect the research performance of universities? *Scientometrics*, 76, 439-455. <https://doi.org/10.1007/s11192-007-1767-z>
 32. Marina, T., & Sterligov, I. (2021). Prevalence of potentially predatory publishing in Scopus on the country level. *Scientometrics*, 126, 5019-5077. <https://doi.org/10.1007/s11192-021-03899-x>
 33. Milojević, S. (2012). How are academic age, productivity, and collaboration related to citing behavior of researchers? *PLOS ONE*, 7(11), e49176. <https://doi.org/10.1371/journal.pone.0049176>
 34. Minister of Education and Science of the Republic of Kazakhstan (MES). (2015). *Order of the Acting Minister of Education and Science of the Republic of Kazakhstan dated March 16, 2015, No. 124 "On approval of the rules for conferring the title "Best University Lecturer"*. Retrieved from <https://adilet.zan.kz/rus/docs/V1500010506>
 35. Minister of Education and Science of the Republic of Kazakhstan (MES). (2011a). *Order of the Minister of Education and Science of the Republic of Kazakhstan dated March 31, 2011, No. 127 "On approval of the Rules for awarding degrees"*. Retrieved from <http://adilet.zan.kz/rus/docs/V1100006951>
 36. Minister of Education and Science of the Republic of Kazakhstan (MES). (2011b). *Order of the Minister of Education and Science of the Republic of Kazakhstan dated March 31, 2011, No. 128 "On approval of the Rules for conferring academic titles (associated professor (docent), professor)"*. Retrieved from <http://adilet.zan.kz/rus/docs/V1100006939>
 37. Minister of Education and Science of the Republic of Kazakhstan (MES). *Order of the Minister of Education and Science of the Republic of Kazakhstan dated November 2, 2021, No. 544 "On the approval of the Rules for awarding the annual prize "Best Researcher"*. Retrieved from <https://adilet.zan.kz/rus/docs/V2100025003>
 38. Minister of Science and Higher Education of the Republic of Kazakhstan (MSHE). (2024). *Law of the Republic of Kazakhstan "On Science and Technological Policy", No. 103-VIII ZRK, July 1, 2024*. Retrieved from <https://adilet.zan.kz/rus/docs/Z2400000103>
 39. Minister of Science and Higher Education of the Republic of Kazakhstan (MSHE). 457 (2024). *Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated September 23, 2024, No. 457 "On approval of the Rules and criteria for the election of academicians of the National Academy of Sciences of the Republic of Kazakhstan"*. Retrieved from <https://adilet.zan.kz/rus/docs/V2400035119#z277>
 40. Minister of Science and Higher Education of the Republic of Kazakhstan (MSHE). (2023). *Order of the Acting Minister of Science and Higher Education of the Republic of Kazakhstan dated September 14, 2023, No. 466 "On the approval of the Rules for awarding prizes and state scientific scholarships in the field of science"*. Retrieved from <https://adilet.zan.kz/rus/docs/V2300033417>
 41. Mishra, V., & Smyth, R. (2012). Are more senior academics really more research productive than junior academics? Evidence from Australian law schools. *Scientometrics*, 96(2), 411-425. <https://doi.org/10.1007/s11192-012-0886-3>
 42. Moldashev, K., Arystanbaeva, S., Kozhahmet, S., & Tleuov, A. (2020). *Problemy prodvizheniya kazakhstanskikh uchenykh v globalnom nauchnom prostranstve [Problems of integration of Kazakhstani scientists into the global scientific space]*. Narxoz University. (In Russian). Retrieved from http://e-lib.dulaty.kz/en/lib/document/SK_ELIB/A9D01A1B-BC23-4012-8B3D-AA8345090EF2/
 43. Moldashev, K., Tleuov, A., & Radko, N. (2018). The economics of publication regime and the

- issues of Kazakhstani researchers integration into the global scientific community. *Central Asian Economic Review*, 4, 127-138. (In Russian). <https://caer.narxoz.kz/jour/article/view/241/242>
44. Nafukho, F. M., Wekullo, C., & Muyia, M. H. (2019). Examining research productivity of faculty in selected leading public universities in Kenya. *International Journal of Educational Development*, 66, 44-51. <https://doi.org/10.1016/j.ijedudev.2019.01.005>
 45. Naumova, T. V. (2012). Feminizatsiya Nauki V Sovremennoy Rossii: Za I Protiv [Feminization of science in modern Russia: Pros and cons]. *Social and Humanitarian Knowledge*, 1, 43-57. (In Russian). Retrieved from https://www.elibrary.ru/download/elibrary_17320432_46959054.pdf
 46. Obuku, E. A., Lavis, J. N., Kinengyere, A., Ssenono, R., Ocan, M., Mafigiri, D. K., Ssenooba, F., Karamagi, C., & Sewankambo, N. K. (2018). A systematic review on academic research productivity of postgraduate students in low- and middle-income countries. *Health Research Policy and Systems*, 16, Article 86. <https://doi.org/10.1186/s12961-018-0360-7>
 47. Rostan, M., & Ceravolo, F. A. (2015). The internationalization of the academy: Convergence and divergence across disciplines. *European Review*, 23(S1), 38-54. <https://doi.org/10.1017/S1062798714000763>
 48. Schöpf, C. M. (2020). The coloniality of global knowledge production. *Social Transformations: Journal of the Global South*, 8(2). <https://doi.org/10.13185/2799-015X.1144>
 49. Shah, W. A., Ali, R., & Lashari, A. (2024). De-naturalizing the “predatory”: A study of bogus publications. *Accountability in Research*, 31(2), 80-99. <https://doi.org/10.1080/08989621.2022.2106424>
 50. Smagulov, K., & Teixeira da Silva, J. A. (2025). Scientific productivity and retracted literature of authors with Kazakhstani affiliations. *Journal of Academic Ethics*. <https://doi.org/10.1007/s10805-025-09624-0>
 51. Tang, G., & Jia, J. (2021). Why do master’s students publish in predatory journals? *Accountability in Research*, 30(1), 1-20. <https://doi.org/10.1080/08989621.2021.1960164>
 52. Wahid, N., Warraich, N. F., & Tahira, M. (2024). Assessing the research profile of highly productive authors of Pakistan. *Global Knowledge, Memory and Communication*, 73, 183-201. <https://doi.org/10.1108/GKMC-01-2022-0012>
 53. Xia, J., Harmon, J. L., Connolly, K. G., Donnelly, R. M., Anderson, M. R., & Howard, H. A. (2015). Who publishes in predatory journals? *Journal of the Association for Information Science and Technology*, 66(7), 1406-1417. <https://doi.org/10.1002/asi.23265>