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PEER REVIEW IN RESEARCH GRANTS: A COMPARATIVE STUDY OF NATIONAL AND INTERNATIONAL EXPERT EVALUATIONS

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Abstract. In emerging economies like Kazakhstan, where government investments in research are expanding, understanding the mechanisms of science funding is essential for effective resource allocation and fostering scientific advancement. Peer-reviewed grant systems are central to selecting high-quality research projects, yet the relationship between expert evaluations remains underexplored, especially across various scientific fields and funding schemes. This study utilizes Pearson correlation analysis to investigate the relationship between national and international expert evaluations in Kazakhstan's peer review system. By analyzing data from grants awarded in 2021, we assess the consistency of expert evaluations across different scientific disciplines and grant types. Despite the use of standardized evaluation criteria, significant variations in correlations between the two expert groups were found, suggesting potential biases or discipline-specific factors influencing the review process. The research also delves into the specific evaluation criteria used by national and international experts, uncovering overlaps in their focus on research impact, team competence, and project feasibility, alongside notable differences in scoring methods and emphasis on commercialization. These findings point to inconsistencies that may hinder the fair allocation of resources, potentially affecting the funding of innovative projects. This study highlights the need for refining evaluation processes to enhance transparency and reduce bias, thereby ensuring that research funds are distributed equitably. Improved systems can also better support groundbreaking projects and foster global competitiveness. These insights are particularly significant for emerging economies like Kazakhstan, where efficient research funding is critical to advancing scientific innovation, addressing socio-economic challenges, and achieving sustainable development goals.

Key words: grant funding, research efficiency, science productivity, peer review

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ЗЕРТТЕУ ГРАНТТАРЫН САРАПТАМАЛАУ: ҰЛТТЫҚ ЖӘНЕ ХАЛЫҚАРАЛЫҚ САРАПШЫЛАРДЫҢ БАҒАЛАУЫН САЛЫСТЫРМАЛЫ ЗЕРТТЕУ

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Аннотация. Ғылыми зерттеулерге мемлекеттік инвестициялар ұлғайып жатқан Қазақстан сияқты экономикасы дамушы елдерде ғылымды қаржыландыру тетіктерін түсіну – ресурстарды тиімді бөлу мен ғылыми прогресті ілгерілетудің кілті болып табылады. Рецензияланатын гранттық жүйелер сапалы зерттеу жобаларын таңдаудың негізі, алайды бағалаулар арасындағы қарым-қатынас, әсіресе әр түрлі ғылыми салалар мен қаржыландыру түрлері бойынша әлі де толық айқындалмаған. Бұл зерттеу Қазақстандық сараптама жүйесіндегі ұлттық және халықаралық сарапшылардың бағалаулары арасындағы байланысты зерттеу үшін Пирсон корреляциялық талдауын пайдаланады. 2021 жылы тағайындалған гранттар деректерін талдау арқылы біз әртүрлі ғылыми пәндер мен грант түрлері бойынша өзара сараптаманың сәйкестігін бағалаймыз. Стандартталған балл қою критерийлерін қолдануға қарамастан, бағалаушылардың екі тобының арасындағы корреляцияда елеулі айырмашылықтар табылды, бұл ықтимал қиғаштықтарды немесе балл қою процесіне әсер ететін салаға тән факторларды көрсетеді. Зерттеу сонымен қатар ұлттық және халықаралық сарапшылар қолданатын арнайы балдық критерийлерді зерттейді. Зерттеу әсеріне, топ құзыретіне және жобаның орындылығына баса назар аударудағы сәйкессіздіктерді, сондай-ақ балл қою әдістеріндегі айырмашылықтарды және коммерцияландыруға баса назар аударуды анықтайды. Бұл тұжырымдар ресурстарды әділ бөлуге кедергі келтіруі мүмкін сәйкессіздіктерді көрсетеді, осылайша инновациялық жобаларды қаржыландыруға теріс әсер етеді. Бұл зерттеу ашықтықты арттыру және біржақтылықты азайту, зерттеу қорларының әділ бөлінуін қамтамасыз ету үшін бағалау процестерін жетілдіру қажеттілігін көрсетеді. Жақсартылған жүйелер сонымен қатар озық жобаларды жақсырақ қолдауға және жаһандық бәсекеге қабілеттілікті арттыруға мүмкіндік береді. Бұл тұжырымдар ғылыми инновацияларды ілгерілету, әлеуметтік-экономикалық міндеттерді шешу және тұрақты даму мақсаттарына қол жеткізу үшін тиімді зерттеулерді қаржыландыру маңызды болып табылатын Қазақстан сияқты дамушы экономикалар үшін аса маңызды.

Түйін сөздер: гранттық қаржыландыру, зерттеулердің тиімділігі, ғылымның өнімділігі, өзара бағалау.

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РЕЦЕНЗИРОВАНИЕ ИССЛЕДОВАТЕЛЬСКИХ ГРАНТОВ: СРАВНИТЕЛЬНОЕ ИССЛЕДОВАНИЕ ОЦЕНОК НАЦИОНАЛЬНЫХ И МЕЖДУНАРОДНЫХ ЭКСПЕРТОВ

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Аннотация. В развивающихся экономиках, таких как Казахстан, где государственные инвестиции в исследования увеличиваются, понимание механизмов финансирования науки играет ключевую роль в эффективном распределении ресурсов и содействии научному прогрессу. Системы грантов с рецензированием занимают ключевое место в отборе качественных исследовательских проектов, однако взаимосвязь между оценками экспертов остается недостаточно изученной, особенно в различных научных областях и типах финансирования. В данном исследовании используется корреляционный анализ Пирсона для изучения взаимосвязи между оценками национальных и международных экспертов в системе рецензирования Казахстана. Анализируя данные по грантам, выданным в 2021 году, мы оцениваем согласованность экспертных оценок в различных научных дисциплинах и типах грантов. Несмотря на использование стандартизированных критериев оценки, были выявлены значительные различия в корреляциях между двумя группами экспертов, что указывает на возможные предвзятости или факторы, характерные для отдельных дисциплин, влияющие на процесс оценки. Исследование также изучает конкретные критерии оценки, используемые национальными и международными экспертами, выявляя совпадения в акцентах на влиянии исследований, компетентности команды и осуществимости проекта, а также различия в методах выставления баллов и акценте на коммерциализации. Эти выводы указывают на несоответствия, которые могут препятствовать справедливому распределению ресурсов, что негативно сказывается на финансировании инновационных проектов. Настоящее исследование подчеркивает необходимость усовершенствования процессов оценки для повышения прозрачности и снижения предвзятости, обеспечивая справедливое распределение исследовательских фондов. Улучшенные системы также смогут лучше поддерживать передовые проекты и способствовать глобальной конкурентоспособности. Эти выводы особенно важны для развивающихся экономик, таких как Казахстан, где эффективное финансирование исследований критически важно для продвижения научных инноваций, решения социально-экономических задач и достижения целей устойчивого развития.

Ключевые слова: грантовое финансирование, эффективность исследований, производительность науки, рецензирование.

Introduction

Scholars have long recognized the role of governments, through various institutional frameworks, in facilitating the transformation of scientific knowledge into innovations that enhance societal welfare (Shaw, 2023). A significant instrument frequently employed to fund research initiatives is the grant system. A foundational element of modern funding allocation is the evaluation process, which often relies on peer review. Widely regarded as the gold standard, peer review is seen as an effective mechanism for selecting research projects based on quality, originality, and potential impact (Roumbanis, 2019). Independent assessment by impartial reviewers is essential for upholding scientific integrity, evaluating the relevance of the research, and conducting cost-benefit analyses. Given its perceived efficiency and widespread credibility, peer review is often viewed as the most reliable method for assessing research proposals. However, since its adoption as the primary method for determining the allocation of resources, concerns have emerged regarding its effectiveness. Is peer review truly the best system for selecting the most innovative researchers and ideas? Can reviewers remain fully objective when evaluating the work of their peers? As the scientific landscape grows and the demand for peer reviews increases, the workload for reviewers becomes more demanding and time-intensive, potentially compromising their ability to accurately assess project quality. This could hinder the system's ability to filter out lower-quality proposals and ensure that funding is awarded to the most deserving projects.

For instance, studies have uncovered various biases in the peer review process that challenge its fairness. Country-specific data has shown evidence of the "Matthew effect," where successful researchers are more likely to continue succeeding, thus reinforcing their prominence (Bol, et al., 2018). Similarly, gender bias has been identified, with some research suggesting that male applicants may receive preferential treatment over their female counterparts in the peer review system (Van Der Lee, et al., 2015). Ethnic bias is another concern, as research by Ginther et al. (2011) highlights that, despite the scientific approach and significance score being key predictors of funding success, ethnicity still appears to play a role in the outcomes. Furthermore, Materia et al. (2015) demonstrated that the composition of the review team, in studies on agricultural research projects, could influence funding decisions. In extreme cases, these biases can affect funding outcomes to the extent that the reviewer's identity plays a more significant role than the quality of the proposed research itself.

The grant peer review process can entail significant costs, particularly in terms of time and effort, which may outweigh its potential benefits. For instance, research using contest models suggests that the resources spent by researchers in preparing proposals could be nearly equivalent to the total scientific value generated by the funded research, especially when only a limited number of proposals are selected for funding (Gross and Bergstrom, 2019). Another study found that the collective effort was equivalent to approximately four centuries of work, yet yielded no immediate benefits to the researchers and resulted in lost research time. Moreover, the process of preparing funding applications is often stressful, incurs significant opportunity costs, and detracts from personal obligations such as family commitments (Herbert, et al., 2014).

The findings related to biases and potential limitations of the grant review system are not definitive in assessing the efficiency and fairness of peer review, primarily because these studies are based on relatively small sample sizes compared to the entire grant system. However, they do highlight the need for further examination of the current system, as broader validation of these findings could impact outcomes and limit opportunities for participation and representation in scientific research (Demarest, et al., 2014). Various alternatives have been proposed, such as the suggestion that funding priority should be given to projects where evaluators show the greatest disagreement, rather than consensus on merit and impact (Linton, 2016). Despite these ideas, systematic evidence on the effectiveness of alternative proposal evaluation methods remains scarce.

Kazakhstan, like many other countries, extensively uses a two-stage peer review system for various types of grant funding, including general grants, grants for young scholars, and postdoctoral research grants. Given this widespread use, it is important to explore whether any biases or other issues might be affecting the peer review process in the Kazakhstani context. Rather than focusing on identifying specific biases, this study aims to investigate the potential presence of such issues in a broader sense. A key aspect of this research is examining the relationship between national and international experts' evaluations across different scientific disciplines. Specifically, our research question is: Is there a statistically significant correlation between the opinions of national and international experts in Kazakhstan's peer review process for grant funding, and how does this relationship vary across scientific disciplines?

In the remainder of the paper, we begin by outlining the available data and our methodology, followed by a presentation of the results and a discussion of potential limitations. We then conclude by reflecting on the significance of developing and assessing new models of peer review in grant funding, along with recommendations for future research.

Materials and methods

Since the 2020s, the research funding allocation mechanism in Kazakhstan has undergone notable reforms, particularly in the frequency of calls for proposals and the diversity of grant types available. Previously, grant calls were issued once every three years, resulting in a prolonged waiting period between grant completions. However, beginning in the 2020s, a wider range of grant types has been introduced. In this study, we perform a correlation analysis on 829 projects awarded grants in 2021, utilizing Pearson's correlation coefficient to examine the statistically significant relationship between national and international expert evaluations. Table 1 provides a summary of the various grant types announced, including the number of awards, maximum funding limits, and total funding allocated in 2021.

Table 1. Overview of Grant Types and Funding information (2021-2023), in thousands of tenge

Grant type	Maximum cap per project	Number of projects funded	Total funding
Grant funding 2021-2023 (12 months)	8 000	170	1 164 020
Grant funding for young scholars 2021-2023 (36 months)	54 000	149	7 311 732
Grant funding 2021-2023 (36 months)	70 000	375	21 028 472
Program-targeted financing for scientific, scientific and technical programs for 2021-2023	Depends on the government program	129	69 504 414
Total		823	99 008 638

As presented in Table 1, four types of grants are available: one-year small grants, three-year grants for young scholars (which require all participants, including principal investigators, to be under forty years of age), three-year grants with no age or other eligibility restrictions, and program-targeted financing, where the call for proposals is structured around specific technical tasks aligned with government priorities. The evaluation protocols from the National Center of Science and Technology Evaluation include assessments from both international and national experts. Descriptive statistics for the awarded projects, categorized by grant type and scientific direction in 2021, are provided in Table 2.

Table 2. Overview of Grant Types and Scientific Directions in 2021

Scientific direction	12 month grants	Grants for young scholars	36 month grants	Program-targeted financing
Geology, extraction and processing of mineral and hydrocarbon raw materials, new materials, technologies, safe products, and constructions	25	35	44	7
Information, communication, and space technologies	14	12	28	8
Research in the field of education and science	19	5	31	2
Research in the field of social and humanitarian sciences	23	12	79	46
Life sciences and health	27	21	57	14
Sustainable development of the agro-industrial complex and agricultural product safety	8	17	14	27
Energy and mechanical engineering	14	18	30	6
Scientific research in the field of natural sciences	33	17	72	11
Rational use of water resources, wildlife and flora, ecology	7	12	20	8
Total	170	149	375	129

As shown in the tables above, the total sample size consists of 823 grant evaluations. We conducted separate analyses to test for statistically significant correlations for each scientific direction, as well as for each type of grant. According to the Rules for the Organization and Conduct of State Scientific and Technical Expertise, all grant submissions undergo an initial eligibility check before being forwarded to a designated pool of international experts. These experts assess the submissions based on several criteria, after which a ranked list of projects is provided to the National Scientific Councils, which are organized by scientific discipline. These processes are regulated by official documents, including the *Law of the Republic of Kazakhstan dated 18 February 2011 № 407-IV "On Science"*, the *Regulation on National Scientific Councils* (approved by the Government of Kazakhstan No. 519, dated May 16, 2011), the *Rules for Basic, Grant, and Program-Targeted Funding of Scientific and/or Scientific-Technical Activities* (approved by the Government of the Republic of Kazakhstan No. 575, dated May 25, 2011), and the *Rules for the Organization and Conduct of State Scientific and Technical Expertise* (approved by the Government of the Republic of Kazakhstan No. 891, dated August 1, 2011).

To establish preliminary expectations regarding the relationship between the evaluations of the two expert groups—whether they would be positively or negatively correlated—we first analyzed the criteria used by both groups in their assessments. Tables 3 and 4 provide a detailed breakdown of these criteria.

Both the international and national expert groups place substantial emphasis on the potential impact of the research outcomes. International experts specifically evaluate the “Expected Results and Their Significance”, while national experts assess the “Degree of Impact of Research Results”, focusing on the scientific and technical potential, human resources, and the competitiveness of the research team and organization. This shared emphasis highlights a mutual understanding of the importance of research that can advance scientific knowledge and yield societal benefits. Additionally, both groups express concern for the feasibility of the project and the expertise of the research team. International experts evaluate the “Competence and Expertise of the Research Team”, paying particular attention to the scientific level of the principal investigator and the availability of resources and infrastructure. Similarly, national experts assess the “Degree of Project Development”, which includes the team’s readiness to execute the research and the likelihood of successful implementation. Both groups acknowledge the importance of ensuring that the research team is sufficiently prepared and capable of achieving the proposed project goals.

Table 3. Breakdown of Evaluation Criteria Used by International Expert Groups

№	Evaluation Criterion	Indicator descriptions	Maximum points
1	Novelty, Relevance, and Prospects of the Project	Novelty and Relevance of the Proposed Scientific and Technical Level of the Project (no more than 200 words)	3
		Importance and Relevance of the Proposed Scientific and Technical Level, and the Degree of Development of the Project for the Advancement of Science (no more than 300 words)	6
2	Quality and Feasibility of the Research Plan	Quality of the Research Plan (no more than 150 words)	3
		Quality of the Research Methodology (no more than 250 words)	3
		Achievability of Results (no more than 250 words)	3
3	Expected Results and Their Significance	Project Outcomes and Efficiency (no more than 250 words)	3
		Significance and Applicability of Expected Results (no more than 300 words)	6
4	Competence and Expertise of the Research Team	Scientific Level and Expertise of the Principal Investigator (no more than 250 words)	3
		Quality of the Research Team (no more than 250 words)	3
		Availability of Resources and Access to Infrastructure (no more than 300 words)	3
5	Interdisciplinary Nature of the Project	If the project is interdisciplinary in terms of fostering collaboration between broad scientific fields, the interdisciplinary approach is fully justified.	2
	Total		38

Table 4. Breakdown of Evaluation Criteria Used by National Expert Groups

№	Evaluation Criterion	Maximum points
1	The Degree of Impact of Research Results on the Scientific and Technical (including human resources) Potential and Competitiveness of Scientific Organizations and Their Teams, Scientists	5
2	Degree of Project Development, i.e., the Readiness of the Team to Successfully Conduct Research According to the Proposed Parameters and the Likelihood of Successful Project Implementation (taking into account the project supervisor's involvement in other projects and previous experience in leading grant-funded projects, if applicable)	5
3	Practical Significance of Research Results, i.e., the Readiness for Commercialization or Application in Addressing Current Socio-Economic and Scientific-Technical Challenges of the Republic of Kazakhstan (considering the impact of previous grant-funded projects led by the project supervisor, if applicable)	5
	Total	15

Furthermore, both groups share a focus on the novelty and readiness of the project. International experts assess the “Novelty, Relevance, and Prospects of the Project”, evaluating the scientific and technical level of innovation. While national experts do not delve as deeply into these factors, they still consider the project’s development and the team’s ability to carry out the research, reflecting a similar concern for the project’s potential to advance scientific knowledge.

To assess the relationship between the evaluations provided by national and international experts in Kazakhstan’s peer review system, we apply the Pearson correlation coefficient. This statistical method enables us to quantify the strength and direction of the linear association between the evaluations of the two groups across various scientific disciplines. The Pearson correlation coefficient, denoted as r, is computed using the following formula

$$r = \frac{\Sigma(X_i - \hat{X})(Y_i - \hat{Y})}{\sqrt{\Sigma(X_i - \hat{X})^2}\sqrt{\Sigma(Y_i - \hat{Y})^2}} \quad (1)$$

Where:

X_i represents the evaluations from the national experts,

Y_i represents the evaluations from the international experts,

X_i and Y_i are the mean values of the national and international experts’ evaluations, respectively.

The value of rrr ranges between -1 and 1, where:

r = 1 indicates a perfect positive correlation,

r = -1 indicates a perfect negative correlation,

r = 0 indicates no correlation between the two variables.

Following the calculation of the Pearson correlation coefficient, we assess the statistical significance of the correlation using a hypothesis test. The null hypothesis (H_0) assumes that there is no correlation between the two sets of evaluations (r=0), while the alternative hypothesis (H_1) posits that a correlation exists (r≠0). To determine the significance of the correlation, we calculate the p-value based on the test statistic:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \quad (2)$$

Where n is the number of paired evaluations. The resulting p-value is compared against a significance level (α), set at 0,05. If the p-value is less than α, we reject the null hypothesis, indicating that the correlation between national and international experts' evaluations is statistically significant.

This approach allows us to identify whether a meaningful relationship exists between the two expert groups across various scientific disciplines in peer review process.

Results and discussion

The evaluation criteria employed by international and national expert groups exhibit both similarities and differences in their focus, structure, and point allocation. Upon analyzing these criteria, it becomes evident that they align in several key areas, particularly regarding the emphasis on research impact, team expertise, and project feasibility. However, differences emerge in the level of detail in their evaluations, considerations of interdisciplinarity, distribution of points, and focus on commercialization. For simplicity, we categorize the nine scientific directions in the table using numeric labels (from one to nine): 1) Geology, extraction and processing of mineral and hydrocarbon raw materials, 2) New materials, technologies, safe products, and constructions, 3) Information, communication, and space technologies, 4) Research in the field of education and science, 5) Research in the field of social and humanitarian sciences, 6) Life sciences and health, 7) Sustainable development of the agro-industrial complex and agricultural product safety, 8) Energy and mechanical engineering, 9) Rational use of water resources, wildlife and flora, ecology, and scientific research in the field of natural sciences.

The correlation analysis for 12-month grants, as shown in Table 5, indicates that in four scientific directions - Geology, extraction and processing of mineral and hydrocarbon raw materials; Research in the field of education and science; Research in the field of social and humanitarian sciences; and Scientific research in the field of natural sciences—there are statistically significant negative correlations. This is particularly surprising, as an examination of the evaluation breakdown suggests that the criteria should generally align between the two expert groups. Therefore, it is essential to further investigate other grant types, which utilize similar assessment structures, to determine whether these results are consistent across all scientific directions.

Table 5. Correlation Analysis between International and National Expert Groups for 12-month grants

Scientific direction	correlation between International and National expert points	Sample size	t statistic	critical value at 95% confidence interval
1	-0,53*	25	-2,97	2,07
2	-0,50	14	-1,98	2,18
3	-0,46*	19	-2,11	2,11
4	-0,56*	23	-3,11	2,08
5	-0,01	27	-0,07	2,06
6	-0,01	8	-0,04	2,45
7	0,01	14	0,03	2,18
8	-0,44*	33	-2,69	2,04
9	-0,19	7	-0,43	2,57
Total	-0,32*	170	-4,41	1,97

In the case of projects for young scholars, the table below reveals significant correlations in three scientific directions: Geology, extraction and processing of mineral and hydrocarbon raw materials; Life sciences and health; and Scientific research in the field of natural sciences. Additionally, a significant positive correlation is observed when considering all directions collectively. Notably, all of these correlations are positive, which stands in stark contrast to the findings for 12-month grants, where negative correlations were prevalent.

Table 6. Correlation Analysis between International and National Expert Groups for young scholars' projects

Scientific direction	correlation between International and National expert points	Sample size	t statistic	critical value at 95% confidence interval
1	0,42*	35	2,64	2,03
2	0,41	12	1,41	2,23
3	0,31	5	0,56	3,18
4	0,43	12	1,51	2,23
5	0,44*	21	2,13	2,09
6	-0,01	17	-0,05	2,13
7	-0,06	18	-0,24	2,12
8	0,79*	17	4,96	2,13
9	0,49	12	1,78	2,23
Total	0,23*	149	2,85	1,98

For the 36-month standard projects, no statistically significant correlations were identified. The table below presents the detailed statistics for these analyses.

Table 7. Correlation Analysis between International and National Expert Groups for 36-month projects

Scientific direction	correlation between International and National expert points	Sample size	t statistic	critical value at 95% confidence interval
1	-0,14	44	-0,92	2,02
2	-0,07	28	-0,38	2,06
3	0,28	31	1,58	2,05
4	-0,09	79	-0,83	1,99
5	0,12	57	0,92	2,00
6	-0,23	14	-0,82	2,18
7	0,05	30	0,26	2,05
8	0,05	72	0,42	1,99
9	-0,15	20	-0,63	2,10
Total	-0,05	375	-0,96	1,97

For the program-targeted projects, two significant correlations were identified. In the scientific direction of Research in the Field of Social and Humanitarian Sciences, the correlation was positive, while in Sustainable Development of the Agro-Industrial Complex and Agricultural Product Safety, the correlation was negative. Additionally, the overall correlation for all 129 projects was positive and statistically significant.

Table 8. Correlation Analysis between International and National Expert Groups for program-targeted projects

Scientific direction	correlation between International and National expert points	Sample size	t statistic	critical value at 95% confidence interval
1	-0,70	7	-2,22	2,57
2	0,38	8	1,02	2,45
3	1,00	2	-	-
4	0,46*	46	3,41	2,02
5	0,11	14	0,38	2,18
6	-0,61*	27	-3,82	2,06
7	0,48	6	1,10	2,78
8	0,30	11	0,95	2,26
9	-0,08	8	-0,20	2,45
Total	0,24*	129	2,83	1,98

The overall correlation analysis provides additional insights, particularly highlighting the lack of consistency across scientific directions. This inconsistency likely stems from the fact that different sets of international experts evaluated the projects, while the national scientific councils remained the same for all projects awarded in 2021. The only exception is the set of 375 projects for 36-month funding, where no statistically significant correlations were observed. The complete results are summarized in Table 9, where all correlation coefficients are displayed, with statistically significant values indicated in bold. These findings suggest potential inconsistencies in the evaluation process, especially where significant correlations have opposite signs. This warrants further investigation, possibly through interviews with decision-makers involved in the evaluation process. Additionally, more data on the participating reviewers is needed, as certain scientific directions may have instructed reviewers to focus on specific aspects, such as the relevance of projects to the local context.

Table 9. Overview of Correlations by Grant Types and Scientific Directions

Scientific direction	12 month grants	Grants for young scholars	36 month grants	Program-targeted financing
Geology, extraction and processing of mineral and hydrocarbon raw materials, new materials, technologies, safe products, and constructions	-0,53*	0,42*	-0,14	-0,70
Information, communication, and space technologies	-0,50	0,41	-0,07	0,38
Research in the field of education and science	-0,46*	0,31	0,28	1,00
Research in the field of social and humanitarian sciences	-0,56*	0,43	-0,09	0,46*
Life sciences and health	-0,01	0,44*	0,12	0,11
Sustainable development of the agro-industrial complex and agricultural product safety	-0,01	-0,01	-0,23	-0,61*
Energy and mechanical engineering	0,01	-0,06	0,05	0,48
Scientific research in the field of natural sciences	-0,44*	0,79*	0,05	0,30
Rational use of water resources, wildlife and flora, ecology	-0,19	0,49	-0,15	-0,08
Total	-0,32*	0,23*	-0,05	0,24*

Some may argue that the varying criteria across different grant types could contribute to the observed differences in evaluation outcomes. However, the primary concern lies in the inconsistency within both grant types and scientific directions. For instance, in the scientific direction of Research in the Field of Social and Humanitarian Sciences, the correlation for 12-month grants is negative, while in program-targeted financing, it is positive. Similarly, in program-targeted financing, correlations for certain scientific directions, such as four and six, are positive and negative, respectively. Although many of the coefficients are not statistically significant, which could be considered a limitation of our methodology, it is important to acknowledge several potential factors influencing this outcome, such as smaller sample sizes. Additionally, we intentionally focused on grants awarded in 2021, as the composition of the National Experts Councils may partially or fully change in other years, potentially altering evaluation policies and the biases discussed in the introduction.

Conclusion

Our analysis highlights several key findings regarding the peer review system used for research funding in Kazakhstan. While the Pearson correlation analysis revealed significant relationships between national and international experts' evaluations in certain scientific directions, these correlations were inconsistent across different grant types. Notably, in the case of 12-month grants, negative correlations were observed in several fields, while positive correlations were found for program-targeted projects and young scholar grants. These inconsistencies suggest potential variations in the evaluation process, which may be influenced by the differences in the composition of national and international expert groups.

Several studies have demonstrated that biases in standard peer-review processes are not uncommon, with highly novel projects often penalized due to difficulties in appreciating innovative work and the bounded rationality of reviewers (Lane, et al., 2021). This tendency can lead to a conservative approach in funding decisions, where well-established ideas are favored over more radical or groundbreaking research. Our findings, in light of these studies, raise concerns about whether similar biases may be present in the Kazakhstani context, particularly when correlations show contradictory signs across grant types and fields.

Further research is needed to explore these potential biases, especially considering the importance of ensuring that peer review remains a fair and effective method for evaluating research proposals. Literature on peer review systems has shown that expert reviewers, even those well-versed in their fields, may struggle with objectivity when assessing proposals closely related to their own work, resulting in lower scores for novel research that might threaten their own standing (Boudreau, et al., 2016). Additionally, biases related to gender, ethnicity, and institutional affiliation have been observed in numerous studies. In our study, we intentionally limited the analysis to grants awarded in 2021 to maintain consistency, as changes in the composition of the National Scientific Councils over time may introduce additional biases and alter evaluation policies. This approach, while necessary for the integrity of our analysis, also highlights one of the limitations of our study: the relatively small sample size may limit the generalizability of our findings. Additionally, as some correlations were not statistically significant, further investigation is required to determine whether these trends persist across larger datasets or over multiple years.

Systematic biases in peer review have far-reaching implications, not only for individual researchers but for the advancement of scientific knowledge as a whole. As previous studies have shown, biases can disadvantage underrepresented groups, such as women and ethnic minorities, as well as researchers from smaller or less prestigious institutions. These biases can also extend to interdisciplinary teams, which may be perceived as riskier or more difficult to evaluate, despite their potential to drive innovation (Banal-Estañol, et al., 2019).

Going forward, it is essential to develop new approaches to peer review that reduce these biases and promote a more inclusive, merit-based system for research funding. Future research should explore process innovations that increase the diversity of expert reviewers and mitigate the influence of individual biases on funding decisions. By fostering greater fairness and transparency in the evaluation process, funding agencies can ensure that scientific research, particularly in emerging fields, is adequately supported and that all researchers have an equal opportunity to contribute to the advancement of knowledge.

References

Banal-Estañol, A., Macho-Stadler, I., & Pérez-Castrillo, D. (2019). Evaluation in research funding agencies: Are structurally diverse teams biased against?. Research Policy, 48(7), 1823-1840. https://doi.org/10.1016/j.respol.2019.04.008

Bol, T., De Vaan, M., & van de Rijt, A. (2018). The Matthew effect in science funding. Proceedings of the National Academy of Sciences, 115(19), 4887-4890. https://doi.org/10.1073/pnas.1719557115

Boudreau, K. J., Guinan, E. C., Lakhani, K. R., & Riedl, C. (2016). Looking across and looking beyond the knowledge frontier: Intellectual distance, novelty, and resource allocation in science. Management science, 62(10), 2765-2783. https://doi.org/10.1287/mnsc.2015.2285

Demarest, B., Freeman, G., & Sugimoto, C. R. (2014). The reviewer in the mirror: examining gendered and ethnicized notions of reciprocity in peer review. Scientometrics, 101, 717-735. https://doi.org/10.1007/s11192-014-1354-z

Ginther, D. K., Schaffer, W. T., Schnell, J., Masimore, B., Liu, F., Haak, L. L., & Kington, R. (2011). Race, ethnicity, and NIH research awards. Science, 333(6045), 1015-1019. https://doi.org/10.1126/science.1196783

Gross, K., & Bergstrom, C. T. (2019). Contest models highlight inherent inefficiencies of scientific funding competitions. PLoS biology, 17(1), e3000065. https://doi.org/10.1371/journal.pbio.3000065

Herbert, D. L., Coveney, J., Clarke, P., Graves, N., & Barnett, A. G. (2014). The impact of funding deadlines on personal workloads, stress and family relationships: a qualitative study of Australian researchers. BMJ open, 4(3), e004462. https://doi.org/10.1136/bmjopen-2013-004462

Lane, J. N., Teplitskiy, M., Gray, G., Ranu, H., Menietti, M., Guinan, E. C., & Lakhani, K. R. (2022). Conservatism gets funded? A field experiment on the role of negative information in novel project evaluation. Management science, 68(6), 4478-4495. https://doi.org/10.1287/mnsc.2021.4107

Linton, J. D. (2016). Improving the Peer review process: Capturing more information and enabling high-risk/high-return research. Research Policy, 45(9), 1936-1938. https://doi.org/10.1016/j.respol.2016.07.004 .

Materia, V. C., Pascucci, S., & Kolympiris, C. (2015). Understanding the selection processes of public research projects in agriculture: The role of scientific merit. Food Policy, 56, 87-99. https://doi.org/10.1016/j.foodpol.2015.08.003

Roumbanis, L. (2019). Peer review or lottery? A critical analysis of two different forms of decision-making mechanisms for allocation of research grants. Science, Technology, & Human Values, 44(6), 994-1019. https://doi.org/10.1177/0162243918822744

Shaw, J. (2023). Peer review in funding-by-lottery: A systematic overview and expansion. Research Evaluation, 32(1), 86-100. https://doi.org/10.1093/reseval/rvac022

The Law of the Republic of Kazakhstan dated 18 February 2011 № 407-IV "On Science" https://adilet.zan.kz/eng/docs/Z1100000407

The Regulation on National Scientific Councils approved by the Government of Kazakhstan No. 519 dated May 16, 2011 https://adilet.zan.kz/rus/docs/P1100000519

The Rules for basic, grant, and program-targeted funding of scientific and/or scientific-technical activities approved by the Government of the Republic of Kazakhstan No. 575 dated May 25, 2011 https://adilet.zan.kz/eng/docs/P1100000575

The Rules for the Organization and Conduct of State Scientific and Technical Expertise approved by the Government of the Republic of Kazakhstan No. 891 dated August 1, 2011 https://adilet.zan.kz/eng/docs/P1100000891

Van Der Lee, R., Ellemers, N., Fiske, S.T., 2015. Gender contributes to personal research funding success in The Netherlands. Proceedings of the National Academy of Sciences of the United States of America 112, 12349-12353. https://doi.org/10.1073/pnas.1510159112

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