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ORIGINAL ARTICLE

Unlocking scientific potential through dual degrees in Kazakhstan's higher education system

Yermek Komekbayev[1], Dina Kurmangaliyeva[2], Gareth John Dyke[3]

[1] NPJSC "S. Seifullin Kazakh Agrotechnical Research University", Kazakhstan.
Corresponding author
Email: stranger6592@mail.ru. **ORCID:** https://orcid.org/0009-0004-4866-855X.
[2] NPJSC "S. Seifullin Kazakh Agrotechnical Research University", Kazakhstan.
[3] Debrecen University, Hungary.

ABSTRACT

Objective. This study examined dual degrees in Kazakhstan from an academic perspective, highlighting the strategies influencing the evolution of the programs and reflecting the country's desire to meet dynamic global educational standards.

Design/Methodology/Approach. Using classification, comparison, induction, deduction, synthesis, and formalization, the authors investigated and compared dual-degree programs (DDPs) in Kazakhstan and foreign higher education institutions (HEIs), drawing on research papers and analytical reports from the Centre for the Development of Higher Education of the Republic of Kazakhstan.

Results/Discussion. Key findings indicated that sustainable partnerships, technological integration, market-oriented curricula, and active state support stimulated positive transformations in this form of education. Cultural diversity was presented as a decisive factor shaping the global thinking of graduates and their comprehensive readiness for the challenges of the 21st century. Linking educational innovation with scientific progress, this study formed a holistic concept for evaluating and implementing collaborative programs, highlighting risk-based approaches, and emphasizing the systemic mechanism of aligning academic courses with current economic, social, and scientific priorities. The findings will help policymakers, managers, and educators adjust curricula, enhance international cooperation, and address quality monitoring issues. Enhancing productive synergies between domestic and foreign partners, along with strict accreditation standards, can strengthen Kazakhstan's scientific potential and improve the competitiveness of graduates both domestically and abroad.

Conclusions. The study offered an in-depth look at the current and future development of DDPs, positioning Kazakhstan as an emerging center of science-oriented higher education reforms and an important participant in academic processes.

Keywords: dual-degree program; research education; Kazakhstan; higher education; scientific output; educational programs.

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1. INTRODUCTION

In the last decade, dual-degree programs (DDPs) in Kazakhstan have increasingly been seen as effective mechanisms for strengthening the scientific potential of higher education institutions (HEIs) and increasing the competitiveness of graduates in the global labor market (European Commission, 2021; International Association of Universities, 2024). Such initiatives allow students to receive two officially recognized diplomas from domestic and foreign universities, deepening their academic mobility, enhancing intercultural exchange, and contributing to the expansion of joint research projects (World Bank, 2023). Given the orientation of the Republic of Kazakhstan toward integration into the global scientific and educational space, including the Bologna process, the importance of such programs continues to grow (Hopbach, 2022). Despite the high interest in double diplomas, the issues of how these programs influence the development of the research base and innovation activities of universities remain insufficiently elaborated. In addition, systematic analyses of the risks associated with differences in educational standards, language barriers, and accreditation requirements are rare in domestic studies (Ministry of Science and Higher Education of the Republic of Kazakhstan, 2022). Finally, given the specifics of higher education in Kazakhstan and interaction with HEIs from the Commonwealth of Independent States (CIS) countries, a more detailed study of the organizational and methodological aspects of managing joint programs, as well as their long-term contribution to improving the scientific status of the country, is needed (European University Association, 2021).

Thus, the scientific problem of this study is the lack of comprehensive data on how exactly DDP contribute to the improvement of the scientific potential of HEIs, the formation of sustainable academic partnerships, and the development of a talent pool for priority industries in Kazakhstan. The aim of this study is to justify and propose a risk-based approach to the development and evaluation of the effectiveness of dual-degree programs, considering the priorities of higher education and scientific development in Kazakhstan. To achieve this goal, the following tasks are intended:

1. To review foreign and domestic sources, existing models of dual degrees and gaps in research are identified.
2. To identify the institutional, academic, cultural, and linguistic factors influencing the successful implementation of DDP in HEIs in Kazakhstan.
3. To develop recommendations for the adaptation of curricula and organization of research on the basis of the needs of the national economy and the requirements of international educational standards.

The higher education sector, where the main internationalization and research cooperation efforts are focused, serves as the key context for this study. The study discusses the outcomes of the literature review, the methods applied, and the results obtained, concluding by analyzing the significance of the findings and drawing conclusions about the prospects for improving dual degrees in the Republic of Kazakhstan. Modern studies on DDP emphasize their importance for the internationalization of higher education and strengthening scientific cooperation (OECD, 2023). Owing to such initiatives, students have the opportunity to study part of their program at a foreign university, thus increasing their academic mobility and building intercultural communication skills (QS Quacquarelli Symonds, 2021). In the context of Kazakhstan, the topic of double diplomas becomes especially relevant, as the state actively supports the integration of universities into the international scientific and educational space and seeks to strengthen the national scientific potential (Ministry of Science and Higher Education of RK, 2023). Initially, the concept of double degrees was most actively developed in European universities, which were interested in simplified mutual recognition of qualifications and strengthening student exchange (OECD, 2023). With globalization, the practice of double degrees has spread to the CIS countries, where its potential to strengthen interuniversity cooperation is becoming increasingly evident (Kazakhstan Center for Strategic Research, 2022). Studies on the internationalization of higher education emphasize that joint programs increase the competitiveness of graduates and stimulate scientific collaboration (Asia-Europe Meeting, 2021; Chan, 2022; OECD, 2023).

There are different organizational formats: from traditional "2 + 2" or "3 + 1" schemes (when part of the program is studied in the home institution and part of the partner institution) to fully integrated courses involving common curricula and joint supervision of research projects (Asia-Europe Meeting, 2021; QS Quacquarelli Symonds, 2021). The success of such models largely depends on coordinated curricula, which are common approaches to ensuring the quality of education and research (Ministry of Science and Higher Education of RK, 2023). A number of authors note that DDP can strengthen the scientific potential of HEIs by providing access to laboratories and research schools abroad and creating prerequisites for joint publications and grants (Chan, 2022; European Higher Education Area, 2024). This is especially true for engineering and technological specialties, where international research and innovation play a leading role. At the same time, there is a need for "risk-oriented approaches" to quality management, considering cultural and regulatory differences between states (European Higher Education Area, 2024). The development of dual degrees in the Republic of Kazakhstan is largely due to state support: certain funding mechanisms are provided, and legal frameworks and standards are formed (Ministry of Science and Higher Education of Kazakhstan, 2023). However, the issue of the scientific component remains underestimated: regulatory documents and local acts of universities often do not contain specific criteria for evaluating the research results of teachers and students participating in DDP (Kazakhstan Center for Strategic Research, 2022). Moreover, the expansion of international research activities as a key priority has been emphasized in various analytical reviews and official documents (Asia-Europe Meeting, 2021; Ministry of Science and Higher Education of Kazakhstan, 2023). Despite the accumulated domestic and foreign experience, the following gaps remain:

1. Insufficient attention should be given to the evaluation of the scientific results of the participants of joint programs and their real impact on scientific indicators of HEIs (Chan, 2022; Kazakhstan Center for Strategic Research, 2022).
2. There is a lack of detailed comparative studies, allowing the selection of optimal models of dual degrees in the context of Kazakhstani HEIs while considering their scientific priorities (Asia-Europe Meeting, 2021).
3. Risk-oriented methodologies that systematically assess cultural, linguistic, and administrative risk during the launch and implementation of dual degrees of risk are not typically applied (European Higher Education Area, 2024).

Taking these aspects into account, further research aimed at forming an integrated approach to the development of dual diplomas, which would consider Kazakhstan's priorities in the field of science, seems relevant. This scientific focus will ensure not only an increase in the competitiveness of graduates but also a closer integration of domestic universities into the global scientific community.

2. MATERIALS AND METHODS OF RESEARCH

The methodological part of the study focuses on the quantitative and qualitative analysis of the effectiveness of DDP in the Republic of Kazakhstan. The main objective is to identify the key factors and conditions influencing the success of such programs, considering the national educational priorities and scientific potential of the country.

2.1. Data sources

1. *Official statistics and departmental reporting*. Materials from the Ministry of Science and Higher Education of the Republic of Kazakhstan (annual reports and statistical compilations) reflecting the dynamics of the implementation of joint educational programs in Kazakhstani universities were used (Kazakhstan Accreditation Council, 2021).
2. *Publications and analytical reports*. This includes works devoted to the development of double diplomas and international academic mobility.
3. *Information from HEIs themselves*. In the course of the research, local normative acts of universities, development plans, data on the contingent of students on DDP, and their

academic performance were collected and systematized.

4. *Semi-structured interviews*. Conducted with representatives of university administration (vice-rectors for academic and research work), as well as heads of international cooperation departments and leading professors directly responsible for the coordination of DDP at universities (Kazakhstan Accreditation Council, 2021).

2.2. Methods of data collection and analysis

1. *Content analysis of the documents:*
   - Official orders and methodological recommendations of the Ministry of Science and Higher Education of Kazakhstan, as well as local documents of universities regulating the implementation of DPPs, were analyzed.
   - Compliance with regulatory requirements, the availability of mechanisms of scientific interaction, and quality criteria (including the scientific results of students) were checked.
2. *Statistical analysis:*
   - The data on the number of universities implementing DDP, the dynamics of enrollment at different levels (bachelor's, master's, and doctoral), and the total number of students in such programs were used (Kazakhstan Accreditation Council, 2021).
   - If necessary, descriptive statistics methods were used (average values, growth/decline rates, and distribution by regions).
3. *Questionnaire survey (online survey):*
   - Online questionnaires in Google Forms were developed to identify the opinions of faculty and students about the quality and scientific component of DDP.
   - The questionnaire was conducted from April to May 2023, with 274 respondents from 12 universities participating voluntarily. The questions focused on evaluating the scientific content of the courses, the complexity of the curricula, the level of intercultural communication, and the prospects for professional development.
4. *Semi-structured interviews:*
   - Since a risk-based approach to assessing the quality of DDP implies considering different points of view, 15 interviews were conducted with the heads of international activities and research departments (Kazakhstan Accreditation Council, 2021).
   - The interviews were conducted in Russia via a preprepared guide (five to seven open-ended questions). The aim was to obtain "first-hand" information about the problems in coordinating curricula, organizing scientific cooperation, accreditation, and so on.
5. *Qualitative analysis of textual data:*
   - The interview notes and answers to the open-ended questions in the questionnaires were transcribed and processed via manual coding by thematic categories (e.g., "academic mobility," "scientific activity," "funding," and "quality of training").
   - Key trends, barriers, and potential growth points are highlighted from the coding results.

2.3. Research procedure and validation

1. *Preliminary stage*. Regulatory documents, statistical data, scientific literature, and research instruments (questionnaires and interview questions) were collected.
2. *Main stage*. Questionnaires and interviews should be conducted in parallel with content analysis of the internal regulations of universities and the statistical processing of official data (Kazakhstan Accreditation Council, 2021).
3. *Synthesis of results*. Comparison of quantitative (e.g., dynamics of the number of students and HEIs) and qualitative data (stakeholders' opinions) for a comprehensive assessment of the role of double degrees in strengthening scientific potential.
4. *Validation*. To increase the reliability of the results, the triangulation method was used (comparing the results of the statistical analysis, content analysis of the documents, and expert comments). Additionally, the results of the interviews were discussed in narrow focus groups with five to seven experts, which allowed us to clarify the interpretation of some controversial points.

2.4. Limitations of the study

1. The sample for the online survey and interviews may not be fully representative, as

participation was voluntary. Nevertheless, the findings provide insights into the most common challenges and successes of DPPs.
2. Differences in HEIs (in terms of scale, specialization, and resources) make it difficult to compare some dual-degree models with others directly.
3. Language barriers may have influenced the completeness of some respondents' answers, especially in the absence of fluency in English, if part of the programs are run jointly with HEIs from further afield.
4. Ethical considerations.

The principles of confidentiality and voluntary consent were considered in the collection and use of the data. All participants in the online survey and interviews were familiarized in advance with the aims of the research and the format of the publication and could withdraw from participation at any stage.

3. RESULTS

The results of the study, on the basis of a comparison of official statistical reports and data collected during semi-structured interviews, show that in the first half of 2023, DDPs were already implemented in 45 Kazakhstani HEIs cooperating with 98 foreign universities from 23 countries (European Higher Education Area, 2022). In total, there are 181 programs covering three levels of higher education: bachelor's, master's, and doctoral studies. The dynamics compared with those in 2022 suggest a slight decrease in the total number of DDPs (207 in 2022), which may be due to several factors:

1. Revision of partnership agreements after the COVID-19 pandemic.
2. Reductions in funding for some programs at the master's and doctoral levels.
3. Curriculum optimization in several public HEIs.

Nevertheless, new programs launched in 2023 continue to operate, which reflects the aspiration of Kazakhstani HEIs to internationalize higher education further (Kazakhstan Accreditation Council, 2021; Ministry of Science and Higher Education of RK, 2023). The analysis demonstrates heterogeneous dynamics by level of education:

- Sixty-eight programs are implemented at the bachelor's level, and this number is close to the indicators of 71 in 2021 and 75 in 2022.
- At the master's level, there are 109 DDPs (130 in 2022 and 143 in 2021), indicating a downward trend in this particular segment.
- In doctoral studies, there are only 4 programs (6 in 2022 and 9 in 2021), indicating the difficulty of implementing double degrees for science-oriented levels of study.

According to the Ministry of Science and Higher Education of the Republic of Kazakhstan, the total number of students enrolled in DDP in the first half of 2023 reached 1,380, whereas in 2022, this figure was 1,240, and in 2021, it was 1,357. Notably, the majority (811 people) are studying in bachelor's degree programs, whereas the dynamics are somewhat weaker in master's (563) and doctoral (6) programs (European Higher Education Area, 2022). On the one hand, this reflects the increased interest of young students in the double degree format; on the other hand, it points to the need to stimulate DDP at the postgraduate level, which is important for the development of the country's scientific potential (Chan, 2022; International Association of Universities, 2024). In 2023, as of the first half of the year, 45 Kazakhstan HEIs, in collaboration with partner universities, will implement 181 DPPs, of which 39 are in English (22%). Compared with the first half of 2022 (207 DDPs), there is a decrease of 12%. Among 45 national HEIs, there are 7 national universities (99 DDPs), 18 state universities (41 DDPs), 8 joint-stock companies (20 DDPs), and 12 private universities (21 DDPs) (Table 1).

The results of the study confirm that HEIs of Kazakhstan actively develop partnerships with foreign universities and that the largest number of programs (119 DDPs) fall on HEIs of CIS countries, primarily the Russian Federation (102 programs) (European Higher Education Area, 2022). At the same time, significant cooperation remains:

- Forty-nine countries are implemented with European countries (Poland, Germany, France, Great Britain, etc.), which reflects the orientation toward European quality standards, the Bologna process, and possibly, participation in international

Name of the university	DDP quantity	Number of students
National universities		
Al-Farabi Kazakh National University	47	288
L.N. Gumilyov Eurasian National University	38	191
Abai Kazakh National Pedagogical University	8	108
Kazakh National Academy of Choreography	1	6
Kazakh National Women's Pedagogical University	3	15
Kazakh National Agrarian Research University	1	10
Satpayev University	1	2
Total of national universities	**99**	**620**
State universities		
Zhetysu University	3	9
North Kazakhstan University	8	51
West Kazakhstan University	1	10
Karaganda Technical University	2	2
Caspian University of Technology and Engineering	3	26
Kostanay Regional University	2	33
Atyrau University of Oil and Gas	1	1
West Kazakhstan Agrarian-Technical University	2	17
Buketov Karaganda University	1	4
Korkyt Ata Kyzylorda University	2	4
Taraz Regional University	1	1
Toraigyrov University	1	12
East Kazakhstan technical university	3	4
Shakarim University of Semey	4	32
Rudny Industrial University	1	2
South Kazakhstan Medical Academy	3	14
M. Auezov South Kazakhstan University	2	3
South Kazakhstan State Pedagogical University	1	2
Total of state universities	**41**	**227**
JSC		
Maqsut Narikbaev University	2	79
Almaty University of Energy and Communications	1	4
Almaty Technological University	7	57
Kazakh-British Technical University	4	203
NARKHOZ University	2	2
Ablai Khan Kazakh University of International Relations and World Languages	2	3
International University of Information Technologies	1	2
KIMEP	1	1
Total of JSC	**20**	**351**
Private universities		
Yesil University	3	4
Innovative University of Eurasia	1	3
Astana IT University	1	41
L.B. Goncharov Kazakh Automobile and Highway Institute	1	4
Kazakh-German University	5	15
Caspian Public University	1	1
Almaty Management University	4	50
Astana International University	1	43
Kazakh-Russian Medical University	1	2
University of International Business	1	8
Sherkhan Murtaza International Taraz Innovation Institute	1	8
University of Turan-Astana	1	3
Total of private universities	**21**	**182**
Total	**181**	**1,380**

Table 1. List of universities in the Republic of Kazakhstan implementing DDP.
Note. DDP: Dual-degree program; JSC: Joint-stock company.

rankings (European Commission, 2021; QS Quacquarelli Symonds, 2021).

- There are five agreements with U.S. universities, whereas Asian countries (China, South Korea, and Indonesia) give a total of eight more DDPs.

The analysis demonstrated that training is conducted in seven languages: Kazakh, Russian, English, German, French, German, and Turkish. Such linguistic diversification stimulates intercultural exchange and provides students with the opportunity to master foreign educational and scientific practices (Ministry of Science and Higher Education of the Republic of Kazakhstan, 2022). However, according to the respondents' estimates, the problem of the lack of highly qualified teachers fluent in foreign languages remains relevant, which can slow the processes of scientific interaction and the implementation of joint research projects. As part of cooperation in the implementation of the DDP, Kazakh universities have developed partnerships with 98 universities from 23 countries (Table 2).

The greatest number of DDPs by country is shown in Figure 1.

The number of DDPs by region is as follows: CIS–119 units, Europe–49 units, the USA–5 units, and Southeast Asia–8 units. The largest number of DDPs are implemented by universities in Russia (102 DDPs), Poland (12 DDPs), Germany (10 DDPs), and France (9 DDPs) (Figure 1). Comparative analysis (2021-2023) reveals that the highest number of DDPs (50) is

Country	Number of DDP	Number of students
CIS		
Azerbaijan	4	35
Belarus	3	25
Kyrgyzstan	5	38
Russia	102	546
Tajikistan	1	14
Uzbekistan	4	99
Total in CIS	**119**	**757**
Europe		
Bulgaria	2	11
Great Britain	4	204
Germany	10	32
Greece	1	6
Spain	1	1
Italy	1	3
Lithuania	1	2
Latvia	3	11
Poland	12	45
Portugal	2	4
Turkey	1	3
France	9	142
Switzerland	2	23
Total in Europe	**49**	**487**
USA		
USA	5	57
Total in USA	**5**	**57**
Asia		
Indonesia	1	1
China	1	43
South Korea	6	35
Total in Asia	**8**	**79**
Total	**181**	**1,380**

Table 2. List of DDP partner universities by country.
Note. CIS: Commonwealth of Independent States; DDP: Dual-degree program.

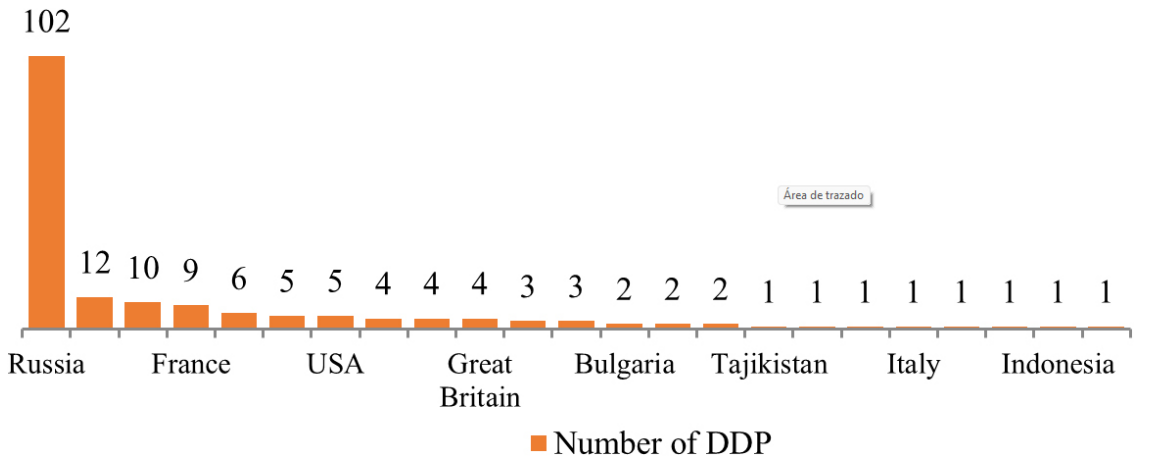

Figure 1. Number of DDP by country, units.
Note. DDP: Dual-degree program.

in the "business, management, and law" block, which is explained by the market demand for economic and legal specialists with international experience (Kazakhstan Accreditation Council, 2021). This is followed by:

- Natural sciences, mathematics, and statistics–24 DDPs.
- Engineering and technical disciplines–22.
- Pedagogical sciences–21.
- Information and communication technologies–15.
- Humanities, including social disciplines and languages —approximately 23 programs in total.

A small but strategically important block of directions in agriculture, health, and veterinary medicine (7, 4, and 1 DDP, respectively) deserves special attention. This reflects the growing interest of the state in food security, biotechnology, and public health. Nevertheless, the development of such programs requires more detailed coordination of curricula and infrastructure (laboratory facilities and joint research projects), which, according to interviews with representatives of HEIs, remains a challenge (Ministry of Science and Higher Education of Kazakhstan, 2023). The number of DDPs by education level is as follows: bachelor's degree–68 (2022–71, 2021–75, 2020–50), master's degree–109 (2022–130, 2021–143, 2020–93), and doctoral programs–4 (2022–6, 2021–9, 2020–9). There is a noticeable decrease in the number of students at all levels compared with the same period last year (Figure 2).

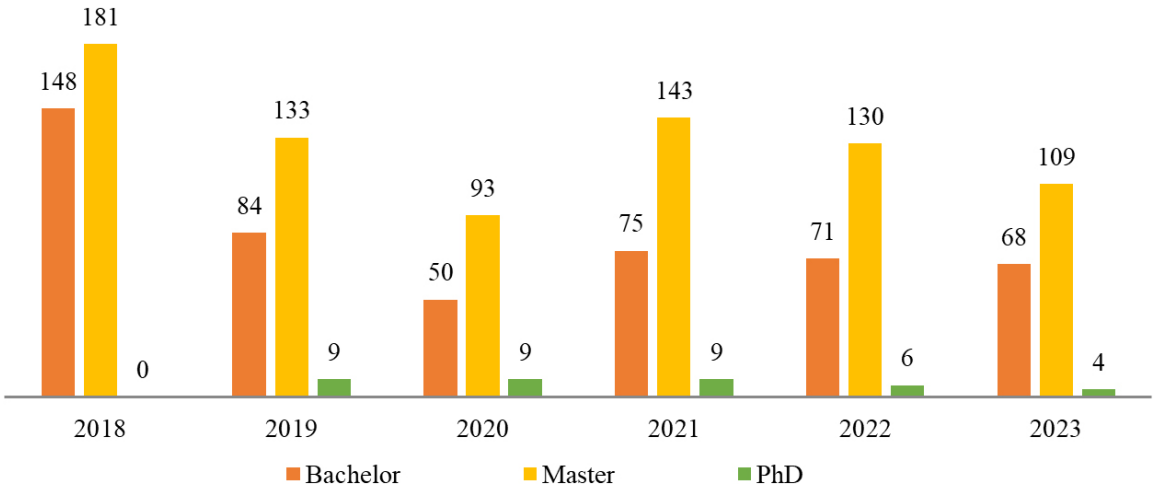

Figure 2. Implementation of DDP by level of education, units.
Note. DDP: Dual-degree program.

The number of students in DDP in the first half of 2023 is 1,380 people (2022–1240 people, 2021–1357 people, 2020–1120 people). The distribution of students across educational levels for DDP is as follows: at the bachelor's level, 811 people (2022–626 people, 2021–780 people, 2020–674 people), and at the master's level, 563 people (2022–603 people, 2021–562 people, 2020–435 people). The contingent of doctoral students in DDP is 6 people (2022–11 people, 2021–15 people, 2020–11 people). The percentage of students with DDP at the bachelor's level has increased by 29%, whereas there have been slight decreases at the master's and doctoral levels (Figure 3).

The largest number of implemented DDP are offered by universities such as the Al-Farabi KazNU (47 programs), L.N. Gumilyov Eurasian National University (ENU) (38 programs), North Kazakhstan University and Abai Kazakh National Pedagogical University (KazNPU) (8 programs each). Additionally, Almaty Technological University (ATU) offers 7 programs. The largest student body within the framework of DDP is at Al-Farabi KazNU–288 students, KBTU with 203 students, L.N. Gumilyov Eurasian National University (ENU) with 191 students, Abai Kazakh National Pedagogical University (KazNPU) with 108 students, and others (Figure 4).

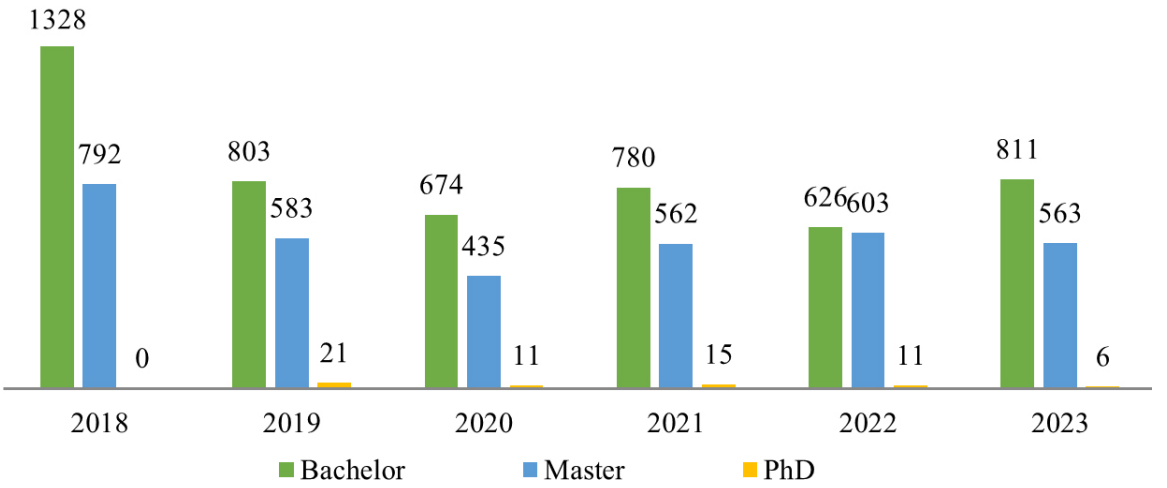

Figure 3. Student body for DDP, by educational levels, people.
Note. DDP: Dual-degree program.

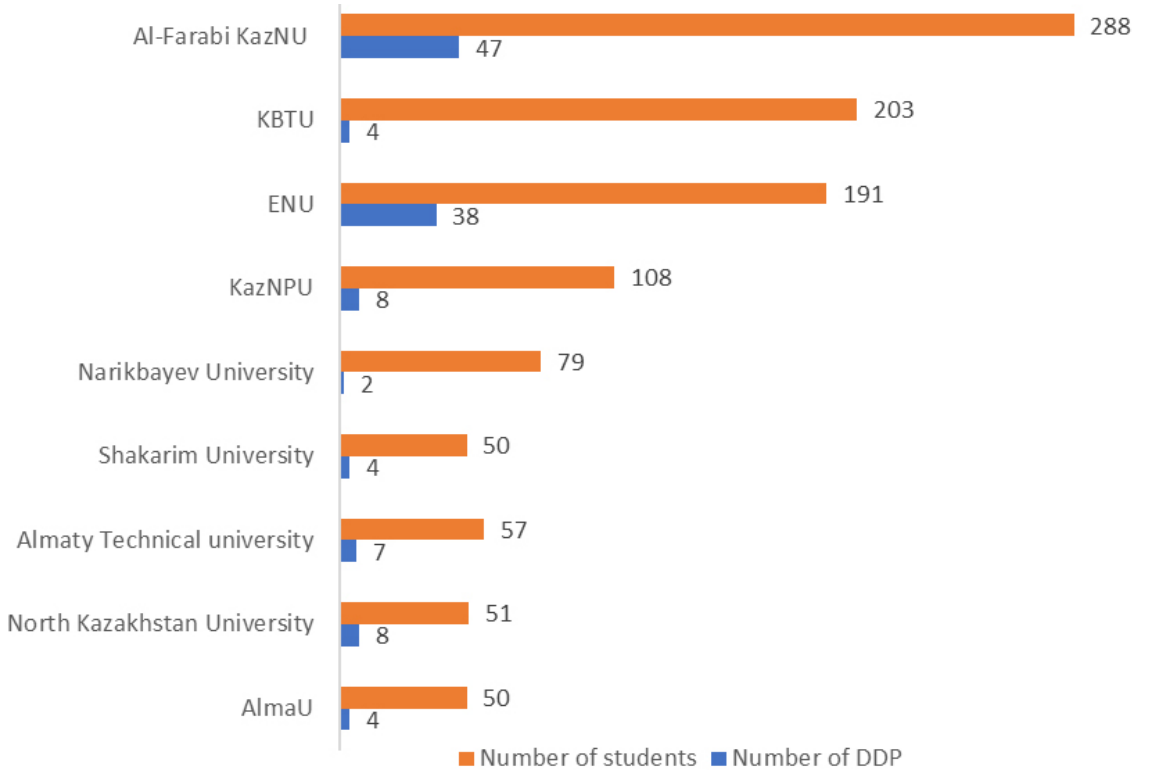

Figure 4. Number of top 10 leading universities by the number of contingent for the implementation of DDP. **Note.** DDP: Dual-degree program.

With respect to monitoring the effectiveness of universities in implementing the DDP program, it is worth noting that 203 people are studying at KBTU within the framework of 4 DDPs, which highlights the effectiveness of KBTU in implementing the DDP in comparison with other universities. Next, it is necessary to consider the effectiveness of DDP at Maqsut Narikbayev University, where 79 people are trained within the framework of 2 DDPs. At KazNPU, 108 students are studying within the framework of 8 DDPs, which indicates the university's prospects for implementing the DDP. The validity period of agreements for the

implementation of the DCF between Kazakhstan universities and their foreign partners ranges from 1 to 10 years. There are contracts of an indefinite nature, as well as with automatic renewal every 5 years. Training is carried out both with the departure of Kazakh students to foreign universities and with the use of distance technologies. Among the leading universities actively introducing DDP, traditionally noted are the following:

- Al-Farabi Kazakh National University (47 programs, 288 students).
- L.N. Gumilyov Eurasian National University (38 programs, 191 students).
- Abai Kazakh National Pedagogical University (8 programs, 108 students).
- Kazakh-British Technical University (KBTU) (4 programs, 203 students).
- Maqsut Narikbayev University (2 programs, 79 students) (European Higher Education Area, 2022).

Moreover, indicators of "effectiveness" in the context of the DDP require considering not only the number of students but also the quality of the programs themselves (international accreditation, research, and the percentage of employment of graduates). Interestingly, KBTU, with a relatively modest number of joint programs (4 MAPs), has a high concentration of participants (203 people), which may indicate a high demand and more "targeted" selection of partners abroad. A similar trend is observed at Maqsut Narikbayev University, which specializes in law and economics, where 2 programs bring together almost 80 students (Figure 4). In addition, the analysis of internal documents of a number of HEIs revealed that some programs remain in a "suspended state" owing to the lack of sufficient resources (laboratories, teachers, and internship opportunities). In several cases (two private HEIs and one state university), the validity of the concluded contracts is about to expire, and their prolongation has not yet been confirmed. These findings indicate that the sustainability of the DDP requires systematic work, including the strategy of funding and promoting programs, the alignment of curricula, and accreditation mechanisms (Kazakhstan Center for Strategic Research, 2022). For a deeper understanding of the factors influencing the implementation of the DDP, university documents were analyzed, and interviews were conducted with vice-rectors for teaching/research and with specialists from international departments (Kazakhstan Accreditation Council, 2021, see "methodology"). As a result, the following aspects were highlighted:

1. *Institutional support.* The existence of approved local acts and an office/center for international programs greatly simplifies the coordination of the DDP. Where such units function well, higher enrollment rates for joint programs are observed.
2. *Funding and government incentives.* Government grants and subsidies are particularly important for master's and doctoral programs, where tuition costs are higher. Some universities face a shortage of financial resources, which leads to a reduction in students' trips abroad and a decrease in the intensity of scientific internships (Ministry of Science and Higher Education of RK, 2023).
3. *Academic and scientific cooperation.* Universities that have joint laboratories and publications with foreign partners show greater involvement of students in scientific activities (Chan, 2022; International Association of Universities, 2024). The absence of scientific collaboration, on the other hand, reduces the DDP to mere academic mobility without serious scientific contributions.
4. *Language training.* Taking courses in English, German, or French (depending on the partner country) is essential for the successful completion of the program. Some universities organize free language courses, whereas others have to leave this task to the students, which leads to uneven results.
5. *Risk management.* In the context of double degrees, a risk-oriented approach to quality management is becoming increasingly relevant (European Higher Education Area, 2022). Universities oriented toward ISO 9001/21001 standards are more flexible in their ability to respond to external challenges —political, economic, pandemic, and so on— which allows them to maintain stability and transparency in the implementation of joint programs.

In summary, these factors indicate the need for a comprehensive approach, including not only a formal agreement with a foreign university but also a detailed elaboration of curricula, research projects, language training, and accreditation mechanisms. Analyzing the collected data and identified factors, it is possible to formulate several general trends in the development of DDP in Kazakhstan:

1. *Strengthen the role of a bachelor's degree.* The increase in the number of students at the bachelor's level confirms that young people seek international experience at the early stages of education. Moreover, master's and doctoral programs require additional incentives and financial support to maintain and develop a scientific focus.
2. *Regional diversification.* Although Russia and other CIS countries account for the largest number of programs and contracts, there is a noticeable increase in cooperation with universities in Europe, the USA, and Asia. This corresponds to the trends of globalization and integration into the world educational space (European Commission, 2021; Ministry of Science and Higher Education of the Republic of Kazakhstan, 2022).
3. *Demand for applied directions.* Many AAPs are concentrated in the fields of business, management, information technology, and engineering sciences, which reflects market demand. At the same time, there remains potential for the development of pedagogy, agriculture, health care, and other areas that are strategically important for the economy and social sphere.
4. *Insufficient systematization of internal processes.* Not all HEIs have detailed procedures for harmonizing curricula, systems of accreditation of scientific results, and unified criteria for assessing the effectiveness of double degrees (Kazakhstan Accreditation Council, 2021; Kazakhstan Center for Strategic Research, 2022). This leads to the risk of noncompliance with international requirements.
5. *Prospects for the introduction of the scientific component.* Despite the focus on academic mobility and international standards, deep integration of scientific research (joint laboratories, grants, and publications) has not yet become a mass phenomenon in all DDPs. There are successful examples, but they are spotty (European Higher Education Area, 2022; Ministry of Science and Higher Education of Kazakhstan, 2023).

Taken together, the results indicate that further development of DDP in Kazakhstan has high potential but requires comprehensive measures: strengthening the scientific component, attracting funding for master's and doctoral studies, strengthening the linguistic base, and introducing risk-based quality management mechanisms. All this should be backed by continuous state support and the interest of HEIs themselves in increasing their competitiveness in the global market of educational services.

3.1. Final summary of the results section

1. Numerical indicators (2021-2023) record an overall decrease in the number of DDPs, but there is an increase in the number of students, especially at the undergraduate level.
2. The geography of cooperation covers 23 countries, with a predominance of CIS HEIs but growing interest in Europe and Asia.
3. Programmed by field: business and management is the leading block, followed by engineering, pedagogy, and information and communication technologies. Agricultural and medical programs are still in the minority.
4. The leading universities (Al-Farabi KazNU, L.N. Gumilyov ENU, KBTU, etc.) demonstrate high demand, although the results of success vary depending on the level of organizational and financial support, language training, and scientific orientation.
5. The main problems are related to the lack of funding, underdeveloped scientific cooperation, and the absence of a unified risk and quality management system. Moreover, HEIs that actively apply risk-oriented approaches (ISO 9001/21001) seem to be more sustainable.
6. Development trends: Strengthening of bachelor's degrees, gradual expansion of geographical boundaries, focus on market-oriented specialties, and the need for deeper integration of research activities in DPPs.

In summary, the results of this study show that the dual degree format plays a significant role in the internationalization of Kazakhstani higher education and the formation of scientific potential. However, for DDPs to become not just a mechanism of academic mobility but also a full-fledged driver of scientific and educational progress, it is necessary to improve funding tools, language training support, and quality management standards, including considering global ESG principles and the real needs of the labor market in Kazakhstan.

4. DISCUSSION

The results presented in Section 3 show that DDPs in Kazakhstan remain relevant and are developing rapidly, despite some fluctuations annually. This is consistent with the general trend of the internationalization of higher education (European Commission, 2021; Hopbach, 2022), which emphasizes that international partnerships are an important driver of HEIs' global competitiveness. In the context of the Bologna process, to which Kazakhstan was one of the first post-Soviet countries to join, BAPs act as an additional tool that allows HEIs to meet European quality standards, stimulate academic mobility, and strengthen scientific collaboration (Ministry of Science and Higher Education of RK, 2023). At the same time, the revealed tendency of active growth of the contingent at the bachelor's level (811 people for the first half of 2023), with decreasing interest in master's (109 DDPs) and doctoral (4 DDPs) programs, coincides with the observations of researchers (European Higher Education Area, 2022, 2024), who noted that lower involvement in collaborative programs at postgraduate levels is often due to financial factors, a lack of clear regulations and higher requirements for scientific competences, and language training. The analysis of Section 3 suggests that much of the DDP is centered around undergraduate study and has educational rather than research bias. However, from the point of view of scientific activity, the master's and doctoral (PhD) programs are the key stages shaping scientific personnel and ensuring progress in research. This is confirmed by foreign studies indicating that double degrees at the graduate studies level (master's and PhD) contribute to the emergence of joint scientific publications, patents, and applied developments (Ministry of Science and Higher Education of RK, 2023; World Bank, 2023).

To date, from interviews with vice-rectors and heads of departments for international activities, not all Kazakhstani HEIs have paid enough attention to the scientific component. Often, joint programs turn out to focus only on student exchange, without systematic development of laboratory facilities or joint funding of R&D (research and development). This may explain the low share of doctoral studies in the DDP structure (4 programs in 2023), where scientific work should be at the forefront. One of the key areas of improvement seems to be the introduction of the risk-based approach (in the context of ISO 9001/21001) mentioned in the results of the European Higher Education Area (2022). It implies a systematic assessment of risks (linguistic, financial, and methodological) at the start of the program and continuous monitoring of scientific efficiency (number of joint publications, grants, citation index, etc.). The practice of a number of leading HEIs (KBTU and Al-Farabi KazNU) shows that this approach yields more sustainable results and allows HEIs to adapt quickly to changes in the external environment. An important finding in Section 3 was that state support, expressed in grants and regulations, greatly facilitates the development of DDP, especially at the level of postgraduate education (Ministry of Science and Higher Education of RK, 2023). However, as the representatives of universities themselves note, this support should be more targeted with respect to scientific research so that DDP are not reduced only to the exchange of students and curricula.

Comparative analyses with other CIS countries (European Higher Education Area, 2024; Kazakhstan Accreditation Council, 2021) show that financial support remains one of the bottlenecks everywhere. Joint research grants, which can be allocated by national or international funds, are especially relevant for master's and doctoral programs. In EU countries, for example, there is a practice of cofinancing research projects by universities and the state within the framework of the DDP, which contributes to attracting master's and doctoral students to high-tech specialties (Hopbach,

2022). In addition, institutional support also implies the professional development of university staff (teachers, methodologists, and managers of international departments), who are responsible for curriculum harmonization, accreditation, and scientific support. In the absence of a sufficient number of "scientific coordinators," HEIs face difficulties in setting up joint laboratories or publishing in foreign journals. As the statistics (Section 3) show, DDPs in Kazakhstan are implemented in seven languages (Kazakh, Russian, English, German, French, French, and Turkish), which significantly expands the linguistic horizon. On the one hand, this contributes to the formation of global competences in students (QS Quacquarelli Symonds, 2021); on the other hand, there are difficulties associated with the low level of foreign language proficiency of some teachers and students (especially in regard to master's and doctoral studies, where scientific texts presuppose mastery of academic English). This problem is not unique and occurs in a number of countries that have undergone the Bologna reforms: the European Commission (2021) noted that without proper language skills, students often experience difficulties when working with scientific databases (Scopus and Web of Science) and when writing articles for international conferences and journals. Thus, to develop the scientific component of the DDP more fully, it is necessary to introduce systematic language training, including not only general English courses but also specialized academic language (English for Research Publication Purposes [ERPP]).

The results noted that some HEIs adopting risk-based approaches to program quality assessment (focus on ISO 9001/21001, ESG standards) show greater resilience to external challenges (political, economic, and epidemiological). This finding supports the idea that systemic risk management allows us to think in advance about mechanisms of curriculum adaptation, flexible schedules for international students, distance learning formats, and so on. World practice indicates that in times of global crisis (e.g., the COVID-19 pandemic), HEIs that have well-established online platforms and prescribed scenarios for switching to distance formats maintain a high level of student and faculty involvement. This is particularly relevant for Kazakhstan, given the large geographical distances and heterogeneous infrastructure. In the case of DDP, a risk-based approach also helps address accreditation issues where different countries have different requirements for diplomas, curricula, and academic reporting (OECD, 2023; World Bank, 2023). Despite the extensive evidence base (1,380 students, 181 programs, and 45 HEIs), the available analysis is not necessarily comprehensive. First, the sample of respondents (students, lecturers, and vice-rectors) who took part in the online survey and interviews was voluntary, potentially introducing bias: the most active or successful participants may have been biased toward positive evaluations. Second, not all HEIs provide detailed data on the scientific contribution of DDPs (joint publications, citation indices, and participation in grants), which complicates the assessment of real effectiveness in terms of scientific development. However, the results obtained still allow us to highlight several prospects for further research:

1. Development of a unified methodology for assessing the scientific performance of DDP (a system of indicators on joint publications, patents, and grants).
2. Comparison of Kazakhstan's experience with the experience of leading universities of post-Soviet countries (Russia and Belarus) and Eastern Europe (Poland and Czech Republic) to identify "best practices."
3. In-depth focus group with master's and doctoral students who have already completed dual degrees to understand to what extent the DDPs truly strengthen their research competence.
4. Considering sectoral cases (engineering, biotechnology, and information technology) where international collaboration often leads to rapid scientific breakthroughs.

The final analysis confirms that DDPs in Kazakhstan have significant potential in terms of scientific progress and strengthening the research infrastructure of HEIs. The scientific value is generated through the following:

- Exchange of research experience between domestic and foreign scientific schools.

- Access to more modern laboratory facilities.
- Opportunities for publications and research collaborations in highly rated journals.
- Joint postgraduate programs, where doctoral students can receive scientific advice from two scientific teams at the same time.

In the long term, if governmental and institutional measures are emphasized in the development of master's and doctoral programs within the framework of the MAP, Kazakhstan can strengthen its position in the global scientific space, including increasing the number of citations of universities in international rankings (times higher education, QS, etc.). However, this requires not only financial injections but also systemic reforms related to the harmonization of educational standards, the development of uniform accreditation criteria, and the expansion of language training for staff. Thus, the discussion allowed the integration of the statistical and qualitative data from the study with the context of the world scientific literature. Main theses:

1. The Bologna process in Kazakhstan has stimulated the development of DDP, but the mechanisms of implementation (especially in terms of master's and doctoral studies) require strengthening (European Higher Education Area, 2024; Ministry of Science and Higher Education of RK, 2023).
2. The scientific component of the MAP is not sufficiently disclosed: mainly educational focus is observed, whereas joint research and publications are still spotty (Chan, 2022; European Higher Education Area, 2022).
3. Risk-oriented quality management (ISO 9001/21001, ESG) helps HEIs better adapt to external challenges and increases the transparency of DDP implementation.
4. The role of the state (funding and regulation) and the availability of qualified staff (academic coordinators and teachers with language training) are critical success factors.
5. The language barrier is one of the main challenges, especially when joint research projects at the doctoral level are implemented.

Overall, DDP in Kazakhstan are in a stage of active growth and have every chance to become a leading tool for the internationalization and development of science in higher education, provided that the processes are comprehensively supported and systematized. Subsequent research could focus on the analysis of specific scientific indicators and develop a detailed methodology for assessing not only quantitative but also qualitative aspects of cooperation (ratings of publications, innovative projects, patents, participation in international grants, etc.). Thus, the contribution of this study to the scientific community of Kazakhstan and CIS countries is that it demonstrates the relevance and potential of the DDP to strengthen the scientific component and identifies barriers and success factors that allow HEIs to optimize the strategy for the development of joint programs with foreign partners.

5. CONCLUSION

This study has demonstrated that DDP are effective tools for the internationalization of Kazakhstani HEIs, contributing to the improvement of their academic potential and the competitiveness of graduates in the global labor market. This study reveals the dynamics of the spread of DDPs, identifies key difficulties of organizational, regulatory, and legal natures, and identifies the factors positively influencing their successful functioning in the higher education system of Kazakhstan. First, the analysis of statistical data revealed that as of 2023, more than 45 Kazakhstani HEIs were involved in the implementation of TAP, cooperating with 98 foreign universities from 23 countries (European Higher Education Area, 2022). Despite a slight decrease in the total number of programs compared with the previous year, the total number of students still remains significant (over 1,300 students). This indicates a stable interest in joint educational projects, as well as the importance of further institutional support from the state and the universities themselves. Second, unevenness in the structure of the PDD by training level is identified: development is predominantly observed at the bachelor's level, whereas at the master's and doctoral levels, there is a decrease in the number of programs and contingents. Given that the postgraduate level ensures the formation of scientific personnel, there is an urgent need for targeted grants and state incentives aimed at strengthening the scientific component of DDP. The practices of a

number of foreign universities show that comprehensive support for master's and doctoral studies can serve as a driver of growth in the number of joint publications, projects, and patents (Hopbach, 2022; World Bank, 2023).

Third, the results of the questionnaires and interviews confirm that the most important condition for the success of PDD is a high level of language training supported by a developed infrastructure (language courses, teaching materials, and academic advisors). The lack of foreign language skills on the part of faculty and students often leads to the fact that joint programs are limited to educational mobility only, without moving into academic collaborations. Similarly, there is a need for more active implementation of the risk-based approach (ISO 9001/21001) to quality management, which has proven to be effective in conditions of instability and global challenges (political, epidemiological, etc.). Fourth, in practice, regional diversification of cooperation (Europe, Asia, USA, and CIS) provides great opportunities for scientific cooperation but requires a common regulatory framework and an effective accreditation mechanism for mutual recognition of qualifications. In this respect, state policy plays a special role, as do the activities of national accreditation agencies, which contribute to the implementation of Bologna process standards and the formation of common criteria for the assessment of the DDP (European Higher Education Area, 2024; Ministry of Science and Higher Education of RK, 2023). The novelty of this study is that a comprehensive study of the role of VPA in strengthening the scientific potential of universities in Kazakhstan has been conducted, considering risk-based methods and analyzing the impact on different levels of specialist training (bachelor's, master's, and doctoral students). The findings can be used not only by HEIs themselves to adjust curricula and strategies for international cooperation but also by governmental bodies (Ministry of Science and Higher Education and accreditation centers) in developing new regulations that stimulate scientific focus in MAP.

5.1. Limitations and perspectives

One limitation is the voluntary nature of respondent sampling in the collection of empirical data, which could bias the results toward more motivated participants. In addition, the study was unable to trace in detail the impact of each specific model of DDP on scientific indicators (number of publications, grant projects, and citation index) because of the lack of full-fledged statistical reports from a number of universities. In the future, it is advisable to develop unified criteria for assessing the scientific performance of DDP, both at the level of HEIs and in the national education system as a whole. The practical significance of this study is that it provides a holistic view of the conditions and factors of the introduction of joint DDP and emphasizes the importance of forming a unified strategy for the development of the scientific component. In particular, HEIs should more actively implement the following:

- Special language courses for teachers and students.
- Mechanisms for regular monitoring of scientific results.
- Risk-oriented quality management systems.
- Global funding instruments (international grants and state cofinancing) to strengthen postgraduate education.

As a result, DDP can not only fulfill the function of academic mobility but also become a catalyst for scientific discoveries, the development of innovative projects, and the strengthening of the reputation of Kazakhstani universities in the global educational environment. However, the realization of this potential presupposes the coordinated work of all stakeholders: state bodies, university management, teaching communities, student organizations, and foreign partners.

5.2. Concluding remarks

Thus, the main contribution of this study is to identify and scientifically substantiate the factors that contribute to improving the effectiveness and scientific efficiency of DDP in Kazakhstan. Continued research in this direction will allow the following:

1. Develop the postgraduate segment of the DDP, strengthening the role of master's and doctoral programs in the generation of scientific knowledge.

2. Create flexible instruments of financing and risk management.
3. To form the skills necessary for successful intercultural and scientific communication among students and teachers.
4. The range of training areas from engineering and information and communication technologies to agriculture and medicine should be expanded, considering the priorities of the state and society.

The results of the study confirm that under the conditions of targeted governmental and institutional support, a clear regulatory framework, and the development of the scientific component, Kazakhstan's DDP can take one of the leading positions not only in the CIS region but also in the global educational space, which corresponds to the strategic objectives to strengthen the competitiveness and scientific status of the Republic of Kazakhstan.

Conflict of interest

The authors declare that there are no conflicts of interest.

Contribution statement

Conceptualization, research, methodology: Yermek Komekbayev, Dina Kurmangaliyeva, Gareth John Dyke.

Supervision, validation, visualization: Yermek Komekbayev.

Initial writing and final version: Yermek Komekbayev, Gareth John Dyke.

Statement of data consent

The data generated during the research can be found in the article. ●

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