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DEVELOPMENT OF HUMAN CAPITAL IN KAZAKHSTAN'S HIGHER EDUCATION INSTITUTIONS: FINANCIAL INVESTMENTS, FACULTY QUALIFICATIONS, AND RESEARCH OUTPUT (2018–2022)

Abstract

This study examines the development of human capital in higher education institutions (HEIs) in Kazakhstan from 2018 to 2022, focusing on financial investments, infrastructure support, faculty qualifications, research output, and student outcomes. Utilizing comprehensive data from official sources, the analysis reveals significant growth in financial commitment to higher education, with substantial increases in expenditures, revenues, and investments in educational infrastructure. The data indicate a diverse and increasingly qualified faculty, though gender imbalances persist at senior academic levels. Research output, as measured by publications indexed in Scopus, has shown consistent growth, reflecting enhanced research productivity. Student performance metrics, including graduation rates and employment outcomes, highlight the effective preparation of graduates for the job market, with rising average salaries and employment rates. Innovation activities within HEIs, such as patent applications and trademark registrations, demonstrate a dynamic but variable landscape. The study identifies key areas for improvement, including the need for sustained investment, policies promoting gender equality in academia, and support for innovation activities. The findings underscore the importance of aligning educational programs with market needs to further improve graduate employability. This study provides valuable insights for policymakers and educational leaders to enhance the quality and competitiveness of higher education in Kazakhstan, contributing to the country's socio-economic development.

Key words: human capital, higher education, financial investment, qualifications, teaching staff, research results, students' achievements.

Introduction

Human capital is a critical factor in the socio-economic development of any nation, playing a pivotal role in enhancing productivity, fostering innovation, and driving economic growth. In the context of higher education, human capital development encompasses various dimensions, including financial investment, infrastructure support, faculty qualifications, research output, and student outcomes. This study aims to provide a comprehensive analysis of these aspects within Kazakhstan's higher education institutions (HEIs) over the period from 2018 to 2022.

The choice of this topic is driven by the increasing recognition of the importance of higher education in shaping a nation's future. As Kazakhstan continues to integrate into the global economy, the need for a highly educated and skilled workforce becomes ever more pressing. Higher education institutions are at the forefront of this endeavor, responsible for equipping students with the knowledge, skills, and competencies required to meet the demands of a rapidly changing world.

Previous research has highlighted the challenges and opportunities faced by Kazakhstan's higher education sector, including issues related to funding, faculty development, and the alignment of educational programs with market needs. However, a paucity of comprehensive studies examines the multifaceted aspects of human capital development in this sector. This study seeks to fill this gap by providing a detailed analysis of key indicators and trends.

The primary objectives of this study are to:

1. Assess the financial investments in higher education and their impact on the development of human capital.
2. Analyze the infrastructure support available to HEIs and its role in facilitating educational and research activities.
3. Evaluate the qualifications and composition of faculty members, with a focus on gender distribution and academic achievements.
4. Examine the research output of HEIs, particularly the number of publications indexed in Scopus.
5. Investigate student performance and employment outcomes, including graduation rates, honors distinctions, and job market integration.
6. Explore the innovative activities within HEIs, such as patent applications, trademarks, and industrial designs.

The significance of this study lies in its potential to inform policy decisions and strategic initiatives aimed at enhancing the quality and effectiveness of higher education in Kazakhstan. By providing a comprehensive analysis of the current state and trends in human capital development, this study contributes to a deeper understanding of the strengths and challenges faced by HEIs, offering insights that can guide future improvements.

In the following sections, we present the materials and methods used in this study, followed by the results and discussion of the key findings. The study concludes with policy recommendations and implications for the future development of human capital in Kazakhstan's higher education sector.

The development of human capital in higher education institutions (HEIs) is a critical area of study that has garnered significant attention globally. This section reviews the existing literature on key aspects of human capital development, including financial investment, infrastructure support, faculty qualifications, research output, and student outcomes. The review focuses on both international perspectives and the specific context of Kazakhstan.

Financial investment is a cornerstone of effective human capital development in higher education. According to Altbach adequate funding is essential for improving educational quality, supporting faculty development, and enhancing research capabilities [1]. Studies have shown that countries with higher levels of investment in higher education tend to have better educational outcomes and more robust research outputs [2]. In Kazakhstan, the government's increasing financial commitment to higher education reflects an understanding of these global trends and a strategic effort to boost the sector's performance [3].

Infrastructure plays a vital role in creating an environment conducive to learning and research. The availability of modern educational facilities, laboratories, libraries, and technological resources is crucial for the effective delivery of educational programs [4]. Research by Hanushek and Woessmann highlights the positive impact of well-developed infrastructure on student performance and faculty productivity [5]. In Kazakhstan, significant investments have been made to expand and modernize HEI infrastructure, aiming to support a growing student population and foster a high-quality educational experience.

The qualifications and diversity of faculty are critical indicators of the quality of education in HEIs. Faculty with advanced degrees and academic titles contribute significantly to the academic and research mission of institutions [6]. Gender diversity among faculty members is also an important factor, as it promotes inclusive and equitable educational environments [7]. Studies indicate that

diverse faculty bodies can enhance the learning experience by bringing varied perspectives and expertise [8]. In Kazakhstan, efforts to increase the number of faculty with PhD degrees and improve gender balance are ongoing, reflecting global best practices [9].

Research output is a key measure of the academic productivity and global competitiveness of HEIs. Publications indexed in databases such as Scopus are often used as indicators of research quality and impact [10]. Higher research output is associated with increased innovation, knowledge creation, and academic reputation [11]. The steady increase in Scopus-indexed publications from Kazakhstan's HEIs suggests significant progress in enhancing research capabilities and contributing to the global academic community [12].

Student performance and post-graduation employment outcomes are vital indicators of the effectiveness of higher education systems. High graduation rates, the achievement of honors diplomas, and successful integration into the job market are indicative of well-designed and effectively implemented educational programs [13]. Research has shown that graduates from well-funded and well-resourced institutions tend to have better employment prospects and higher earning potentials [14]. In Kazakhstan, improving student performance and employment outcomes has been a key focus, with positive trends observed in recent years.

Innovation and intellectual property activities, such as patent applications, trademarks, and industrial designs, are critical components of a knowledge-based economy. These activities reflect the ability of HEIs to contribute to technological advancement and economic development [15]. The literature suggests that institutions with strong research and development capabilities are more likely to produce significant innovations and intellectual property [16]. Kazakhstan's HEIs have shown dynamic, albeit fluctuating, engagement in innovation activities, highlighting the need for sustained support and strategic initiatives to foster a robust innovation ecosystem.

Materials and мethods

The methodology of this study involves a quantitative analysis of the collected data to assess the development and performance of human capital in Kazakhstan's HEIs. The methods employed are as follows:

1. Data Collection: Data were sourced from official statistical agencies and financial reports to ensure accuracy and reliability. The dataset spans five years (2018–2022) to capture trends and changes over time. The study period of 2018–2022 was selected to coincide with several pivotal educational reforms in Kazakhstan, such as adjustments in funding models and the introduction of new accreditation standards. These changes are crucial for assessing impacts on educational outcomes and human capital development in the country. However, it is important to note that the limitation of data up to 2022 is influenced by the lack of updated information on key government websites, such as the Taldau and the Bureau of National Statistics of Kazakhstan, at the time of this research. The unavailability of complete data for 2023 may restrict the comprehensiveness of our analysis and interpretation of the latest trends in the development of human capital. The data for this study were primarily sourced from official reports of the Ministry of Education and Science of the Republic of Kazakhstan and national statistical surveys conducted by the Bureau of National Statistics of Kazakhstan. These sources were selected due to their comprehensive coverage of educational metrics across the country. To ensure the openness and accessibility of our research, all data utilized were publicly available or provided under specific data-sharing agreements that comply with research transparency standards.
2. Data Organization and Presentation: The data were organized into tables and figures to facilitate analysis and visualization. Tables were created in Microsoft Word format, and figures were generated to illustrate key trends and comparisons. Each table and figure is accompanied by a note indicating the source of the data.
3. Statistical Analysis: Descriptive statistics were used to summarize the data, including calculations of total expenditures, revenues, and growth rates. Trends in faculty composition, research output, and student performance were analyzed to identify significant patterns and insights.
4. Comparative Analysis: Comparative analysis was conducted to examine changes over the five years. This involved comparing financial indicators, infrastructure developments, faculty qualifications, research outputs, and student outcomes across different years.

5. Interpretation and Discussion: The results were interpreted in the context of human capital development, considering factors such as investment in education, faculty qualifications, research productivity, and graduate employability. The discussion also highlights challenges and areas for improvement, providing policy recommendations based on the findings.

Principles of Data Collection In collecting data, several key principles were upheld to ensure the integrity of the research:

Openness and Accessibility: Data sources were chosen based on their public availability and relevance to the educational sector in Kazakhstan, ensuring that the results are verifiable and reproducible by other researchers.

Transparency:The methodology for data collection and analysis was clearly outlined to allow for independent verification and to foster trust in the findings presented.

Comparability: Care was taken to use data that were consistent in methodology over the years 2018–2022, enabling accurate comparisons and trend analysis. This comparability is vital for assessing the impact of educational reforms on human capital development accurately.

Results and discussion

The analysis of human capital in Kazakhstan's higher education institutions (HEIs) has provided several insights into the current state and trends in the sector. The data and figures collected from 2018 to 2022 highlight key aspects of infrastructure support, financial indicators, faculty composition, research output, and student performance.

The chart provided illustrates the dynamic structure of expenditures for higher education institutions (HEIs) in Kazakhstan from 2018 to 2022. The chart includes three key metrics: overall expenditures (in blue), expenditures specifically for HEIs (in orange), and expenditures converted to dollars (represented by the gray line with markers).

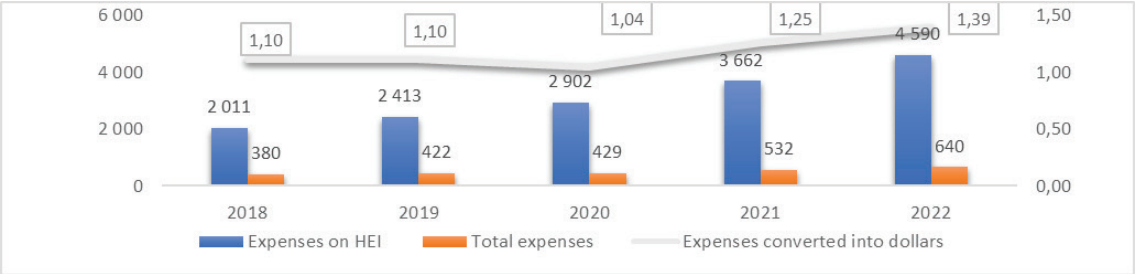


Figure 1 – The dynamic structure of expenditures for Higher education institutions (HEIs) in Kazakhstan

Note: Compiled by the authors based on the source [17].

The overall expenditures for HEIs show a significant upward trend over the five years. Starting at approximately 2,011 billion tenge in 2018, the overall expenditures increased steadily to 4,590 billion tenge by 2022. This growth indicates a strong commitment to investing in higher education, reflecting efforts to improve infrastructure, resources, and educational quality.

The expenditures specifically for HEIs also demonstrate a positive trend. In 2018, the expenditure was 380 billion tenge, which rose to 640 billion tenge by 2022. This increase in targeted spending highlights the focus on directly supporting higher education institutions through funding for operations, faculty salaries, and academic resources.

The gray line with markers represents the expenditures converted to dollars, showing the exchange rate impact over the years. The markers indicate the dollar value equivalent of the expenditures for each year.

The expenditure in dollars started at 1.10 (value not specified, likely in billions or another unit) in 2018 and remained stable in 2019, despite an increase in tenge expenditures. This stability suggests a consistent exchange rate or minor fluctuations.

In 2020, there was a slight decrease to 1.04, possibly indicating a depreciation of the tenge against the dollar or a less significant increase in dollar expenditures relative to tenge.

However, from 2021 onwards, the dollar value equivalent increased to 1.25 in 2021 and further to 1.39 in 2022, indicating a strengthening of expenditure growth in dollar terms. This rise could be due to either an increase in spending or a favorable exchange rate.

Table 1 provides a detailed breakdown of the expenditures for higher education institutions (HEIs) in Kazakhstan from 2018 to 2022. The data highlights the overall trend in spending, including total labor costs, salary fund expenses, and specific expenditures on educational materials and professional development services.

Table 1 – Dynamic Structure of Expenditures for Higher Education Institutions from 2018 to 2022

№	2018	2019	2020	2021	2022
Expenditures for HEIs	379,688,945	421,733,204	428,859,784	532,455,069	640,309,147
Total Labor Costs	177,338,452	213,591,538	233,273,773	280,871,362	351,128,285
Salary Fund Expenses	163,239,586	190,079,642	209,082,665	250,305,273	311,690,362
Expenses on Textbooks and Educational Materials	-	1,212,143	649,053	876,088	2,672,198
Expenses on Training and Professional Development Services	-	1,250,107	1,158,118	1,133,680	2,040,010
Travel Expenses	-	7,253,931	2,443,679	10,913,231	6,942,752
Note: Compiled by the authors based on the source [17].					

The expenditures for HEIs have shown a significant increase over the five years, rising from approximately 380 billion tenge in 2018 to over 640 billion tenge in 2022. This growth indicates a strong commitment to enhancing the educational infrastructure and capabilities. Notably, the total labor costs and salary fund expenses have also increased, reflecting improvements in faculty compensation, which is crucial for attracting and retaining qualified staff. The investments in textbooks, educational materials, and professional development services, though relatively smaller, highlight the focus on improving the quality of education and continuous professional growth. The marked increase in travel expenses in 2021 indicates a significant effort in faculty and student mobility, likely related to conferences, training, and collaboration opportunities. Table 2 – presents revenue and profit metrics of HEIs over five years.

Table 2 – The revenue and profit metrics of HEIs

№	2018	2019	2020	2021	2022
Total Revenue	2,014,517,094	2,401,938,953	3,060,211,845	3,822,683,862	4,771,698,664
Profit	17,391,053	35,491,128	38,781,211	49,933,859	64,777,362
Total HEIs Revenue	346,934,693	391,410,328	464,578,117	551,950,136	695,408,198
Total HEIs Profit	9,340,216	7,647,724	25,731,018	3,842,910	20,521,563
Government HEIs Revenue	1,691,609,695	247,697,906	181,871,784	204,729,235	460,834,442
Government HEIs Profit	11,000,901	(498,268)	3,793,554	(20,808,182)	16,667,009
Private HEIs Revenue	416,169,000	189,962,320	279,850,276	344,159,846	230,325,770
Private HEIs Profit	18,111,641	7,710,434	21,454,328	24,498,670	3,264,396
Foreign HEIs Revenue	16,627,129	3,138,723	2,856,057	3,061,055	4,247,986
Foreign HEIs Profit	(11,721,489)	435,558	483,136	152,422	590,158
Note: Compiled by the authors based on the source [17].					

The revenue and profitability data indicate a steady growth in financial resources for HEIs, with total revenues increasing significantly from 2018 to 2022. The overall increase in revenues and profits across HEIs demonstrates their growing financial stability and capacity to invest in educational and research activities. Private universities show consistent profitability, suggesting effective financial

strategies and operations. However, the variability in government revenues and profits, particularly the negative profit in 2019 and 2021, indicates challenges in funding and financial management within state institutions. This variability suggests a need for more stable and predictable funding mechanisms to ensure the sustainability of public HEIs. The foreign institutions' fluctuating profits, despite their relatively small scale, highlight the competitive pressures and operational challenges they face in the Kazakhstani higher education market. Table 3 presents the balance sheet of HEIs, detailing the assets, liabilities, and equity over a five-year period.

Table 3 – Balance sheet of Higher education Institutions (HEIs) (thousand tenge)

№	2018	2019	2020	2021	2022
Assets					
Total	1,099,428,316	981,053,074	1,063,260,517	1,114,071,254	1,021,760,340
Current Assets	287,621,152	231,375,451	252,917,513	319,278,727	319,500,931
Long-term Assets	811,807,164	749,677,623	810,343,004	794,792,527	702,259,409
Liabilities and Equity					
Total	1,099,428,316	981,053,074	1,063,260,517	1,114,071,254	1,021,760,340
Current Liabilities	234,398,503	119,064,671	120,992,200	149,973,593	147,204,564
Long-term Liabilities	491,701,966	466,783,410	461,550,115	467,862,808	346,745,769
Equity	373,327,847	395,204,993	480,718,202	496,234,853	527,810,007
Note: Compiled by the author based on source [17].					

The balance sheet data reveal a stable asset base for HEIs, with total assets consistently exceeding one trillion tenge. The substantial proportion of long-term assets indicates significant investments in infrastructure and facilities, which are crucial for maintaining educational quality. However, the data also show an increase in liabilities, both current and long-term, which suggests a need for effective financial management to ensure sustainability. The growth in equity over the period reflects the strengthening financial position of HEIs. The increase in current liabilities highlights the need for efficient short-term financial strategies to manage operational costs. The consistent growth in equity indicates that HEIs are generating surplus revenues, which are being reinvested into the institutions to support further development.

Table 4 provides information on the material and technical base of HEIs, including the number of institutions, R&D enterprises, building areas, and available resources from 2018 to 2022.

Table 4 – Material and Technical Base in Higher Education Institutions (HEIs) for H human capital

№	2018	2019	2020	2021	2022
Number of Higher Education Institutions	124	125	125	122	116
Number of Enterprises Conducting R&D	384	386	396	438	414
Total Building Area in HEIs (sqm)	5,802,191	6,073,115	6,105,247	6,709,418	6,641,886
Total Area of Educational and Laboratory Buildings (sqm)	2,638,287	2,722,571	2,771,786	2,665,193	2,674,059
Area of Sports Halls in HEIs (sqm)	338,332	359,908	343,325	388,221	402,179
Area of Assembly Halls in HEIs (sqm)	99,351	102,425	106,226	101,219	89,710
Area of Dormitories in HEIs (sqm)	1,457,257	1,545,954	1,531,101	1,472,043	1,481,821
Design Capacity of Canteens (seats)	67,769	66,644	66,886	61,203	58,058
Number of HEIs with Libraries (units)	126	129	125	119	116
Library Collection in HEIs (units)	78,546,757	76,446,462	74,749,497	71,483,009	69,309,915
Number of Computers Used in the Educational Process in HEIs (units)	79,720	78,223	81,541	81,606	82,121
Number of Computers with Internet Access in HEIs	71,381	70,357	76,350	75,929	77,090
Number of Sets of Interactive Equipment in HEIs	5,501	6,069	6,131	6,062	6,213
Note: Compiled by the author based on source [17].					

The material and technical base data indicate a well-resourced higher education sector, with significant investments in building areas, educational facilities, and technological resources. The number of enterprises conducting R&D has increased, reflecting a growing focus on research and innovation. However, there has been a slight decrease in the number of higher education institutions, which may suggest consolidation or closure of underperforming institutions. The steady growth in the number of computers and interactive equipment underscores the importance of digital tools in modern education. The data also show consistent improvements in the availability of library resources, which are essential for supporting research and academic activities. The decline in the design capacity of canteens might reflect a shift towards more decentralized or diverse food service options on campus. table 5 and table 6 provide data on the staff contingent in HEIs, highlighting the gender distribution and professional qualifications of the academic staff from 2016 to 2021.

Table 5 – Staff contingent of Higher education Institutions (HEIs) at the beginning of the academic year (persons)

	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
Total Main Staff	38,241	38,212	38,275	38,470	36,307
From the Main Staff:					
with an academic master's degree	11,135	12,098	12,337	12,995	13,067
with a PhD degree	1,562	1,854	2,157	2,635	2,942
with a doctor of profile degree	1,562	208	222	235	137
with a candidate of science degree	3,499	3,251	3,197	3,274	11,514
with the academic title of professor	14,023	13,276	12,896	12,723	2,280
with the academic title of associate professor	2,425	2,349	2,291	2,466	5,345
In addition, staff working under part-time employment (external part-timers)	6,297	5,983	5,650	5,876	6,137
Note: Compiled by the author based on source [17].					

The data indicate a diverse and qualified staff contingent within HEIs, with a notable presence of female academics across various professional categories. The increase in the number of staff with PhD degrees and academic titles such as professors and associate professors reflects ongoing efforts to enhance the qualifications of faculty members. The gender distribution data show that while there are more male candidates of science and professors, the proportion of female associate professors and candidates of science is also significant, indicating progress towards gender balance in academia. The decrease in the total main staff in 2020/2021 might reflect the impact of economic or policy changes affecting employment in HEIs. The increase in staff working under part-time employment highlights the flexible and dynamic nature of academic staffing in response to changing needs. Staff Contingent of HEIs presented in table 6.

Table 6 – Staff contingent of Higher education Institutions (HEIs) by gender and professional division

	Men					Women				
	2016/ 2017	2017 /2018	2018/ 2019	2019/ 2020	2020/ 2021	2016/ 2017	2017/ 2018	2018/ 2019	2019 /2020	2020/ 2021
Candidates of Science	5 379	5 059	4 852	4 885	4 335	8 644	8 217	8 044	7 838	7 179
Associate Professors	2 796	2 709	2 480	2 685	2 275	3 501	3 274	3 170	3 191	3 070
Doctors of Science	2 065	1 943	1 839	1 964	1 695	1 434	1 308	1 358	1 310	1 257
Professors	1 552	1 503	1 408	1 610	1 458	873	846	883	856	822
Note: Compiled by the author based on source [17].										

The gender distribution data illustrate the professional hierarchy within HEIs, with a greater number of male candidates of science and professors compared to their female counterparts. However, the number of female associate professors and candidates of science is substantial, indicating significant gender representation at these levels. Over the years, there has been a steady presence of women in higher academic positions, although men still dominate the senior positions such as professors and doctors of science. This distribution highlights the ongoing efforts towards gender equality in academic staffing, though there remains room for improvement to achieve a more balanced representation at the highest academic levels. Figure 2 illustrates the number of publications by Kazakhstan's higher education institutions (HEIs) indexed in Scopus from 2018 to 2022. Scopus is one of the largest abstract and citation databases for academic journal articles, and the number of publications indexed in Scopus is a key indicator of research output and academic productivity.

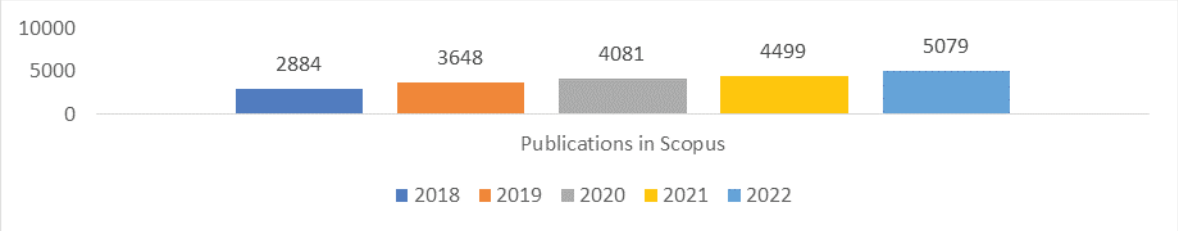


Figure 2 – The number of publications by Kazakhstan's HEIs indexed in Scopus

Note: Compiled by the author based on source [17].

2018: The number of publications started at 2,884. This figure provides a baseline for subsequent years and reflects the initial state of research output. 2019: There was a noticeable increase to 3,648 publications, marking a significant growth in research activities and outputs by HEIs. This 26.5% increase indicates a concerted effort to enhance research productivity. 2020: The number of publications further increased to 4,081, showing continued improvement and growth in academic research. This 11.9% rise from the previous year highlights the sustained momentum in research activities despite potential challenges. 2021: The number of publications reached 4,499, maintaining the upward trend. This 10.2% increase suggests ongoing investment in research infrastructure and support for academic staff to produce high-quality research. 2022: The chart shows the highest number of publications at 5,079, reflecting a 12.9% increase from 2021. This peak indicates a robust and growing research culture within Kazakhstan's HEIs.

Table 7 details the average monthly nominal salary and median salary for faculty in HEIs, categorized by gender.

Table 7 – Average monthly nominal salary and median salary

	Average Monthly Nominal Salary			Average Median Salary		
	Total	Men	Women	Total	Men	Women
Average Monthly Nominal Salary	322,845	361,481	285,744	251,356	273,864	234,561
Education	265,311	250,582	270,285	229,101	206,484	236,453
Note: Compiled by the author based on source [17].						

The average monthly nominal salary data reveal a gender pay gap, with men earning more than women on average. This gap is evident in both the total and education-specific salary data. The median salary figures further illustrate this disparity, although the difference is somewhat narrower compared to the average salary. This data underscores the need for policies and practices that address gender-based pay disparities in HEIs. The relatively higher median salaries for women in the education category suggest that women may be more concentrated in lower-paying positions, affecting the overall average. Addressing these disparities is crucial for promoting gender equality and ensuring that all faculty members are fairly compensated for their work. Table 8 provides the results of the final

state certification, detailing the total number of students who passed, including those who received honors diplomas and those who achieved “excellent” and “good” grades.

Table 8 – Final state certification results

	Total	Including Women	Of the Total
			Graduates with Honors Diplomas
Republic of Kazakhstan	161,524	89,755	14,688
State Universities	32,842	18,842	4,363
Private Universities	127,904	70,471	10,282
Foreign Organizations	778	442	43
Note: Compiled by the author based on source [17].			

The final state certification results show a high number of graduates, with a significant proportion being women. The data indicate that private universities have the largest number of graduates, which reflects the substantial role of private institutions in Kazakhstan’s higher education sector. The number of graduates with honors diplomas and those achieving “excellent” and “good” grades highlights the academic achievements and quality of education provided by these institutions. However, the relatively lower numbers of honors diplomas suggest that while many students perform well, fewer attain the highest levels of academic distinction. This analysis can inform efforts to enhance academic support and excellence programs to increase the number of top-performing graduates. Table 9 presents the employment statistics of students, detailing the percentage of overall employment, average job search time, and average graduate salary from 2020 to 2022.

Table 9 – Employment statistics of students

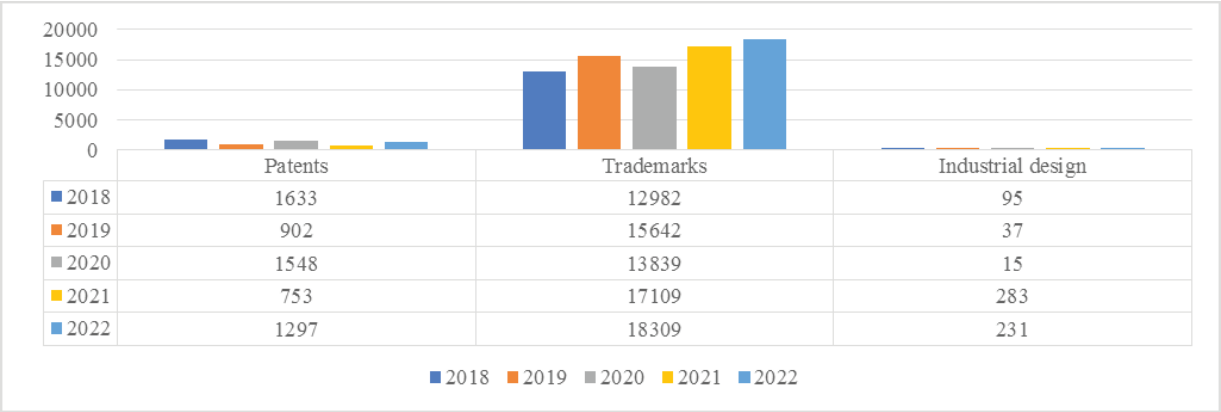
Year	Percentage of Overall Employment of Students	Average Job Search Time (days)	Average Graduate Salary (tenge)
2020	71.0%	90	114,067
2021	77.7%	88	103,811
2022	79.5%	97	155,621
Note: Compiled by the author based on source [17]			

The employment statistics indicate an improving trend in the employment rate of graduates, increasing from 71% in 2020 to 79.5% in 2022. This positive trend suggests that HEIs are effectively preparing students for the job market. However, the average job search time increased slightly in 2022, which could be due to various factors, including economic conditions and market demands. The significant increase in the average graduate salary in 2022 reflects improved job opportunities and potentially higher-value positions available to graduates. These trends highlight the importance of continuous alignment between academic programs and labor market needs to sustain and further enhance graduate employability and salary outcomes.

Figure 3 provides data on the number of patent applications, trademark registrations, and industrial design applications in Kazakhstan from 2018 to 2022. These metrics are essential indicators of the innovative activities within the country, particularly in the context of higher education institutions (HEIs) and their contributions to research and development.

Consistent Growth in Trademarks: The consistent increase in trademark registrations, particularly from 2019 to 2022, indicates a strong emphasis on brand protection and intellectual property management. This growth reflects the increasing commercialization of research outputs and the strategic importance of branding for institutions and businesses.

Volatile Industrial Design Applications: The data on industrial designs show significant volatility, with a sharp decline followed by a steep increase in 2021. This trend suggests that while there is potential for growth in industrial design, it may be more susceptible to external factors and market conditions compared to patents and trademarks.



	Patents	Trademarks	Industrial design
2018	1633	12982	95
2019	902	15642	37
2020	1548	13839	15
2021	753	17109	283
2022	1297	18309	231

Figure 3 – Patent applications, trademarks, and industrial designs (2018–2022)

Note: Compiled by the authors based on the source [17].

Fluctuations in Patent Activity: The data on patent applications show notable fluctuations, with peaks in 2018 and 2020 and troughs in 2019 and 2021. These variations suggest that patenting activity is influenced by multiple factors, including economic conditions, institutional policies, and strategic priorities.

The analysis of human capital in Kazakhstan's higher education institutions (HEIs) has provided several insights into the current state and trends in the sector. The data and figures collected from 2018 to 2022 highlight key aspects of infrastructure support, financial indicators, faculty composition, research output, and student performance.

1. Financial Indicators and Infrastructure Support. The dynamic structure of expenditures for HEIs (table 1) and the overall revenue data (table 2) reveal a strong and growing financial commitment to higher education in Kazakhstan. The significant increase in both total expenditures and revenues over the five-year period indicates robust investment aimed at enhancing educational infrastructure and capabilities. The rise in expenditures, particularly in labor costs and salary fund expenses, suggests improvements in faculty compensation, which is crucial for attracting and retaining qualified staff.

The balance sheet data (table 3) show a stable asset base for HEIs, with total assets consistently exceeding one trillion tenge. This stability, coupled with increasing equity, reflects a strengthening financial position. The material and technical base data (table 4) highlight substantial investments in building areas, educational facilities, and technological resources, which are essential for creating a conducive learning environment and supporting research activities.

2. Faculty Composition and Scientific Activity. The staff contingent data (tables 5 and 6) indicate a diverse and qualified faculty within HEIs, with a notable presence of female academics across various professional categories. The increase in the number of staff with PhD degrees and academic titles such as professors and associate professors reflects ongoing efforts to enhance faculty qualifications. However, the gender distribution data show that men still dominate senior academic positions, indicating room for improvement in achieving gender balance at the highest levels.

The publication data (figure 2) show a consistent increase in the number of publications indexed in Scopus, highlighting the growing research output and academic productivity of HEIs. This trend suggests that investments in research infrastructure and support for academic staff are yielding positive results, enhancing the global academic presence and reputation of Kazakhstan's HEIs.

3. Student Performance and Employment Outcomes. The final state certification results (table 8) and employment statistics (table 9) provide insights into student performance and post-graduation outcomes. The high number of graduates, including a significant proportion of women, reflects the accessibility and inclusivity of higher education in Kazakhstan. The increasing employment rate of graduates, coupled with rising average salaries, indicates that HEIs are effectively preparing students for the job market. However, the slight increase in average job search time in 2022 suggests ongoing challenges in aligning educational outcomes with market demands.

4. Innovation and Intellectual Property. The data on patent applications, trademarks, and industrial designs (figure 3) illustrate the innovative activities within Kazakhstan's HEIs. The consistent growth

in trademark registrations and the fluctuations in patent applications and industrial designs suggest a dynamic but variable innovation landscape. The increase in trademarks indicates a strong emphasis on brand protection and commercialization of research outputs, while the fluctuations in patent and design applications highlight the need for sustained support and strategic initiatives to stabilize and enhance innovative outputs.

Conclusion

In conclusion, the evaluation of human capital in Kazakhstan's higher education institutions (HEIs) between 2018 and 2022 demonstrates substantial progress, evidenced by improvements in educational quality, research output, and student outcomes. The linkage of these advancements to educational reforms is pivotal. Specifically, the observed increase in patents and publications can be directly associated with enhanced qualification requirements for scientific supervisors, refined competitive documentation of Grant Financing (GF), and updated rules for awarding academic degrees. These reforms have systematically incentivized increased activity in research and innovation.

To further harness and amplify these gains, the following strategic policies are recommended:

- Continued Educational Investment: Persistent and augmented funding in higher education, particularly focusing on research and development, to maintain and boost current advancements.
- Reform Implementation and Monitoring: Strengthening the implementation of educational reforms that align qualification requirements, grant financing, and degree conferral processes with international standards to foster a competitive academic environment.
- Promotion of Gender Equality: Establishing robust policies to address gender imbalances, particularly at senior academic levels, to ensure equal opportunities for all faculty members.
- Enhanced Support for Innovation: Augmenting support for intellectual property creation through facilitated patent filings and support for industrial design, thereby nurturing a culture of innovation.
- Alignment with Market Demands: Continuously updating curriculum and program offerings to reflect the evolving needs of the global and local job markets, emphasizing digital literacy and practical skills.

By adhering to these policies, Kazakhstan can ensure its HEIs not only sustain their current trajectory but also expand their influence and effectiveness globally. This strategic focus on enhancing human capital is crucial for positioning Kazakhstan as a leader in innovation and higher education in Central Asia and beyond.

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ҚАЗАҚСТАННЫҢ ЖОҒАРЫ ОҚУ ОРЫНДАРЫНДАҒЫ АДАМ КАПИТАЛЫН ДАМЫТУ: ҚАРЖЫЛЫҚ ИНВЕСТИЦИЯЛАР, ОҚЫТУШЫЛАРДЫҢ БІЛІКТІЛІГІ ЖӘНЕ ЗЕРТТЕУ НӘТИЖЕЛЕРІ (2018–2022)

Аңдатпа

Бұл зерттеу 2018–2022 жж. аралығындағы Қазақстанның жоғары оқу орындарындағы (ЖОО) адам капиталын дамытуға бағытталған, қаржылық инвестициялар, инфрақұрылымдық қолдау, оқытушылардың біліктілігі, зерттеу нәтижелері және студенттердің жетістіктеріне назар аударады. Ресми деректерді кеңінен пайдалана отырып, талдау жоғары білімге қаржылық қолдаудың айтарлықтай өскенін көрсетеді, шығындар, кірістер және білім беру инфрақұрылымына салынған инвестициялар айтарлықтай өсті. Деректер әртүрлі және біліктілігі жоғары оқытушылар құрамының бар екенін көрсетеді, алайда жоғары академиялық деңгейлерде гендерлік теңсіздік сақталуда. Зерттеу өнімділігі Scopus-та индекстелген жарияланымдармен өлшенеді, зерттеу өнімділігінің тұрақты өсуін көрсетеді. Студенттердің көрсеткіштері, оның ішінде бітіру деңгейі мен жұмысқа орналасу нәтижелері, түлектердің еңбек нарығына тиімді дайындалғанын көрсетеді, орташа жалақы мен жұмысқа орналасу деңгейі артып келеді. ЖОО-дағы инновациялық қызметтер, мысалы, патенттік өтінімдер мен сауда белгілерін тіркеу, динамикалық, бірақ айнымалы көріністі көрсетеді. Зерттеу жақсарту қажет негізгі салаларды анықтайды, соның ішінде инвестицияларды қолдау, академиялық ортада гендерлік теңдікті насихаттау саясаты және инновациялық қызметтерді қолдау қажеттілігі. Қорытындылар түлектердің жұмысқа орналасуын одан әрі арттыру үшін білім беру бағдарламаларын нарық қажеттіліктері-

мен үйлестірудің маңыздылығын көрсетеді. Бұл зерттеу саясаткерлер мен білім беру көшбасшыларына Қазақстандағы жоғары білімнің сапасы мен бәсекеге қабілеттілігін арттыру үшін құнды түсініктер береді, елдің әлеуметтік-экономикалық дамуына үлес қосады.

Тірек сөздер: адам капиталы, жоғары білім, қаржылық инвестициялар, біліктілік, оқытушылар құрамы, зерттеу нәтижелері, студенттердің жетістіктері.

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РАЗВИТИЕ ЧЕЛОВЕЧЕСКОГО КАПИТАЛА В ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ КАЗАХСТАНА: ФИНАНСОВЫЕ ИНВЕСТИЦИИ, КВАЛИФИКАЦИЯ ПРЕПОДАВАТЕЛЬСКОГО СОСТАВА И РЕЗУЛЬТАТЫ ИССЛЕДОВАНИЙ (2018–2022)

Аннотация

В данном исследовании рассматривается развитие человеческого капитала в высших учебных заведениях (вузах) Казахстана в период с 2018 по 2022 гг., с акцентом на финансовые инвестиции, инфраструктурную поддержку, квалификацию преподавательского состава, результаты исследований и достижения студентов. Используя обширные данные из официальных источников, авторы выявляют значительный рост финансовых вложений в высшее образование, с существенным увеличением расходов, доходов и инвестиций в образовательную инфраструктуру. Данные указывают на разнообразный и все более квалифицированный преподавательский состав, хотя гендерные дисбалансы сохраняются на старших академических уровнях. Исследовательская активность, измеряемая публикациями, индексированными в Scopus, демонстрирует устойчивый рост, отражающий повышение продуктивности исследований. Показатели успеваемости студентов, включая уровень выпуска и трудоустройства, подчеркивают эффективную подготовку выпускников к рынку труда с увеличением среднего уровня зарплат и уровня занятости. Инновационная деятельность в вузах, такая как подача патентных заявок и регистрация торговых марок, показывает динамичную, но переменную картину. Исследование выявляет ключевые области для улучшения, включая необходимость поддержания инвестиций, политики по продвижению гендерного равенства в академической среде и поддержку инновационной деятельности. Выводы подчеркивают важность согласования образовательных программ с потребностями рынка для дальнейшего повышения трудоустройства выпускников. Исследование предлагает ценные рекомендации для политиков и образовательных лидеров по повышению качества и конкурентоспособности высшего образования в Казахстане, способствуя социально-экономическому развитию страны.

Ключевые слова: человеческий капитал, высшее образование, финансовые инвестиции, квалификация, преподавательский состав, результаты исследований, достижения студентов.

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