



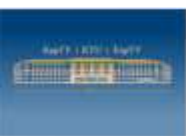
**KARAGANDA TECHNICAL UNIVERSITY  
NON-PROFIT JOINT STOCK COMPANY**

**APPROVED by the  
Decision of Board of Directors of  
Karaganda Technical University  
NPJSC  
(Decision No. 2 dated 24/02/2022)**

**STRATEGIC PLAN**  
**of Karaganda Technical University Development for  
2021-2025**

**Considered at the extended meeting of  
the Academic Council (Minutes No. 7  
dated 27/01/2020)  
(amended and revised on 17/08/2020,  
Minutes No. 13)**

**Karaganda 2020**



# TABLE OF CONTENTS

1	Introduction	3
2.	Prospects of KTU NPJSC development	7
3	Analysis of the current state and predicting the demand for personnel	8
3.1	Analysis of the state of KTU NPJSC activities	8
3.2	Estimation of the team innovation potential	19
3.3	Forecast of the tendencies of the labor market changes on the demand for personnel	25
4	Vision	38
5	Mission	38
6	Strategy of implementing the Development Plan	39
6.1	Place and role of the University in the system of higher and postgraduate education of Kazakhstan	39
6.2	Academic policy	41
6.3	Development of the innovation potential and its achievement	42
6.4	Commercialization of scientific-technical developments	44
7	Ways of achieving the goals of the Development Plan	46
8	Expected results	52
9	Implementation of the Strategic Plan of Development	55
9.1	STRATEGIC LINE 1: TRAINING PERSONNEL FOR THE FUTURE ECONOMY	55
9.2	STRATEGIC LINE 2: MAKING A STABLE RESEARCH ECOSYSTEM	59
9.3	STRATEGIC LINE 3: INTERNATIONALIZATION OF THE UNIVERSITY	61
9.4	STRATEGIC LINE 4: SOCIAL DEVELOPMENT	63
9.5	STRATEGIC LINE 5: INFRASTRUCTURE AND DIGITALIZATION	65
9.6	STRATEGIC LINE 6: EFFICIENT MANAGEMENT AND CORPORATE CULTURE	67
9.7	Strategic resources	69

# 1. INTRODUCTION

## PASSPORT of the Strategic Plan of Karaganda Technical University Development for 2021-2025

<b>Name</b>	Strategic Plan of Karaganda Technical University Development for 2021-2025
<b>Grounds for developing</b>	<ul style="list-style-type: none"><li>– Law of the Republic of Kazakhstan dated July 27, 2007 No. 319-III “On Education” (as amended and supplemented as of July 7, 2020);</li><li>– Law of the Republic of Kazakhstan dated February 18, 2011 No. 407-IV “On Science”;</li><li>– Law of the Republic of Kazakhstan dated December 27, 2019 No. 293-VI ZRK “On the status of a teacher”;</li><li>– Decree of the President of the Republic of Kazakhstan dated December 26, 2014 No. 986 “On the Anti-Corruption Strategy of the Republic of Kazakhstan for 2015-2025”;</li><li>– Decree of the President of the Republic of Kazakhstan dated February 15, 2018 No. 636 “On approval of the Strategic Development Plan of the Republic of Kazakhstan until 2025 and invalidation of some decrees of the President of the Republic of Kazakhstan”;</li><li>– Letter of the President of the Republic of Kazakhstan N.A. Nazarbayev to the people of Kazakhstan dated December 14, 2012 "Strategy "Kazakhstan - 2050": New political course of the established state";</li><li>– Letter of the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan dated September 2, 2019 "Constructive public dialogue is the basis of stability and prosperity of Kazakhstan";</li><li>– Letter of the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan dated September 1, 2020 "Kazakhstan in a new reality: time for action";</li><li>– Letter of the President of the Republic of Kazakhstan K.K. Tokayev to the people of Kazakhstan dated September 1, 2021 "The unity of the people and systemic reforms are a solid foundation for the country's prosperity";</li><li>– Decree of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827 “On Approval of the State Program “Digital Kazakhstan” (as amended and supplemented on July 29, 2019);</li><li>– Decree of the Government of the Republic of Kazakhstan dated November 13, 2018 No. 746 “On approval of the State Program for the Development of Productive Employment and Mass Entrepreneurship for 2017-2021 “Enbek”;</li></ul>

	<ul style="list-style-type: none"> <li>– Decree of the Government of the Republic of Kazakhstan dated December 31, 2019 No. 1050 “On Approval of the State Program for Industrial and Innovative Development of the Republic of Kazakhstan for 2020-2025”;</li> <li>– Decree of the Government of the Republic of Kazakhstan dated December 27, 2019 No. 988 “On approval of the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020–2025”;</li> <li>– Decree of the Government of the Republic of Kazakhstan dated December 31, 2019 No. 1050 “On Approval of the State Program for Industrial and Innovative Development of the Republic of Kazakhstan for 2020-2025”;</li> <li>– Article of the First President of the Republic of Kazakhstan N.A. Nazarbayev "Looking into the future: modernization of public consciousness" dated April 12, 2017; Article of the First President of the Republic of Kazakhstan N.A. Nazarbayev "Seven Facets of the Great Steppe" dated November 21, 2018;</li> <li>– Strategic Plan of the Ministry of Education and Science of the Republic of Kazakhstan for 2020-2024;</li> <li>– Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 19, 2021 No. 171 “On approval of the corporate governance code of a non-profit joint-stock company in the field of higher and postgraduate education”.</li> </ul>
<b>Developers</b>	<p>Doctor of Engineering, Professor Ibatov M.K.; Doctor of Engineering, Professor Zhetessova G.S.; Candidate of Technical Science, Associate Professor Kropachev P.A., Candidate of Pedagogical Science, Associate Professor Smirnova G.M.; Candidate of Pedagogical Science, Associate Professor Udartseva S.M.; Candidate of Pedagogical Science Jantassova D.D.; Candidate of Chemical Science Sultanova L.M., Candidate of Technical Science Toleuova A.R., PhD Amirov A.Zh., PhD Kurmasheva B.K., PhD Rakishev A.K., PhD Suleyev B.D., PhD Shormanbayeva D.G., Kozhukhova M.M., Kozhanov M.G. , Shebalina O.A.</p>
<b>Purpose</b>	<p>Development and promotion of the intellectual capital of Kazakhstan on the basis of interdisciplinary and cross-cultural collaborations for technological modernization and digitalization of the country.</p>
<b>Tasks</b>	<ol style="list-style-type: none"> <li>1. Ensuring a high level of training for the future economy, taking into account the development of digital technologies with competences that are in demand in various sectors of the economy, creative thinking and entrepreneurial skills.</li> <li>2. Ensuring the continuity and continuity of education aimed at creating equal conditions for quality education for all categories of students, in accordance with the needs of the economy and taking into account modern achievements in science and production.</li> <li>3. Forming at the University an effective holistic system for assessing the quality of education in the context of its further recognition at the global and national levels</li> <li>4. Developing continuously and systematically the scientific and pedagogical staff of the University in accordance with the structure of</li> </ol>

	<p>competencies required for an innovative economy</p> <p>5. Developing an intellectual potential of science, increasing the demand for scientific developments and the integration of scientific research into the world scientific space.</p> <p>6. Implementing a set of measures to develop a sense of patriotism, high moral and leadership qualities among students, involving them in strengthening the spiritual and moral values of the National Patriotic Idea "Mangilik El" and the culture of a healthy lifestyle.</p> <p>7. Ensuring an increase in the transparency and efficiency of the management and financing system of the University.</p> <p>8. Improving the material and technical base of the University, providing a safe and comfortable learning environment, modernizing and digitalizing the scientific and educational infrastructure, reducing the shortage of places in hostels.</p>
<b>Terms and stages of implementation</b>	2021-2025
<b>Sources of funding</b>	<ul style="list-style-type: none"> <li>• Republican budget;</li> <li>• funds of public-private partnership;</li> <li>• funds from organizations and enterprises according to agreements;</li> <li>• special funds allocated by international scientific, educational funds and organizations;</li> <li>• income from the results of the implementation of scientific clusters, the commercialization of innovative projects and the results of the activities of innovative enterprises, entrepreneurship, spin-out and</li> <li>• special funds allocated by international scientific, educational funds and organizations;</li> <li>• income from the results of the implementation of scientific clusters, the commercialization of innovative projects and the results of the activities of innovative enterprises, entrepreneurship, spin-out and start-up companies;</li> <li>• own funds of the University;</li> <li>• endowment fund;</li> <li>• charitable contributions from sponsors, voluntary donations from legal entities and individuals, patronage;</li> <li>• funds from other sources.</li> </ul>

Most developed and developing countries, as well as large companies, are currently betting on the development of human capital. The amount of investment in education is growing around the world. In the context of the knowledge economy formation, the requirements for specialists who are able to work in conditions of uncertainty and perform complex analytical tasks are changing. In the structure of employment in advanced countries, such specialists already now account for at least 25%.

Active scientific research and implementation of their results, such as the Internet of things, robotics, nanotechnologies and others, are changing world economies, and consequently labor markets, which form the demand for highly

qualified specialists.

Intense modernization processes in Kazakhstan require the formation and support of sustainable systemic relationships between socio-economic development programs, labor market needs for qualified personnel and the system of training specialists. In turn, technological renewal and digitalization of industries dictates the need for close cooperation with the educational and research sectors.

Global social megatrends reflected in the key requirements of the Strategic Plan of the Republic of Kazakhstan Development until 2025, the State Program for the Industrial and Innovative Development of the Republic of Kazakhstan for 2020-2025 and the State Program for the Development of Education and Science of the Republic of Kazakhstan for 2020-2025, necessitate higher and postgraduate education to be sensitive to changes taking place in the socio-economic sphere, be open to innovation and implement a flexible policy in the field of educational and research activities, based on the principles of sustainable development. It is under these conditions that the directed, continuous and systematic development of personnel becomes possible in accordance with the structure of competencies required for an innovative economy.

The development of the University requires forming a strategy in accordance with the priority areas for the development of education and science of the Republic of Kazakhstan based on the goals and KPI in the field of sustainable development, the risk management system, balancing the interests of stakeholders and their own innovative potential.

The Strategic Plan of KTU Development for 2021-2025 defines the educational, research and management activities of the University aimed at improving the quality of human capital and the competitiveness of personnel for the formation of a knowledge-intensive economy in Kazakhstan.

The priority areas of the KTU development are determined as a result of a multifactorial analysis of the external and internal environment of the university, taking into account regional characteristics, and provide for consistent and systematic improvement of university management processes, integration of sustainable development into key processes, including risk management, planning, human resource management, investment, reporting, operational activities, decision-making processes.

## 2. PROSPECTS OF KTU NPJSC DEVELOPMENT

Based on long-term goals and objectives of the Strategic Plan of KTU NPJSC Development, the prospects for the development of the University were determined within the framework of the relevant Strategic Lines:

Strategic Line	Prospects of development
1. Training personnel for the future economy	Ensuring the training of highly qualified specialists with demanded competences in accordance with international standards for a scientific and technological breakthrough in the region
2. Making a stable research ecosystem	Improving the quality of scientific developments for implementation of research results in the real sector of the economy and the expansion of international collaborations
3. Internationalization of the University	Implementation of sustainable and feasible strategies for internationalization of the educational process for the training of technical specialists, taking into account the national and international context
4. Social development	Sustainable development of spiritual and moral values and leadership qualities among young people in the conditions of the formed accessible educational environment.
5. Infrastructure and digitalization	Achieving a high level of: <ul style="list-style-type: none"> <li>- developing the infrastructure on the basis of constant strengthening and improvement of the material and technical base of the university;</li> <li>- digitalization of scientific and educational activities;</li> <li>- quality of educational, research and consulting services.</li> </ul>
6. Efficient management and corporate culture	An efficient system of managing the processes of the university, the development of human resources and the achievement of a high level of corporate culture.

### 3. ANALYSIS OF THE CURRENT STATE AND PREDICTING THE DEMAND FOR PERSONNEL

#### 3.1 Analysis of the state of KTU NPJSC activities

Currently, Karaganda Technical University trains specialists in 83 relevant educational programs, including 46 bachelor, 29 master and 8 PhD doctoral programs. In addition, 9 military specialties are implemented at the military department of the University.

Since September 1, 2019, taking into account the demand for the regional labor market, personnel are being trained in 7 newly developed innovative educational programs related to digital technologies in industry.

The contingent of students is 8890 people with the share of master and doctoral students of 6% (486 people) and 2% (107 people), respectively. For the period from 2018 to 2020, there has been a decrease in the number of students at all three levels of education (Table 1).

Table 1 – The contingent of KTU students according the levels of education

Level of education	Contingent of students by years, people		
	2018	2019	2020
Bachelor's program,	9980	10255	9733
<i>Including the part-time mode of training</i>	2877	2444	1614
Master's program	1394	1124	388
Doctoral studies	128	141	135
<b>Total</b>	<b>11402</b>	<b>11520</b>	<b>10256</b>

The main reason for decreasing the number of bachelor students is the closure of part-time education in the Republic of Kazakhstan in 2018, in the master's program it is decreasing the number of grants under the State Program for Industrial and Innovative Development of the Republic of Kazakhstan, as well as changing the format of admission to educational programs of master's and doctoral studies and the introduction of mandatory language with international certification.

Over the past 3 years, the University has trained more than 6,000 specialists for the region and the country. For example, the priority areas of the region economy, active work with enterprises within the framework of the innovative and educational consortium "Corporate University", provided employment for graduates of KTU in 2020, including more than 74% at the enterprises in Karaganda and the Karaganda region, taking into account continuing master's degree programs more than 89% (Figure1).



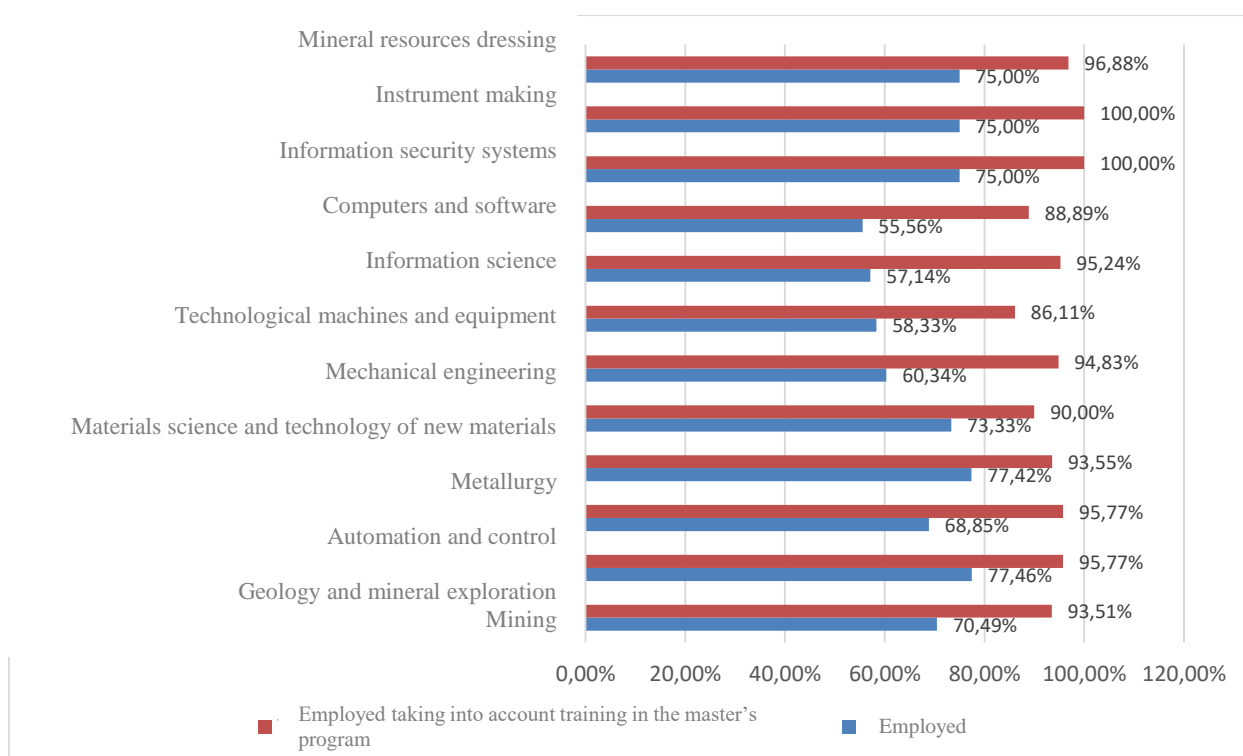


Figure 1 – Graduate employment in the priority areas of the region economy

Graduate employment statistics for this period indicates a high demand for the University graduates (see Table 2)

Table 2 - Analysis of the university graduates employment by years and levels of education

Indicators		2018		2019		2020	
		Winter	Summer	Winter	Summer	Winter	Summer
<b>Bachelor's program</b>							
<b>1</b>	<b>Number of graduates</b>		<b>1298</b>		<b>1714</b>		<b>1600</b>
	<i>On a budgetary basis</i>		707		828		797
	<i>On a commercial basis</i>		591		886		803
<b>2</b>	<b>Employed</b>		<b>1225</b>		<b>1398</b>		<b>1187</b>
			<b>94.4%</b>		<b>81.6%</b>		<b>74.2%</b>
	<i>On a budgetary basis</i>		621		622		661
			87.8%		75.1%		82.9%
	<i>On a budgetary basis</i>		243		507		526
	<i>Entered the master's program</i>		<b>361</b> (27.8%)		<b>269</b> (16.2%)		<b>246</b> (15.4%)
<b>Master's program</b>							
Indicators		2018		2019		2020	
		Winter	Summer	Winter	Summer	Winter	Summer
<b>1</b>	<b>Number of graduates</b>	<b>319</b>	<b>85</b>	<b>521</b>	<b>100</b>	<b>17</b>	<b>683</b>
	<i>On a budgetary basis</i>	315	54	509	79	2	671

	<i>On a commercial basis</i>	4	31	12	21	15	12
<b>2</b>	<b>Employed</b>	<b>293</b>	<b>72</b>	<b>490</b>	<b>93</b>	<b>17</b>	<b>599</b>
		<b>91.8%</b>	<b>84.7%</b>	<b>94.0%</b>	<b>93.0%</b>	<b>100.0%</b>	<b>87.7%</b>
	<i>On a budgetary basis</i>	289	46	478	72	2	599
		<b>91.7%</b>	<b>85.2%</b>	<b>93.9%</b>	<b>91.1%</b>	<b>100.0%</b>	<b>89.3%</b>
	<i>On a commercial basis</i>	4	26	12	21	15	0
<b>3</b>	<b>Not employed</b>	<b>26</b>	<b>13</b>	<b>31</b>	<b>7</b>	<b>0</b>	<b>84</b>
		<i>On a budgetary basis</i>	26	8	31	7	0
	<i>On a commercial basis</i>	0	5	0	0	0	0
<b>Doctoral studies</b>							
<b>Indicators</b>		<b>2018</b>		<b>2019</b>		<b>2020</b>	
		<i>Winter</i>	<i>Summer</i>	<i>Winter</i>	<i>Summer</i>	<i>Winter</i>	<i>Summer</i>
<b>1</b>	<b>Number of graduates</b>		<b>12</b>		<b>14</b>		<b>45</b>
		<i>On a budgetary basis</i>		12		13	
	<i>On a commercial basis</i>		0		1		4
<b>2</b>	<b>Employed</b>		<b>12</b>		<b>13</b>		<b>42</b>
			<b>100.0%</b>		<b>100.0%</b>		<b>93.3%</b>
	<i>On a budgetary basis</i>		12		13		38
			<b>100.0%</b>		<b>100.0%</b>		<b>92.6%</b>
	<i>On a commercial basis</i>		0		1		2

The Table shows decreasing the percentage of employment of bachelor graduates, which is associated with the following reasons:

- In connection with changing the employment procedure associated with increasing the term of employment up to two years (when the state of emergency or situations of a social, natural and man-made nature is declared, the University ensures the employment of its graduates in their specialties over the next two years).

- Students who graduated from the program "Mangilik el zhastary industry!" - "Serpis 2050", must be employed in the region of study, i.e. in the Karaganda region. Meanwhile, many graduates were employed in other regions of Kazakhstan, which is a violation of the requirements of the Law "On Education" and the Rules for sending young specialists to work, approved by the Decree of the Government of the Republic of Kazakhstan and is not reflected when uploading information about employment from the base of the Branch of JSC "State Corporation "Government for Citizens" in the Karaganda region. To form the conditions for working out graduates at the place of study, NPJSC KTU recommended that graduate students find vacancies at the enterprises and organizations from among Corporate University or register with the Employment Center of the Karaganda region.

- Karaganda region is an industrial region, where mainly enterprises of mining and metallurgical and mineral raw materials profile are located. The specifics of existing industries do not allow all graduates who have mastered educational programs in the specialties "Mangilik el zhastary industry!" to find a job! - Serpin 2050.

- It is worth noting that due to the current epidemiological situation, some enterprises in the region are currently reducing their staff and not recruiting specialists for vacant positions, which complicates the process of finding a job for graduates.

- At the same time, there is a trend of stable 100% employment of master's and doctoral graduates.

On the basis of the university, there is a leading educational and methodological association in 4 areas of training: "Engineering and Engineering"

- "Industrial and processing industries";
- "Standardization, certification and metrology (by industry)"
- "Hygiene and labor protection at work".

In the educational process there participate 645 teachers and 80 leading specialists of enterprises, including 270 candidates and doctors of sciences, PhDs.

The analysis of changes in the staff of the University in the three-year period is presented as part of an assessment of the innovative potential of the team.

Since 2008, on the basis of KTU, the innovative and educational consortium "Corporate University" has been operating, which includes 76 large industrial companies, including the Kazakhmys Corporation LLP, the ArcelorMittal Temirtau JSC, the Sokolov-Sarbay Mining and Processing Production Association JSC ", the Shubarkol Komir JSC and others. At the enterprises of the consortium, there are 60 training centers in the branches of the graduating departments equipped with unique technological and laboratory equipment, training grounds, simulators and professional software systems.

Research activities of Karaganda Technical University are focused on technological innovation and engineering in industry. Fundamental scientific areas in mining, metallurgy, mechanical engineering, structural mechanics, automation of production processes, etc., have been formed and are in demand by industry.

At the enterprises of the Coal Department of ArcelorMittal Temirtau JSC and Kazakhmys Corporation LLP, innovative technologies have been introduced for underground coal mining, controlling the state of mine workings, storing run-of-mine coal and special coke, improving the reliability of mining equipment, automatic control and regulation of ore dressing processes.

At the mining enterprises of SSMPP JSC, Kazmarganets JSC, Altynalmas JSC, Shubarkol Komir JSC, Zhairesky MPP JSC, the results of studies to ensure stability of slopes, ledges and pit walls have been implemented. In the field of metallurgy, new processes and casting machines, as well as innovative technologies have been developed and put into practice:

- powder metallurgy;
- obtaining new materials by modifying the surface;
- production and processing of wear-resistant materials of a new generation for the production of parts for metallurgical units;

- production of sand-resin molds at non-stationary pressure in order to improve the quality of finished products;
- production of refractory materials for the metallurgical industry with optimal porosity and increased thermal stability.

Innovative technologies have been developed and implemented for the metallurgical industry.

In the field of mechanical engineering, the development of the Kazakhstan system of automation of technological preparation of machine-building production is being carried out.

In the field of automation of production processes at the enterprises of Shubarkol Komir JSC, digital systems for remote monitoring of the operating modes of high-voltage substations and excavators have been created and implemented. Devices for protection against leakage currents developed by scientists of the University, were manufactured at a small enterprise (Elat LLP) in the amount of 650 pieces and introduced at almost all the enterprises of the Republic of Kazakhstan that carry out open-cast mining.

In the field of structural mechanics and engineering reliability of buildings and structures, scientists and specialists of the Research "Kazakhstan Multidisciplinary Institute of Reconstruction and Development" provided scientific and technical support for safe construction and reconstruction based on innovative technologies for monitoring and strengthening load-bearing structures of more than 2,000 industrial and civil facilities in Kazakhstan. Among them there are almost all the unique buildings of the capital of Kazakhstan: the city of Nur-Sultan, such as the Palace of Independence, Baiterek, the Kazakh Eli complex, Khan Shatyr and others. KazMIRD has developed 31 republican regulatory and technical documents based on Eurocodes, put into effect on January 1, 2018 in the territory of the Republic of Kazakhstan, which will expand the practice of international projects and the introduction of innovations in the domestic construction industry.

There are 5 Dissertation Boards at KTU for defending dissertations for awarding the PhD degree in specialties: "Mining", "Geology and exploration of mineral deposits", "Metallurgy", "Engineering", "Electric power", "Transport, transport equipment and technologies" , "Construction" and "Production of building materials, products and structures".

The University has scientific schools, 51 research groups. The share of the teaching staff involved in R&D is 65%, of students 29%, master and doctoral students 00%. More than 60% of students' theses and 100% of master graduation works are of a research nature and are executed by the orders from enterprises.

There is a positive trend of a significant increase in the total volume of R&D funding. In general, the University funding for R&D increased by 36% (from 690.5 million tenge in 2018, 923.5 million tenge in 2019, to 941.52 million tenge in 2020).

For a series of works on the topic: "Development of heat-resistant alloys and new generation technologies for manufacturing and processing parts based on them", a group of KTU scientists were awarded the Al-Farabi State Prize of the Republic of Kazakhstan for 2020.

In 2019, based on the results of implementing the project "Improving

corrosion resistance of metals through the use of halloysite nanotubes", a new production of the national product was organized with providing seven new jobs.

According to the results of scientific research, there is an increase in the publication activity of the teaching staff of the university (Table 3)

Table 3 – Publication activities of the teaching staff

No.	Databases	2018	2019	2020
1	RSCI	568	669	573
2	Scopus	87	124	132
3	Web of Science	65	95	94

The publication activities of the teaching staff was assessed using three main international databases: Scopus, Web of Science, RSCI. A sharp surge in publication activities was observed in 2019, so according to the RSCI database it was 17.7%, according to the Scopus database 42% and according to the Web of Science database 46%. In terms of 2020, there is a decrease in publications in the RSCI database and an increase in the Scopus database, and stability is observed in the Web of Science database.

The publication activity of the teaching staff of the University shows a positive trend, which is associated with involving in active research activities not only the teaching staff but also master and doctoral students.

Currently, there are more than 1,567 titles of protection on the balance sheet of KTU, including 106 patents received since 2006, the right holder of which is the University (Table4).

Table 4 – Dynamics of receiving titles of protection

No.	Name of the title of protection	2018	2019	2020
1.	Patent	31	56	79
2.	Certificate of state registration of rights to objects of copyright	152	215	276

In 2018, the University filed a total of 62 patent applications, and received 31 patents. 153 applications were submitted, 152 certificates of state registration of rights to objects of copyright were received. In 2019, there were received 56 patents and 215 certificates of state registration of rights to copyright objects. In 2020, there were received 79 patents and 276 certificates of state registration of rights to copyright objects, and 79 patent applications were filed.

The analysis shows that the number of applications filed for obtaining titles of protection has been increasing over the past three years. A sharp increase in applications for title of protection is mainly caused by simplification of the filing process itself. Since 2018, the acceptance of copyright applications has moved to an electronic format. If earlier the process of obtaining an Intellectual Property Certificate took up to one month on average, now with electronic submission of documents this period has been reduced to two days. The same trend is observed when applying for a patent starting in 2019.

The total area of buildings and structures of KTU is more than 96 thousand square meters. The campus of the University consists of 7 educational and

laboratory buildings, in which there are 185 laboratories, as well as a large sports complex, 3 comfortable hostels, the Youth Palace, the Polytechnic sports and recreation camp in the resort area of Karkaralinsk.

The educational, scientific and industrial base of the University includes:

- 5 Research Institutes (Research Institute "Kazakhstan Welding Institute", a member of the club "International Institute of Welding", Research Institute "Kazakhstan Multidisciplinary Institute for Reconstruction and Development", Research Institute "New Materials", Research Institute "Industrial Ecology", Research Institute "Patriotic Education"), 185 laboratories, 70 computer classes, 88 interactive classrooms:

- 6 Centers of working professions ("Mining", "Engineering", "Welding", "Construction", "Energy", "Telecommunications");

- 4 small enterprises (Elat LLP, Pnevmpodyem LLP, Alternativa LLP, Temir Men Mys LLP);

- 7 engineering competence centers equipped with equipment and software systems of transnational corporations TOTAL, FESTO, Schneider Electric, Mitsubishi Electric, Leica Geosystems, Epam Systems and FLUOR;

- IT Competence Center (6 laboratories of IT companies "WTO", "ABI", "Wooppay", "X-net", "Gexabyte", "ERP-company" and CISCO Networking Academy);

- 4 scientific and educational complexes ("Industry 4.0", "Digital Engineering", "Nanotechnologies in Metallurgy" and "Bioengineering");

- Business Skills Park (co-working center, offices of business incubators and other infrastructure for developing entrepreneurial skills and start-ups on an area of 300 m<sup>2</sup>).

The laboratory complex also includes an accredited Engineering Testing Laboratory "Complex Development of Mineral Resources" and 5 world-class educational and scientific laboratories.

The University digital campus includes:

- an Upgrade Center for monitoring, analysis and management of the processes of the university;

- an International Center for Materials Science;

- an automated information system "Univer";

- licensed software for educational processes and scientific research;

- a digital library;

- a Directum electronic document management system;

- a video surveillance system and pass on chip cards.

In the period of 2018-2020 the park of computer equipment and the technical and technological equipment of the classroom fund were radically modernized. So, within 3 years, the computer park and office equipment were updated by 90% with the installed Windows 10 and Microsoft Office. More than 3,000 modern workstations are installed in the KTU buildings.

All the workstations installed at the University use the MS Windows operating system, are connected to local area networks and have access to the Internet.

Server hardware was updated by 80%, which significantly reduced the

response time to KTU information systems. Hard drives for the server RAID arrays were upgraded and more than 20 uninterruptible power supplies were installed.

The computer network of the University includes a significant number of servers and network equipment. All the University buildings have wireless access points that cover 100% of the classrooms and the surrounding campus.

In 2018, a project of a wireless Internet network and video surveillance with an advanced face recognition system was implemented in all university buildings based on Cisco equipment. The following services are deployed on the basis of the corporate network:

- the Wi-Fi network of about 500 points in the buildings and dormitories of the university;
- television broadcasting of programs in the buildings and dormitories of the university;
- video surveillance in educational computer classes, libraries and hostels.

KTU has a corporate portal (<http://www.kstu.kz/>), which is intensely updated. In 2019, KTU won the National Internet Award for the first time and occupies a leading position in the international ranking of webometrics in the Republic of Kazakhstan. In 2020, KTU moved its website to the education domain zone.

In 2020, thanks to the computer technology used at the University for storing and processing data of the course of the educational process using remote technology, for interaction between participants in the educational process, including teachers, students during the global pandemic, the University was able to switch 100% as soon as possible to the distance technology learning format.

At KTU, using distance learning technologies, students can study using the available information systems: IS "Univer 2.0", MOODLE, ZOOM, Cisco Webex, CER certification system.

The University has developed, certified and introduced into the educational process 12686 electronic educational publications (EEP), 8483 of which have been developed by the teaching staff of the University (Table 5).

Table 5 – Electronic teaching resources

<b>ETR name</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Basic versions	1432	1635	-
Video lectures	118	113	164
Internet versions	88	76	244
Virtual laboratory and practical complexes	6	15	27
Multimedia presentations	198	281	285
Slide lectures	633	1326	1819
Web portfolio	-	-	2
MOOC	-	4	61
Complexes of video classes	2	3	27
Acquired EEP	983	1469	1751
CER	-	-	5897
<b>TOTAL</b>	<b>5478</b>	<b>6941</b>	<b>10277</b>

Since 2019, KTU has been managing electronic documents based on the DIRECTUM electronic document management and interaction management system.

Since 2006, KTU has been participating in the international scientific and educational network project on industrial automation and mechatronics "SYNERGY", implemented under the auspices of one of the world leaders in "Industry 4.0", the transnational corporation "FESTO" (Austria, Germany).

KTU cooperates with more than 100 universities of the world within the framework of cooperation agreements in the field of education and science.

In 2017, a cooperation agreement was signed between the University and the Moscow State Institute of International Relations, MGIMO (Moscow, Russia) for training top managers for the mining and metallurgical industry under the MBA and DBA programs within the framework of the interuniversity educational center.

On October 28, 2021, on the basis of KTU the Kazakhstan branch of the International Center of Competence in Mining and Engineering Education under the UNESCO auspices was organized to award the qualification "mining engineer" recognized by all the world companies (headquarters at St. Petersburg Mining University, St. Petersburg, Russia).

#### *Financial sustainability of the University*

The analysis of implementing the Strategic Plan of Karaganda Technical University Development for 2011-2020 showed that 100% fulfillment of all the indicators of the strategic development of the University laid down in the plan was achieved, including the accounting for the decrease in the number of students from 2018 to 2020. At the same time, it was found that the main reason for decreasing the contingent of bachelor students is the closure of part-time education in the Republic of Kazakhstan in 2018; introduction of the mandatory delivery of a foreign language with international certification. Despite decreasing the contingent of students from 11402 people in 2018 to 10856 people in 2020, which was 4.7%, there was provided financial sustainability of the University presented in the form of the corresponding indicators of Table 6.

Table 6

Basic indicators of financial-economic activities		Units	Values of the basic indicators of financial-economic activities, th. tg.		
			2018	2019	2020
Assets		Th. tenge	6 979 667,0	7 025 019,0	8 025 364,0
Liabilities	Total:	Th. tenge	6 979 667,0	7 025 019,0	8 025 364,0
	<i>Own capital</i>	<i>Th. tenge</i>	<i>5 351 425,0</i>	<i>5 449 537,0</i>	<i>6 681 726,0</i>
	<i>liabilities</i>	<i>Th. tenge</i>	<i>1 628 242,0</i>	<i>1 575 482,0</i>	<i>1 343 638,0</i>
Income		Th. tenge	Th. tenge	5 836 529,0	6 477 553,39
Expenses		Th. tenge	Th. tenge	5 725 495,0	5 719 894,87
Gross income (gross loss is indicated with the minus sign)		Th. tenge	Th. tenge	470 307,86	974 374,89
Profits (loss) before taxation (loss is indicated with the minus sign)		Th. tenge	85 713,0	111 034,0	757 658,52



Net profit (loss is indicated with the minus sign)		Th. tenge	75 506,0	111 034,0	757 658,52
Distribution of net profit that is left at the disposal of organization		Th. tenge	75 506,0	97 029,0	757 658,52
	<i>For development</i>	<i>Th. tenge</i>	75 506,0	97 029,0	757 658,52
Profitability	assets	%	1.08	1.58	9,44
	own capital	%	1.41	2.04	11,34
	income	%	1.48	1.9	11,7
Leverage			0.3	0.29	0.2
Leverage effect		%	0.13	0.35	1.9
EBITDA (Earnings before interest, taxes, depreciation and amortization)		Th. tenge	771 352,0	893 299,41	1 603 658,86

In accordance with the Order of the Ministry of Finance of the Republic of Kazakhstan No. 372 dated April 9, 2020 “On approval of the Rules for calculating coefficients and determining the boundaries of financial stability classes” for legal entities, as well as joint-stock companies whose shares are not placed on the securities market, the financial stability of an organization (Z) is established based on the total value of the main indicators of its financial sustainability:

$$Z=0,717*K1+0,847*K2+3,107*K3+0,42*K4+0,998*K5,$$

where K1 is the return on assets;  
K2 is the leverage;  
K3 is the leverage effectiveness;  
K4 is the return on equity;  
K5 is the return on income (sales).

Based on the calculations, the value of the financial stability of the University Z increases from 3.5 in 2018 to 29.28 in 2020, which makes it possible to attribute the University to the I class of financially stable joint-stock companies ( $Z \geq 2.9$  and above) and confirms stable financial stability of KTU (Figure 2).

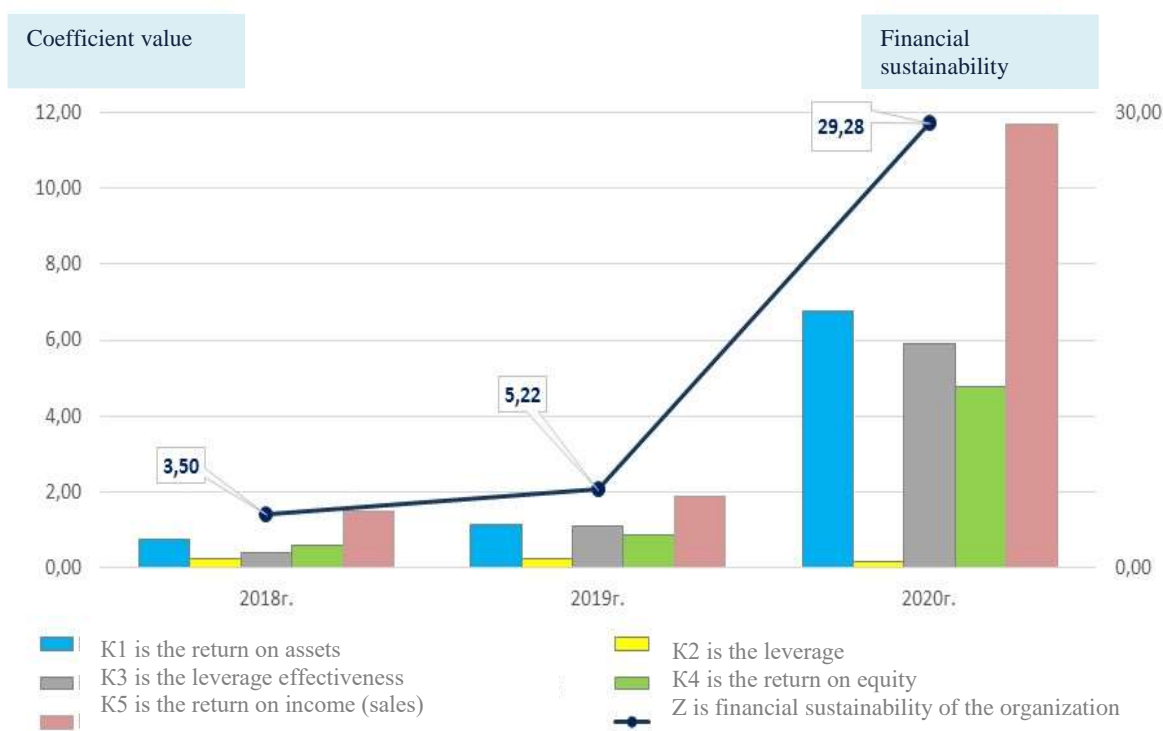


Figure 2 – KTU financial sustainability

### 3.2 Estimation of the team innovation potential

The innovation potential of the staff of Karaganda Technical University is a combination of the abilities and capabilities of employees to implement the sustainable development of the University. As part of the analysis of the innovation potential of the KTU team, an assessment of innovative readiness for work is required, including intellectual development, professional competence and the ability for professional self-development; in addition, motivational qualities and an innovative attitude to work are important, including an orientation towards high standards of labor quality, a creative attitude to work, and susceptibility to innovations.

Based on the above, the analysis was carried out over the three-year period in the following areas:

- the degree of teaching staff;
- the completion of advanced training courses, trainings of the teaching staff of the university on the development of professional competence, motivational qualities and innovative attitude to work;
- the potential of young scientists;
- the potential of research activities;
- the publication activities.

Within the period of 2018-2020, the University has seen a slight increase in the degree rate due to an increasing PhDs, as well as decreasing the number of full-time teachers as a result of decreasing the staffing. So, in 2018, the degree rate was 41%, in 2019 42%, in 2020 43%. The number of doctors and candidates of sciences is gradually decreasing for a number of reasons. Most doctors and

candidates of sciences are people of retirement age who due to age, health status stop working at their own request or due to circumstances beyond the control of the parties, as well as in connection with changing the place of work or place of residence. At the same time, successful defenses of doctoral students with the award of the degree of Doctor of Philosophy lead to increasing the degree rate of the University and a natural replacement of doctors and candidates of sciences with Doctors of Philosophy (PhD) (Figure 3).

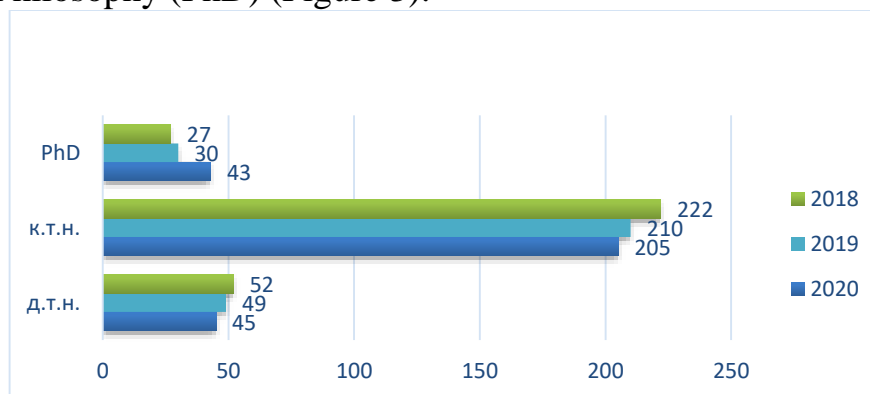


Figure 3 – Dynamics of the academic degree holders rate

The professional development of the teaching staff of the University is aimed at developing professionally important qualities of a teacher, developing flexible skills, creative thinking and developing entrepreneurial competence.

In 2018, there completed advanced training courses 691 teachers in the following areas:

1. In order to modernize the content of higher and postgraduate education in the context of global trends, on the basis of cooperation with strategic partners, a "Training seminar on the design of competence-oriented educational programs in cooperation with employers" was held (18 hours) from 05/02/2018 to 23/02/2018, (66 people)

2. In order to develop integrated entrepreneurial culture, the teaching staff of the university conducted advanced training courses on the topic "Modern management technologies in education and entrepreneurial activity" (Time management in the management of educational systems; developing startups in the higher education system as a success factor for entrepreneurship in the technological field) in volume 36 hours from 02/04/2018 to 21/04/2018 (99 people).

3. In order to improve the efficiency of corporate governance and improve the skills of heads of structural divisions and teachers in the field of implementing the principles of collective responsibility, advanced training courses were held on the following topics:

- "Planning the strategic development of the university" (Defining the mission of the educational institution; Analysis and evaluation of the external and internal environment (SWOT-analysis); Strategic goal-setting; Formation of a strategic plan) in the amount of 36 hours from 05/02/2018 to 05/18/2018 (140 people).

- "Implementation of the principles of collective responsibility in the university" (Effectiveness of corporate governance; Teambuilding as a way of forming collective responsibility; Effective mechanisms for making collective

decisions; Principles and rules for the development and implementation of managerial innovations) in the amount of 36 hours from November 13, 2018 to November 30, 2018 (136 people).

4. In order to implement the Comprehensive University Development Program, increase the level of theoretical knowledge, improve practical skills and abilities in connection with the ever-increasing requirements for the qualifications of teaching staff and employees, 98 people completed advanced training and internships at the enterprises of the Corporate University, as well as in various organizations, at the universities of the Republic of Kazakhstan 124 people, abroad 28 people.

In 2019, there completed advanced training courses 301 teachers:

1. In order to improve the efficiency of managing the pedagogical process through the formation of culture of pedagogical communication, advanced training courses "Technologies of emotional leadership. Management through Influence" in the amount of 36 hours for the faculty and staff of the university from 10/07/2019 to 10/18/2019, (51 people).

2. In order to implement the Comprehensive University Development Program, increase the level of theoretical knowledge, improve practical skills and abilities in connection with the ever-increasing requirements for the qualifications of teaching staff and employees, 105 people completed advanced training and internships at the enterprises of the Corporate University, as well as at various organizations, at the universities of the Republic of Kazakhstan 114 people, abroad 31 people.

In 2020, advanced training courses were completed by 857 teachers.

1. In order to implement the Roadmap for the staged transfer of theoretical education, practices, ongoing monitoring of progress, intermediate and final certification of students into a remote format using ICT, advanced training courses in the amount of 36 hours were held for the faculty of the University from 06/08/2020 till 20/06/2020 in the following areas:

- "Effective use of DOT based on the use of Moodle tools" (158 people);
- "The use of distance technologies in teaching languages" (28 people);
- "New platforms and formats for DOT. Developing virtual laboratory works" (73 people);
- "Virtual group training using Skype-technologies. Experience in using the Cisco Webex platform in educational activities" (111 people);
- "Google best practices in distance learning technologies. Possibilities of using streaming when conducting classroom activities using the Youtube service" (206 people).

2. In order to improve the professional development of the teaching staff and the University staff from among the youth personnel reserve in the field of modern management technologies in education, advanced training courses "Development of the managerial potential of HiPo-employees" were held in the amount of 36 hours from 11/09/2020 to 11/21/2020 based on the ZOOM platform (35 people).

3. In order to implement the Comprehensive University Development Program, to increase the level of theoretical knowledge, to improve practical skills and abilities during the pandemic, 75 people completed online advanced training

courses and internships in various organizations and enterprises, at the universities of the Republic of Kazakhstan 181 people, abroad 18 people.

The dynamics of the number of teaching staff who have completed advanced training courses in the context of three years is shown in Figure 4.

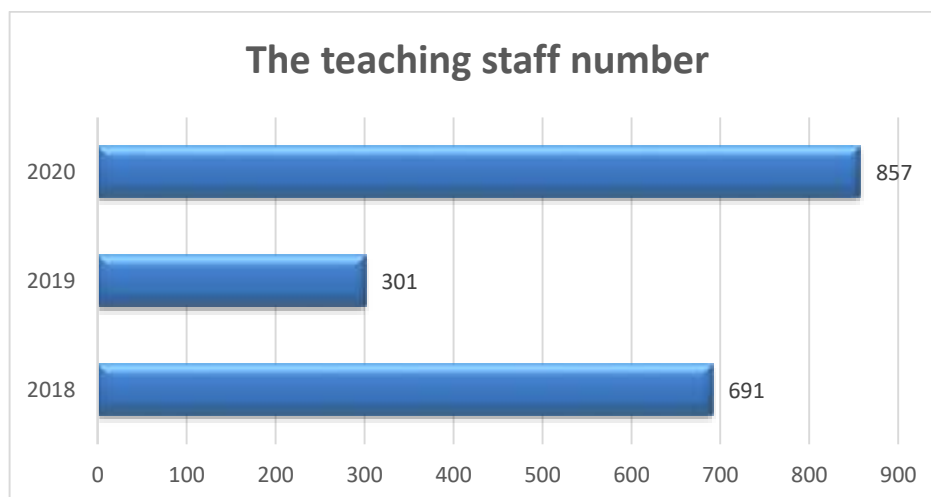


Figure 4 – Dynamics of the teaching staff number in terms of professional development within the Comprehensive University Development Program

Particular attention at the University is paid to strengthening the potential of the team through the development of the Institute of Young Scientists. KTU provides training in 8 educational doctoral programs, which, in addition to mastering educational loans and passing various types of practices, attend lectures by leading professors from near and far abroad, perform research work with a mandatory scientific internship. In the period from 2018 to 2020, 38 works were defended for the degree of Doctor of Philosophy (PhD). The information of the activities of young scientists is presented in Figure 5.

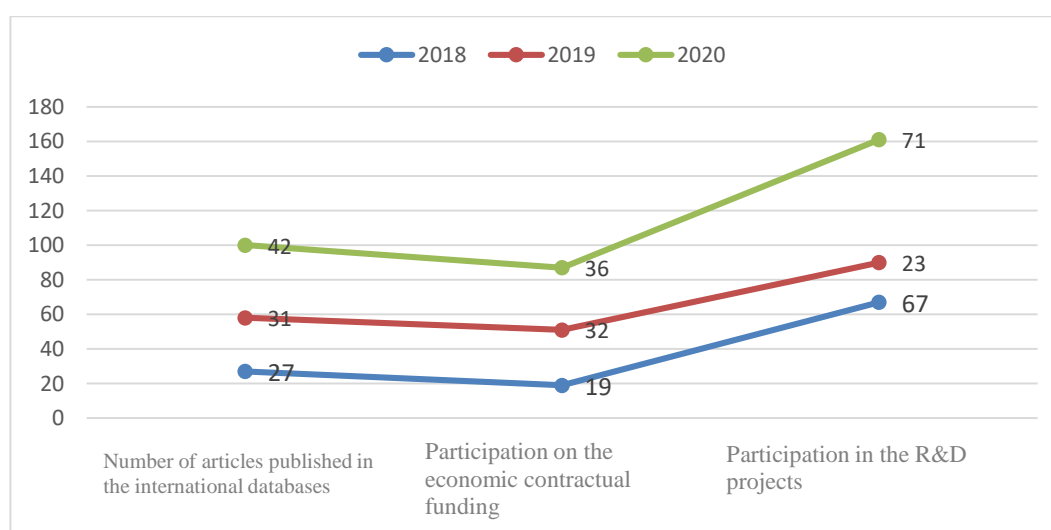


Figure 5 – Young scientists' activities

In 2019 the growing participation of young scientists in economic

contractual projects amounted to 68% compared to 2018 and 89% in 2020.

In terms of the “Participation in state budget research projects” indicator, there was a decrease in activity in 2019 due to the fact that in 2018, the Ministry of Education and Science of the Republic of Kazakhstan, did not announce a competition for young scientists. In 2020, the indicator increased, showing the activity of young scientists, according to the results of the announced competition for grant funding of young scientists for scientific and (or) scientific and technical projects for 2020-2022. The potential of young scientists of the University is high and shows steady growth.

In recent years international scientific cooperation at the University has mainly been carried out at the level of cooperation with foreign scientists to carry out joint projects (Table 7).

**Table 7 – Participation of foreign scientists in KTU programs and projects**

<b>No.</b>	<b>Name, position, organization, country</b>	<b>Name of the scientific project. Name of the project manager from KTU</b>
1.	Marina Sidorová, PhD, professor of the Technical University of Kosice, Slovakia	Development, manufacture and testing of a new design of the rotary assembly of the conveyor with the rotation of the cargo flow at an angle of up to 90 degrees in the plane of the working soil for downhole excavation systems and curved workings, project manager Doctor of Engineering, Prof. Beisembayev K.M.
2.	Juraj Janočko, PhD, professor of the Technical University of Kosice, Slovakia	
3.	Azotte A., Deputy Director of the Institute of mechanics and Microstructure, PhD, Professor of the University of Lorraine, France	Development and implementation of technology for manufacturing refractory materials for the metallurgical industry with optimal porosity and increased heat resistance, project manager Doctor of Engineering, Prof. Issagulov A.Z.
		Improving the technology of manufacturing precision castings from complex alloy steels with a homogenized structure and improved properties using raw materials of Kazakhstan content, project manager PhD, Prof. Kvon S.S.
4.	Michot J., PhD, Professor of the University of Lorraine, France	Improving the technology of manufacturing precision castings from complex alloy steels with a homogenized structure and improved properties using raw materials of Kazakhstani content, project manager PhD, Prof. Kvon S.S.
		Development and implementation of technologies for the production and processing of wear-resistant materials of a new generation for the production of parts for metallurgical units, project manager Doctor of Engineering, Prof. Issagulov A.Z.
5.	Olegas Černašėjus, PhD, Professor of Vilnius Technical University n.a. Gedeminas, Vilnius, Lithuania	Development of a resource-saving technology for the repair of long rods of hydraulic cylinders of large-sized special equipment for industrial use with the possibility of restoring local damage at the place of its operation, project manager Dr. Eng., Prof. Zhetessova G.S.
6.	Jelena Škamat., Dr. Eng., sn.reseracher of the Laboratory	Development of a resource-saving technology for the repair of long rods of hydraulic cylinders of

	of Composite materials, Associate Professor of the mechanics and Engineering of materials department of Vilnius Technical University n.a. Gedeminas, Vilnius, Lithuania	large-sized special equipment for industrial use with the possibility of restoring local damage at the place of its operation, project manager Doctor of Engineering, Prof. Zhetessova G.S.
7.	Lyapunova M.V. Chemist of the Organic synthesis laboratory of Tomsk State University, Tomsk, Russia	Development of methods for the isolation of natural triterpenoids from plants and their chemical transformation in order to search for new biologically active substances, project manager PhD, head of the C&CT department Takibayeva A.T.
8.	Mitussov A.A. Sr. Eng., Prof. Of the Engineering networks, heat power engineering and hydraulics department of Altai State Technical University n.a I.I.Polzunov, Barnaul, Russia	Developing and studying the hydraulic impact mechanism for the production of mining and construction works, project manager PhD, Prof. of the ES department Kyzzyrov K.B.
9.	Kovalev P.V. Cand. Tech. Sci., Ass. Professor of Peter the Great Saint-Petersburg Polytechnic University, Russia	Development and implementation of producing sand-resin molds at non-stationary pressure in order to improve the quality of the finished product, project manager Doctor of Engineering, Prof. of the TT&LSS department Ibatov M.K.
		Development and implementation of technology for manufacturing refractory materials for the metallurgical industry with optimal porosity and increased heat resistance, project manager Doctor of Engineering, Prof. of the TT&LSS department Ibatov M.K.
		Development and implementation of technologies for producing and processing wear-resistant materials of a new generation for the production of parts for metallurgical units, project manager Doctor of Engineering, Prof. of the TT&LSS department Ibatov M.K.
10.	Melnikov A.G. Cand. Tech. Sci., Ass. Professor of national Tomsk Polytechnic University, Tomsk, Russia	Development and implementation of technology for the manufacture of refractory materials for the metallurgical industry with optimal porosity and increased heat resistance, project manager Doctor of Engineering, Prof. of the TT&LSS department Ibatov M.K..

Based on the assessment of the innovative potential of the team, there is also observed sustainable development of the University aimed at improving the quality of education and caused by the high intellectual potential and professionalism of the team, readiness to increase the intensity of work; the presence of professionals in the team; intensity of communications; readiness for mutual learning; leadership; positive experience in research and project activities; information culture of the team.

### **3.3 Forecast of the tendencies of the labor market changes on the demand for personnel**

In recent years, the economy of Kazakhstan has shown stable growth. In 2018, the GDP growth amounted to 4.1%, maintaining the momentum gained in 2017. Almost all the segments of the economy showed a positive trend due to the high investment and consumer demand, as well as industrial activity in the basic sectors of the economy.

In the real sector of the economy, there is observed a synchronous growth in the mining and manufacturing industries. In general, the volume of industrial production increased by 4.4%. The growth of industry was significantly affected by increasing the extraction of iron ore, natural gas and oil, an increase in the production of machine building, petroleum products and the chemical industry. In the mining and quarrying industry, production increased by 4.6%, in the manufacturing industry by 4.5%.

In the structure of the gross regional product of the Karaganda region, industry dominates: 48.4%. The share of the manufacturing industry in the total GRP of the region is 31.4%, mining 13.1%, electricity, gas, steam and air conditioning 3.2%, water supply; sewerage system, control over the collection and distribution of waste 0.7%.

The industrial base of the region is formed by more than 200 enterprises and industries of mining, manufacturing, electricity and water supply.

One of the main priorities of the economy of the Republic of Kazakhstan is the development of new jobs. In 2018, there were developed 318.2 thousand jobs. The number of employees increased by 126.5 thousand people and amounted to 6.6 million people. This helped keeping the unemployment rate low at 4.9%. In 2018 the average monthly nominal wage increased by 8.4% to 162.3 thousand tenge. Real monetary incomes of the population increased by 5.3%. In 2019, economic activity also showed a progressive growth trend. In general, in 2020, in the republic, the need for personnel amounted to 148,526 people, of which 79,804 people (54%) have secondary specialized education, 20,732 people (14%) have higher education, 47 people have professions that do not require special education: 990 people (32%).

According to the data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, priority sectors were identified with the greatest need for personnel in the context of specialties/ educational programs of Karaganda Technical University (Table 8).

It has been established that the largest number of vacancies has developed in the following industries:

- in the manufacturing industry - 12,457;
- in mining and quarrying - 5,345;
- in supplying electricity, gas, steam, hot water and conditioned air – 6,161;
- - in civil engineering - 5,132.



Table 8 – The number of vacant jobs and the expected need for workers by type of economic activity

Total for the Republic of Kazakhstan			Akmola region		Aktobe region		Almaty region		Atyrau region		West Kazakhstan region		Zhambyl region		Karaganda region		Kostanay region		Kyzylorda region		Mangystau region		Pavlodar region		North Kazakhstan region		Turkistan region		East Kazakhstan region	
Priority industries of EP	Number of vacant jobs (1)	Expected need for employees (2)	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
			Mining industry and quarrying	1 982	786	148	-	212	-	x	-	57	501	-	-	25	-	127	56	853	-	113	140	54	1	x	-	-	-	113
Manufacturing industry	5 304	2 313	461	346	135	-	313	114	117	-	155	54	13	11	520	205	536	x	17	x	72	-	841	14	277	145	17	12	434	31
Supply of electricity, gas, steam, hot water and air-conditioned	3 015	295	466	-	105	-	45	1	241	94	224	-	-	-	344	-	289	-	12	-	51	-	215	-	232	-	90	-	425	17
Civil engineering	2 129	930	x	-	63	-	109	-	1 070	345	199	x	12	12	94	41	x	-	-	x	-	x	x	13	-	-	62	x	53	x
Passenger rail transport, intercity	582	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	-	-	-	-	-	-	-	-	-	-	-
Railway freight transport	697	x	28	-	144	-	x	-	24	-	x	-	1	-	10	-	1	-	4	-	-	-	183	-	-	-	-	-	153	-
Other passenger land transport	1 416	156	-	-	53	-	-	-	x	x	x	-	-	-	212	80	-	-	-	-	-	-	130	-	-	-	-	-	-	-
Freight transportation by road and transportation services	220	64	-	-	-	-	-	-	x	-	-	-	-	-	x	59	-	-	-	-	x	-	-	-	-	-	48	-	x	x
Communication	582	231	-	-	17	-	-	-	x	x	29	-	4	-	52	-	56	-	66	-	x	-	42	-	10	-	x	-	95	-
Computer programming, consulting and other related services	260	190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-
Activities in the field of architecture, engineering surveys, technical tests and analysis	257	51	-	-	-	-	-	-	18	-	x	x	x	-	30	x	x	-	-	-	-	-	-	-	-	-	-	-	x	-
<b>Total</b>	<b>20 324</b>	<b>5 668</b>	<b>1 131</b>	<b>346</b>	<b>960</b>	<b>0</b>	<b>469</b>	<b>120</b>	<b>1 732</b>	<b>961</b>	<b>731</b>	<b>54</b>	<b>56</b>	<b>23</b>	<b>1 631</b>	<b>580</b>	<b>1 792</b>	<b>0</b>	<b>326</b>	<b>140</b>	<b>177</b>	<b>1</b>	<b>1 724</b>	<b>27</b>	<b>519</b>	<b>145</b>	<b>378</b>	<b>80</b>	<b>1 429</b>	<b>68</b>

Based on the analysis of vacancies in the Republic of Kazakhstan, it is possible to determine the future need for personnel with higher and postgraduate education in the context of specialties / educational programs of KTU through vacancies of specialists in the Karaganda region (Table 9).

Table 9 – Number of vacancies in specialists with higher education in Karaganda and the Karaganda region by year, people.

Name of vacant jobs	The number of vacant jobs at the beginning of the three-year period		
	2018	2019	2020
Industrial		981	1229
Mining industry and quarrying		137	204
Mining technicians, metallurgists and specialists-technicians of related occupations	21		
Mining engineers, metallurgists and related professionals	40		
Oil and gas engineers	74		
Oil and gas technicians	9		
Technicians in industry and production	42		
Manufacturing industry		399	562
Power supply, gas supply, steam and air conditioning		290	360
Water supply; sewerage system, control over waste collection and distribution		155	
Civil engineering		36	75
Civil engineers	110		
Construction technicians	15		
Transportation and warehousing		515	501
Land transport and pipeline transportation		-	328
Passenger rail transport, intercity		164	-
Railway freight transport		60	83
Other passenger land transport		247	238
Warehousing and auxiliary transport activities		-	34
Warehousing and storage of cargo			-
Auxiliary activities during transportation			34
Freight transportation by road and transportation services		-	-
Information and communication		13	
Communication		13	20
Telecommunications and broadcasting engineers	111		
Computer programming, consulting and other related services			-
Activities of information services			-
Specialists-information technology professionals (IT)	354		
Software and application developers and analysts	243		
Database and networking professionals	111		
Specialists-technicians in the field of science and technology	687		
Real estate transactions		8	
Real estate transactions		8	
Purchase and sale of real estate		-	
Professional, scientific and technical activities		110	
Activities in the field of law and accounting		-	-
Activities in the field of architecture, engineering surveys, technical tests and analysis		16	35

Architects, planners, surveyors and designers	187		
Architects of buildings and structures	36		
Urban planners and other designers	76		
Graphic and multimedia designers	6		
Administrative and support services activities			615
Advertising activities and market research		-	
Specialists-professionals in the field of science and technology	1733		
Meteorologists	59		
Chemists	-		
Geology, geophysics and other specialists-professionals in the field of natural sciences	70		
Biologists, botanists, zoologists, pharmacologists and specialists-professionals of related occupations	15		
Specialists-professionals in the field of environmental protection	26		
Specialists are professionals in the field of technology, excluding electrical engineers	888		
Environmental Engineers	12		
Mechanical engineers	196		
Chemical engineers	20		
Specialists-professionals in the field of technology, excluding electrical engineers, NES	135		
Electrical engineers	296		
Electrical engineers	137		
Electronics engineers	48		
Geodesists, cartographers and specialists-professionals of related occupations	66		
Engineering and teaching staff of colleges and other organizations of technical and vocational education (2)	16		
Assistant engineers	111		
Technicians in the field of physical and technical sciences (1)	244		
Technicians in the field of physical and technical sciences (2)	129		
Technicians in the field of chemical and physical sciences	6		
Environmental protection technicians	11		
Mechanical technicians	138		
Chemical production techniques	2		
Electrical technicians	84		
<b>TOTAL:</b>	<b>6564</b>	<b>3152</b>	<b>4318</b>

According to the simulation results, the expected total need for personnel in the Karaganda region for the period from 2020 to 2025 will amount to 93,801 specialists, taking into account extrapolation to enterprises and organizations of the district/ city administration as a whole, based on the total number of operating enterprises in the district / city administration, as well as the average republican share of economic entities that, according to the results of the survey The National Chamber of Entrepreneurs of the Republic of Kazakhstan expressed the need for personnel (45%).

Depending on the districts/city administrations, these indicators vary. In the context of administrative-territorial objects, the greatest aggregate demand is noted in Karaganda (29.9 thousand people), Zhezkazgan (13.8 thousand people) and Ulytau

district (6.8 thousand people), and the smallest – in the cities of Karazhal (1.3 people), Priozersk (769 people) and Osakarovsky (1.3 thousand people) district.

Karaganda region is one of the leaders in the expected number of vacancies in the forecast period up to 01.01.2026<sup>1</sup>, in particular by industry (Figure 6).

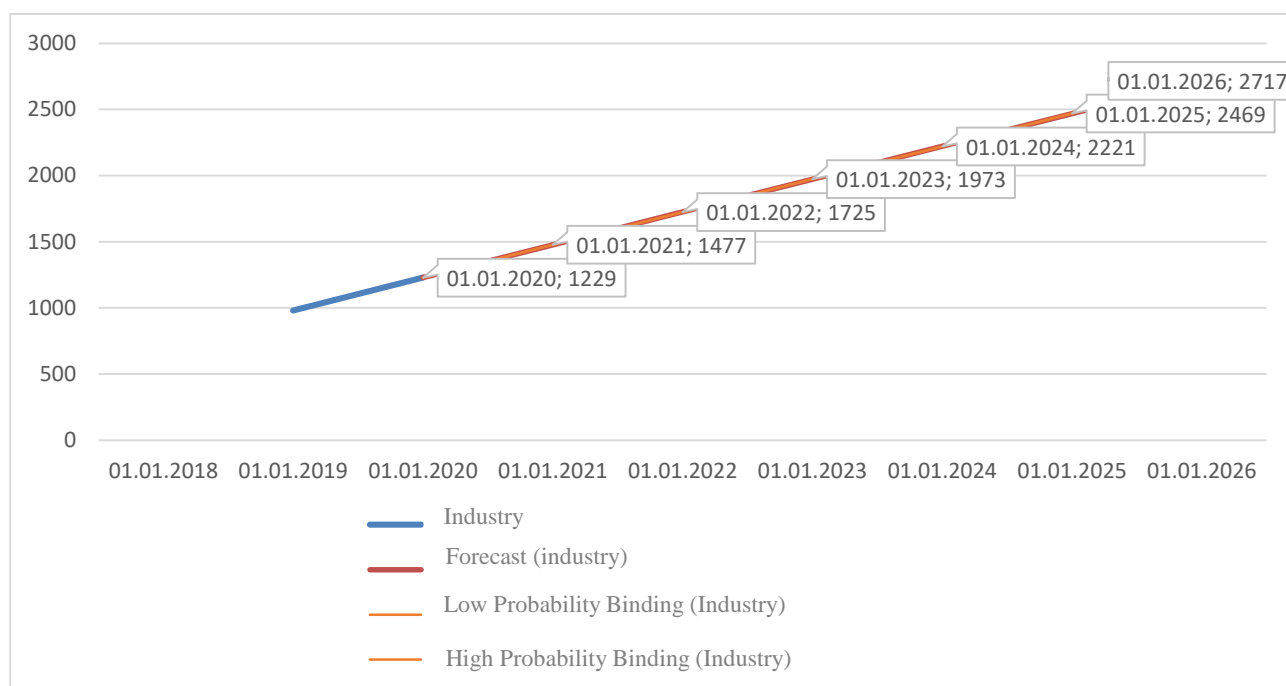


Figure 6 – Forecast of the need for personnel in the industries of the Karaganda region

Based on the analysis of vacancies in various industries and according to the data of JSC Center for Human Resources Development of the Ministry of Labor and Social Protection of the Population of the Republic of Kazakhstan, industries with an increased shortage of personnel, including higher and postgraduate education, in the Karaganda region by 2025 remain:

- manufacturing industry – 31% (the share of GDP in the structure of the economy of Kazakhstan);
- mining industry – 13%;
- trade – 13%;
- other industries – 43%.

Based on the above, it can be argued that the educational programs of the Karaganda Technical University are in demand not only in the region, but also in the republic as a whole. This analysis served as the basis for determining the target indicators of the Strategic Development Plan of the NPJSC "Karaganda Technical University" for 2021-2025.

Analysis of the state of the university's activities, assessment of the innovative potential of the team, trends in the development of the labor market and the projected need for personnel, as well as priority areas outlined in the Strategic Development Plan of the Ministry of Education and Science of the Republic of Kazakhstan for 2020-2024, identified the main categories of SWOT analysis of the activities of KTU

<sup>1</sup> Center for HRD: annual report on the labor market

to identify key internal and external factors:

1. Ensuring high-quality training of competitive personnel.
2. Modernization of the content of higher and postgraduate education in the context of global trends.
3. Improvement of management and monitoring of the development of higher and postgraduate education.
4. Digitalization and infrastructure development of higher education institutions.
5. Development of the intellectual potential of science.
6. Modernization of scientific infrastructure and science digitalization.

	<b>Strengths</b>	<b>Weaknesses</b>
<b>Internal environment</b>	<p><i>1. Ensuring high-quality training of competitive personnel</i></p> <ul style="list-style-type: none"> <li>– high places in national and international rankings;</li> <li>– successful completion of specialized accreditation and post-accreditation monitoring of educational programs of higher and postgraduate education;</li> <li>– implementation of end-to-end educational programs "college-university" and applied bachelor's degree;</li> <li>– development of a Corporate University as the implementation of a social partnership mechanism;</li> <li>– adaptation of educational programs taking into account the needs of students for students with disabilities;</li> <li>– high level of employment of graduates;</li> <li>– orientation of academic policy to the needs of students;</li> <li>– implementation of academic mobility programs, including the positive dynamics of the level of outgoing mobility among students;</li> <li>– providing support for the educational process with electronic training courses posted on the KTU portal;</li> <li>– the current system of encouraging talented youth through financial incentives;</li> <li>– sustainable system of educational work.</li> </ul>	<p><i>1. Ensuring high-quality training of competitive personnel</i></p> <ul style="list-style-type: none"> <li>– a decrease in the quality of teaching staff, lack of personal motivation for self-development and the introduction of new technologies in teaching;</li> <li>– the level of English proficiency of teaching staff and students is not high enough;</li> <li>– low level of proficiency in teaching methods of technical disciplines in English among teaching staff;</li> <li>– low level of external incoming mobility;</li> <li>– insufficient level of funding for academic mobility programs of teaching staff and students at the expense of the university;</li> <li>– low level of language training of applicants;</li> <li>– insufficient number of operating virtual laboratories.</li> </ul>
	<p><i>2. Modernization of the content of higher and postgraduate education in the context of global trends</i></p> <ul style="list-style-type: none"> <li>– expanding the list of new and innovative educational programs <sup>2</sup>;</li> </ul>	<p><i>2. Modernization of the content of higher and postgraduate education in the context of global trends</i></p> <ul style="list-style-type: none"> <li>– low level of participation in international educational exhibitions and</li> </ul>

<sup>2</sup> In 2021, 4 new and 7 innovative educational programs were developed and included in the Register of Educational Programs

	<ul style="list-style-type: none"> <li>– updating of educational programs in accordance with the requirements of the new economy;</li> <li>– the presence of disciplines in the curricula focused on the development of entrepreneurial skills;</li> <li>– operating centers of international level;</li> <li>– involvement of representatives of large international companies in the educational process;</li> <li>– orientation of educational programs to Industry 4.0;</li> <li>– functioning of the IT Competence Center.</li> </ul>	<p>projects;</p> <ul style="list-style-type: none"> <li>– the formal attitude of employers in the region to the design of competence-oriented educational programs;</li> <li>– insufficient level of digital skills of teaching staff for the development of e-learning content;</li> <li>– insufficient number of joint educational programs and Double Degree programs.</li> </ul>
	<p><i>3. Improvement of management and monitoring of the development of higher and postgraduate education</i></p> <ul style="list-style-type: none"> <li>– training, advanced training, internship of scientific and pedagogical personnel;</li> <li>– advanced training of teaching staff for teaching students with special educational needs;</li> <li>– purposeful formation of a youth personnel reserve from among teaching staff and employees and professional development in the field of soft &amp; business skills;</li> <li>– functioning of the "Upgrade Center" for monitoring, analysis and management of University activities;</li> <li>– availability of financial incentive mechanisms for teaching staff and employees;</li> <li>– systematic and systematic work for the formation of anti-corruption consciousness of employees and students of the university;</li> <li>– successful implementation of the monitoring system and identification of the most significant compliance risks for the University, prevention of conflicts of interest.</li> </ul>	<p><i>3. Improvement of management and monitoring of the development of higher and postgraduate education</i></p> <ul style="list-style-type: none"> <li>– lack of staff who speak three languages;</li> <li>– low level of development of the system of advanced training of administrative and support personnel due to appropriate postgraduate support;</li> <li>– fixed thinking attitudes of teaching staff and employees: unwillingness to develop, denial of existing problems, lack of orientation to personal growth;</li> <li>– insufficient level of integration of the unified information system of analytics and monitoring of processes with the existing IS of the university.</li> </ul>
	<p><i>4. Digitalization and infrastructure development of higher education institutions</i></p> <ul style="list-style-type: none"> <li>– updating and strengthening the material and technical base of the university, including with the participation of social partners;</li> <li>– providing a safe and comfortable learning environment by creating conditions for inclusive education</li> </ul>	<p><i>4. Digitalization and infrastructure development of higher education institutions</i></p> <ul style="list-style-type: none"> <li>– the educational process management system based on LMS Moodle is poorly integrated with other information systems of the university;</li> <li>– library collection is mainly in Russian;</li> <li>– lack of a comprehensive information</li> </ul>

	<p>(ramps, elevator, tactile plates, conversion of common areas, installation of staff call buttons, information signs);</p> <ul style="list-style-type: none"> <li>– annual renewal of the park of educational equipment and computer equipment <sup>3</sup>;</li> <li>– high level of digitalization of the main processes of the university <sup>4</sup>;</li> <li>– high level of book stock for EP.</li> </ul>	<p>security system;</p> <ul style="list-style-type: none"> <li>– lack of university mobile apps.</li> </ul>
	<p><i>5. Development of the intellectual potential of science</i></p> <ul style="list-style-type: none"> <li>– high level of income from research in the total income of the university;</li> <li>– operating scientific laboratories and centers focused on innovation and engineering in industry;</li> <li>– conducting R&amp;D to solve scientific, technical and production problems of industrial enterprises and business structures on a contractual basis;</li> <li>– increase in the number of monographs and patents, publications in highly rated journals, increase in the citation level of publications;</li> <li>– availability of dissertation councils for awarding academic degrees;</li> <li>– involvement of KazMIRD and other institutes, university teaching staff to conduct consultations and examinations in specialized subject areas;</li> <li>– the presence of recognized scientific schools in the Republic of Kazakhstan and abroad;</li> <li>– stable scientific relations with scientists from near and far abroad;</li> <li>– publications in journals with a high Impact factor;</li> <li>– international magazine "Material and Mechanical Engineering Technology", which is distributed in Europe and America, Vietnam, China, Japan, Russia, CIS;</li> <li>– focus on integrating IT with various industries;</li> </ul>	<p><i>5. Development of the intellectual potential of science</i></p> <ul style="list-style-type: none"> <li>– low level of participation of teaching staff in international research projects;</li> <li>– inconsistency of the conducted research with international promising scientific directions for obtaining grants for conducting research commissioned by sectoral state bodies and national companies;</li> <li>– lack of direct international funding for research;</li> <li>– insufficient number of publications in English;</li> <li>– lack of entrepreneurial and research skills in teaching staff;</li> <li>– insufficient development of commercialization of innovations;</li> <li>– insufficient use of research infrastructure.</li> </ul>

<sup>3</sup> In the Public Procurement Plan for 2021, an update of the educational equipment park in the amount of 212 367 809.12 tenge was made; as part of the renewal of the digital infrastructure of the university, the purchase of computers in the amount of 57 383 850 tenge (115 pcs.) was made in the Public procurement Plan for 2021.;

<sup>4</sup> upgrade of server equipment by 30%; implementation of software and hardware-a backup package; Wi-Fi network of about 500 points in university buildings and dormitories; television broadcasting of programs in university buildings and dormitories; video surveillance in computer classrooms, libraries and dormitories; there is a learning process management system based on LMS Moodle; the current software and hardware complex of access control.

	<ul style="list-style-type: none"> <li>– availability of 8 postdoctoral programs;</li> <li>– availability of personal scholarships for young scientists.</li> </ul>	
	<p><i>6. Modernization of scientific infrastructure and digitalization of science</i></p> <ul style="list-style-type: none"> <li>– development of the material and technical base for research activities<sup>5</sup>;</li> <li>– functioning and development of Business Skills Park.</li> </ul>	<p><i>6. Modernization of scientific infrastructure and digitalization of science</i></p> <ul style="list-style-type: none"> <li>– lack of an electronic database of accounting for scientific achievements of teaching staff and the university as a whole;</li> <li>– low level of information processes in the field of notifying scientists about ongoing competitions for grant and program-targeted funding.</li> </ul>
	<b>Opportunities</b>	<b>Threats</b>
<b>External environment</b>	<p><i>1. Ensuring high-quality training of competitive personnel</i></p> <ul style="list-style-type: none"> <li>– improving positions in national and international rankings;</li> <li>– development of new directions of academic mobility, including with foreign countries;</li> <li>– cooperation on the formation of a positive image of the university in the international market of educational services;</li> <li>– cooperation on the formation of a positive image of the university in the international market of educational services;</li> <li>– increase in income from non-grant programs by recruiting students;</li> <li>– compliance of educational programs of Kazakhstani universities with international standards and criteria;</li> <li>– increasing the share of international students;</li> <li>– development of cooperation with universities included in the TOP-700 of the QS-WUR world ranking;</li> <li>– participation of teaching staff in international educational projects;</li> <li>– attracting foreign teaching staff and scientists from the world's top universities;</li> <li>– purposeful formation of the student body in accordance with the needs of the region.</li> </ul>	<p><i>1. Ensuring high-quality training of competitive personnel</i></p> <ul style="list-style-type: none"> <li>– slowing down of internationalization processes due to the COVID-19 pandemic;</li> <li>– dependence on global trends in the educational services market;</li> <li>– growing competition between universities;</li> <li>– reduction in the number of grants for master's and doctoral studies;</li> <li>– outflow of applicants to foreign universities;</li> <li>– decrease in incoming academic mobility due to the COVID-19 pandemic;</li> <li>– growing rating of QS partners;</li> <li>– declining position in the world rankings;</li> <li>– lack of financial resources and resources for student grants, research and staff development;</li> <li>– imperfection of digital learning systems support systems.</li> </ul>
	<p><i>2. Modernization of the content of higher and postgraduate education in</i></p>	<p><i>2. Modernization of the content of higher and postgraduate education in the</i></p>

<sup>5</sup> The Public Procurement Plan for 2021 includes the renewal of the laboratory equipment fleet in the amount of 333,547,945.70 tenge; the renewal of the digital infrastructure of the university in the amount of 213,418,262 tenge.



	<p><i>the context of global trends</i></p> <ul style="list-style-type: none"> <li>– development of human resources and human resource management system of universities;</li> <li>– development of joint educational programs, including Double Degree, MBA, DBA with leading world-class universities;</li> <li>– introduction of new educational technologies in the process of training specialists (knowledge transfer);</li> <li>– increase of employers' satisfaction with the level of graduates' training.</li> </ul>	<p><i>context of global trends</i></p> <ul style="list-style-type: none"> <li>– lack of clear coordination on the part of the republican educational and methodological councils for educational programs aimed at improving the quality of educational programs;</li> <li>– decrease in the level of preparation of applicants;</li> <li>– development of new and innovative educational programs without taking into account international practice;</li> <li>– training of personnel at all levels of education without taking into account the development of economic sectors in the regions and the Republic of Kazakhstan as a whole;</li> <li>– obsolescence of knowledge in the fields taught;</li> <li>– the current system of personnel training, material and infrastructure resources of universities do not meet the expectations of stakeholders, including employers;</li> <li>– reduction of motivation of foreign partners to cooperate;</li> <li>– the existing qualification requirements for the qualification levels of specialists do not correspond to the new production technologies;</li> <li>– imbalance of labor resources in forecasting the need for personnel in economic sectors.</li> </ul>
	<p><i>3. Improvement of management and monitoring of the development of higher and postgraduate education</i></p> <ul style="list-style-type: none"> <li>– university brand development;</li> <li>– development of the alumni association in order to receive help and support from them;</li> <li>– systematic professional development of administrative personnel in the field of management and communication skills development;</li> <li>– increase in the number of employees who speak three languages.</li> </ul>	<p><i>3. Improvement of management and monitoring of the development of higher and postgraduate education</i></p> <ul style="list-style-type: none"> <li>– lack of clear regulations of information flows vertically and horizontally of management, which leads to a decrease in the efficiency of information dissemination;</li> <li>– reduction of government funding;</li> <li>– formalism of professional development of teaching staff at industrial enterprises of economic sectors.</li> </ul>
	<p><i>4. Digitalization and infrastructure development of higher education institutions</i></p> <ul style="list-style-type: none"> <li>– updating the digital material and technical base of the university, including at the expense of social partners, state programs;</li> <li>– mutual provision of access to digital library collections within the</li> </ul>	<p><i>4. Digitalization and infrastructure development of higher education institutions</i></p> <ul style="list-style-type: none"> <li>– the growing level of threats to information security in connection with the active digitalization of university and university services.</li> </ul>

	<p>framework of partnership agreements with foreign universities.</p>	
	<p><i>5. Development of the intellectual potential of science</i></p> <ul style="list-style-type: none"> <li>– development of joint research with foreign partners;</li> <li>– development of research works in the priority areas of Industry 4.0;</li> <li>– presentation of research results at the international level;</li> <li>– implementation of scientific projects through the conclusion of tripartite agreements (University-scientific organization-business);</li> <li>– increase in the citation level of publications;</li> <li>– development of existing research laboratories and research centers to the level of consortium research structures to improve the efficiency of the introduction and commercialization of scientific results;</li> <li>– increasing the number of partners represented by leading foreign scientific parks;</li> <li>– attracting new investment partners to the implementation of scientific research.</li> </ul>	<p><i>5. Development of the intellectual potential of science</i></p> <ul style="list-style-type: none"> <li>– emigration of scientific personnel to realize their scientific potential;</li> <li>– reduction of the level of knowledge and technology transfer;</li> <li>– decrease in the interest of the labor market in ongoing scientific research;</li> <li>– reduction of investment income based on the results of innovative and scientific activities;</li> <li>– decrease in the efficiency and effectiveness of scientific research and applied developments offered by universities for real production;</li> <li>– decrease in the investment attractiveness of the university.</li> </ul>
	<p><i>6. Modernization of scientific infrastructure and digitalization of science</i></p> <ul style="list-style-type: none"> <li>– updating of the material and technical base of the university, including at the expense of PTF, contractual and grant financing;</li> <li>– modernization of the university infrastructure in accordance with the tasks of scientific clusters.</li> </ul>	<p><i>6. Modernization of scientific infrastructure and digitalization of science</i></p> <ul style="list-style-type: none"> <li>– obsolescence of laboratory equipment due to the development of technologies;</li> <li>– reduction of costs for the purchase of laboratory equipment due to a decrease in the financial stability of the university.</li> </ul>

Based on the results of the analysis, potential risks and priority areas of KTU activity have been identified. The results obtained are aimed at developing a Strategic plan for the development of the university, which allows for the selection and implementation of strategic directions for the development of the university in close cooperation with the labor market in order to ensure the quality of training of specialists with higher and postgraduate education.



## 4. VISION

Karaganda Technical University is a world-class innovation and entrepreneurship university that ensures the integration of education, science, innovation, production and business based on the socio-cultural values of modern Kazakhstan.



## 5. MISSION

Ensuring high quality of innovative engineering education, scientific research and entrepreneurship for sustainable socio-economic development of Central Kazakhstan.

## 6. STRATEGY OF IMPLEMENTING THE DEVELOPMENT PLAN

### 6.1 Place and role of the University in the system of higher and postgraduate education of Kazakhstan

The high status of KTU as the leading scientific and educational center of the Karaganda region is confirmed by the institutional accreditation of the university by the Independent Agency of Accreditation and Rating "IAAR" (certificate no. AA0136 dated 20.12.2018).

In 2019, 68 educational programs were accredited (rating agencies ACQUIN, KAZSEE, IAAR, IQAA), and in 2020, 8 more, which is 92.7% (Table 10).

Table 10 – information on accredited programs in the context of three years

Name of the accreditation agency	Number of accredited EP by year		
	2018	2019	2020
KazSEE	-	11	
IAAR	-	17	
IQAA	-	15	
ACQUIN	-	7	8
<b>Total</b>	-	<b>68</b>	<b>8</b>

According to the IQAA National Rating in 2020, the university took 2nd place among the best technical universities in Kazakhstan and 2nd place in the nomination "Rating of websites of Kazakhstani universities. In the annual ranking of educational programs according to the IAAR, the university took 1st place in the field of education "Engineering, manufacturing and construction industries" and 3rd place in the General Ranking of universities of the country.

For the first time in its history, Karaganda Technical University entered one of the most prestigious rankings – the QS World University Ranking. In the final ranking table of the TOP 1000 world universities for 2018, KTU immediately took a position in the 751+ cluster among more than 4,000 universities from 85 countries of the world. In addition, the university has been occupying a high position in the international rankings given in Table 11 over the past years.

Table 11 – information about the positioning of KTU in international ratings

Name of the international rating	2018	2019	2020
QS World University Rankings	751+	751+	801+
QS University Rankings: EECA	171	197	197
UI Green Metric: World University Rankings		482	421
RANKPRO: Worldwide Professional University Rankings	577	600+	-
ARES: Academic Ranking of World Universities-European Standard	BBB+	BBB+	BBB+
UNIRANK: World University Rankings	3763	2765	3261
WEBOMETRICS	5835	5574	4706

The University annually participates in national rankings conducted by NCE "Atameken", IQAA, IAAR. Information on the relevant positions of this rating is

presented in a three-year period (see Table 12).

Table 12 – Information about the positioning of the KTU in national rankings.

Name of the rating	2018	2019	2020
National IQAA Ranking	3rd place	3rd place	2nd place
NCE "Atameken "	Atameken: 17 specialties in the top ten	Atameken: 16 specialties in the top ten	Atameken: 21 specialties/EP ranked in the top ten
IAAR	46 specialties out of 50 specialties in the top ten	48 specialties out of 50 specialties in the top ten	42 specialties/EP out of 50 specialties in the top ten

For example, in 2020, according to the results of the ranking of NCE "Atameken", 3 bachelor's degree programs ("Mining", "Technological Machines and Equipment", "Professional training ") took first place, 7 bachelor's degree programs ("Transport Construction", "Production of Building Materials, Products and Structures", "Metallurgy", "Mechanical Engineering", "Heat Power Engineering", "Materials Science and Technology of New Materials", "Geology and Exploration of Mineral Deposits") took 2nd place. In general, out of 35 educational programs of Karaganda Technical University, 24 educational programs entered the TOP 10.

NPJSC "KTU" is a major integrator of scientific and technical knowledge in central Kazakhstan, which has a high educational and investment attractiveness. University activity contributes to the sustainable development of internationally recognized engineering education and research with an emphasis on intercultural interaction.

As a result of the implementation of the goals and objectives of the Strategic Development Plan, Karaganda Technical University will occupy a leading position in the system of higher and postgraduate education in Kazakhstan, whose activities will be based on the following Principles:

1. *Continuing education* is aimed at the formation of the competencies of future specialists associated with the sustainable development of scientific research and production.

2. *Collective responsibility of the subjects of the scientific, industrial and educational process* is the training of personnel with *Continuing education* competencies in demand in various sectors of the economy, creative thinking and entrepreneurial skills.

3. *Future planning* is a consistent assessment of the level of need for engineering and technical personnel, considering the development of economic sectors.

4. *Human capital development* is the directed, continuous and systematic development of scientific and pedagogical personnel in accordance with the competence structure required for an innovative economy.

5. *Guaranteed demand* – training of personnel aimed at meeting the needs of the labor market.

6. *Corporate governance* is the implementation of a fundamentally new policy of educational organizations regarding the division of powers and the determination of the total responsibility of all participants in the educational process.

7. *Modernization of the educational and production environment* – purposeful bringing of the existing educational, scientific laboratories, information resources of the organization of education in accordance with the basic needs of production.

## 6.2 Academic policy

The Academic policy of the University is a system of measures, rules and procedures for planning and managing educational activities and effective organization of the educational process aimed at improving the quality of education and the implementation of student-centered learning. Its development is based on normative legal acts regulating the activities of organizations of higher and postgraduate education.

The content of the Academic Policy regulates such processes as the Organization of educational process, Conducting ongoing monitoring of academic performance, Conducting boundary control of academic performance, Conducting midterm assessment, Transfer of the student to the next course, Organization of training for the study of additional disciplines, elimination of academic debt and academic difference, Transfer of disciplines studied in other educational institutions according to other educational programs, Criteria for assessing students' knowledge, Choosing an educational trajectory by students, Registration to attend training sessions, Research (experimental research) work of students, Independent work of students, Research (experimental research) work of students, Organization and internship, Organization and conduct of the state exam on the Modern history of Kazakhstan, Academic mobility of students, Qualification Examination of undergraduate students, Qualification examination of students in master's and doctoral studies, Registration of the history of educational achievements of students, Transfer and restoration of students, Provision of academic leave to students, Expulsion of students from the university, The procedure for awarding vacant educational grants released in the process of obtaining higher and postgraduate education, Procedure for payment of state scholarships, Tuition fees.

The sections contain all the necessary information both for students and for the teaching staff, which allows you to quickly find answers to questions related to the educational process at the University.

The Regulation on Academic Policy was approved by the decision of the Academic Council (Minutes No. 5 of December 26, 2018).

The content of the Academic Policy is amended in accordance with the newly adopted or when amendments are made to the existing regulatory legal acts regulating the educational activities of the University.

In 2020, changes were made to the organization of the educational process in connection with the pandemic (Covid 19) - training using distance learning technologies (DLT), organization of an examination session, final certification in online format.

### 6.3 Development of the innovation potential and its achievement

The innovative potential of the KTU consists of significant own and integrated human, material, technical and intangible resources, including:

- a large contingent of students with a share of undergraduates and doctoral students;
- a highly qualified teaching staff;
- recognized scientific schools;
- the modern scientific and educational infrastructure of the university and the educational and production facilities of the consortium "Corporate University";
- the digital educational and scientific ecosystem, its licensed software;
- educational programs and scientific projects that are in demand by production.

For example, in 2018 and 2019, the university was aimed at implementing the following priority research areas:

1. Rational use of natural resources, including water resources, geology, processing, new materials and technologies, safe products and structures;
2. Power engineering and mechanical engineering;
3. Information, telecommunication and space technologies, scientific research in the field of natural sciences;
4. Life and Health Sciences;
5. Scientific foundations of "Mangilik el" (education of the XXI century, fundamental and applied research in the field of humanities);
6. Sustainable development of the agroindustrial complex and safety of agricultural prod;
7. National security and defense, without the "secret" stamp.

With the change in the priority scientific directions of the Republic of Kazakhstan in 2020, the range of scientific activities of the University was expanded to:

1. Power engineering and mechanical engineering
2. Rational use of water resources, flora and fauna, ecology;
3. Geology, extraction and processing of mineral and hydrocarbon raw materials, new materials, technology, safe products and structures;
4. Information, communication and space technologies;
5. Sustainable development of the agroindustrial complex and safety of agricultural products;
6. Life and health science;
7. Research in the field of social sciences and humanities;
8. Research in the field of education and science;
9. National security and defense;
10. Scientific research in the field of natural sciences.

In 2021, research in the field of technological modernization and digitalization of science and production will be in the trend, the following areas of research are expected in the priorities of the development of the region and the university:

1. Advanced technologies of prospecting, extraction, transportation and processing of mineral and hydrocarbon raw materials;
2. Advanced technologies in the mining and metallurgical complex;
3. Advanced technologies in the agroindustrial complex, food industry and agrochemistry;
4. Advanced technologies in the pharmaceutical industry, medical industry, biotechnology, bioengineering, genetic engineering;
5. Advanced technologies of chemistry and petrochemistry;
6. Advanced engineering technologies, including the use of new materials;
7. Alternative energy, renewable energy sources;
8. Energy efficiency technologies;
9. Infocommunication technologies;
10. Advanced technologies in light industry;
11. Advanced technologies in the furniture and woodworking industry;
12. Advanced technologies in construction, including the use of new materials;
13. Advanced technologies in the packaging industry;
14. Robotics;
15. Nano- and space technologies;
16. Power engineering.

In order to further develop the innovative potential, Karaganda Technical University plans to:

- strengthen the connection of science with production on the basis of the innovation and educational consortium "Corporate University" functioning on the basis of the university;
- develop scientific infrastructure and collaboration with leading scientific centers of the world in the framework of joint research;
- allocate university grants for the research of young scientists, as well as for the continuation of research in postdoctoral studies;
- develop a digital educational and scientific ecosystem;
- increase the publication activity based on research results and the citation of highly rated publications;
- modernize the existing and purchase new educational and laboratory equipment, licensed software;
- increase the share of undergraduates and doctoral students in the total contingent of students;
- increase the share of teaching staff, students, undergraduates and doctoral students actively involved in R&D.

#### **6.4 Commercialization of scientific-technical developments**

The activities of the commercialization office are aimed at the formation of the entrepreneurial orientation of the KTU. University scientists take an active part in competitions of state budget financing and JSC "Science Foundation".

The share of commercialized projects since 2018, one project has been implemented through a grant from JSC "Science Foundation" for commercialization



for a total amount of funding of 170.0 million tenge.

In 2020, the KTU Commercialization Office completed the implementation of the grant of Technology Transfer/Commercialization Offices in the amount of 116,330,000 tenge. The grant is aimed at increasing the potential and strengthening the institutional capabilities of the university.

The university has created the Enactus KTU team and the KTU business Club with the involvement of business practitioners who serve to develop an entrepreneurial culture among students. The Rector's Office supports the Enactus team. Meetings with participants are held, projects that will be implemented by our students and presented at the "National Competition of the Enactus-Kazakhstan program" are discussed.

In 2018, the Enactus KSTU team became a semi-finalist of the National Student Entrepreneurship Cup. In 2019, one of the projects of the Enactus KSTU team took second place.

In order to support youth initiatives in the creation of new startups, a business incubator Business skills park has also been created at the University. At the moment, new equipment and equipment is being equipped.

In order to develop this direction, it is necessary:

- to ensure the participation of scientists and University staff in competitions aimed at creating new companies for the provision of high-tech services and the production of goods, the commercialization of RSSTA;

- to carry out active work together with JSC "Science Foundation" to find and attract private investors to provide financing or co-financing of projects within the framework of the competition;

- to prepare projects for participation in competitions of JSC "Science Foundation" for grant financing of scientific projects for the purpose of their commercialization;

- to organize the interaction of the Enactus KTU team with student groups;

- to participate in various development programs.



## 7. WAYS OF ACHIEVING THE GOALS OF THE DEVELOPMENT PLAN

Based on the analysis of the current situation, the goal set in the Strategic Development Plan of KTU will be achieved by implementing the following tasks:

*Task 1. Ensuring a high level of personnel training for the economy of the future, taking into account the development of digital technologies with competencies in demand in various sectors of the economy, creative thinking and entrepreneurial skills*

- annual updating of existing, design of new and innovative educational programs, evaluation of learning outcomes based on professional standards;
- involvement of regional employers and foreign partners in the development of educational programs on an ongoing basis;
- attracting foreign scientists for consultations on the development of curricula within the framework of partnership agreements;
- implementation of multilingual education with a focus on intercultural and collaborative communication;
- introduction of new educational technologies in the process of training specialists through the integration of training with scientific research and production;
- provision of additional education and development of additional digital qualifications;
- using the production capabilities of partner enterprises to organize practice-oriented and creative training;
- conducting a survey of employers in the framework of related industries focused on obtaining new professions;
- development of Business Skills Pak as a means of forming competencies for small and medium-sized businesses;
- application of the international practice of creating a postgraduate support group and postgraduate training programs;
- active involvement of existing foreign partners in academic mobility programs;
- ensuring the university's permanent presence and presentation on the international arena through participation in international educational events to increase the reputation and recognition of the university;
- development of a methodology for language training of university staff and students as a condition for the development of key methodological competencies for teaching and learning in English;
- development of programs for the organization of academic mobility of students, funded by extra-budgetary funds and funds of the university;
- attracting and supporting international students;
- improvement of the library system in order to increase the availability of available resources for students;
- participation in international exchange programs following the example of

Erasmus+, DAAD and Fullbright.

**Task 2.** *Ensuring succession and continuity of training aimed at creating equal conditions for quality education of all categories of students, in accordance with the needs of the economy and taking into account modern achievements of science and industry*

- development and implementation of new educational programs focused on the needs of regional labor markets, as part of the integration of training with scientific research and production;
- development of the material and technical base and strengthening ties with production;
- development of educational programs based on Worldskills Kazakhstan standards;
- provision of additional education and development of additional digital qualifications;
- corporate training of enterprise specialists in the communicative and technical skills of the profession in accordance with the concept of lifelong learning;
- carrying out activities to strengthen the brand of the university in order to attract promising young people to study;
- strengthening ties with technical and vocational education organizations;
- development of the system of early profiling and professional orientation of students;
- activation of the work of the Centers of Working Professions of the University to provide educational services to the population, including through the Employment Center;
- development of a plan for the organization of psychological and pedagogical support of inclusive education at the university;
- advanced training of teaching staff and administrative staff of the university to work with students with special educational needs (hereinafter - SEN) and disabilities;
- improving the system of material and technical support for inclusive education;
- improvement of educational and methodological support for the organization of training of students with SEN and disabilities, including distance learning;
- improvement of individualized forms of control and evaluation of educational achievements of students with disabilities, adapted to their capabilities;
- introduction of adaptive (for students with SEN and disabilities) academic disciplines into the university's educational programs;
- organization of measures to increase the level of tolerance of the socio-cultural environment;
- providing volunteer assistance to students with SEN and disabilities.

**Task 3.** *Formation of an effective holistic system of assessment of the quality of education at the University in the context of its further recognition at the world and national levels*

- conducting a survey of stakeholders on the most popular competencies of

specialists;

- organization of internships of the teaching staff at the enterprises of the region in order to study new production technologies;
- involvement of labor market representatives in the design of competence-oriented educational programs;
- involvement of leading specialists of enterprises and organizations of the Corporate University in the educational process of the university;
- development of a set of measures to improve the quality of theses and master's theses;
- assistance in the procedure of independent certification of engineers (university graduates) at the KazSEE International Certification Center, the European Federation of National Engineering Associations (FEANI): assistance in obtaining the "European Engineer Passport" EngineerING Card; registration of engineering specialties in FEANI;
- identification of key competencies of future engineers to work in international companies, training of future technical specialists to study in other countries and with the necessary foreign language and educational horizons;
- expanding the list of foreign partners;
- search for new programs and grants for the mobility of teaching staff.

***Task 4. Continuous and systematic development of the University's scientific and pedagogical staff in accordance with the competence structure required for the innovative economy***

- development of professional development programs in key areas of the innovative economy in the short and long term with the use of new forms and methods of conducting;
- organization of trainings for teaching staff and personnel reserve on anti-corruption culture, academic leadership and effective management in education and science with the involvement of foreign specialists on the principle of "Life-long learning";
- organization of advanced training courses for teaching staff on digital learning technologies and educational process management with the participation of foreign trainers;
- professional development of the teaching staff and scientists on the development of linguistic and cross-cultural competencies;
- conducting trainings for teaching staff on corporate culture with a focus on the implementation of the principles of team building, collaboration and the connection of corporate culture with the results of work;
- creation of networking for the implementation of cooperation between teaching staff and foreign professors for self-improvement of professional qualities of a teacher and a scientist;
- search for new areas of cooperation within the educational activities of the university, as well as for the provision of specialized services on the basis of existing institutes of the university;
- search for new programs and competitions to finance collaborative initiatives;
- improving the mechanisms for organizing internships of teaching staff at

industrial enterprises;

- organization of interaction with employers in the development of a mechanism for professional development, including an integrated entrepreneurial culture of scientific and pedagogical workers;
- expanding the list of postdoctoral programs, including through the introduction of minor programs;
- improvement of the incentive system for teaching staff and employees based on the results of scientific, educational, methodological, innovative and entrepreneurial activities.

***Task 5. Development of the intellectual potential of science, increasing the demand for scientific developments and integration of scientific research into the world scientific space***

- increasing the number of partnership agreements in the field of science and innovation with universities abroad;
- attracting foreign partners to joint research activities and commercialization of the results obtained by organizing an open dialogue platform;
- creation of a network digital library of scientific resources together with foreign partners;
- development of a system of incentives for teaching staff and scientists to expand international cooperation and form a network of international collaborators;
- stimulating entrepreneurial activity of teaching staff and students, including for participation in projects to find sponsors for the implementation of start-ups;
- identification of priority areas of scientific research in order to purchase laboratory equipment conforming to international standards;
- strengthening of communication with regional and republican industrial enterprises to identify the need for scientific research and execution of business contracts by order of enterprises, provision of consulting services.

***Task 6. Implementation of a set of measures to develop a sense of patriotism, high moral and leadership qualities among students, involving them in strengthening the spiritual and moral values of the National Patriotic Idea "Mangilik El" and the culture of a healthy lifestyle***

- activation of the work of the "Rukhani Zhangyru" project office on the development of activities and the search for new ways to implement the program in the university's cancers;
- involvement of students in clubs and circles of the university;
- development of mechanisms to support creative and sports initiatives at the expense of the endowment fund;
- actualization of the Model of patriotic education "Formation of a New Kazakhstan Patriotism";
- improving the efficiency of student self-government;
- development of the debate movement;
- conducting seminars and trainings on the development of students' leadership qualities;
- development of volunteer and charity programs;

- development of the Alumni Association;
- conducting anti-corruption activities among students with the involvement of law enforcement officials;
- carrying out activities in the field of information and propaganda work in the field of healthy lifestyle formation;
- development of new programs of charitable targeted assistance to disabled students, orphaned students and students left without parental care.

***Task 7. Ensuring increased transparency and efficiency of the University's management and financing system***

- smooth diversification of university funding;
- creation of an endowment fund and development of effective mechanisms for its functioning;
- ensuring the participation of university executives in domestic and foreign advanced training courses in the field of management;
- development of a set of active measures aimed at team building and the formation of skills for solving common tasks in a team <sup>6</sup>;
- formation of a high level of anti-corruption culture;
- involvement of active students in the system of collegial management of the university;
- improving the process of digitalization of academic and research activities of the university.

***Task 8. Improving the material and technical base of the University, ensuring a safe and comfortable learning environment, modernization and digitalization of scientific and educational infrastructure, reducing the shortage of places in dormitories***

- ensuring a safe and comfortable learning environment by creating conditions for inclusive education: installation of elevators, provision of buildings with ramps, re-equipment of common areas in accordance with the needs of students with disabilities, installation of staff call buttons and information signs, installation of tactile plates in buildings;
- replenishment of the information environment of the university with modern personal computers, laboratory equipment, educational and methodical literature in accordance with modern requirements;
- implementation of measures to improve video monitoring systems and access control system;
- formation of the digital ecosystem of education. Creation of an interactive online map of the university with the provision of information about the university, including a virtual scientific laboratory, the results of the analysis of their resource availability and effectiveness;
- development of the university infrastructure, including the repair of buildings and dormitories;
- updating the material and technical base of the university, including at the

---

<sup>6</sup> Teambuilding

expense of social partners, income from RW and contractual activities.



## 8. EXPECTED RESULTS

As a result of the implementation of the proposed measures, the share of educational programs developed on the basis of industry qualifications frameworks and professional standards in accordance with the needs of the new economy will increase, which will ensure guaranteed employment and recognition of the qualifications of future specialists due to the compliance of the level of training of graduates to conduct professional activities. In particular, special emphasis will be placed on the development of "soft" skills and the formation of a willingness to flexibly respond to changing labor market conditions and the requirements of the new economy.

The results of the implementation of the target indicators will be an increase in the number of enterprises of the Corporate University participating in on-the-job training programs, as well as providing the needs of the region with highly qualified specialists through flexible retraining programs.

A database of educational courses will be formed, including digital ones, which are in demand at the industrial enterprises of the region.

The list of applied bachelor's degree programs focused on the needs of the region will be expanded, which will ensure the continuity of the chosen educational trajectory.

An increase in the level of preparation of applicants for admission to engineering educational programs will be provided by opening engineering classes in schools, lyceums and gymnasiums of the city for the purpose of early profiling.

The originality and level of completion of theses and the scientific value of master's theses will be increased.

As a result of the events, a sustainable research ecosystem will be formed, the quality of scientific research and the level of commercialization of results will increase, which will ensure the growth of income from research and innovation activities.

The citation level of publications will increase. The share of faculty participation in international seminars, conferences, forums will be increased, which will expand the network of international partners in the field of science and innovation to strengthen the image of the university in the global scientific space.

Focusing on priority areas of scientific research will have a positive impact on increasing the share of R&D commissioned by enterprises, the number of start-up projects of teaching staff and students, and will entail updating the database of laboratory equipment, including at the expense of partners.

A network digital library with partner universities will be created.

The number of employees with a PhD degree among the teaching staff and administrative and managerial staff will be increased.

The events held will strengthen the international brand of the university, expand international relations, ensure an increase in the share of foreign students from the total number, which will strengthen the university's position in international rankings.

The quality of technical education will be improved in accordance with international standards and the formation of an integral system of compliance of



students' professional competencies with international standards will be ensured.

The number of students enrolled in external incoming mobility programs will increase. The percentage of external outgoing mobility will increase, including through university funding.

The number of foreign scientists involved in conducting classes at the university will be increased both remotely and in the traditional format.

Comfortable conditions will be created in KTU for the education of students with SEN and disabilities, which will contribute to increasing the coverage of persons with special educational needs with higher and postgraduate education and the development of tolerance among the student contingent.

A wide coverage of students will be provided with activities within the framework of the program "Rukhani Zhangyru".

There will be an increase in the number of winners and prize-winners of scientific, creative and sports events, active participation of young people in charity events and the volunteer movement.

Work will continue on the prevention of corruption manifestations, the formation of high moral qualities among students, a sense of patriotism and respect for their native country, a healthy lifestyle culture, environmental culture.

The number of students with organizational skills and leadership qualities, formed corporate culture, commitment to the values of the university and feeling proud of alma mater will increase.

The complex of implemented measures will create a comfortable and safe environment, ensure free movement on the university campus for students with SEN and disabilities.

The modernization of access control and management systems, guaranteed power supply will be carried out and the information security system of KTU will be implemented, aimed at the smooth functioning of the university's digital campus.

An effective scientific infrastructure of the university will be created that meets modern requirements. Conditions will be created for the application of new technologies, obtaining new knowledge from the implementation of joint projects with international scientific foundations and leading universities of foreign countries.

The material and technical base of the university will continue to be developed taking into account global trends and the needs of the national economy to ensure a high level of provision of educational, research and consulting services.

The implementation of the proposed measures will allow achieving a high level of development of the university's human resources potential by modernizing the existing system of the concept of advanced training of teaching staff, increasing entrepreneurial activity and collaborative communication, as well as updating the digital competencies of teaching staff.

The quality of teaching will be improved, the process of introducing new pedagogical teaching technologies will be launched by improving the pedagogical skills of teaching staff.

The level of intercultural communication between teaching staff and scientists will be increased to present the results of scientific research at the international level with an increase in publication activity.

The strengthening of ties with regional industries and the improvement of the quality of education will continue due to the compliance of the disciplines taught with

modern production requirements;

The development of the university's brand at the national and global levels will be ensured, the efficiency of corporate governance of the university will be improved through the development of professional development programs for heads of structural divisions and teaching staff in the field of implementing the principles of collective collaboration and anti-corruption culture.

The university's revenues will grow due to changes in existing and the emergence of new sources of funding, including the endowment fund.

A program to support student initiatives in the management of the educational process will be implemented.

## 9. IMPLEMENTATION OF THE STRATEGIC PLAN OF DEVELOPMENT

### 9.1 STRATEGIC LINE 1: TRAINING PERSONNEL FOR THE FUTURE ECONOMY

**The goal of Strategic Line 1:** Training of highly qualified specialists with in-demand competencies in accordance with international standards for scientific and technological breakthrough in the region.

#### Tasks and target indicators

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
<i>1. Ensuring a high level of personnel training for the economy of the future, taking into account the development of digital technologies with competencies in demand in various sectors of the economy, creative thinking and entrepreneurial skills</i>							
1	Share of grants at the expense of LEA funds, employers	%	0,09	0,12	0,15	0,18	0,18
2	The share of employers and business structures involved in the educational process	%	-	5	7	8	9
3	The share of implemented and updated EP from the total number of EP	%	-	80	85	90	95
4	The share of educational programs of higher and postgraduate education implemented in three languages	%	40	45	50	60	70
5	The share of innovative educational programs developed by order of industry associations and enterprises	%	85	95	97	98	98
6	The proportion of students covered by the elements of dual education	%	40	50	55	60	70
7	The share of educational programs aimed at developing students' entrepreneurial skills	%	85	90	100	100	100
8	The number of EP implemented using remote technologies	unit	75	80	85	92	95
9	The share of EP implemented using remote technologies	%	-	100	100	100	100
10	The increase in the number of electronic resources introduced into the educational process	%	-	5,7	7,4	8,5	8,5
11	The share of disciplines in which online courses have been developed	%	80	85	90	95	95
12	The proportion of students	%	40	50	55	60	70

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
	covered by the elements of dual education						
<i>2. Ensuring succession and continuity of training aimed at creating equal conditions for quality education of all categories of students, in accordance with the needs of the economy and taking into account modern achievements of science and industry</i>							
1	Training of specialists with higher and postgraduate education	ppl.	9046	9148	9258	9356	9356
2	Admission to the 1st year, bachelor's degree, total	ppl.	2180	2260	2348	2426	2426
3	Admission to the 1st year, bachelor's degree, state order	ppl.	1242	1267	1311	1356	1356
4	Admission to the 1st year, bachelor's degree, contract	ppl.	938	993	1037	1070	1070
5	Admission to the 1st year, master's degree, total	ppl.	283	303	323	343	343
6	Admission to the 1st year, master's degree, state order	ppl.	253	268	283	298	298
7	Admission to the 1st year, master's degree, contract	ppl.	30	35	40	45	45
8	Admission to the 1st year, doctoral studies, total	ppl.	46	51	56	61	61
9	Admission to the 1st year, doctoral studies, state order	ppl.	46	51	56	61	61
10	Number of undergraduate students, total	ppl.	8239	8319	8407	8485	8485
11	Number of full-time undergraduate students, state order	ppl.	4831	4856	4900	4945	4945
12	Number of full-time undergraduate students, contract	ppl.	3408	3463	3507	3540	3540
13	Number of undergraduates, total	ppl.	667	684	701	716	716
14	Number of undergraduates, state order	ppl.	592	607	622	637	637
15	Number of undergraduates, contract	ppl.	75	77	79	81	81
16	Number of doctoral students, total	ppl.	140	145	150	155	155
17	Number of doctoral students, state order	ppl.	140	145	150	155	155
18	Number of winners and prize-winners of scientific, creative and sports events	ppl.	115	125	135	145	145
19	The share of those who entered the university with the signs "Altyn Belgi", winners of international Olympiads and competitions of scientific projects of the last three years,	%	1,7	2,0	2,1	2,3	2,5

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
	winner of the presidential, republican Olympiads and competitions of scientific projects of the current academic year (awarded with diplomas of 1, 2, 3 degrees) from their total number						
20	The number of students studying at the expense of employers	ppl.	270	275	280	285	285
21	The proportion of students studying in English from the total number of students	%	0,07	0,1	0,15	0,2	0,2
22	The share of students studying within the framework of multilingualism, of the total number of students	%	40	50	60	70	80
23	Training of specialists with technical and vocational education (college)	ppl.	620	620	620	620	620
24	Number of students, contract (college)	ppl.	620	620	620	620	620
25	Admission to the 1st year, contract (college)	ppl.	150	150	150	150	150
26	Number of trainees who have completed advanced training courses	ppl.	1100	1100	1100	1100	1100
27	The share of graduates who have been trained in scientific and educational laboratories from the total number of graduates	%	-	57	72	84	84
28	The number of end-to-end educational programs of applied bachelor's degree, focused on the formation of flexible and professional skills (soft skills, hard skills)	unit	4	5	6	7	9
29	The number of engineering classes opened by the University in schools, lyceums and gymnasiums of the city for the purpose of early profiling	unit	5	7	10	12	15
30	Other additional educational services	ppl.	1100	1100	1100	1100	1100
<i>3. Formation of an effective holistic system of assessment of the quality of education at the University in the context of its further recognition at the world and national levels</i>							
1	Composite index of satisfaction with educational programs of higher and postgraduate education of the university	%	60	70	80	85	90

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
	according to the results of a sociological survey						
2	Improving the positions of educational programs in the rating of NCE "Atameken"	%	10	15	20	25	30
3	The share of employed graduates in the first year after graduation (from the total number of graduates)	%	73	74	75	76	77
4	The share of employed graduates in the first year after graduation according to the state educational order	%	-	75	76	77	78
5	The ratio of the average salary of a university graduate to the average monthly salary in the Republic of Kazakhstan (according to official data stat.gov.kz )		0,57	0,58	0,59	0,61	0,61
6	Reduction of the proportion of repeated inspections of evaluated works (diploma projects/works, master's projects/works) of students for the presence of plagiarism	%	5	8	10	15	20

## 9.2 STRATEGIC LINE 2: MAKING A STABLE RESEARCH ECOSYSTEM

**The goal of Strategic Line 2:** Improving the quality of scientific developments for the implementation of research results in the real sector of the economy and the expansion of international collaborations.

### Tasks and target indicators

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
<i>5. Development of the intellectual potential of science, increasing the demand for scientific developments and integration of scientific research into the world scientific space</i>							
1	RW services (research work)	unit	82	82	82	82	82
2	The amount of RW income from the total income of the university	%	-	10,98	11,5	12,0	12,0
3	The number of young scientists who have received a university grant for research activities	ppl.	3	5	7	7	7
4	The proportion of young scientists who have received a university grant for research activities	%	-	3,5	4,5	5,5	5,5
5	The share of young researchers involved	%	-	5,1	6,6	7,4	7,4
6	The share of attracted foreign scientists with a high h-index	%	-	0,15	0,30	0,50	0,50
7	Number of patents obtained by university scientists	amt.	59	62	65	67	69
8	Growth of publications in rating publications from the total number of publications over the past three years	%	7,2	7,6	8,0	8,2	8,2
9	The citation level of publications based on the Web of Science Core Collection (Clarivate Analytics) of the total number of publications	%	53	54	57	59	63
10	Number of post-doctoral programs implemented	amt.	1	1	1	1	1
11	Share of implemented post-doctoral programs	%	-	100	100	100	100
12	The share of projects funded by LEA and business representatives	%	-	72	72	72	72
13	Number of student experimental design bureaus	unit	2	3	4	5	5
14	The number of startup projects implemented by employees studying at the university	unit	3	5	7	10	11
15	The share of startup projects implemented by employees studying at the university	%	-	20	25	30	32

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
16	The number of funded educational and research projects carried out on the basis of the university	amt.	16	17	18	19	20
17	The share of funded educational and research projects carried out on the basis of the university	%	-	28	28	28	28
18	Share of research conducted using a digital platform	%	-	52	55	57	57
19	The share of income received from scientific activities, innovative developments and commercialized projects from the total budget of the university	%	11	13	15	17	17



### 9.3 STRATEGIC LINE 3: INTERNATIONALIZATION OF THE UNIVERSITY

**The goal of Strategic Line 3:** Development and implementation of a model for the development of the internationalization potential of KTU for the implementation of sustainable and feasible strategies for the internationalization of the educational process of training technical specialists, taking into account the national and international context.

#### Tasks and target indicators

No.	Indicators	Un. of mes..	Planning period				
			2021	2022	2023	2024	2025
<i>1. Ensuring a high level of personnel training for the economy of the future, taking into account the development of digital technologies with competencies in demand in various sectors of the economy, creative thinking and entrepreneurial skills</i>							
1	The share of foreign students in the higher education system of the total number of students	%	4,2	4,4	4,6	4,8	4,8
2	Number of students enrolled in academic mobility	ppl.	65	70	75	80	85
3	The share of students studying within the framework of academic mobility funded by the university, of the total number of students	%	0,15	0,17	0,19	0,21	0,23
4	The number of EP implemented in the educational process in English	unit	7	8	9	10	11
5	The number of educational programs within the framework of double-degree education with partner universities from among the top 700 of the QS rating	unit	2	3	4	5	6
6	The share of educational programs in the framework of double-degree education with partner universities from among the top 700 of the QS rating	%	-	2,25	3,0	3,7	3,7
<i>3. Formation of an effective holistic system of assessment of the quality of education at the University in the context of its further recognition at the world and national levels</i>							
1	The university's place in the international QS WUR rating		801+	801+	801+	801+	801+
2	The university's place in the international ranking of QS EECA		180	180	180	180	180
3	The university's place in the international Webometrics ranking		4707	4707	4707	4707	4707
4	Number of branches of the university abroad (including joint branches with other universities of the Republic of	unit	1	1	1	1	1

No.	Indicators	Un. of mes..	Planning period				
			2021	2022	2023	2024	2025
	Kazakhstan)						
5	The share of attracted teaching staff and top managers from abroad from the total number of teaching staff	%	0,5	0,6	0,7	0,8	0,8
6	The share of educational programs that have passed international accreditation in agencies that are full members of international European networks for ensuring the quality of education and are included in the register of the authorized body in the field of education	%	80	85	90	95	100
7	Number of international scientific and educational projects	unit	2	3	5	7	9
8	The share of implemented international scientific projects from the total number of projects	%	-	0,10	0,12	0,15	0,17

## 9.4 STRATEGIC LINE 4: SOCIAL DEVELOPMENT

The goal of Strategic Line 4: Sustainable development of spiritual and moral values and leadership qualities among young people.

### Tasks and target indicators

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
<i>2. Ensuring succession and continuity of training aimed at creating equal conditions for quality education of all categories of students, in accordance with the needs of the economy and taking into account modern achievements of science and industry</i>							
1	The share of students with special educational needs from their total number	%	0,1	0,15	0,2	0,25	0,3
2	The level of provision of conditions for students with special educational needs (curricula, elevators, ramps, handrails)	amt.	3	4	5	6	7
<i>6. Implementation of a set of measures to develop a sense of patriotism, high moral and leadership qualities among students, involving them in strengthening the spiritual and moral values of the National Patriotic Idea "Mangilik El" and the culture of a healthy lifestyle</i>							
1	The increase in the number of events within the framework of the "Rukhani Zhangyru" program from their total number	%	12	15	17	20	25
2	The increase of students involved in the youth patriotic club "Otan" from their total number	%	15	20	25	30	35
3	The proportion of students, undergraduates and doctoral students who possess organizational skills and leadership qualities within the framework of the implementation of the program "Personnel Policy"	%	18	20	22	25	27
4	The share of students engaged in volunteer activities from the total number of students enrolled in bachelor's degree programs	%	2,0	2,4	2,7	3,0	3,2
5	The proportion of students taking an active part in the public life of the university, district, city	%	80	83	87	90	91
6	For students from the total number of university students involved in the activities of student organizations, student clubs, youth affairs committees	%	50	53	57	60	63

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
7	The increase in the number of students involved in the activities of the student charity movement "Akniet" to support children from orphanages and boarding schools, from their total number	%	20	25	27	30	32
8	The increase in funding for charitable targeted assistance to disabled students, orphaned students and students left without parental care, relative to the amount of funding in this area	%	20	25	30	35	40
9	The increase in the number of winners and prize-winners of scientific, creative and sports events from their total number	%	12	15	17	20	23
10	The number of anti-corruption activities among students ("Clean session", "No plagiarism", "No corruption", "School of Integrity", "Academic integrity") with the involvement of volunteers of the project "Accelerators of good"	unit	4	7	9	12	15

## 9.5 STRATEGIC LINE 5: INFRASTRUCTURE AND DIGITALIZATION

**The goal of Strategic Line 5:** Infrastructure development, strengthening and improvement of the material and technical base of the University, digitalization of scientific and educational activities aimed at improving the quality of educational, research and consulting services.

### Tasks and target indicators

No.	Indicators	Un. of mes.	Planning period				2025
			2021	2022	2023	2024	
<i>8. Improving the material and technical base of the University, ensuring a safe and comfortable learning environment, modernization and digitalization of scientific and educational infrastructure, reducing the shortage of places in dormitories</i>							
1	The volume of attracted investments for the development of the university from the total income of the university	%	8,03	8,57	8,87	9,0	9,1
2	Increase in funding for digitalization of all types of University activities	%	25	30	35	40	43
3	The share of expenses for the development of educational laboratories from the total budget of the university	%	3,2	3,5	3,7	4,0	4,0
4	The share of laboratory development costs from the total budget of the university	%	5,1	5,3	5,5	5,7	5,7
5	The share of expenses for the development of educational and scientific laboratories from the total budget of the university	%	-	8,8	9,2	9,7	9,7
6	Number of implemented virtual laboratories	unit	2	2	3	4	5
7	Availability of the online educational portal of the university		1	1	1	1	1
8	Availability of an information system for distance education		1	1	1	1	1
9	The number of online portals created, including on the principle of "one window"	unit	1	1	1	1	1
10	Number of information systems for determining borrowing in order to implement the principles of academic integrity of the	unit	1	1	1	1	1

No.	Indicators	Un. of mes.	Planning period				2025
			2021	2022	2023	2024	
	university (availability of an agreement)						
11	The number of proctoring systems to ensure the interim and final certification	unit	1	1	1	1	1
12	Availability of an electronic document management system		1	1	1	1	1
13	The share of updated certified scientific equipment of the university	%	13,5	13,7	14,0	14,3	14,3
14	Number of beds created for nonresident students	unit	1504	1504	1504	1504	1504

## 9.6 STRATEGIC LINE 6: EFFICIENT MANAGEMENT AND CORPORATE CULTURE

**Goal of Strategic Line 6:** Formation of an effective management system of the university's activities, development of human resources and achievement of a high level of corporate culture.

### Tasks and target indicators

No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
<i>4. Continuous and systematic development of the University's scientific and pedagogical staff in accordance with the competence structure required for the innovative economy</i>							
1	The share of doctors and candidates of sciences, PhD doctors from the total number of teaching staff in the context of educational programs	%	51	53	55	57	60
2	Number of teaching staff with academic degrees of Doctor of Sciences	ppl.	35	30	25	20	15
3	Number of teaching staff with PhD degrees	ppl.	202	200	198	195	190
4	Number of teaching staff with PhD degrees	ppl.	40	45	50	55	60
5	The share of teaching staff teaching in English from the total number of teaching staff	%	7,9	10,5	12,5	15,8	15,8
6	Percentage of teaching staff with international certificates confirming foreign language proficiency in accordance with the pan-European competencies (standards) of foreign language proficiency	%	6,5	6,5	7,0	7,5	7,5
7	Percentage of teaching staff who have completed advanced training and foreign internship	%	42	50	55	60	60
8	The share of teaching staff who have passed advanced training in the framework of improving pedagogical skills	%	60	70	80	90	100
9	The share of university teaching staff participating in educational and research projects from the total number of teaching staff	%	75	78	80	85	85
10	The share of teaching staff and employees stimulated by the results of scientific, educational, methodological, innovative and entrepreneurial activities	%	55	60	65	70	80
11	The share of teaching staff and	%	75	90	100	100	100

No.	Indicators	Un. of mes.	Planning period				2025
			2021	2022	2023	2024	
	employees who have been trained to improve the level of cyberculture and cyber hygiene in the framework of digitalization of the university's activities						
12	The ratio of the average salary of university teaching staff to the average monthly salary in the Republic of Kazakhstan		1	1	1	1	1
<i>7. Ensuring increased transparency and efficiency of the University's management and financing system</i>							
1	Gradual increase in the proportion of women in executive bodies, based on the results of the competition for vacant positions of the Board	%	-	30	50	50	50
2	Gradual increase in the proportion of women on the Board of Directors, based on the results of the evaluation of the work of the Board of Directors for the year in accordance with the decision of the Sole Shareholder	%	-	25	50	50	50
3	Gradual increase in the share of female managers in the structural divisions of organizations	%	-	30	50	50	50
4	The share of active students involved in the University management system	%	17	20	22	25	30
5	For heads of structural divisions who have passed advanced training in the field of management	%	40	50	55	60	70
6	The level of implemented new qualification requirements (standards) for talent management, human resources development		1	1	1	1	1
7	The share of updating the management system, organizational structure, architecture and personnel policy in the conditions of academic freedom of the university	%	-	1,2	1,5	1,7	1,7
8	Increase in the level of KPIs of heads of structural divisions of the University	%	12	15	17	20	25
9	Positioning of the university in social networks		5	5	5	5	5
10	The share of funds in the endowment fund from the total	%	-	0,1	0,3	0,7	0,9



No.	Indicators	Un. of mes.	Planning period				
			2021	2022	2023	2024	2025
	income of the university						

### **1. Effective management system**

The existing management system of KTU ensures a high level of organization of academic, research and innovation activities and compliance with corporate governance standards.

The University's corporate governance system is aimed at improving the efficiency of internal and external processes, ensuring transparency and accountability, strengthening the reputation and brand of KTU at the national and international levels, delineating powers and responsibilities between structural units and officials and reducing the cost of raising capital.

### **2. Corporate culture**

The unity of strategic guidelines and effective personnel policy ensure the formation of a holistic perception of the activities of the staff and faculty of the university, based on the principles of academic integrity, collective responsibility, tolerance and respect for the established traditions and values of the university.

### **3. HiPo employees**

The presence of employees with high potential is one of the main factors determining the success of the university. The human resources development system, aimed at identifying and developing talents, is designed to become a key source of competitive advantage. The involvement of HiPo employees in the university management processes ensures the most effective achievement of corporate goals and increase of their personal potential.

### **4. Developed infrastructure**

KTU campus provides academic, research and socio-cultural needs of employees and students. The systematic development of the material and technical base and the digital ecosystem, the purposeful expansion of the inclusive environment is focused on improving the quality of educational, research and consulting services.

### **5. Financial support**

Funds from the following sources of financing will be allocated for the implementation of the Strategic Development Plan in 2021-2025: the republican budget; public-private partnership funds; funds received from organizations and enterprises under contracts; special funds allocated by international scientific, educational foundations and organizations; income from the results of the implementation of scientific clusters, commercialization of innovative projects and the results of the activities of innovative enterprises and entrepreneurship; own funds of the University; charitable contributions of sponsors, voluntary donations of legal entities and individuals, patronage, including endowment fund; funds from other sources not prohibited by the legislation of the Republic of Kazakhstan.

As sources of formation of the endowment fund, the funds of KTU as the founder of the fund, charitable donations of graduates, organizations and enterprises, income from scientific, technical and commercial activities of the university, as well as other income not prohibited by the legislation of the Republic of Kazakhstan are identified.

The directions of spending the income of the endowment fund will be:

1. Support for KTU students from socially vulnerable categories, as well as those who have significant success in educational, scientific, sports or social activities by providing study grants and scholarships;

2. Development of professional and scientific potential of teachers and staff of KTU by paying for training, internships, advanced training in promising areas with subsequent training in KTU;

3. Development of student potential by financing the activities of the Youth Association "Zhas Orda" aimed at the socio-cultural development of students;

4. Development of the university campus infrastructure: modernization and opening of named classrooms, coworking spaces, alleys, sports grounds, cultural and creative facilities, dormitories, sports and recreation camp "Polytechnic", etc.;

5. Investments in startups and spin-out companies of teachers and students of KTU.

The structure of the necessary financial resources is dominated by expenditures on: modernization and creation of modern scientific and innovative infrastructure; development of fundamental and applied research; commercialization of scientific research; ensuring a high-quality educational process based on world practice; development of modern information and communication infrastructure; implementation of professional development programs for personnel; international academic and student exchanges; procedures for international certification, accreditation and patenting, etc. The extra-budgetary funds of KTU received from the sale of educational services, scientific, innovative, industrial and entrepreneurial activities are supposed to be directed to the development of educational and laboratory, information, research and material base of the university.

The total amount of financing for 2021-2025 is 27.9 billion tenge:

2021 – 5.0 billion tenge;

2022 – 5.0 billion tenge;

2023 – 5.5 billion tenge;

2024 – 5.9 billion tenge;

2025 – 6.5 billion tenge.