

R.B. Zhashkenova¹, G.N. Nakipova², I.V. Denisov³, A.T. Omarova⁴, A.A. Legostayeva⁵

^{1,2,4,5}*Karaganda Economic University of Kazpotrebsoyuz, Kazakhstan;*

³*Plekhanov Russian University of Economics, Moscow, Russia*

¹*zhashkenova2015@mail.ru, ²genakipova@mail.ru, ³denisov.iv@rea.ru,*

⁴ainuraphd@mail.ru, ⁵anjal@mail.ru

¹<https://orcid.org/0000-0001-6038-8180>, ²<https://orcid.org/0000-0001-6754-246X>,

³<https://orcid.org/0000-0002-8718-9023>, ⁴<https://orcid.org/0000-0001-9808-4908>,

⁵<https://orcid.org/0000-0002-7057-7652>

²*Scopus Author ID: 55971405900, ³Scopus Author ID: 56890822500,*

⁴Scopus Author ID: 55982396200, ⁵Scopus Author ID: 57191428797

³*Researcher ID: C-2191-2019*

Improving the scientific support for strategic planning in the Republic of Kazakhstan

Abstract

Object: The article discusses the features of scientific support for strategic planning in the Republic of Kazakhstan, which are necessary conditions for solving problems in the field of building the digital economy of Kazakhstan. Strategic planning in all hierarchical structures of government, both at the national and territorial, sectoral levels, in the activities of absolute common companies and business organizations. In accordance with strategic planning, all the coordinates of the entire state planning system.

Methods: Authors and analytical materials based on educational, scientific, technical and innovative processes that lead to Kazakhstan. Based on the construction of regression models, it was found that the number of organizations engaged in research and development, and the volume of government spending on higher and postgraduate education affect the volume of internal research and development costs.

Findings: It is recommended to improve scientific support for the realization of educational government program.

Conclusions: In the process of the study, conclusions were drawn and recommendations were given, a way to provide assistance in providing a more advanced system of scientific support for strategic planning, necessary for solving urgent economic and social problems of the Republic of Kazakhstan.

Keywords: science, scientific support, education, strategic planning, management, globalization, scientific and technical process, R&D — research and development organizations.

Introduction

Over the past decade, significant changes have taken place in the post-Soviet space in the organization of management and planning of scientific support: a legal framework has been formed, a departmental approach to managing educational institutions is being overcome, the interaction of state and public forms of education management is emerging, and the role of associations of educational institutions is growing. A new approach to understanding modern education has been formed in society, based on its quality and the introduction of the latest innovative pedagogical technologies. Education has become one of the main state priorities of many countries that are striving to create a flexible mobile higher education system that meets new requirements in the face of global competition.

In accordance with the Message of the President of Kazakhstan N.A. Nazarbayev to the people of Kazakhstan “Strategy 2050”, technological discoveries are fundamentally changing the structure and needs of world markets. Digital and nanotechnology in various industries and fields of activity, robotics, regenerative medicine and many other achievements of science will become commonplace, transforming not only the environment, but also the person himself (Strategy 2050, 2012). For Kazakhstan, this becomes especially relevant when the influence of integration processes and involvement in the global economic system are strengthened. Public administration in the field of scientific support is faced with certain difficulties and changes caused by the processes of digitalization and globalization of educational services. The current stage of development of scientific support is characterized by a particular intensity of transformations, equally affecting the organizational and managerial structures of education, its purpose and content, teaching methods and technologies, funding sources and mechanisms, as well as the conditions and forms of educational, scientific and industrial cooperation. This indicates that the development of human capital is a decisive factor in the implementation

of tasks on the path to building a digital economy. Despite the significant achievements that the Republic of Kazakhstan has been able to achieve in the field of science in recent years, global competition poses for the state in the field of education absolutely specific, and often new tasks, which must be solved so that Kazakhstan remains a full-fledged, independent and respected member of the world community.

The strategic interests of Kazakhstan require increasing the competitiveness of the domestic economy and comprehending the fact that at the present stage, the quality of the country's human resources is, along with innovation and investment activities, the key factors in transforming the domestic economy into the post-industrial stage (Pupysheva, 2014).

The author of this article has identified a hypothesis about the influence of the volume of internal R&D expenditures on the number of organizations carrying out R&D and the amount of government spending on higher and postgraduate education. In this regard, the development of the intellectual potential of youth through improving the quality of education is one of the main priorities of the state policy of the Republic of Kazakhstan, since globalization, radical changes taking place in the world have a great impact not only on the development of material, technical and scientific-theoretical foundations of social progress, but also on the socio-political and ideological processes, the formation of a progressive and free social consciousness.

The need to assess the effectiveness of the implementation of strategic and program documents is associated not only with control, but also helps to focus the attention of performers on achieving specific results, analyze existing trends, ensure timely adjustment, and gain public confidence by publishing the results of activities (State program, 2016).

Literature Review

The system of state strategic planning and forecasting is a tool for forming long-term priorities of the state's activity, implementing global and large-scale tasks, ensuring the coherence of the plans of the central and regional authorities, local authorities, linking decisions made in the process of state strategic management with budgetary restrictions for the medium and long term. In the short time after independence, Kazakhstan achieved effective results in its economic and social development, thanks to the use of strategic planning in the public administration system (Yuvitsa, 2015, 247).

In the article of Mironov A.V. "Education as a sphere of public policy", it was noted that state educational policy is the directing and regulating activity of the state in the field of education, carried out by it to achieve the corresponding strategic goals and objectives of national and global importance (Mironov, 2012, 29).

The field of science is an essential part of the national heritage, a fundamental resource for the country's economic and social transformations. The scientific potential largely determines the country's place in the world community, the prospects for competition in the foreign market, and the possibilities in solving its internal problems (National Science Report, 2018, 3).

In his publications, Petrenko E.S., Koroleva A.A. give an assessment of education as a factor in the development of a creative economy from the point of view of a marketing approach, where the education sector should be more focused on creating a creative class that can make money on new ideas. The lack of a creative class is the main cause of the economic crisis (Petrenko et al., 2019, 325).

In the scientific publications of such researchers as Borbasova Z.N., Sedlarsky T., Bezler O.D. an analysis of the modern interaction of the labor market and vocational education in Kazakhstan is presented, where it is noted that in providing the country's economy with a key resource, highly qualified personnel, a large role is given to the effective interaction of the labor market and higher education institutions, the integration of their main goals and objectives. Errors in the market coordination of these most important subsystems of the market lead to irreversible economic losses and negative social consequences, since under the market conditions the development of the economy and the country's competitiveness is largely determined by high-quality human capital (Borbasova et al., 2019, 105).

Analyzing the general trends in the financing of research and development in foreign countries, we note that due to the increase in their importance in the socio-economic development of countries, the total aggregate expenditures on research and development also tend to increase. At the same time, an increase in total spending on science was observed in some countries even during the crisis period (Maass, 2013).

A distinctive feature of financing research and development in leading foreign countries is that it is implemented to a large extent at the expense of the private sector. In terms of the share of private spending on research and development, the undisputed leaders are Japan (76.5 %), South Korea (74 %), and China (74 %). The top ten also includes Taiwan (72.5 %), Switzerland (68 %), Finland (67 %), Germany (66 %), Australia (62 %), Belgium and Denmark (60 % each), USA (58 %) (Gulbrandsen et al., 2015, 343).

One of the highest and at the same time steadily growing from year to year are total spending on science in Switzerland (despite the relatively low level of government spending on research and development) (Locke et al., 2012, 705).

Scientific and technical policy, being the most important part of state economic policy, is independent and represents a dynamic tool of state management and entrepreneurship (Belyakov et al., 2019, 657).

You can consider the various strategic planning tools necessary for scientific support. If we consider this from the point of view of providing quality higher education, we can consider the process of implementing an interactive tool for compiling a digital curriculum, which was developed at the University of Utrecht. The tool was designed to assist academic developers and supervisors in practical discussions of the aforementioned issues and to facilitate the processes of improving the coordination of curricula and the visibility of learning paths for teachers and students. An online mapping tool offers a smart but comprehensive overview of the learning path in the curriculum (Wijngaards-de Meij et al., 2018, 219–231).

The lack of empirical research in the field of scientific support, as well as the theoretical contribution that helps us better understand the role and importance of this study by conducting research and sharing not only success stories, but also failure reports (Bolander et al., 2020, 1–4).

Thus, it can be concluded that the role of higher education and its “contribution” to the country's economy is the primary lever of economic growth. This is confirmed by the studies of many both domestic and foreign researchers, as well as programs and development strategies at the legislative level. So, for example, A.A. Bulasheva, T.A. Kusainova, assess the impact of investment in education on the development of human capital and its impact on economic growth (Bulasheva et al., 2019, 41–48).

The implementation of the “Kazakhstan-2050 Strategy” and the task of joining the “thirty” of the advanced countries of the world require the mobilization of the scientific and research potential of the country, the implementation of international research and their wide practical implementation (Strategy, 2012).

In recent years, Kazakhstan has been taking active steps at the state level to solve the tasks to create a knowledge-based economy of the country. Further implementation of the Law “On Science” is carried out, which defines a new model of science management, which is maximally adapted to international best practice (Borbasova et al., 2019).

The Law “On Commercialization of the Results of Scientific and (or) Scientific and Technical Activities” (October 31, 2015 No. 381V) and the State Program for the Development of Education and Science for 2016–2019 (March 1, 2016 No. 205), adopted in 2015–2016 They are aimed at developing new mechanisms for the interaction of science and business, increasing the effectiveness of scientific research, their focus on practical implementation, ensuring the introduction of high-tech technologies in production and stimulating the entrepreneurial sector to participate in scientific projects (Maass, 2013; Gulbrandsen et al., 2015).

In the world community, the role and importance of education in recent times are considered as the main factor in socio-economic progress. As noted by specialists from the Organization for Economic Co-operation and Development (OECD), “the rate of basic long-term economic growth in OECD countries depends on maintaining and expanding the knowledge base. The comparative advantages of countries are less and less determined by the wealth of natural resources or cheap labor and more and more by technical innovations and the competitive application of knowledge. Economic growth today is as much a process of accumulating knowledge as a process of accumulating capital” (Locke et al., 2012).

In the Republic of Kazakhstan, 386 organizations were engaged in research and development in 2017 (in 2016 — 383 organizations) (Figure 1) (Belyakov et al., 2019).

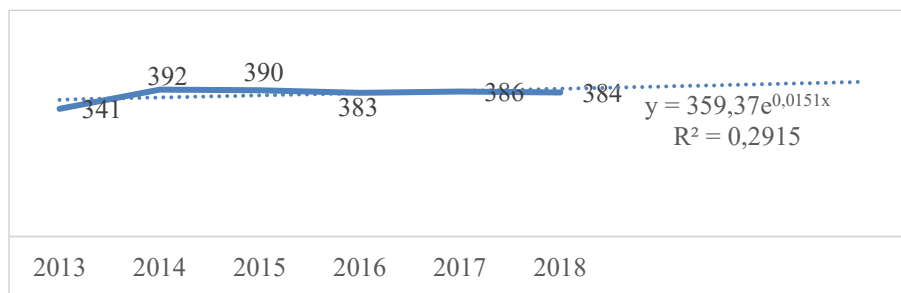


Figure 1. The number of organizations performing research and development in the Republic of Kazakhstan for the period from 2013–2018, units

Note — Compiled on the basis of the source: Electronic resource: Data of the Committee on Statistics of the Republic of Kazakhstan for 2013–2018. //www.stat.gov.kz

If we consider the number of organizations performing research and development in a regional aspect, then the situation is as follows (Table 1) (Belyakov et al., 2019).

Table 1. The number of organizations performing research and development in the regional aspect for the period from 2013–2018, units

Region	2013	2014	2015	2016	2017	2018
Akmola	12	11	11	9	11	11
Aktobe	13	1	14	14	16	16
Almaty	10	13	11	10	11	9
Atyrau	8	9	10	11	10	10
East Kazakhstan	29	30	30	35	34	35
Zhambyl	9	11	11	11	11	9
West Kazakhstan	9	9	7	8	8	10
Karaganda	23	31	32	33	29	28
Kostanay	13	13	14	13	14	12
Kyzylorda	6	6	8	10	8	7
Mangistau	7	7	5	7	6	6
Pavlodar	10	11	9	10	11	14
North Kazakhstan	3	3	4	5	5	5
Turkestan	3	5	4	5	6	6
Astana city	52	59	53	55	62	60
Almaty city	122	148	152	133	131	135
Shymkent city	12	12	15	14	13	11

Note — Compiled on the basis of the source: Electronic resource: Data of the Committee on Statistics of the Republic of Kazakhstan for 2013–2018. //www.stat.gov.kz stat.gov.kz

According to table 1, an increase in organizations occurred in the East Kazakhstan, West Kazakhstan and Pavlodar regions and the city of Almaty. A decrease in the number of scientific organizations occurred in seven regions of the country, such as Almaty, Zhambyl, Karaganda, Kostanai, Kyzylorda and the cities of Nur-Sultan and Shymkent (National Science Report, 2018, 6).

Almaty continues to be the main scientific center of the Republic of Kazakhstan. In 2018, 135 organizations, or about a third of all scientific organizations in the country, were engaged in scientific research and development in Almaty.

The public sector, including institutions funded by the state budget, was represented by 103 organizations in 2018. Over the past four years, this sector has been constantly growing.

The number of organizations in the business sector, including organizations whose main activity is related to the production of products or services for sale, increased by 3 units compared to 2017, but remained unchanged compared to 2016 (Table 2) (Belyakov et al., 2019).

Table 2. The number of organizations performing research and development by sector of activity for the period from 2013–2018, units

Region	2013	2014	2015	2016	2017	2018
In total, including:	341	392	390	383	386	384
– government sector	78	101	94	100	101	103
– sector of higher professional education	112	105	103	103	99	95
– business sector	110	149	154	149	146	149
– non-profitsector	41	37	39	31	40	37

Note — Compiled on the basis of the source: Electronic resource: Data of the Committee on Statistics of the Republic of Kazakhstan for 2013–2018. //www.stat.gov.kz stat.gov.kz

The higher education sector (95 organizations) includes universities, institutes, academies and other institutions of post-secondary education, regardless of the source of their funding and legal status; research institutes, experimental laboratories and clinics, which are managed by higher education institutions. The smallest number of organizations is represented in the non-profit sector of science, which includes legal entities funded by private non-profit organizations — 37.

Regarding the types of organizations, a generally stable nature of development can be noted. Only in comparison with 2016, the number of universities decreased by 4 units, the number of research institutes also tends to decrease (Figure 2) (Belyakov et al., 2019).

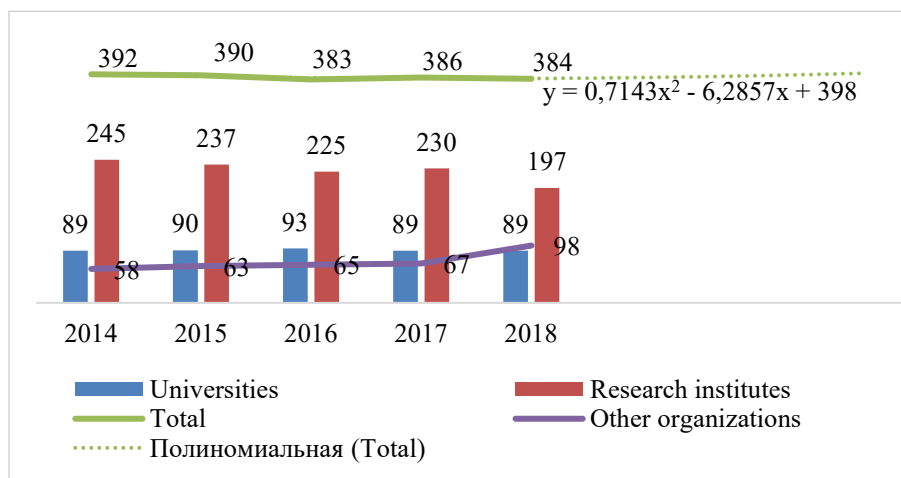


Figure 2. The number of organizations engaged in research and development by type in the Republic of Kazakhstan for the period from 2013–2018, units

Note — Compiled on the basis of the source: Electronic resource: Data of the Committee on Statistics of the Republic of Kazakhstan for 2013–2018. //www.stat.gov.kz

For 2017–2019, the decision of VNTK approved new priorities for the development of science in Kazakhstan:

- Scientific foundations of “Mangilik el” (education of the XXI century, fundamental and applied research in the field of humanities);
- Energy and engineering;
- Rational use of natural resources, including water resources, geology, processing, new materials and technologies, safe products and structures;
- Information, telecommunication and space technologies, scientific research in the field of natural sciences;
- Sustainable development of the agricultural sector and the safety of agricultural products;
- National Security and Defense;
- The science of life and health.

The main criteria for selecting priority areas:

- compliance with the priorities of the country's socio-economic development, the Strategic Plan for the Development of the Republic of Kazakhstan until 2050, the State Program for Industrial and Innovative Development of the Republic of Kazakhstan for 2015–2019, the State Program for the Development of Education and Science for 2016–2019;
- compliance with world trends in the development of science; — the availability of personnel and material and technical potential;
- compliance with the interests of national security;
- the possibility of commercializing research results for subsequent use in innovative development.

In accordance with these new priorities, in 2018 a new competition of scientific projects for grant financing for 2018–2020 was held in the republic (Figure 3) (National Science Report, 2018, 27).

Two priorities dominate in the number of applications submitted for the contest of the Ministry of Education and Science of the Republic of Kazakhstan: “Rational use of natural resources, including water resources, geology, processing, new materials and technologies, safe products and designs” — 134 applications (33 %) and “Scientific basis” Mangilik el” (education of the 21st century, fundamental and applied research in the field of humanities) — 94 (23.2 %). The following are: “Life and health sciences” — 72 (17.7 %); “Information, telecommunication and space technologies, scientific research in the field of natural sciences” — 55 (13.5 %); “Energy and engineering” — 38 (9.4 %); “National Security and Defense” (without secrecy stamp) — 13 applications (3.2 %) (National Science Report, 2018, 27).

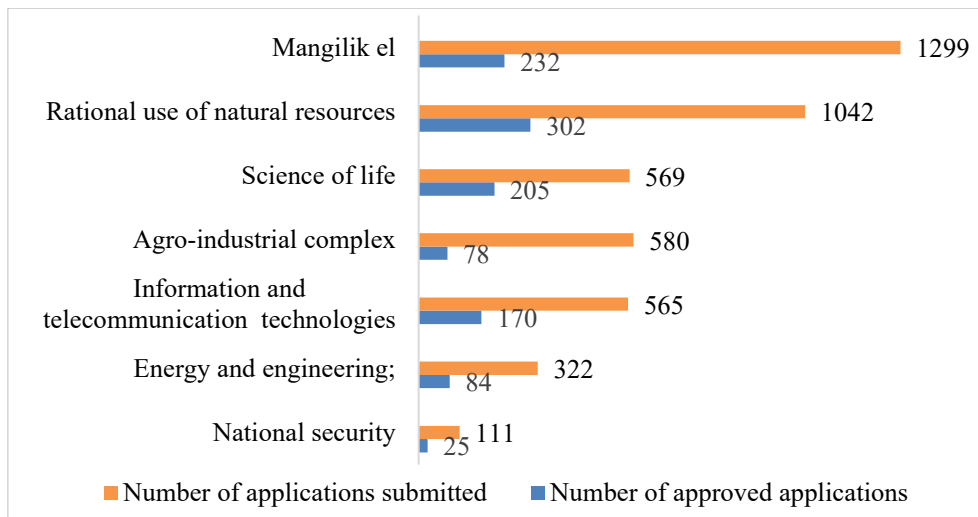


Figure 3. Distribution of grant funding applications for 2018–2020 in the context of priority areas for the development of science

Note — Compiled on the basis of the source: *National report on science — Astana, Almaty, 2018. — 27 p.*

According to operational data, in 2017, the share of domestic R&D expenditures in GDP amounted to 0.13 %, which is lower than in 2016 (0.14 %). The ratio of production of goods and production of services to GDP in 2017 amounted to 36.0 % and 57.9 %, respectively (Wijngaards-de Meij et al., 2018, 53).

Thus, the goals of Kazakhstan regarding the education system are clearly reflected in a number of political statements that link scientific support, that is, education, with the broader goal of becoming one of the leading nations of the world. Three of these statements have a direct impact on the provision of quality higher education by Kazakhstan:

- Strategy — 2050, which highlights the critical role of higher education in the process of preparing a skilled workforce;

- The State Program for the Development of Education (GPRO) for 2011–2020 (2010) and the State Program for the Development of Education and Science for 2016–2019. (2016) the Ministry of Education and Science of the Republic of Kazakhstan, which emphasize (among many other statements) the need to prepare students and undergraduates to meet the needs of industrial and innovative development, the importance of an independent assessment of the qualifications of graduates and the importance of integration into the European higher education space;

- Plan of the nation: 100 specific steps. The main points of this document are the creation of a group of ten leading higher education institutions that will receive additional resources and autonomy with the aim of possible transfer of their experience to other higher education institutions, the gradual elimination of centralized education management and the introduction of English as a widely used language of instruction.

The goals set out in these documents are ambitious, but often, in the first place, contribute to improving quality. They include the desire to be included in the “top 30 countries” in the Global Competitiveness Index (GIC) and the appearance of two of their higher education institutions in the top row of international university rankings.

According to the UNESCO Institute for Statistics (UIS) database, over the years of independence of Kazakhstan, a consistent development of the country's education system has been observed. Revenues from oil and gas exports gave a powerful impetus to economic development and made it possible to invest in improving the education system. But the issue of financing higher education remains critically important (Figure 4) (Bolandier et al., 2020).

In addition to state financing and own funds, scientific organizations use such sources as loans and loans of banks, foreign investments, loans of non-banking legal entities (except for development institutions).

Today, in Kazakhstan, the share of expenditures on science is on average 0.2 % of the country's GDP, while the UNESCO International Academic Committee recommends that the share of expenditures for developing countries be at least 1–1.5 % of GDP. For example, in Japan this figure is 3.3 % of national GDP, in the USA — 2.8 %, in Germany — 2.5 %, in China — 1.4 %, in Russia — 1.3 %. In almost all regions of the Republic of Kazakhstan, we can observe an increase in domestic R&D expenditures, with the exception of Zhambyl, Kostanai, Kyzylorda, and Pavlodar regions (Table 3).

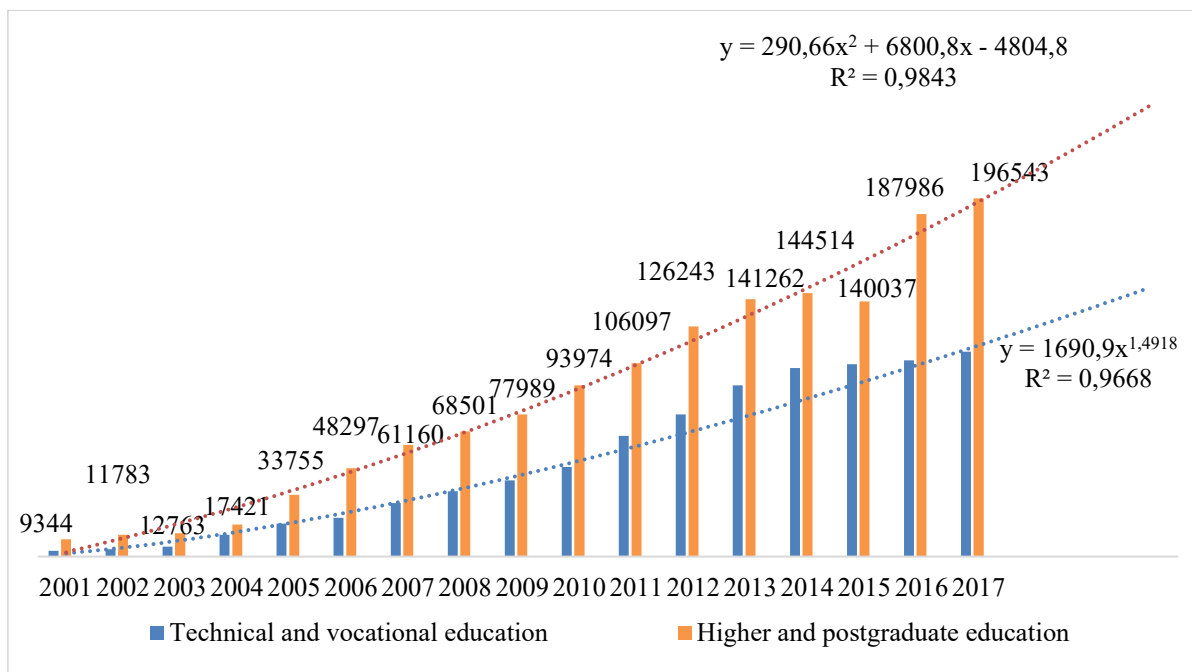


Figure 4. Dynamics of indicators of public spending on education in the Republic of Kazakhstan, million tenge
 Note — Compiled from the source: UNESCO Institute for Statistics (UIS) database data, <http://data.uis.unesco.org> 2017

Table 3. Internal R&D expenditures by regions for the period from 2013–2018, units

Indicator	2013	2014	2015	2016	2017	2018
The Republic of Kazakhstan	61 672.7	66 347.6	69 302.9	66 600.1	68 884.2	72 224.6
Akmola	742.5	826.7	1 113.1	797.3	898.2	1 694.3
Aktobe	559.2	735.3	701.6	763.0	839.1	974.6
Almaty	1 117.4	804.2	1 053.6	941.7	871.1	1 121.1
Atyrau	1 880.0	1 885.7	2 415.9	2 753.3	3 637.7	4 494.5
East Kazakhstan	916.0	672.2	753.2	1 789.2	298.5	878.2
Zhambyl	1 077.0	1 322.3	689.7	456.3	1 024.3	731.6
West Kazakhstan	3 407.7	4 048.9	3 597.8	4 279.1	3 488.1	3 508.3
Karaganda	445.3	574.0	599.2	562.1	1 176.5	827.4
Kostanay	213.3	266.0	235.6	613.6	506.3	301.9
Kyzylorda	5 095.4	6 160.7	7 694.5	7 800.4	8 043.5	9 848.7
Mangistau	335.3	322.9	320.8	390.4	335.7	290.2
Pavlodar	209.6	236.3	224.4	180.2	185.2	226.3
North Kazakhstan	247.3	284.1	313.0	173.1	204.9	273.6
Turkestan	3 773.3	3 040.6	3 300.0	3 475.4	5 000.5	5 319.1
Astana city	9 741.2	10 187.7	13 451.9	13 990.6	16 297.5	14 094.2
Almaty city	30 991.0	34 030.3	31 791.2	26 596.1	25 357.8	26 586.5
Shymkent city	921.2	949.7	1047.4	1038.3	719.3	1 054.0

Note — Compiled on the basis of the source: Electronic resource: Data of the Committee on Statistics of the Republic of Kazakhstan for 2013–2018. <http://www.stat.gov.kz>

Of the total expenditures for scientific research in 2018, more than 47 % (34 billion tenge) falls on the own funds of organizations, state funding makes up about 45 % of the total costs, of which 73 % is for basic research. The share of investments from other sources, including foreign, exceeds 8 % (Table 4) (Belyakov et al., 2019).

Table 4. Sources of financing of internal costs for research and development for the period from 2013–2018

	2013	2014	2015	2016	2017	2018
Domestic costs by main sources of financing, million tenge						
The Republic of Kazakhstan	61672.7	66347.6	69302.9	66600.1	68884.2	72224.6
Total budget funds, million tenge	39273.3	43343.5	40719.1	35440.5	35979.9	32145.7
Own funds, million tenge	17836.2	19858.3	25356.6	26388.8	28187.6	34251.0
Other means of financing, million tenge	4563.2	3145.8	3227.2	4770.8	4717.0	5827.9
The share of financing in total costs, %						
The Republic of Kazakhstan	100	100	100	100	100	100
Total budget funds, million tenge	63.7	65.3	58.8	53.2	52.2	44.5
Own funds, million tenge	28.9	29.9	36.6	39.6	40.9	47.4
Other means of financing, million tenge	7.4	4.7	4.7	7.2	6.8	8.1
<i>Note — Compiled on the basis of the source: Electronic resource: Data of the Committee on Statistics of the Republic of Kazakhstan for 2013–2017. //www.stat.gov.kz</i>						

According to data, in 2018, internal R&D expenses amounted to 72.2 billion tenge. At the same time, the share of domestic R&D expenditures from GDP fell to 0.12 %, continuously decreasing over the past 5 years. The current level of costs in this area is an order of magnitude lagging behind developed and even many developing countries. At the same time, the number of organizations and enterprises engaged in R&D in 2018 decreased to 384 throughout the republic, while 10 years ago there were 438. Over the past five years, the number of employees performing R&D has decreased by more than 3 thousand people, i.e. by 14 %.

Therefore, in the absence of adequate R&D funding and specialists in this field, one cannot expect the construction of an innovative economy even with the creation of technology parks, incubators and other expensive infrastructure.

Among the sources of financing, there are almost no representatives of entrepreneurs representing the real sector of the economy. At the same time, according to the OECD, at present, for European and American companies, the share of this sector in total R&D expenditures of 60–65 % is optimal. The importance of the source of funding was recognized by the Lisbon Strategy, whose goal was to make the EU “the most competitive and dynamic knowledge-based economy”. One of the goals of the Lisbon agenda is to bring the share of the private sector in total R&D expenditures to 2/3 of all funding. That is why the financing of research and development in all developed countries today at 60–75 % is carried out precisely by the business sector. And, as a result, the highest science-intensive GDP is also noted in these countries (National Science Report, 2018, 57).

Methods

Let us analyze the impact on the volume of internal expenditures on R&D of such factors as the number of organizations engaged in R&D and the volume of government spending on higher and postgraduate education.

We construct a regression model by adopting the following notation:

y — the volume of domestic R&D expenditures (million tenge);

x_1 — the number of organizations engaged in research and development (units);

x_2 — the volume of government spending on higher and postgraduate education (million tenge).

To evaluate the parameters of the two-factor regression equation, we used the statistical data of these indicators for the period from 2008 to 2017 (source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan). As a result, the following multiple linear regression equation was obtained:

$$y = 39166.482 - 64.995x_1 + 0.299x_2, R^2 = 0.789$$

(0.805) (-2.590) (4.025)

The multiple correlation coefficient is equal $R = 0.889$, which indicates a close relationship of the resulting trait with two factor traits at the same time. The coefficient of determination is equal $R^2 = 0.789$, i.e. 78.9 % of the variation of the dependent variable is explained by the regression obtained.

From the data of the regression analysis execution protocol, we have that the observed value of the Fisher criterion is equal $F_{\text{observable}} = 13.155$. The critical value of the Fisher criterion at the level of significance $\alpha = 0.05$ and the number of degrees of freedom $k_1 = m = 2$, $k_2 = n - m - 1 = 7$ is equal $F_{\text{critical}}(0.05; 2; 7) = 4.737$. Since $F_{\text{observable}} > F_{\text{critical}} (13.155 > 4.737)$ then, the obtained regression equation is statistically significant and reliable.

We will check the significance of individual parameters of the obtained regression equation using Student's t -test. In the regression model, t -statistics for the corresponding coefficients are indicated in parentheses. Comparing the absolute values of the observed values of t -statistics with a critical value $t_{\text{critical}} = 2.365$ (at the significance level $\alpha = 0.05$ and the number of degrees of freedom $k = n - m - 1 = 7$), we can conclude that the regression coefficients will be statistically significant, but the free term will not.

Results

The analysis of the obtained regression coefficients shows that:

- with an increase in the number of organizations carrying out R&D by 1 unit, the volume of internal R&D expenses decreases by 64.995 million tenge;
- an increase in government spending on higher and postgraduate education by 1 million tenge, entails an increase in domestic spending on R&D by 0.299 million tenge.

As S.V. Anoshin, currently such a task has become the modernization of the higher education system in order to meet the requirements of the global trend of transition to a knowledge economy, where the conditions for the necessary modernization are the creation of a real competitive environment in this sector of the national economy (Bulasheva et al., 2019, 38).

The Government of Kazakhstan plays a very important role in the development of scientific support and the country's education and training system:

- The executive branch in the person of the government determines the basic educational strategies and develops key initiatives, such as the network of Nazarbayev Intellectual Schools, which educate gifted students. The government also monitors progress towards the goals of the education strategy;
- The Ministry of Education and Science of the Republic of Kazakhstan (MES RK) manages, implements and supervises work in the field of education, science, protection of children's rights and youth policy;
- The Ministry of Education and Science of the Republic of Kazakhstan has several subordinate organizations that work in specific areas (for example, ensuring quality guarantees, statistics or managing international projects). For example, the Information and Analytical Center provides analytical support to the Ministry of Education and Science of the Republic of Kazakhstan and is responsible for various projects, such as international projects of the Ministry (including educational system reviews such as this). The National Center for Continuing Education (Orleu) provides a second example. He is responsible for developing and providing professional development opportunities for teachers and school leaders.
- The Ministry of Education and Science of the Republic of Kazakhstan reports to the Administration of the President of the Republic of Kazakhstan, assesses the performance of the Ministry of National Economy of the Republic of Kazakhstan (MNE of the Republic of Kazakhstan) and monitors budget execution by the Ministry of Finance.

Discussions

When reviewing the statistical analysis of legislation in the field of education and science, it should be noted that there is a tendency to increase the intensity of adoption of legal acts that amend and supplement the Law "On Education", which is a characteristic feature of the development of the modern educational system at this stage, as well as scientific support in Kazakhstan.

Scientific publications are a measure of the quality and effectiveness of individual scientists and research teams, as well as a criterion for comparing the position of countries in global science. This was made possible largely due to the access of researchers and administrators of science from different countries to the resources of information market leaders. At present, about 300 Kazakhstani universities and research institutes have the opportunity to use relevant scientific information concentrated in the foreign resources of the largest companies Clarivate Analytics, Elsevier, Springer.

The education system is called upon to carry out its transformative functions, where all the links in the education system are in interaction and interconnected with each other. This objectively contributes to the integrity of the system, its unity. Therefore, it is necessary to improve the training of highly qualified specialists, offering to go beyond formal education, improve management and strengthen the formation of professional skills, taking into account the development of small and medium-sized businesses.

Conclusions

The tasks of developing scientific support, as in many other industries, are inextricably linked with the digitalization process. Of course, in order to achieve results, it is necessary to create specialized centers of

competence. This requires systematic measures to organize training taking into account the new employment structure and, accordingly, improving the quality of education.

The author of the article revealed how the number of organizations engaged in research and development and the volume of government spending on higher and postgraduate education affect the volume of internal research and development costs. Also, in the process of research and analysis, conclusions were drawn and recommendations were made that could contribute to the improvement of an effective, more advanced system of scientific support for strategic planning, necessary for solving urgent economic and social problems of the Republic of Kazakhstan.

The foreign experience of improving the quality of training was studied. So, in higher education, for example, in the USA, organizational development grew out of the “movement for quality rooted in work to improve the quality of work, productivity and improve educational processes (Sutherland, 2018, 264).

Thus, improving the quality of training qualified personnel adapted to the digital economy is the basis for the future well-being of the population and society as a whole, as qualified employees are the intellectual competence qualifier for the modern economy of the Republic of Kazakhstan.

The results of the analysis indicate that in order to transition to “sustainable innovative development” in the future, Kazakhstan needs to combine the development of breakthrough technologies with a concentration of efforts on “industrial and innovative development”. It is breakthrough technologies that will be the main factor in Kazakhstan joining the group of technological leaders. In this regard, by 2030, Kazakhstan should expand its niche in the global market for scientific support and bring to the logical conclusion a number of initiated projects. For this, it is necessary to combine the efforts of participants in educational, scientific, technical and innovative processes that ensure the further progressive development of domestic science and the introduction of its results in the real sector of the national economy.

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Р.Б. Жашкенова, Г.Н. Накипова, И.В. Денисов, А.Т. Омарова, А.А. Легостаева

**Қазақстан Республикасындағы стратегиялық жоспарлауды
ғылыми қамтамасыз етуді жетілдіру**

Аннотация

Мақсаты: мақалада адам капиталын дамытудағы басқарудың қажетті құралы және Қазақстанның цифрлық экономикасын құру жолындағы міндеттерді іске асырудың шешуші факторы болып табылатын Қазақстан Республикасындағы стратегиялық жоспарлауды ғылыми қолдау ерекшеліктері қарастырылған. Жаһандану және елдің әлемдік экономикаға интеграциялану жағдайында стратегиялық жоспарлау ұлттық басқарудың иерархиясында ұлттық және аумақтық, салалық деңгейлерде, ұлттық компаниялар мен бизнес ұйымдарының басым көпшілігінің қызметінде қолданылады. Мақалада стратегиялық жоспарлау іс жүзінде бүкіл мемлекеттік жоспарлау жүйесінің басты үйлестірушісі бола бастағаны туралы айтылған.

Әдісі: Қазақстанда отандық ғылымның дамуын және оның нәтижелерін ұлттық экономиканың нақты секторына енгізуді қамтамасыз ететін білім беру, ғылыми-техникалық және инновациялық үрдістерге негізделген стратегиялық жоспарлауды ғылыми тұрғыдан қамтамасыз ету талданған. Регрессиялық модельдің құрылысына сүйене отырып, авторлар ғылыми-зерттеу жұмыстарымен айналысатын ұйымдардың саны мен жоғары және жоғары оқу орнынан кейінгі білім беруге жұмсалатын мемлекеттік шығындардың көлемі зерттеулер мен әзірлемелердің ішкі шығындарының көлеміне қалай әсер ететіні ашып көрсеткен.

Қорытынды: мақалада мемлекеттік білім беру бағдарламасын іске асырылуды ғылыми қамтамасыз етуді жақсарту бойынша ұсыныстар жасалған.

Тұжырымдама: зерттеу барысында Қазақстан Республикасының өзекті экономикалық және әлеуметтік мәселелерін шешуге қажетті стратегиялық жоспарлаудың ғылыми тиімді жетілдірілген жүйесін жақсартуға ықпал ете алатын тұжырымдар жасалған және ұсыныстар берілген.

Кілт сөздер: ғылым, ғылыми қамтамасыз ету, білім беру, стратегиялық жоспарлау, басқару, жаһандану, ғылыми-техникалық үрдіс, ҒЗТҚТ — ғылыми зерттеу және тәжірибелік конструкторлық талдамалар.

Р.Б. Жашкенова, Г.Н. Накипова, И.В. Денисов, А.Т. Омарова, А.А. Легостаева

Совершенствование научного обеспечения стратегического планирования в Республике Казахстан

Аннотация

Цель: в статье рассмотрены особенности научного обеспечения стратегического планирования в Республике Казахстан, которые являются необходимым инструментом управления в развитии человеческого капитала и решающим фактором в реализации поставленных задач на пути построения цифровой экономики Казахстана. В условиях глобализации и интеграции страны в мировую экономику стратегическое планирование применяется во всей иерархии государственного менеджмента, как на национальном, так и на территориальном, отраслевом уровнях, в деятельности абсолютного большинства национальных компаний и бизнес-организаций. В статье отмечено, что стратегическое планирование реально становится главным координатором всей системы государственного планирования.

Методы: авторами дан анализ научного обеспечения стратегического планирования на основе образовательного, научно-технического и инновационного процессов, которые обеспечивают в Казахстане развитие отечественной науки и внедрение ее результатов в отрасли реального сектора национальной экономики. На основе построения регрессионной модели авторами было выявлено, как количество организаций, осуществляющих научно-исследовательские организации конструкторских разработок (НИОКР) и объем государственных расходов на высшее и послевузовское образование, влияют на объем внутренних затрат НИОКР.

Результаты: авторами даны рекомендации по улучшению научного обеспечения реализации образовательной государственной программы.

Выводы: в процессе исследования были сделаны выводы и даны рекомендации, способные содействовать совершенствованию эффективной, более совершенной системы научного обеспечения стратегического планирования, необходимые для решения актуальных экономических и социальных задач Республики Казахстан.

Ключевые слова: наука, научное обеспечение, образование, стратегическое планирование, управление, глобализация, научно-технический процесс, научно-исследовательские организации конструкторских разработок.

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