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Innovative Development of Industrial Enterprises of Kazakhstan in the Conditions of Economic Growth Downturn

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ABSTRACT

The main purpose of the article is to analyze the state and prospects of innovative development of industrial enterprises of the Republic of Kazakhstan. The understanding of innovation processes in the changed economic conditions in the Republic of Kazakhstan related to the falling prices for oil products and a slowdown in economic growth was based on the theory of innovation in the context of cycles and crises. The theory of technological modes was also used.

Together, these methods allowed giving a generalized characterization of innovative development of industrial enterprises of Kazakhstan, identifying the problem points and their qualitative characteristics. A result of the study was the identification of the main features and components of innovative development of industrial enterprises, the capacities of the country to accomplish a technological leap and move to a higher technological mode.

In today's world, there are three models of economic development: innovative, technological and raw materials producing. Since 2002, Kazakhstan has been implementing the tasks of industrial-innovative development of the country. Since Kazakhstan was at the agro-industrial stage of technological development, the key factors influencing the technological development were the efficiency of production and technical re-equipment, the rate of development of new kinds of products and bringing in the up-to-date production technologies. A particular impact of these factors on the technological development of the country was due to the structure and the state of Kazakhstan's industry, the situation in the sphere of science and technology, world market conditions for raw materials, growth trend of the national economy and such historically formed factors as the quality of human resources and raw materials orientation of the structure of industry. However, during the modernization years, the raw materials character of the Republic of Kazakhstan's economy has not been overcome; and today, when the world oil prices have plummeted, the country finds itself in a very difficult situation, and if the conditions for the development of a real innovation-based economy are not created at last, then the threat is not only the decline of economic growth, but also more serious economic and social consequences. The only way for successful socio-economic development of the country is an innovative way.

Keywords: Innovation, innovation activity, new technologies, technological mode, technological multistructurality, research and development (R&D), venture financing, the National Innovation Fund, Growth-funds.

1. INTRODUCTION

The technological level of the country is determined by the structure and efficiency of industrial production, the level of development of scientific potential and the rate of introduction of new technologies.

For countries at different stages of technological development, different sets of factors apply, which have the greatest impact on their technological development in the framework of their industrial policy. So, for the countries at the agricultural stage of technological development, it is important to increase the level of education, to develop basic industries, to create basic infrastructure, whereas for the post-industrial countries the crucial factor of technological development is the development of scientific potential and the adoption of governmental environmental policies.

A feature of the economy of Kazakhstan is its technological multistructurality. If before the beginning of the 80s extended reproduction of the third wave of innovation remained with gradual introduction of the fourth, while maintaining the first and second waves of innovation, the largest lagging behind the global trends was observed in the implementation (in fact, almost complete absence) of the components of the fifth and sixth technological waves.

Moreover, even today, when at the state level numerous programs are adopted and implemented aimed at the innovative development and transfer of economy to the sixth technological mode, the Kazakhstan industry still does not attach particular importance to the level of the technologies being used. Accordingly, the Kazakhstan industrial enterprises do not strive to carry out R&D on their own, are not inclined to invest in the purchase of such products. In this sense, even those enterprises are relatively inactive that are engaged in the production modernization. According to statistics, the level of innovation activity of enterprises in Kazakhstan in 2004-2010 oscillated at the level of 2.3-3.4%; only since 2011 there was observed an increase to 5.7, in 2012, to 7.8, in 2013 and 2014 it reached 8% (The level of innovation activity in the field of innovation). This figure is much lower than in the industrially developed EU countries or even in the countries with economies in transition such as Estonia and Hungary. This is explained by the fact that the structure of industrial production in Kazakhstan tends to concentrate in the traditional mining and oil-and-gas sectors. Meanwhile, the potential of high growth rates in the conditions of crisis and unfavorable external factors (primarily, the decline in the world prices for oil and other raw materials) is exhausted, whereas the retardation of innovative upgrading of the critically outdated fixed capital and the economy as a whole reduces the competitiveness of domestic products not only in the foreign, but also in the domestic market. Therefore, the only source and driver of economic growth can and should be the strategy of innovative breakthrough, the implementation of which requires not only technological, but also economic innovations associated with the development of post-industrial mode of production, the formation of an effective mixed economy, gradual overcoming of the societal polarization and positive structural changes.

2. METHODS

The research methodology is based on the application of the works of foreign researchers of the 30-70s of the XX century J. Bernal, N.D. Kondratieff, B.N. Kuzyk, G. Mensch, J. Adelsky, P. Sorokin, W. Thompson, O. Spengler, J. Schumpeter, Yu.V. Yakovets, F. Jansen, who were, in fact, the founders and followers of the theory of innovations in the context of cycles and crises and who marked the formation of the innovation management theory. In the study of innovative development of industrial enterprises of the Republic of Kazakhstan, the theoretical constructs of J. Schumpeter were important. He substantiated

the discreteness of the development of innovations in time and called "clusters" (bundles) the periods of time during which an outburst of innovation takes place (Schumpeter 1982). Among the later researchers, the "waves of innovation" term became more popular (Menshikov and Klimenko 2014). A West German scholar G. Mensch, the author of the "technical mode of production" term, interpreted the Kondratieff cycle as a life cycle of a technical mode of production, described by the logistic curve (Mensch 1995). An Englishman C. Freeman, a supporter of the idea of diffusion of innovations, formulated a concept of "techno-economic paradigm", which was later developed by his student C. Perez (Perez 2011).

Among the Russian and Kazakh researchers, a widely used term "technological mode" has become an analogue of the "wave of innovation", "techno-economic paradigm" and "technical method of production" concepts. It was first proposed in 1986 by Soviet economists D.S. Lvov and S.Yu. Glazyev in the article "Theoretical and applied aspects of the scientific-technical progress management" (Lvov and Glazyev 1986).

3. RESULTS

It is considered that there used to be 5 technological modes in the world, currently there comes the sixth techno-mode, the time of nanotechnologies. The Russian researchers V.E. Lepsky (Lepsky, *n.d.*) and I.A. Prokhorov (Prokhorov, *n.d.*) are trying as well to predict the main features of the seventh technological mode, which is defined by them as the "Age of cognitive technologies". According to this theory, the advanced countries such as the United States have in their economies more than 60% of enterprises, corresponding to the fifth mode, and they actively develop the sixth mode. In the economies of post-Soviet countries, Kazakhstan being among them, the vast majority of enterprises belong to the third and fourth technological modes, which can be classified as the "era of steel" and the "oil era", and only a small part of them corresponds to the fifth mode (the era of computers and telecommunications). In Russia, there are 10% of enterprises of the fifth techno-mode, whereas in Kazakhstan there are less than 1% (Table 11.1).There is clearly a huge technological retardation.

Table 11.1
The share of various technological modes in the economies of US, Russia, Ukraine and Kazakhstan (Kablov 2010; Rogozin 2013; Vasilenko 2013; Institute of Economics of the Science Committee of the Ministry of Education and Science of Kazakhstan)

	III techno-mode	*IV techno-mode*	*V techno-mode*	*VI techno-mode*
US	–	20%	60%	5%
Russia	30%	50%	10%	–
Ukraine	57.9%	38%	4%	0.1%
Kazakhstan	65%	34.2%	0.8%	–

As follows from the given data, the technological retardation of Kazakhstan from the US is huge. Essentially, the Kazakhstan economy is almost entirely in other, earlier era, the "era of steel", the gap is more than an entire technological mode. The gap between Kazakhstan and these other former Soviet countries, Russia and Ukraine, is also significant.

The technological backwardness of Kazakhstan, especially in the present conditions, when the potential of the raw-material-based economy in the country is completely exhausted, required the development of a new anti-crisis stratagem voiced by the Head of the Republic of Kazakhstan in his Message on November 30,

2015, where one of the main goals is defined as "... the innovative potential of the Kazakhstan economy. It is important to lay foundations for building the economy of the future. We need to develop the competences in the field of smart technologies, artificial intelligence, integration of cyber-physical systems, energy production of the future, design and engineering. It can be done only through the creation of an efficient research-innovation system" (. Kazakhstan in the new global reality: growth, reforms and development).

Today, the technological gap between the vanguard countries and most backward countries is becoming critical. This predetermines the low competitiveness of the products of lagging economies, the growing gulf between rich and poor. The main scientific-technical and innovative potential is concentrated in the vanguard civilizations: the North American, Western European, and Japanese. The "Report on science till 2030" presented by UNESCO in 2015 says that during 2007-2013 the gross domestic expenditure on scientific research in the world has increased by almost a third. Among the countries which invest into science the most are the US (28.1%) and China (19.6%), which is ahead of the EU (19%). To the rest of the world, there corresponds 23% of the total (UNESCO, n. d.).

In 2014, with respect to the relative indicator of the expenditure on R&D, Israel has become the leader, with expenditures rising to 4.4% of GDP. Finland and South Korea have brought the expenditure on R&D to 3.88 and 3.74%. For a long time, the expenditures of Sweden, Japan, and Denmark have been exceeding 3% of GDP. Switzerland has come very close to this group of leaders, its expenditure has reached 2.99%. The United States, being in the 8th place, spends on R&D 2.90% of its GDP. The expenditures of Germany and Austria are close to these figures: 2.82 and 2.75%, respectively. China has dramatically increased its expenditure, 1.70% of GDP.

Currently, Russia is in the 32d place and spends only 1.16% of GDP on R&D; Kazakhstan looks like a failure in this rating, the country is on the 69th place and its expenditure amounts to only 0.23% of GDP (Ranking of the countries in terms of R&D expenditures in 2014). On the other hand, the government planned to increase the state spending on science and innovation to 1% of GDP by the year 2015. Even this extremely low figure has not been achieved.

Comparing the trends of realization of science and technology policy in the developed countries and in Kazakhstan, some fundamental differences should be noted. While the developed countries are characterized by increasing funding of the basic and applied research, promoting the connection between science and the private sector, a reverse trend still remains in Kazakhstan. In these countries, the direct and indirect expenditures on research are stimulated in the private sector, along with continuous intensification of efforts to use scientific and technical potential to address economic and social problems; whereas till the present day, in Kazakhstan there is no system of stimulation by the government of the corporate expenditures on science and innovation, the importance of creation and mastering the domestic technologies is still underestimated.

Even more important thing than the potential of mass resources is the relative position in the world, which is occupied by some or other country in creating new technologies and producing new kinds of products. Technological superiority is directly transformed into economic growth and is an extremely important monopolized resource of economic growth in the modern world. The complexity of this problem lies in the fact that to ensure sustainable technological progress, it is necessary to determine not only its main directions that require top-priority government support, but also the technological level to be achieved. Depending on the technological mode, on the priority development of which the state focuses its efforts, we may expect fundamentally different variants of technological and economic future.

The researchers of this problem have repeatedly said that an important condition for innovation and technological development of the Kazakhstan economy is solving the problem of scientific-technical progress funding, which is impossible without the creation of a system of scientific and technological development funds. In particular, it is necessary to create and develop venture capital funds established with the support of the state "Development Bank".

The innovation-technological development should provide the key industrial structural changes and economic proportions. It is necessary to reconsider the priority of various sectors in accordance with the main economic-political challenges facing the country's economy.

The level of innovation activity in the enterprises demonstrated stagnation in 2013-2014. As the reasons for this, the enterprises indicated "no need for innovation as a result of earlier innovations" (mainly for inactive enterprises), "lack of capital within the enterprise" and "lack of market demand."

In 2013, the most innovatively active enterprises were concentrated in Almaty city, Karaganda region, East Kazakhstan, West Kazakhstan regions, Zhambyl, Aktobe, and Pavlodar regions; and in 2015 they showed some changes (Table 2) (Data of the Statistics Committee of the Ministry of National Economy of Kazakhstan).

Table 11.2
Innovative activity of the Kazakhstan enterprises with respect to regions on 01.01.2015

	The number of enterprises, total	*Among them*	
		Having innovations, number	*Innovation activity level, in %*
The Republic of Kazakhstan	22,070	1,774	8.0
Akmola region	1,173	83	7.1
Aktobe	1,044	68	6.5
Almaty	1,318	126	9.5
Atyrau	798	41	5.1
West Kazakhstan	646	34	5.3
Zhambyl	734	75	10.2
Karaganda	1,957	148	7.6
Kostanay	1,393	164	11.8
Kyzylorda	709	85	12.0
Mangistau	838	20	2.4
South Kazakhstan	2,009	29	6.4
Pavlodar	1,118	95	8.5
North Kazakhstan	1,047	114	10.9
East Kazakhstan region	1,767	99	9.9
Astana city	1,617	179	11.1
Almaty city	3,902	314	8.0

In 2015, the highest level of innovative activity was observed among the enterprises of Kyzylorda (12.0%), Kostanay (11.8%), and North-Kazakhstan (10.9%) regions. It should be noted that today the leaders with respect to the level of innovation activity are the regions with a large component of agribusiness. The regions focused on oil extraction and mining sector are presently among outsiders.

The main types of innovation activities of enterprises using completed innovations are: introduction of new technologies, equipment, materials − 51.2%, scientific research − 12.6%, engineering and design – 3.1%, science and technology programs − 2.0%.

A comparative analysis of the indicators of innovative activity of the Kazakhstan industrial enterprises shows their steady growth in 2004-2013, and then in 2014-2015 stagnation is observed (Figure 11.1).

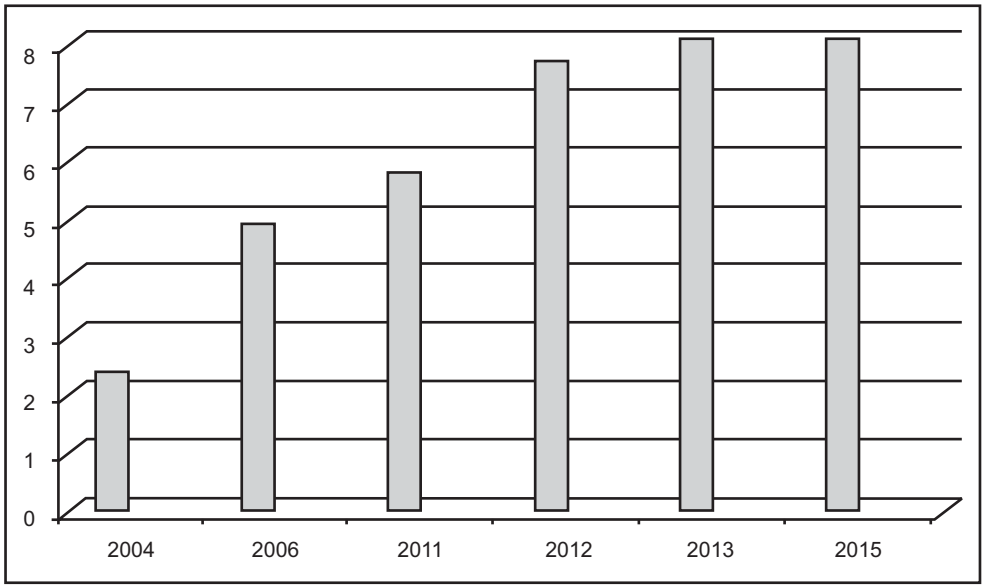

Figure 11.1: The dynamics of innovation activity of the Kazakhstan enterprises in 2004-2015 (Comp. according to the data of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan)

Despite an increase in innovation activity in 2004-2015 by more than three times, from 2.3 to 8%, it is still extremely small. For example, this indicator for Germany is 82.5; for Sweden 75.3; for Australia 60.8%. The task, set in the "Program for the development of innovation and promotion of technological modernization in the Republic of Kazakhstan for 2010-2014", namely, to increase the innovation activity of enterprises in the country to 10% by 2015 has not been realized (Program for the development of innovation and promotion of technological modernization in the Republic of Kazakhstan for the years 2010-2014).

The share of innovative products in relation to GDP during the ten-year period remains at a low level: from 1.27% in 2003 to 1.69% in 2013.

State investments in innovation cannot be matched with the corporate ones in terms of the expenditure volume, the number of scientific personnel, the number of patents obtained, the flow of technical innovations in the form of products, processes and services. According to experts, in most developed countries, the share of corporate spending on research and development in total national R&D expenditure exceeds 65%.

Thus, we can claim that the state strategy aimed at achieving competitiveness by increasing investments into industries and sectors of Kazakhstan's economy with great competitive potential, that is, first of all, the raw-material-extracting ones, is no longer effective and needs a complete revision. Today, Kazakhstan's economy, based on oil, is experiencing a difficult time. The 2015 World Bank report "Kazakhstan: adaptation to low oil prices, the difficult times are ahead" states that "the economy of Kazakhstan is faced with a difficult task of adapting to the great shock of the change in the trade conditions due to lower domestic

and foreign demand" (Kazakhstan: adaptation to low oil prices, the difficult times are ahead. Semi-annual report on the economy). In the conditions of a sharp decline in oil prices, the Kazakhstan GDP growth has decreased from 4.1% (as compared to the same period of the previous year) during the first nine months of 2014 to about 1% during the corresponding period of 2015.

The forecast of the World Bank for the Kazakhstan economy is quite negative; in their opinion, a complex external environment will continue to influence the medium-term prospects of development of Kazakhstan. The World Bank experts see the solution in the diversification of economy to improve the country's resilience to external shocks.

In connection with the new challenges and risks, the new Program of infrastructure development "Nurly Zhol" for 2015-2019 focuses on the development of manufacturing industries. The Program presupposes the concentration of efforts and resources on a limited number of sectors, regional specialization within the cluster approach, as well as on the effective industrial regulation.

To identify the priority sectors, their analysis was carried using a two-factor model. In this case, first of all, we took into account the market prospects (including the volume and growth of the local market and the macro-market), as well as the potential economic effect. Second, we considered the current level and prospects of development of the sector itself.

As a result, the program includes 6 priority processing industries, including metallurgy, chemical industry, petrochemical industry, machine building industry, production of construction materials and food industry.

These branches of industry, in turn, are divided into 14 sectors: iron-and-steel industry; non-ferrous metallurgy; oil refining; petrochemical industry; agrochemistry; chemical products for industry; vehicles, their parts, accessories and engines; electrical machinery and electrical equipment; agricultural machinery; railway equipment; machinery and equipment for mining industry; machinery and equipment for oil refining and oil industry; construction materials; food products.

As the innovative sectors, all the sectors of the so-called new economy are concerned, the development of which is largely based on research and development, including mobile and multimedia technologies, nano- and space technologies, robotics, genetic engineering, as well as search for the energy of the future.

As a result of implementation of the program, by 2020 the share of innovatively active enterprises should be increased to 20% (in accordance with the OECD methodology), the share of innovative products in the total volume of GDP, to 2.5%, while the share of domestic expenditure on research and development, to 2% of GDP (The infrastructure development program "Nurly Zhol" for the years 2015-2019).

The program includes a cluster policy, which is aimed at the transition of the economy to a new technological platform, the formation of the industry branches with high levels of productivity, added value and the degree of processing of goods and services. Moreover, clusters will be created based on the needs of regional development, as well as industry specialization, taking into account their industrial and socio-economic potential.

During the implementation of the second five-year plan of industrialization, the state intends to focus on developing one national cluster in the basic resource sector, three territorial clusters in the market-oriented manufacturing sectors, as well as two innovation clusters in the sector of "new economy".

As for innovation clusters, the first one, created in Astana on the basis of Nazarbayev University, will develop fundamental and applied science. The research centers will be formed there in the field of medicine, 3D-printing, geology, metallurgy, composite materials, as well as energy-saving and construction technologies. Also on the basis of Nazarbayev University, a business campus will be created, where geological, information-technological, medical and other clusters will be developing new research projects.

The second cluster, the "Park of innovative technologies" in Almaty, is designed to solve the problem of transfer of advanced technologies and the industrial introduction of the research results. The priority directions of its development are space, information-communications, mobile, and multimedia technologies.

In the new realities, the drivers of innovation growth should be the venture capital funds. The amount of venture capital in the world is growing rapidly. For the first nine months of 2015, the venture capital investments in the world amounted to $ 98.4 billion, which is more than for the entire year of 2014, when they amounted to $ 88.7 billion (Cherkashin 2015).

Now in Kazakhstan a network of venture capital funds was established in which an active role is played by the state, through a specially created National Innovation Fund (NIF), acting as a fund of funds. The priority directions for the Fund (namely, the technologies for oil-and-gas sector, food processing, information technologies, biotechnologies and the pharmaceuticals industry) account for 70% of financing, the remaining money is used in the sectors of alternative power engineering, nanotechnologies, space technologies.

In 2014, the National Innovation Fund participated in the capital of 10 venture funds: 5 Kazakhstani and 5 foreign. The capitalization volume of 5 domestic venture funds is comparable to the R&D expenditure from the state budget in the year 2006: 13.721 billion tenge (114 million US dollars).

However, since the establishment of venture funds, a full-fledged and quality market of funds has not been formed, though these funds could become an alternative to loans. The market of direct investment funds (DIF) did not strike root at all and did not develop in the country, whereas the funds were not able to implement even half of the planned projects. Almost all of these funds were created with the participation of the state as an anchor investor. In the Kazakhstan market, there are practically no completely private DIFs, *i.e.* without participation of state-owned companies and international development institutions. Given the investment period coming to an end, only four funds are actually considering new deals at present. It should be noted that in the market there are a number of private players, which are structured as investment holdings rather than the direct investment funds.

In Kazakhstan, almost all the operating funds are growth-funds which acquire a minority stake by investing in the development of the already established companies, providing the capital necessary for the expansion of production, developing new products, entering new markets, and so forth.

During 2010-2015, all Kazakhstani funds collectively completed about 12-15 deals, while they were to complete 50-60 of them. Each fund during its investment period had to complete 10 deals on average provided the capital was used effectively (Dnishev and Alzhanova 2015).

Venture capital funds should be considered as a link between the centers of advanced technologies and the enterprises of the real sector of economy. To realize this, it is necessary to solve a number of problems.

First, there is a problem of the choice of projects. So far, the funds do not have an extensive portfolio of applications for funding. This indirectly characterizes a low level of development of the market of technologies in the country.

Second, it is necessary to diversify the structure of the venture financing sources in Kazakhstan. Without the creation of tax incentives, it will be rather difficult to attract money to such funds.

To form a national system of venture financing, it is necessary to determine the conditions of participation of corporate investors – insurance companies, pension funds and banks – which can invest in venture funds, reserve funds and insurance funds for the "risky" operations. To a great extent, this system is conditioned by shortcomings of institutional mechanism, which limits the ability of institutional investors.

Third, today the greatest total risk of venture investment is taken by the state represented by the NIF and a limited range of venture capital funds. The size of resources that are possessed by venture funds now, is equal to half of the total R&D budget in the country (about 0.14% of GDP). Consequently, in the strategy of the venture capital development, an important thing is to determine an acceptable country risk of the venture investment taking into account the practice of developed countries. The share of venture capital investment in GDP in different countries ranges from 0.01% to 0.68%.

Fourth, in Kazakhstan there is no systematic information, which reflects the development of this important sector in terms of specific indicators adopted in the world practice. The information resources of the National Innovation Fund are very limited and offer most general data on the development of the venture industry. It is necessary to organize analytical work taking into account the experience of the European Venture Capital Association; it is important to determine the size of acceptable country risk of the venture investment, taking into account the practice of developed countries.

Today, there is no longer necessary to create growth-funds in Kazakhstan. It is necessary to stimulate the creation of funds, which will help expand this thin layer of medium-sized and large businesses, which will invest not in the operating businesses, but to the promising ideas of talented people and strong teams. For example, the DIFs can finance the business concepts and start-ups of such teams. These projects may represent any industry, not just new technologies. This will allow creating a new generation of business in the country and increasing the quality of GDP growth by reducing the dependence of economy on a few large holdings.

This investment model presupposes the creation of venture capital funds that invest in business plans and experienced teams. A team, the initiator of the project, gets a share in the funded project, which varies from 5 to 20% depending on its success.

Management of the venture funds requires a very high competence and a high level of confidence on the part of the DIF investors. While in the developed markets this barrier has been long overcome, it still exists in Kazakhstan. A venture fund should invest only in the best ideas and teams, choosing only 1-2% of all proposals. To this end, Kazakhstan needs to engage professional and independent management companies in the field of venture funds and, investing in them, should not interfere with their operation.

Since the beginning of the transitional period, the innovation system of Kazakhstan has undergone a significant reduction of resources and personnel. In Soviet times, Kazakhstan was an important scientific research center, where some 40,900 scientists were employed. Most of these scientists and engineers worked on the projects related to defense and space exploration. While the flow of government orders aimed at the study of space has stopped, the staff number of research institutions has fallen sharply. However, this did not result in structural reforms before the adoption of the state program of industrial-innovative development.

In the 2000s, the reduction in the number of research institution employees continued, and in 2007 the number was just 17,000. The crisis situation with the state of scientific and technical personnel required urgent actions, and beginning from 2010 a positive trend began to emerge (Figure 11.2).

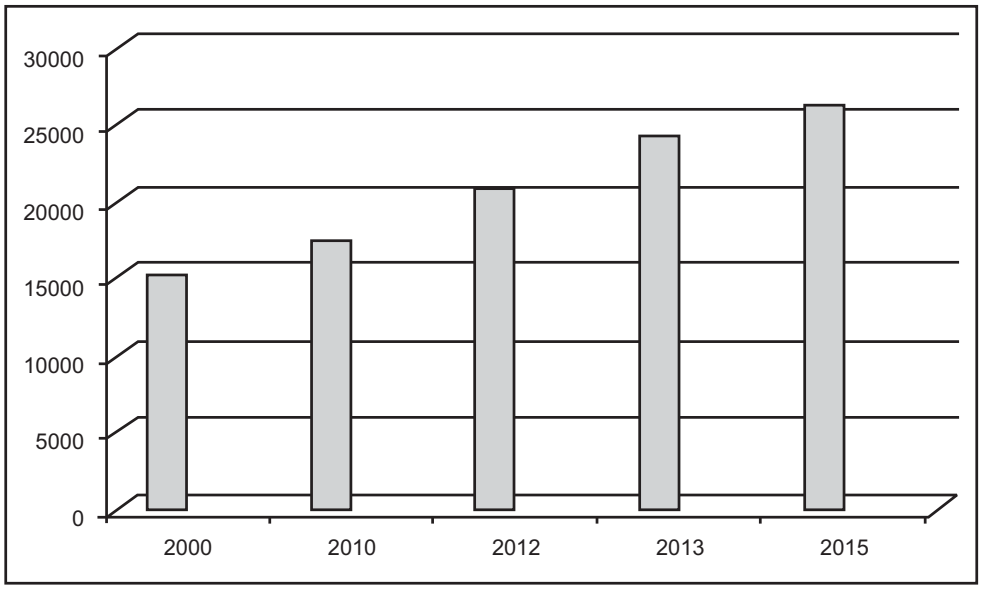

Figure 11.2: The number of scientific researchers in Kazakhstan in 2000-2015 (Comp. according to the data of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan)

In 2015, the number of employees, engaged in research and development, has grown to 25,793 people, which is less even than in 1965 (18.2 thousand people). In terms of availability of scientific personnel, Kazakhstan is inferior not only to the world leaders, but some CIS countries. For example, in Kazakhstan, the number of researchers per 1 million people is 629 people, while in Ukraine 1,774, in Belarus 1,871, and in Russia 3,319.

Clearly, this is a very small figure: so few scientists cannot create a critical mass for the implementation of an innovation breakthrough scenario.

Currently, an acute problem for the industry of the country is the lack of technologists and design engineers for a whole range of modern high-tech areas of production. There is a lack of specialists in organization of innovation activity, scientific and technical-economic expertise, assessment and use of intellectual property, commercialization of scientific research and many other fields.

The figures related to the development of science in the country are not impressive. In 2013, Kazakhstan spent 0.18% of its GDP on research and experimental development (R&D), which is far below the maximum of 0.28% of GDP in the year 2005.

In total, during 2005-2013 Kazakhstan allocated 714 million dollars on scientific research. For comparison, during the same period, the United States spent 396.7 billion, China 290.1, Japan 141.4, South Korea 64.7, France 45.7, and Brazil 31.3 billion dollars (Zubov, n.d.).

According to official data, in 2014 the expenditure on research in Kazakhstan amounted to 66.4 billion tenge, which was 2.5 times more compared to 2010. Hundreds of scientific programs were realized, thousands of patents were obtained. In 2014, according to the Ministry of Education data, the results of 118 research projects were used in manufacturing. The number of researchers has increased from 15 thousand in 2009 to 25.8 thousand in 2015.

In the world practice, science funding is distributed as follows: about 40% corresponds to fundamental and applied research, whereas 60%, to the experimental developments of scientists. On the contrary, in Kazakhstan, about 84% of financing corresponds to the fundamental and applied research and only 16%, to the experimental development. Now the task is set to increase funding for experimental developments in order that scientists together with business can actually implement the research results into practice.

If the development of science is considered as a tool of diversification, creation of new industries and avoiding the dependence on raw materials, then it must be noted that, so far, these investments have not yielded a significant result for the economy as a whole. The share of processing industry in the GDP structure of Kazakhstan has decreased from 11.8% in 2008 to 11% in 2014. In recent years, the processing industry is stagnating: the growth of the physical volume of production in the first half of 2015, as compared to 2013 and 2014, was 0% and 0.3%, respectively. In the machinery-producing industry, for example, in 2015 the production fell by 29.5% against 2013 and by 30.7% versus 2014. The share of the non-resources in the export structure during 5 years has decreased by 4% and amounted to 24% according to the results of 2014 (The site of the National Center for Scientific and Technical Information).

With regard to the technology transfer, just 168 technologies were transferred in the year 2013. Of these, 75% were transferred to the Republic of Kazakhstan at the stage of research and development, which suggests that these products have not reached a higher level of commercialization such as licensing. The leaders in the field of technology transfer are Astana and Almaty cities, Karaganda, Kyzylorda, Pavlodar, and East Kazakhstan regions.

Among the 87 technologies acquired in 2013, 50% were transferred to the Republic of Kazakhstan as the rights to patents, licenses for the use of inventions, utility models and industrial prototypes. This indicates that the technologies were purchased already at the completed stage of commercialization, i.e., at higher prices. With regard to less expensive technologies, at the stage of research, there were purchased only 5 of them for the entire Republic of Kazakhstan.

In 2011, the system of science funding was a modernized. According to the data of the National Scientific and Technical Information Center, out of 4,354 research and development (R&D) works carried out in 2014, 44.7% were grant-funded on the basis of tenders for 2012-2014 and 2013-2015. Thus, half of the funds allocated by the state for research is spent on the work, the implementation of which is not requested by the real sector.

However, the recent years saw a trend of decreasing the share of the research supported by budgetary funds; its lowest level was observed in 2014: just 38% (2013, 53.7%; 2012, 87.1%; 2011, 55.4%; 2010, 77.5%; 2009, 93.1%).

The reason for this is the decline in the share of R&D performed within the framework of scientific-technical programs (STP), although in all previous years it was dominant. In 2014, this share was only 25.8%, while in 2009, 77% of the R&D projects were realized with the support of the program-target financing. Low expenditures for the target STPs by the state companies and holdings testify to a weak innovation component of their activities and the absence of strategic objectives of the new high-tech products creation.

4. DISCUSSION

The performed analysis allows making the following conclusions about the innovation activity of the enterprises of the Republic of Kazakhstan:

1. The innovation activity of the enterprises in Kazakhstan is low, only 8%. For the most part, it is the process innovation in the enterprises (80%), which is manifested by the purchase of new technologies, machinery and equipment mainly from abroad.
2. Currently, the Kazakhstan industrial enterprises do not try to engage in R&D on their own and are not inclined to invest in the purchase of the R&D products. In this sense, even those enterprises that are engaged in modernization of manufacturing are relatively inert. They prefer "turnkey" projects, where the technological solutions are already embodied in the imported machinery and equipment. Such a strategy is also characteristic of the enterprises of other developing countries. There is nothing bad in the strategy of acquisition of new technologies in the form of machinery and equipment. Germany, Japan and Korea have created a strong innovative economy by importing equipment and technologies and their integration into the domestic production processes. However, in these countries, private companies worked within the framework of a strategy of innovative economic development, specifically designed to support the introduction and dissemination of new technologies. Unfortunately, in Kazakhstan such unified innovation policy is still at the stage of development.

5. CONCLUSION

The analysis of the current situation allows assuming that Kazakhstan needs a package of measures to support technological upgrading of traditional industries and establishment of closer links between: the domestic and the international sectors of R&D; domestic industrial enterprises and international technology markets; as well as medium/small-sized enterprises and rapidly developing major enterprises located both in Kazakhstan and abroad.

The venture investment in Kazakhstan is developed very poorly, the system of technology brokerage is not well developed either.

The most useful areas of application of new technologies and technical objects are medicine and veterinary medicine (87 entities), chemistry and metallurgy (74), meeting vital public demands (71). However, medicine and veterinary medicine are not the most active areas of innovation, because there are still no established mechanisms for commercialization of innovations in the Republic of Kazakhstan.

The system of techno-parks is not yet sufficiently developed in the Republic of Kazakhstan (totally, 15 companies).

Thus, in order that the country can make the transition from the economy based on the exploitation of natural resources (with low added value and high salary and qualification of workers) to an innovative economy based on modern technologies, which are used for the production of goods and services with a high added value demanded by the global market, it is necessary to increase the effectiveness and productivity of the National Innovation System (NIS) of Kazakhstan. To do this it is necessary:

1. To promote the innovation activity in the country.
2. To increase the efficiency of state spending on the R&D projects.
3. To provide their tangible socio-economic benefits to Kazakhstan.
4. To establish links between the Kazakhstan science and domestic and international markets.

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