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**CONTEMPORARY INDUSTRIAL INNOVATIVE ACTIVITY**

*The article considers the issues of organization of innovative and research activities, their financing in terms of both theoretical fundamental works and applied studies as well. The key priority in the strategy of innovative development must be the formation of production and social infrastructure. In this regard the organization of industrial innovative activity requires a certain combination of basic elements of innovative process for further restoration of the connection between science and production, however, on a higher, more commercialized level.*

**Keywords:** Kazakhstan; innovation; science; production; commercialization; infrastructure.

**Жібек Давильбекова, Сауле Абдыгаппарова, Марина Матушак**  
**ІНДУСТРІАЛЬНО-ІННОВАЦІЙНА ДІЯЛЬНІСТЬ У СУЧАСНИХ**  
**УМОВАХ**

*У статті розглянуто проблеми організації інноваційної та наукової діяльності, фінансування теоретичних фундаментальних робіт, а також прикладних досліджень. Пріоритетом у стратегії інноваційного розвитку є створення виробничої та соціальної інфраструктури. В цьому аспекті організація індустріально-інноваційної діяльності потребує встановлення основних елементів інноваційного процесу, тобто забезпечення зв'язку "наука – виробництво", але на вищому комерційному рівні.*

**Ключові слова:** Казахстан; інновація; наука; виробництво; комерціалізація; інфраструктура.

**Рис. 2. Літ. 11.**

**Жибек Давильбекова, Сауле Абдыгаппарова, Марина Матушак**  
**ИНДУСТРИАЛЬНО-ИННОВАЦИОННАЯ ДЕЯТЕЛЬНОСТЬ**  
**В СОВРЕМЕННЫХ УСЛОВИЯХ**

*В статье рассмотрены проблемы организации инновационной и научной деятельности, финансирования теоретических фундаментальных работ, а также прикладных исследований. Важным приоритетом стратегии инновационного развития является создание производственной и социальной инфраструктуры. В этом аспекте организация индустриально-инновационной деятельности требует установления основных элементов инновационного процесса, т.е. обеспечения связи "наука-производство", но на более высоком коммерческом уровне.*

**Ключевые слова:** Казахстан; инновация; наука; производство; коммерциализация; инфраструктура.

**Introduction**

Under the contemporary society development, when the power of any country is determined by the level of its scientific and technological development, Kazakhstan is actively moving towards a new technological level of its development. State is now paying much more attention to the enhancement of certain financial mechanisms in science and research. At the current stage of economic and social development a number of problems remain unsolved so far. In particular, under discussion there are the following issues: the role of state, its priorities and mechanisms in organization of innovative activities; how to increase the industrial productivity and efficiency; the

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relationship between science and production; the issues of research results commercialization. All of this predetermines the topicality of our research and its importance.

#### **Literature review**

Innovative strategies of industrial development have got much attention in academia worldwide. Inter alia, one can mention Boylan M. (1977), Stieglitz D. (1998) and many others. However, in the CIS countries not much attention has been paid to this issue. We can mention here F. Amosov (2008), P. Nagapetyan (2008), A. Korzhov (2007) and some other authors.

The **research subject** is the innovative industrial activity under the current economic conditions.

The **key objective** of the research is to determine the priorities and the mechanism of innovative activity organization under the contemporary economic conditions.

**Methods of the research** are: generalization, synthesis, comparative analysis of the leading world practices, review and analysis of the scientific literature and statistical data on the problem.

#### **Analysis of industrial innovative activity in Kazakhstan**

Innovative development as a leading direction of state economic policy is rather promising, even when considered within the global challenges, therefore, the issue is widely discussed at various meetings of all levels. In particular, socioeconomic modernization as the key vector of Kazakhstan's development has been emphasized by Nursultan Nazarbaev in the latest state strategic document titled "Kazakhstan-2050" (December, 2012). Generally, in all recent documents and speeches the national leader highlights the necessity of innovations' practical introduction for further socioeconomic modernization of the country.

Under the current conditions of postindustrial society and knowledge economy the key role belongs to intellectual capital as the major component of intellectual activities and generally to all intangible assets available at R&D institutions, universities and high-tech companies.

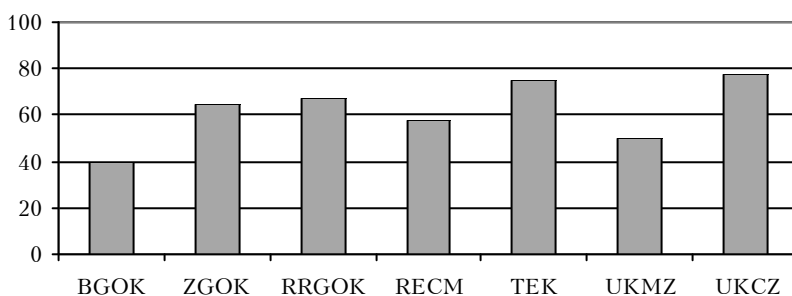
Theory and practice of intellectual activity management, development of creative thinking and establishment of science-based economy are the new important directions in Kazakhstan's transformation from being an export-based purely staples economy to innovative economic development based on technological reequipping of all sectors. The leading role in it is to be played by creative workforce. Brand new, original ideas must be in the forefront to solve the most urgent problems.

University research in the USSR was not always financed directly by state but by large industrial enterprises which had a special expenditure item for R&D. University researchers were participating in such R&D projects at enterprises, thus promoting their technological development. Numerous inventions of those times are still widely used at the same enterprises. For example, at such giants of Kazakhstani iron ore sector as "Karmetkombinat" (now renamed "Arcelor Mittal Steel Temirtau"), JSC(O) "Kazakhmys", "Kazakhalyuminium" and some others.

At the same time the state directly supported the fundamental theoretical studies, while most of the applied studies were integrated into the R&D projects of enterprises. In the times of USSR sectoral sciences were widely developed and the country used to have quite many sectoral research institutions. However, many of them

were mostly busy with repair of already existing equipment for industries, instead of inventing new ones. Reconstruction and modernization of the outdated equipment was their major activity, on which too much knowledge and workforce were spent. Though in some sectors new solutions and new equipment were still developed, e.g., in iron ore processing, machine-building, light and food sectors and some others.

It is necessary to note here that previously, even when financed by state and invented in sectoral research institutions, many truly innovative elaborations, techniques and technologies were never actually applied to real practice. Here there is an obvious structural break (gap) in the relationship between science and research development and real economy. And this most probably is the major cause for moral and physical depreciation of key assets at industrial enterprises (see Figure 1 for a sample statistics of one of the leading Kazakhstan's enterprises).



Russian acronyms stand for separate units of the company.

Source: Authors' own calculations on the official statistics data.

**Figure 1. Physical depreciation of technological equipment at JSC(O) "Kazcynk", in %, 2011 data**

Figure 1 gives an obvious demonstration of the level of both moral and physical depreciation in most of Kazakhstan's research centers and laboratories. Besides, after the Soviet split and during the period of transition to market a significant volume of equipment was trivially plundered and/or lost in the processes of privatization and ownership change.

However, the most significant loss is the loss of scientific HR potential after nearly all sectoral R&D institutions were closed. In the USSR nearly half (47.5%, as compared to 25% in the USA same period, for example) of all researchers were working in technical sciences, after the country's split low salaries and nearly total absence of work ruined the image of this profession (Nagapetyan, 2008).

Only recently the state returned to the idea of supporting the development of science and research by means of: special-purpose target financing of innovations; grants for innovational projects and special state programs on technical expertise.

The new Law of the Republic of Kazakhstan "On Science" (February, 2011) presents the brand new model of its management, as proposed by the President on September, 4th, 2009. This new law brings about quite radical and systemic changes in the field of science and research. For the first time legislation divides the functions of administration and expertise. From now on the decision on implementation of research projects are to be made by the science community itself. For this, new scientific institutions have been established in Kazakhstan – national research councils

(NRC) and the National Center of State Science & Technical Expertise, in which independent domestic and foreign experts would evaluate the proposed projects. The membership lists for these national research councils are to be settled by special decrees of the Republic's Government.

Each year around 60 mln USD are assigned by the state on financing of innovative activities in various industries. All these projects are to be financed by grants and by means of special-purpose target financing. Only in 2012 such grants covered nearly 98 mln USD, while 160 mln USD were distributed on special-purpose research projects. Altogether, we can say that the state has started financing science and research at all levels and the total government expenditures on science and research have the growth trend. In particular, in 2014 the government spending on science was 178 mln USD, and in 2012 the same spending was already 320 mln USD, thus demonstrating the growth by 80%. The major clauses in these expenditures include: infrastructure for research institutions; target financing of equipment purchase; training for young experts abroad. Concentrating on these particular directions in state spending promotes further development of science and universities in Kazakhstan.

Recently, the state has reevaluated its vision of the current situation and made the decisions on structural reformation of innovative sectors, creation of an efficient system of material stimulation of innovations creation and freedom in private initiative in this field. Therefore, the innovative complex has begun its modifications, transforming in accordance with the common logic of the country's development. During the recent years we can observe a real innovative dash in the country: the powerful economic, technological, scientific and human potentials are being strengthened by the efficient mechanisms of personal motivation, individual initiative and freedom of choice. Numerous enterprise in the country have started orienting on innovative activity. Kazakhstan demonstrates a significant progress in this field. Let's look at the Global Competitiveness Index rankings, for example. In 2012 Kazakhstan was ranked 51st with 4.4 pts., this is 21 positions higher than in 2011 (ranked 72nd). Looking at this progressive dynamics, we also need to highlight that at the same time Kazakhstan was shifting from the group of countries with transitive economies (the so-called second stage, or the stage of efficient development) to the group of countries at their third stage (the stage of innovative development) (Global Competitiveness Report, 2012).

#### **Priorities and mechanisms of innovative activity arrangement**

Despite a significant progress in recent years, much space and potential are still left for further development in terms of innovations. The constructive approach of state authorities, combined with the current potential, creativity and initiatives would hopefully lead to further innovative transformations.

The current stage of economic development shows that there is a necessity for accumulation of economic resources which would further be used for radical modernization of the country's technological complex. There is a real chance to catch up the world technological leaders, even though several stages in the country's technological development are still missing (Schumpeter, 2007; Hamilton, 2004; Myasnikovich, 2003; Boylan, 1977).

The developed system of international labour division guarantees further development of other directions in international exchange. The most vivid examples of this

would be the high-tech industries of Japan and the US, the latter being the unquestionable leader in the production of microchips, while Japan is leading in the field of matrix patterns.

The current stage of Kazakhstan's economic development predetermines the key components of the state innovative strategy: human potential development; production capacities modernization; concentration of efforts on several most important directions in production; establishing innovative infrastructure; motivating the innovative behavior of individuals. At this stage, we can already acknowledge that forced innovative policy has become the priority for state authorities.

For further realization of the innovative policy the most advanced technologies must be promoted within the most strategically important industries (Boylan, 1977; Amosov, 2008).

The task to increase labour productivity presupposes radical modernization of all industries in the country. Innovative modernization should include regular purchases of foreign most advanced equipment. At the same time the potential of national production should not be ignored. In particular, the domestic machine-building sector needs state support in the form of "starting impulse" and certain beneficial preconditions for competitiveness increase. For this, the tasks within state innovative policy must include financial support for machine-building enterprises, inviting the most prominent national and foreign scientists in the related fields and active promotion of private investments into the sector.

Special conditions should be created, so that national enterprises could take use of leasing and rental mechanisms to get the most advanced equipment and machines. This in turn requires enterprises have access to real financial resources of the country's banking sector. At this the state has to guarantee the security and execution of such operations.

Later, the purchased high-tech equipment demands the personnel has the correspondingly high level of qualifications, thus the task to restore the system of professional training emerges. Such system must function not only by means of enterprises, but with direct state support and participation.

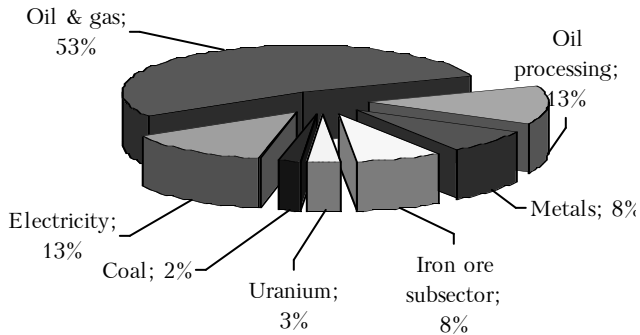
At the current stage the share of investments into the fixed capital of processing industries is much lower than the same share for the subsectors of mining (see Figure 2 for more details).

In the process of investments attraction the priority should be given to the processing sectors and subsectors for their technical and technological renovation which would further promote the competitiveness of national end product.

One of the most important directions within the national strategy of industrial innovative development of Kazakhstan is the creation of infrastructure and environment which would be attractive for the sectors and businesses other than raw-materials and mining related. Advanced production and social infrastructure in any country is the necessary prerequisite for enhanced qualitative economic development (Korzhov, 2007).

Establishment and further development of innovative infrastructure will speed up all the processes related to innovations. First of all, it is important to organize the process of innovations' promotion from the stage of a scientific idea to the stage of an end product. This is why new elements of innovative infrastructure are to connect

enterprises working at different stages of an innovation cycle. Innovators' activities must be coordinated by providing them with material, technical information support etc. And this means that innovational structures like technoparks or technopolises are to regulate efficiently all the processes related to innovations performing in this way the joining function, leaving to innovative subjects only the purely scientific and technological tasks.



Source: Constructed by the authors basing on state statistics.

**Figure 2. Structure of investments into fixed capital by industrial sectors and subsectors in Kazakhstan, 2011**

Financing of innovative activities is mostly predetermined by venture mechanisms development; the existence of preferential crediting and target financing is also important.

The system of motivation for innovative behavior includes solving several tasks. First of all, conditions must be formed under which introduction of innovations would be beneficial and realistic for enterprises within the real sector. This can be achieved by means of indirect financing, tax preferences and also by introducing the policy of accelerated depreciation for particular types of equipment etc. (Myasnikovich, 2003).

A special pattern must be developed to demonstrate how an intellectual product of research and experimental activities performed within an innovative chain would gradually transform into its end market shape through patenting, licensing and pre-production prototype. Only in this case the state can participate financially.

Secondly, the core structure of innovative processes must be changed. The connection between science and production must be restored but on a much more commercial level. Keeping this in mind, attention should be concentrated first of all on the restoration of connections between sectoral sciences and real production.

In the context of research results' commercialization and their inclusion into the processes of real economy it is also worth noting that in Kazakhstan such practices are still novel and underdeveloped and there are several legal gaps concerning the organization of rights' transfer from individual researchers to the enterprises which are to commercialize new technologies further.

All the enterprises involved in innovative processes must have the right for financial support in the form of tax preferences for a term of an innovative project. Many developed countries, the USA including, apply the well-known mechanism of public-private partnership to realize innovative projects and commercialize innovative technologies (Boylan, 1977). The state on the conditions of share participation can

influence these processing stimulating the private sector and attracting it for participation in innovative projects. The government can oblige its ministries involved in high-tech production spend up to 10–20% of their research budgets on organization of joint research projects with business entities. Participation of business in such joint projects increases the chances for further implementation of innovations into real production and their consequent commercialization. Private business has more experience in analyzing the commercial potential of an innovative project and is more interested in successful commercialization.

### Conclusions

Recently, Kazakhstan's state authorities have started paying much more attention to organization of innovative production. In our opinion, for opening new fields for competition, based on science technologies, further concentration of material, intellectual and technological resources is needed on several directions at the same time. Their coordination would be possible only under the leading role of state. Efficiency of such projects depends largely on financing which must be sufficiently full and timely. Such financing must be provided largely by state, besides, the state should also control and stimulate private provision by business in this field. It is also of vital importance to ensure the protection of local producers of science-driven products from unfair competition at external markets. National innovational products must be wisely promoted, in some cases by political means. Therefore, all scientific and engineering efforts must be centered and concentrated on several, the most critical directions of utmost priority. Besides, infrastructure must be further developed and more convenient conditions created, including a special "regime" for promotion of innovative products. Promotion must cover all the stages, from a scientific idea till the end product. Market support instruments must also be used widely, first of all, leasing and franchising.

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