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THE STATE AND PROBLEMS OF COMMERCIALIZATION INNOVATIVE TECHNOLOGIES IN KAZAKHSTAN

In the conditions of the 4th industrial revolution, the role and importance of innovative technology is expanding the practice of commercializing the results of scientific research. This practice is relevant not only for the post-Soviet states, but also for such highly developed countries as Norway, Switzerland, etc. The agenda is not just an innovation infrastructure, but also a commercialization infrastructure.

The article examines the state of affairs on granting innovative grants for 2013-2017, analyzes the indicators of the competition for grant financing of commercialization projects for scientific and / or scientific and technical activities. Based on the results of the analysis, the authors propose a number of recommendations.

Key words: innovative technologies, commercialization of scientific developments, infrastructure, grant financing of projects.

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Қазақстанның инновациялық технологияларды коммерциализациялау жағдайы мен мәселелері

4-ші индустриалды революция жағдайында инновациялық технологияның рөлі мен маңызы ғылыми зерттеулер нәтижелерін коммерциализациялау тәжірибесін кеңейтеді. Бұл тәжірибе тек посткеңестік кеңістіктегі мемлекеттер үшін ғана емес, сондай-ақ Норвегия, Швейцария және т.б. сияқты дамыған елдер үшін де маңызды. Бұл тұста мәселе тек инновациялық инфрақұрылым ғана емес, сонымен қатар коммерциализациялау инфрақұрылымы да болып табылады.

Мақалада 2013-2017 жылдарға арналған инновациялық гранттар беру бойынша жүргізілген жұмыстар қарастырылады, ғылыми және / немесе ғылыми-техникалық қызметті коммерциализациялауды гранттық қаржыландыруға конкурстың көрсеткіштері талданады. Талдау нәтижелері бойынша авторлар тарапынан бірқатар ұсыныстар жасалынды.

Түйін сөздер: инновациялық технологиялар, ғылыми зерттеулерді коммерциализацияландыру, инфрақұрылым, жобаларды гранттық қаржыландыру.

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Состояние и проблемы коммерциализации инновационных технологий в Казахстане

В условиях 4-й промышленной революции становится значимой роль инновационной технологии, расширяется практика коммерциализации результатов научных исследований.

Рассматриваемая практика актуальна не только для постсоветских государств, но и для таких высокоразвитых стран, как Норвегия, Швейцария и др. На повестке дня стоят вопросы не только инновационной инфраструктуры, но и инфраструктуры коммерциализации.

В статье рассматривается состояние дел по предоставлению инновационных грантов за 2013–2017 годы, анализируются показатели конкурса на грантовое финансирование проектов коммерциализации результатов научной и (или) научно-технической деятельности. По итогам анализа авторами предлагается ряд рекомендаций.

Ключевые слова: инновационные технологии, коммерциализация научных разработок, инфраструктура, грантовое финансирование проектов.

Introduction

Commercial implementation of innovations is impossible without the formation of individual elements of innovation infrastructure, which together lead to the commercialization of the results of scientific and technical activities of the organization. Accordingly, the infrastructure of commercialization of innovations can be defined as a set of interrelated service structures that make up and / or ensure the implementation of the results of the intellectual activity of its employees. Commercialization can be part of an innovation infrastructure, and may work indirectly [1, p.104]

Experimental part

Stimulation of commercialization of technology is carried out not only for the sake of profit, to some extent, commercialization is a bridge between science, business and the state, allowing to realize the model of the triple helix put forward by Henry Itskovich [2]. In the domestic economic literature, the problems of the commercialization of innovative technology were considered in the writings of Alibekova G. Zh., Elyubaeva A., Tulesheva G. etc.

The purpose of analyzing the process of commercialization of innovative technologies is to show the state and outline the ways to improve them.

The source of information for the analysis are:

- electronic resource of the Committee on Statistics of the Ministry of Education and Science of the Republic of Kazakhstan;
- official internet resource of NATD;
- annual report of the NATD;
- the official Internet resource of JSC «Science Foundation».

Results and discussion

The process of creating conditions for the commercialization of scientific developments in the Republic of Kazakhstan was launched in 2012 with the granting of grants for the commercialization of technologies.

To date, state grants for commercialization are provided by two agencies: the Ministry of Investment and Development (MID) of the Republic of Kazakhstan represented by JSC NATD and the Ministry of Education and Science represented by Center for Commercialization of Technologies LLP (until 2015) with the support of the World Bank, the Management Group projects (since 2016) with the support of the World Bank, JSC «Science Foundation» (since 2016) [3; 4; 5].

In general, the country has a low level of filing applications for the commercialization of technology and for the production of high-tech products, which is an indicator of ineffective activity of infrastructural elements of innovation activity.

The statistics on granting innovative grants are presented below (Figure 1).

From the information provided by JSC «NATD» statistics on grant financing of innovation for 2013–2017. We can conclude that the process of commercialization under the agency is weak. For 4 years out of 107 applications received, 19 projects were approved and financed.

Analysis of already completed grant projects shows that most projects on technology commercialization are not high-tech and that many projects have not found their final consumer. Thus, analyzing the ICT projects financed up to 5 million tenge, we can see that mobile applications have no more than 100 consumers and obviously can not be profitable.

In 2008, the program «Commercialization of Technologies» was implemented by the Ministry of Education and Science of the Republic of Kazakhstan, with the support of the World Bank. The program was intended to support Kazakhstan innovators and bring science closer to production. Since the beginning of the program, more than 1,500 applications have been considered, and investments of 180 million tenge have been attracted. For the amount of 5.9 billion tenge, 65 projects were supported, 40 of which reached the level of sales of finished goods for a total of more than 900 million tenge [7; 8]. The program «Commercialization of Technologies» was completed in 2015.



Figure 1 – Statistics on the provision of innovative grants for 2013-2017 years. [6, p.3]

Since 2016, along with JSC «NATD» and LLP «Center for Commercialization of Technology», the Fund for Science of Kazakhstan is the operator of grant financing of projects for the commercialization of scientific and (or) scientific and technical activities (RNSTD) results. Below in the figure, the results of the competitive selection for grant financing of commercialization projects are presented (Figure 2).

As can be seen, from Figure 2, of the 337 applications for commercialization received, only 31 (9.2%) were approved, that is, almost every tenth project. For the Science Foundation, which only finances research teams, this number shows a low level of scientific and technical feasibility of the proposed projects. This ultimately negatively affects the overall level of innovation development in the country, and is a retarding factor in the growth of innovative enterprises.

Large number of applications (22.25%) were rejected already for admission for formal reasons, even without having passed the examination. Often this is the result of poor knowledge of the authors of the project about the timing of the competition or are not sufficiently aware of the order of registration of competitive documents.

In early 2016, the Government of the Republic of Kazakhstan and the World Bank launched

the «Project for the stimulation of productive innovations». Within the framework of the grant program for senior and junior research workers, the Council reviewed over 400 applications and 33 applications were announced winners for obtaining grant funding by the end of 2016.

Figure 3 shows the general results of the competition for grant financing of commercialization projects of the PSSTA for 2016 in the context of regions according to the Science Foundation (Figure 3).

As can be seen from Figure 3, most of the projects financed in 2016 fall on the city of Almaty and the cities of Astana and Karaganda. In the context of the regions, there is a very low level of approved commercialization projects, in particular six projects covered 1 or 2 projects, and out of seven regions there is no project, which is an indicator of low scientific potential and innovative development of the vast majority of regions. Also, this indicator is caused by the ineffectiveness of the functioning of infrastructure elements of innovation activity, which are represented in the form of technological parks in almost all the regions participating in the competition [14].

The mere fact that commercialization and production is financed separately, from the entire cycle of the innovation process, in itself reduces the

effectiveness of both the project and its successful implementation. It is worth remembering that the innovation process is a complex phenomenon and without appropriate scientific and marketing support the projects are doomed to failure.

For Kazakhstan, the principle of the single operator of innovation activity of JSC «NATD» is of great importance – how grants are handled and their further development. It is also important how

the structural elements of JSC «NATR» interact. In spite of the fact that technological parks, venture funds, commercialization bureau are elements of one system, it is very difficult to trace the inter-linkage of these organizations [15]. So, for example, projects that received a grant from JSC «NATD» do not undergo a full cycle of the innovation process at the agency, and projects that do not win a grant are not sent to the appropriate structures for further development.

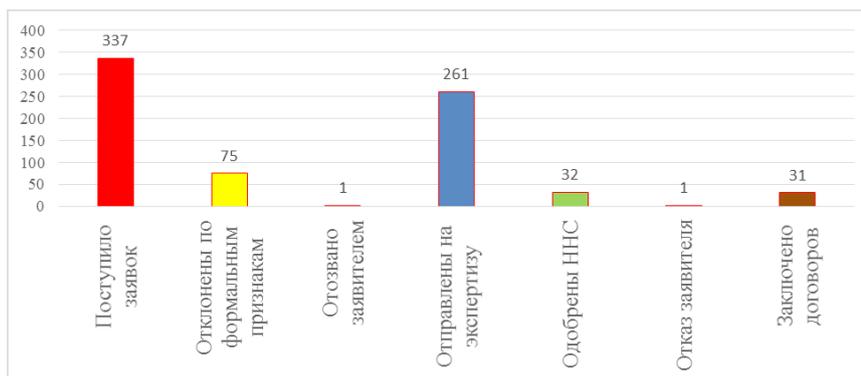


Figure 2 – Results of the competition for grant financing of projects of commercialization of PSSTA by the number of projects [3, p.3]

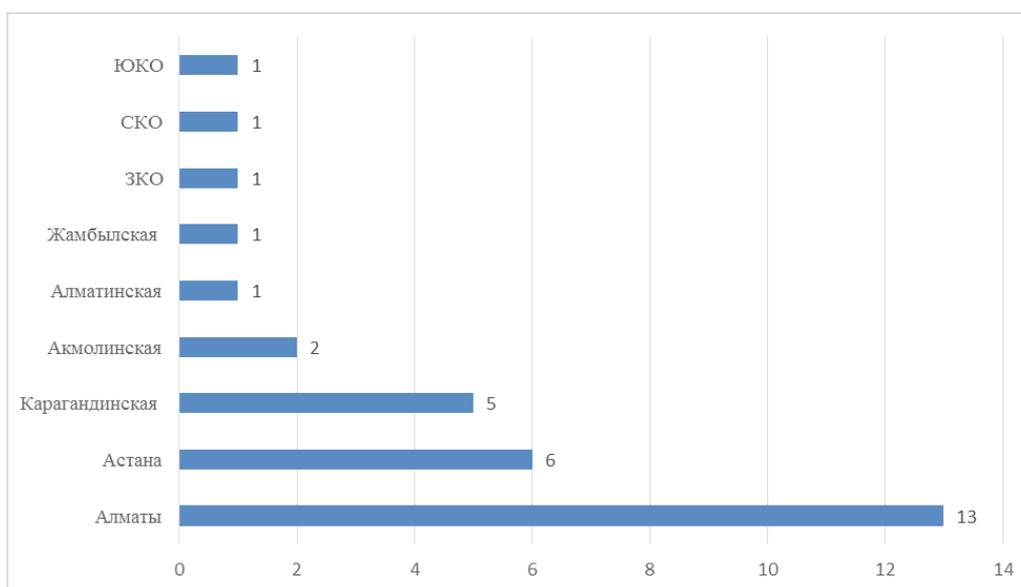


Figure 3 – Number of approved projects for grant financing of commercialization of PSSTA in the context of regions [3, p.3]

In the standard scheme of grant financing of commercialization of technology, one can see a linear model that does not cover the whole cycle of the innovation process and does not have full control over the distribution of grant funds. In addition, the

scheme does not envisage the further development and finalization of potentially profitable projects that were announced for grant financing [6, p.3].

Along with this, one must take into account the fact that not all innovators have entrepreneurial

skills and it makes sense to organize the project's co-financing or provide outsourcing services to form a full-fledged team to bring the innovative product to the market and its further commercial implementation.

Additional support for innovative activities in Almaty is provided by business incubators, in particular the business incubator MOST, which not only provides the innovators with premises, but also searches for venture financing of projects, conducts accelerating programs and provides mentoring programs for young entrepreneurs.

With the largest number of innovative infrastructure in the country and the highest domestic costs for R & D, the 14th place out of 16 does not paint the former capital. What is the reason for this state of affairs in the scientific and research sphere of Almaty? In our opinion, one of the reasons is the old approach to the selection of the research subjects, which do not take into account the needs of the market economy. Another reason is that international corporations are operating in the country, which have their own research institutes, centers where fundamental scientific problems are being developed, and they also work on the order of production, not only lacking financial means, equipment and materials. Kazakhstan's institutions have lost previous connections. There are many other reasons, which is the subject of special study [16].

The indicators of Astana on the volume of production of innovative products in 111.2 billion tenge significantly exceed the average value for the RK. The internal costs of R & D in Astana amounted to 13.5 billion tenge, which significantly exceeds the average value for the republic. Also, in Astana, there is a high level of innovative activity in comparison with other regions of the Republic of Kazakhstan. From the elements of the innovation infrastructure in Astana, a regional technopark of Astana and an intellectual and innovative cluster at the Nazarbayev University have been formed. In the same way, the majority of national scientific centers and investment holdings are concentrated in the city. It is also favorable that JSC «NATR» is located in the city – a single operator that develops innovative activity in the country, 2 branch design bureaus and 3 commercialization offices of technology [17]. Of course, the number of the latter, with billions of expenditures for scientific and technical research, are scanty. Consequently, the subject of the research and the researchers themselves should initially be aimed at selling the results of their work, on their introduction into production. Despite the fact

that the innovative infrastructure in Kazakhstan is practically formed, it is too early to speak about its effectiveness [18]. As analysis shows, the presence, and even the abundance of infrastructure elements of innovation activity does not guarantee the innovative activity of the enterprise in the region and the large volume of production of innovative products.

The Global Innovation Index Report notes that R & D funding in emerging markets is inadequate, which has slowed down their economic growth [13, p.25]. This provision applies to Kazakhstan, where low R & D costs are observed, although we all know that: «Investments in innovation are an important condition for increasing the pace of long-term economic growth» [13, c.32]. Therefore, infrastructure facilities serve as an important basis for the development of the economy, but the country should focus not only on building its own research capacity, but also to know what and why research is needed in order to compete successfully in a rapidly changing global economy [19].

In the current economic climate, mobilizing new sources of growth and taking advantage of the opportunities offered by global innovation become a priority for all stakeholders [20]. In the future, the search and use of such opportunities will naturally increase commercialization in the country, will stimulate the growth of innovative activity of the enterprise and, on the whole, will enhance the innovative culture in the country.

Conclusion

Summarizing the analysis of the effectiveness of innovation infrastructure and analysis of general indicators of innovation activity by region, it is possible to identify a number of problems that need to be addressed:

- Firstly, the elements that make up the country's innovative infrastructure do not correspond to the conditions necessary for their free interaction. Technological parks, design bureaus and technology transfer centers are for the most part isolated from each other;

- Secondly, technological parks, FEZs and other infrastructure elements do not fulfill their primary function, do not use the scientific potential for the development and implementation of innovative projects;

- Thirdly, the low share of researchers and scientists engaged in research and development in technological parks and design offices negatively affects the functioning of the entire innovation infrastructure of Kazakhstan;

– Fourthly, the costs of research and development are still minimal. Innovative activity of the business sector does not show a significant positive dynamics, therefore, the share of innovative products in GDP still remains at a low level.

As practice shows, the creation of an innovative infrastructure does not guarantee that an «innovative boom» will take place in the country. To achieve the effective functioning of the infrastructure, it is necessary to solve a number of issues related to the involvement of scientific personnel; financing of activity of technological parks, design bureaus and technology transfer centers; improvement of normative and legislative and legal bases regarding the activity of technological parks; and the integration of innovative infrastructure elements into a single system.

In Kazakhstan, there is an understanding that weak or missing links between science

and production are one of the main obstacles to the development of the national innovation system. It is necessary to significantly enhance the scientific and organizational potential of the parties interested in innovations, their desire and motivation for cooperation. Changes in legislation can improve the basic conditions, but this is not enough. It is necessary to interest the subjects of economic activity in innovations, to make enterprising the organizations that generate knowledge. The raw orientation of the economy of Kazakhstan creates considerable difficulties for the redistribution of productive resources in favor of new industries. Solving this task requires a long-term vision, determination and a planned strategy to ensure the independent functioning of the system, in which the role of the state is gradually reduced to the coordination of market mechanisms.

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