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**INSTITUTIONAL CONDITIONS OF  
DEVELOPMENT OF AN  
INNOVATIVE INFRASTRUCTURE IN  
UKRAINE**

**ABSTRACT.** The article deals with institutional problems of creation and functioning of an innovative infrastructure within the limits of National Innovation System (NIS) of Ukraine. Author analyzes more than ten years of formation of technological and scientific parks, business-incubators, the regional innovative centers; he exposes shortcomings of legal and organizational maintenance of an innovative infrastructure of Ukraine. The article provides basis for propositions, aimed at the improvements of development of a network of objects of an innovative infrastructure, in particular its industrial-technological and information-analytical subsystems with use of programming and target-oriented methods.

**JEL Classification:** Q31, Q35 **Keywords:** Innovative infrastructure, technopark, scientific park, innovation center, institutional conditions, target-oriented programs, legal background.

**Introduction**

One of decisive pre-conditions of transition of the economy to an innovative path of development is the creation and effective functioning of National Innovative System (NIS). The leading role in NIS has to be played by the innovation infrastructure, as a subsystem with the most effective components in terms of production and commercialization of innovations, which serves the innovation sphere and provides effective realization of innovation processes.

First of all, it is a question of creation of a network of innovative structures (technoparks, technopolises, business-incubators, innovative-technological centers, the centers of a transfer of technologies), formation of the developed infrastructure of scientific and innovative activities (innovative stock exchanges, the centers of collective utilization of the scientific equipment and devices, the centers of consulting, and also information-marketing, leasing, advertising, auditor and certification firms).

The purpose of development of an innovative infrastructure is creation of conditions for association of all participants of innovative process by the way of institutional transformations and economic incentives. It has to comprise all stages from generating of knowledge to realization of innovative production in the internal and external markets.

In the process of formation of a network of technoparks, the innovation centers and business-incubators, special attention should be turned on intensification of work of small and average innovative business with the help of these organizations, growth of a technological

level of production, creation of new working places for highly qualified employees in each region.

In Ukraine, from the very beginning, technoparks have been developed in non-systematic, incidental way, without corresponding long-term state program. To the great extent, their active development have relied on the initiatives of local authorities (especially in the Western region), individual research institutes, the enterprises, business associations. The special law on state regulation of activity of technoparks was passed in 1999. Even bearing in mind amendments to it and the passing of corresponding statutory acts of the Government, legal foundations of technopark activities need further changes in a direction of strengthening of a role of an innovation infrastructure in assistance of development of innovative business and in rationalization of a system of control.

### **The present state**

Formation of active infrastructural objects is originated from orientation of Ukraine to innovative model of development of economy. It should create conditions for effective functioning of the most viable enterprises of small and medium innovation businesses. It is especially important in conditions, when the imperfect market environment does not allow to influence actively the formation of innovation sphere.

In these conditions, the state strategy of support of an innovative infrastructure and its individual elements could become one of the most powerful levers of development of innovation activities.

The problems of formation and functioning of an innovative infrastructure and its elements are described in publications of numerous Ukrainian scientists. It is possible to mention V.P. Seminozhenko, V.P.Solovev, D.M.Chervanev, A.A.Masur, I.B.Gagauz among others. Foreign authors V.E.Shukshunov, S.V.Valdajtsev, L.N.Neharosheva, B.Santo, D.Ashauer, D.Bill, D.V.Gibson, and others also contributed to the studies of these problems.

However, the analysis of results of the researches connected with the subjects under examination, testifies that questions of creation institutional environment for effective functioning of innovation infrastructure need the further scientific researches.

The purpose of the article is the scientific justification of strengthening of a role of institutional factors in development of an innovative infrastructure, and, in particular, development of legislative and statutory background and a programming and goal-oriented control of these processes.

### **Diagnosis of the problems**

Idea of creation of technological and scientific parks and the innovative centers in Ukraine started from the creation of agrarian technopark "Brody" (the Lvov region) according to the Decree of the President of Ukraine from 25.03.1994г. №113/94 «About economic-technological experiment in Brody district of the Lvov region» and the corresponding decision of the Cabinet of Ministries of Ukraine from 14.06.1994г. №396. Realization of the experiment was scheduled for 5 years. However, despite of granting of some economic privileges, including introduction of a special regime of foreign investment, the experiment have been finished ahead of schedule due to some subjective reasons, in particular counteractions from the side of the local authorities.

It is necessary to note a weak innovation orientation of production of this agrarian technopark (basically, agricultural products and garments). There was no scientific centre or university there, despite of the fact that scientific and methodical support of the Brody technopark experiment has been assigned to the National Academy of Sciences of Ukraine.

The economic experiment of creation of the resort-polis Truskavets was more successful. It was created on the base of Truskavets valeological centre. According to the Decree of the President from 18.03.1998, N. 199/98 «About an economic experiment in resort-polis Truskavets, the Ukrainian Parliament gave it the status of a special economic zone in February 1999. This status is accompanied with corresponding privileges.

Attempts to create objects of innovation infrastructure were made at a regional level in a Kiev, AP Crimea, and in some regions, however majority of them have failed, mainly because of the lack of necessary legislative base on the status of these structures and the lack of special forms of the state support, i.e. corresponding institutional environment.

Only in 1999, after passing the Law of Ukraine «On a special mode of investment and innovative activity of technological parks» by the Supreme Rada of Ukraine, which contained a list of economic incentives similar to those free economic zones had, the real development of technoparks has been slowly stipulated.

According to this Law, three technoparks «Institute of electric welding, named after E.O.Paton" (IES), "Semi-conductor technologies and materials, optoelectronics and sensor equipment» (Kiev), «Institute of monocrystals» (Kharkov) along with their associated enterprises have been given special mode of investment and innovative activity for period of 15 years. It could operate only in case of doing investment and innovation projects in priority areas of activity of this or that technopark during first five years from date of the registration of projects. The projects had to be performed only within special terms, which include an establishment of tax privileges for profit and the VAT, currency and customs regimes, granted by the state to guarantee the attraction of credits from foreign investors.

According to the changes to this Law, in 2002, it has been registered five more technological parks in Ukraine: «Uglemash» (Donetsk) and Kiev technoparks « Institute of technical thermophysics», «Intellectual information technologies», «Ukrinfoteh», "Perspektiva" (National technical university " KPI").

In contrast with the majority of foreign technoparks, Ukrainian ones, created before 2004 according to the Law, financing has been made by the way of re-investment of the money , transferred to the special accounts of the project participants according to the special conditions of preference regime, on scientific and innovation activities, development of scientific and technological and experimental base, and the infrastructure of technoparks.

Participants of the innovation projects transferred 75 % of the amount of incentives, including tax on profit and VAT to their special accounts. The remaining 25% were left in the special centralized account of a technopark.

In 2002-2003, technoparks and participants of the innovation projects have used about 190 million Hrivnas. 40 millions of them have been spent on machines and equipment [1]. For the five years' period of functioning of technoparks in 2000-2004, 251 million Hr. have been transferred to the state budget and specialized state funds, 386 millions Hr. were received as the result of incentives; 2,3 thousand new working places for highly qualified specialists have been created, 450 million Hr. of investments have been attracted [2].

However, real results of activity were demonstrated by first four technoparks (three of them were created in 1999 plus and «Uglemash»).

Some technoparks have not started innovation projects till 2004. The lion's share of production was produced by two technoparks: the realization of innovative projects that the lion's share of innovative production has been developed{produced} by two technoparks – “IES” and “Monocrystal”, which had the economic results. First of them has transferred 179 million Hr. to the budget, while it has received 143 million as “incentives”.

But the activity of the Ukrainian technoparks has been actually suspended in 2005, because the Law of Ukraine “On modification in the Law of Ukraine “On the State budget of Ukraine for 2005 ” and some other acts of Ukraine ”, which have abolished

economic privileges for the participants of innovation projects and which were important for the technopark development.

One of the reasons of abolishment of the special tax regime for innovation activity of technoparks were financial infringements of some participants of the projects, utilization of the financial privileges not with accordance of the corresponding laws. To some extent, the violations of the rules are related to the situation, when the technoparks were left as the only structures with 'friendly' attitude to innovators after regular (since 2003) termination of the key clauses of the Law of Ukraine "On innovation activity". Unfortunately, some non-innovation projects were also included into the list of technoparks's projects. It could be partially explained by the fact that, in contrast with the 'Western practice', Ukrainian technopark model does not presume compact location of the technopark activities within the certain territory.

As a result, it was difficult to control and supervise different types of activities of the project participants, especially in conditions of some uncertainties, which exist in the Ukrainian legal and accounting systems.

Only as a result of the review of technopark's innovation projects, made by the Ministry of Science and Education of Ukraine in 2003-2004, special registration of the twenty six of them was cancelled [3].

Liquidation of the special regime has led to the situation, when total volume of expenses on research and development and manufacture of pre-production models at a level of technoparks declined by 21 % in 2005 on an annual basis. The number of newly-created working places for the exaction of innovation projects within the technoparks dropped by the factor of two [4].

Only with the passing of the Law of Ukraine from 1/12/2006 "On a special mode of innovative activity of technological parks" a hope for revival of activity of these structures in Ukraine has emerged.

This Law stipulates the modified system of the state support, aimed at the strengthening state support of direct financing of the realization of the specific innovation projects of technoparks. This, according to the initiators of the Law, has to stop violations in the legal sphere, related to financial incentives for innovation activities.

Special budgetary program «The State support of activity of technological parks» has been introduced within the State budget of Ukraine - 2007 with this idea to support innovation projects in technoparks. It contains special measures, aimed at financial support of innovation projects:

- Total or partial (up to 50 %) interest-free loans to cover expenses of innovation projects of technoparks;
- Total or partial compensation of the bank interest on loans related to the innovation projects.

In addition, participants of the innovation projects in technoparks receive special subsidies in the form of tax exemption for import duties on import of equipment or components, which are not produced in Ukraine. Similar incentives are established for tax on profit, received from innovation projects, which are registered in technoparks. Transfer of the specified sums of taxes and their utilization is carried out according to order, which was in operation till 2004.

However, in reality the mechanism of realization of projects of the Ukrainian technoparks in 2006 has not been started due to the absence of special regulatory rules, which had to be established by Government of Ukraine.

In 2006, as well as in 2005, no new innovation projects were started in Ukrainian technoparks, while in the previous years the dynamics was the following: 2001 – 43 projects, 2002 - 29, 2003 - 0, 2004 - 8 projects. The share of innovation production of technoparks was

only 6,3 % of the total amount of such production in Ukraine in 2007, which, in turn, did not exceed 6,7 % of the total shipped industrial output [2], i.e. the share of innovation production of technoparks was less than 0,42 % in volume of the shipped industrial output in 2007.

The total number of working places created by technoparks declined from 782 in 2004 to 399 - in 2005, 166 - in 2006, and 201- in 2007.

The new mode of the state support has led to the situation, when total amount of taxes and other payments to the budget reached 265 million Hr.; 230 million of them were transferred to the budget. At the same time, participants of the projects have received only 35 million Hr. on their special accounts (in 2004 corresponding figures were 289, 116 and 173 millions Hr. accordingly). This means that the level of stimulation of technoparks and participants of innovation projects has declined by almost in 5.8 times in 2007, if compare with 2004.

However, we think that the main problem of technoparks in Ukraine, lies in fact that the overwhelming majority of them does not carry out function of "growing up" of the small and medium-sized innovation enterprises. Technoparks have not become the centers of commercialization of scientific results, they do not involve venture capital for financing new firms. Only technopark «Institute of monocrystals» has an innovative business-incubator «The Kharkov technologies », which was created with the financial assistance of the USA.

We completely agree with conclusions of the Kharkov scientists [4], that technoparks in Ukraine looks more like innovative enterprises, not elements of manufacture. They almost do not provide marketing, engineering, consulting and similar services.

To great extent, this is a result of the legal definition of technoparks in the Law of Ukraine «On innovation activity» as innovative enterprise along with technopolises, the innovation centers and innovation business-incubators.

As a whole, in Ukraine, creation of other innovative structures, and, in particular, business-incubators has slowed down in recent years without corresponding state legislative and financial support. After the finish of financing from the international program sources, activity of many similar structures either was curtailed, or became purely commercial and often- 'non -innovative'. Thus, the bulk of Ukrainian business-incubators are playing a role of consulting firms, instead of structures, that support innovation activities. Only six or seven business-incubators have sufficient area for firms of clients to undertake incubatory activity, and approximately half of them is engaged in support of high-tech business [5].

Technoparks of Ukraine have not yet become the regional centers of development of innovation activity. Till 2004, six of them have been registered in Kiev, one - in Kharkov and one - Donetsk. In 2004, the law was passed, which increased the number of to 15, and it expands a zone of their functioning to four cities (Sumy, Kherson, Odessa, Yavoriv the Lviv regions). However, in connection with the moratorium of 2005, they were deprived from the state support.

At the same time, for example, technoparks are created in 25 regions in Russia.

One of the reasons of weak regional aspect in activity of the Ukrainian technoparks is the model mentioned above, which permits participation of the enterprises from different regions in the structure of technopark. So, structure of technopark «Institute of electric welding of E.O.Patona» includes enterprises from Kiev, Kramatorsk, Kakhovka, Simferopol and other cities, technopark «Institute of monocrystals» - enterprises from Kharkov, Sumy, Mariupol, Kherson, Odessa, Kiev. As a result, local authorities are not always interested in development of technopark. In fact, other regional authorities receive tax revenues from its activities, not local ones.

Among organizational barriers, which curb development of innovation structures in Ukraine, hypercentralization of decision-making is one, that is necessary to mention. Decisions on creation of new technoparks could be made on the level of the Supreme Rada,

and the decision on registration of innovative projects of technoparks could be made at the level of the special Governmental commission, while local authorities are staying out of the processes, which are important for development of business at the regional level.

Incomplete legislative base, an 'blurred' "rules of the game" in 'technopark movement' along with organizational factors are important barrier on the way of creation and more active work of innovation structures in Ukraine.

According to the Law, mentioned above (2006), the supervising body of technopark is one of its participants to whom (under the contract about joint activity functions) the right to undertake current management belongs. At the same time, functions of strategic management of the technopark are not legislatively defined.

In addition, the nomination of one of the participants of technopark could affect the rights of other participants of innovation projects. In fact, some participants become dependent on the ruling authorities of technopark. The most vulnerable group consist from the small innovation enterprises, which are not financially strong as some other participants of innovation projects [6].

We assume that the supervising body of technopark should be created on the basis of corporatization. Thus, it is necessary to use foreign experience in solving this problem.

In particular, the Russian technoparks utilize the whole range of modern organizational-rules and legal norms, typical for the market organization of economy. Almost half of them are closed joint-stock companies, a quarter - societies with limited liability.

As a rule, the most successful technoparks have an effective control system. So, management of French park of high technologies "Sofia - Antipolis", which is one of the biggest in Europe, with 1200 organizations of a different structure and 25 thousand employees in these companies, is created on the principle of association. Ten local communes, commercial and industrial chamber, agricultural chamber and General council of department Maritime Alps are its collective members. Operative management of technopark is the responsibility of the joint-stock company. Its budget is formed by the above-mentioned association and by the revenues from the rent payments of technopark participants [7].

The definition of technopark in the above-mentioned Law is too narrow, as it does not include such important functions, as formation of the modern innovative environment in regions, support of innovative business by "growing up in" in business-incubators of small and medium-sized innovation firms, commercialization of scientific knowledge.

There is no even note on business-incubators in any version in the laws, related to technoparks.

In this respect, the Law of Republic Kazakhstan from 23.03.2006, №135-3 «On the state support of innovation activities» contains the legislative norms on organizational activity of technoparks and technological business-incubators.

Until recently, the Ukrainian technoparks were based mainly on the basis of the academic and branch scientific research institutes. Except rare occasions, the leading high schools and universities were excluded from this process, despite their intellectual and human potentials are evident. In this light of this the Law of Ukraine «On scientific park «Kiyv polytechnika», passed in December 2006, has been positively met in the high schools of Ukraine.

In contrast with technoparks, scientific park has no privileges from the state.

However, the property rights on technologies and the objects of intellectual property rights, received as a result of undertaking the projects in scientific park, are the property of scientific park and (or) its partners, except the objects of the intellectual property rights, related to the sphere of national security and defense or those, which should be used strictly in public interests.

These clauses of the Law open the way for strengthening interaction of scientific groups, faculties, chairs, and companies, which are in the market of high-tech products, and also for investment and venture funds. This is important for obtaining synergy effect from their interaction.

According to the Law, scientists from the National University «Kiyv Polytechnical Institute» could protect patents the know-how and create the companies within the scientific park. Thus, they could receive royalty by utilization of their intellectual products without breaking their ties with the Universities. It is also promoted by the business-incubator, created at the University.

In contrast with operating technoparks, the scientific park has a regional binding through it functions only in the certain region, where it pays taxes, creates high-tech working places and attracts extra investment.

The scientific park can open branches in other regions. So, the Vinnitsa regional administration and the local legislative body have made a decision to enter into scientific park and to create a branch of science park near Vinnitsa (Ukrainian version of a Silicon Valley), focused on such areas, as energy saving, alternative sources of energy, information technologies and a high-tech agriculture. 200 hectares of the ground are already allocated for this purpose. As a whole, not less \$ 2 billion US dollars are required on realization of the project of creation of this object of an innovation infrastructure [8, 9].

The exceptional significance for commercialization of R&D results has creation of a network of the organizations, dealing with the transfer of technologies. This work is at the initial stage in Ukraine too. Experience of Belarus is useful in this sense. Belarus has created the Republican center of a transfer of technologies in 2003. Eight centers for transfer of technologies with branch specialization were created in high schools and Universities. The pilot centers for transfer of technologies with participation of the state centres of science, higher educational institutions, the academic and branch institutes were created also in six federal districts of Russia.

There is a hope of more active development of technology transfer (TT) in Ukraine. This hope is related to the recently passed Law from 9/14/2006 №143-V «On the state regulation of activity in sphere of a transfer of technologies», in which subjects of a transfer, their interaction, rights and duties, forms of state regulation and so on are determined, are registered. It is especially important that different aspects of the state policy in the TT sphere are considered in the Law, including state experts' appraisal of technologies, registration of contracts, the state accreditation on the right of realization of intermediary activity, patent protection and so on.

Regulation of financial and economic maintenance of activity in the sphere of a TT is considered in the Law. Special attention is paid to the problem of encouragement of authors of technologies and the persons, who are carrying out their transfer, questions, related to provision of loans and subsidizing of a transfer.

In particular, the Government could provide the state guarantees on repayment of credits of the commercial banks, which were received for purchase of technologies and their components, if it is necessarily. These guarantees could be provided to the enterprises, subordinated to National and to the branch academies of sciences, some state enterprises, which are making production on the state order.

Targeted subsidies for TT are established in certain limits:

- The amounts of the profit tax of the enterprises received from introduction of technologies;
- The amounts of the custom duties, calculated at the moment of import of the equipment, accessories, materials which are not produced in Ukraine, for TT projects

However, in the Law does not clarify the mechanisms of the financial compensation to the organizations, where these technologies will be applied. These mechanisms have to be considered in the special law.

Bearing in mind negative situation with creation of innovation infrastructure in Ukraine, absence of the system long-term planning in this sphere, we propose to utilize target-oriented and programming methods, as this opens the way for implementation of system approach to problem-solving in the sphere of creation of corresponding innovation infrastructure.

Propositions on creation of such instrument have been pushed forward many times during the last ten years at different levels, including special reports to the executive power, papers to the scientific and so on.

At the end, the situation has started to change recently.

In May 2008, the Cabinet of Ministries of Ukraine has approved two state target-oriented programs, aimed on creation and development of an innovation infrastructure:

- The State target-oriented Economic program «The creation of innovation infrastructure in Ukraine» for 2009-2013;
- The State target-oriented program of development of system of information and analytical provision for realization of the state innovation policy and the monitoring conditions for innovation development of the economy (2009-2011).

The first program considers development of an industrial-technological subsystem, and also creation of separate elements of other subsystems (financial, economic, information, recruiting as an best possible option).

According to the opinion of program designers, its execution will allow to provide functioning of traditional infrastructure of support of small innovative businesses (technoparks, innovative business-incubators and so on), as well as development of a network of elements of an innovative infrastructure, which is a new one for Ukraine (the innovation centers, the centers of TT, scientific parks, regional innovative clusters, etc.). Total number of the elements of the innovation infrastructure could reach 400 units.

In particular, the organization of twenty five base centers of TT for small enterprises with participation of large corporate structures is planned. Creation the regional centers of innovation development is also planned (with participation of the regional centers of scientific and technical and economic information; 11 of them are created already with the assistance of the State Investment authorities). 20 demonstration centers on priorities of scientific and technical and innovative activity will also be organized. Realization of the pilot project on creation of the Ukrainian version of information portal 'International Business Innovation' for maintenance of direct connection with databases on innovation projects from the regions to search for relevant information in the countries - members of the EU. The organization of the specialized research center of innovative development is also planned.

In the Program, special attention is paid to the creation of a comprehensive system of infrastructural maintenance in high schools, in particular, to the organization of divisions, responsible for intellectual property protection, and 25 business-incubators at technical universities, along with 10 production and innovation and investment complexes.

Creation of 25 centers of a TT is planned in the state-owned research institutes. 15 special structural divisions for monitoring results of scientific researches, their introduction to the market of intellectual property, assistance in searching of investors or the organization of the small innovation enterprises will be organized.

Regarding the creation of infrastructure for financial support, the organization of 2 municipal specialized non-banking innovation financial establishments and the venture fund is planned in the regions.



At the regional level, 25 innovation technological clusters will be created with participation of local executive authorities.

As a result of realization of the Program during the first 5 years, above 10 thousand new working for highly skilled specialists should be created, the number of small innovation enterprises will increase to 10 thousand, innovative activity of the industrial enterprises will raise by not less than 5 %, the level of growth of innovative production will accelerate for not less than by 20 %, almost 7 billion Hr. of new investment for realization of innovative projects will be attracted.

Second program is aimed at creation of a system of a up-to-date provision of information and analytical materials for administrative decision-making in the sphere of the state regulation of innovation activity and monitoring of the situation with the innovation development of the economy.

The pilot project of the Program has been developed by the Research economic institute and the Ministry of Economy of Ukraine. It contained a complex of tasks, which allows effective functioning of the above mentioned system, in particular, on its institutional formation and on provision of information for proper support, including wide access of the interested users to results of scientific researches and innovation activity, promotion of the processes of public discussion on the questions related to formation and realization of the state innovative policy.

However, during discussion on the Program draft in the ministries and departments, important elements of the Program were excluded without proper motivation. As a result, the system lost its integrity and a material basis. In particular, actions, aimed on improvement of an infrastructure, technical maintenance of formation of the system, development of model of the automated system of accumulation, actualization, processing and information exchanges between subjects of System "have disappeared" from the draft of the Program at some stage.

On the other hand, some actions of this second program are duplicated in the first program, mentioned above (on creation in Ukraine of an innovative infrastructure) as a result of the lack of coordination between different ministries. As an example, it concerns the improvement of professional skill of employees and some others.

### **Remedies**

As only special mode of innovative activity of technoparks is legislatively regulated in Ukraine, it is necessary to develop the base Law «On an innovative infrastructure», which will define precisely the terms, the purpose of the innovation infrastructure creation, main principles of functioning, types of innovative structures, the status, the rights and functions of management, basic documents, needed for creation suspension of TT centres, distribution of power between central and local authorities, questions of financing, economic incentives and other forms of the state support.

It would be useful to use «Regulations on Park of high technologies», the approved by the Decree of the President of Byelorussia from 9/22/2005, N. 12 for the regulation of activity innovative structures, especially positions related to the problems, functions and the organizations of work of the Supervisory council and Administration of the park.

To provide legislative base for creation of a network of scientific parks in Ukraine as research-and-production associations of high schools and (or) scientific institutes and other organizations, including small innovation firms, it is necessary to accelerate passing the base Law «On scientific parks» by the Parliament of Ukraine. The experience of functioning of scientific park "Kiyv polytechnika" in 2007-2008 could be used.

It is necessary to use more the experience of Belarus on creation of a network of the centers of collective utilization of the unique scientific equipment and devices.

With the purpose of strengthening of interaction of various departments during target-oriented planning development of various components of an innovative infrastructure, it is necessary to use the experience of formation and realization of the State program of innovative development of Byelorussia for 2007-2010 and the Complex program of actions on realization of innovative policy in St.-Petersburg for 2008-2011.

### Recapitulation

Our analysis shows, that it is necessary to undertake a number of state-sponsored actions for a upgrading of the innovation infrastructure of Ukraine from it's an initial conditions. First of all, changes of institutional nature of support of innovation infrastructure are needed. This will allow along with increase of a number of the infrastructure objects to improve significantly and functional capacities of the infrastructure. Thus, the basic attention should be paid to development of legislative base and the foundations for programming and target-oriented planning of upgrading the innovation infrastructure.

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