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**SHEBEKO Konstantin K.**, Doctor of Econ. Sc., ProfessorPolessky State University,  
Pinsk, Republic of Belarus**INNOVATIVE INFRASTRUCTURE OF SCIENTIFIC–INDUSTRIAL CLUSTER**

*Summary.* Based on the analysis of problems of creation and functioning of innovation infrastructure in Belarus conclusions on the lack of its effectiveness are made.

Main focus is given to the analysis of the practice of innovation infrastructure functioning, created on the basis of Polessky State University as a research university in order to perform technological modernization of the economy and the dissemination of effective business practices in Pripyat Polesye region in the form of scientific and industrial cluster.

The description of the functioning of the basic elements of the created cluster as a system is made: Science and Technology Park; “Start-up” movement; educational project “Business School” in the “start-up” movement; business event “Invest – Weekend”.

Models for created innovative enterprises which are based on the cases of using open innovation, technology transfer through a franchise license agreement and the participation of owners of innovations in the capital of new companies are developed.

It is concluded that created scientific-industrial cluster as a institute of innovation economy may provide human capital growth and, consequently, increase the socio-economic level of development of the region through the creation of conditions for opening new innovative companies, modernization and growth of existing innovative companies, and their effective interaction with other economic agents.

**Introduction.** The level and pace of technological development is largely determined by the availability of adequate modern innovative infrastructure. Problems of its establishment and effective functioning in Belarus have been paid considerable attention to by the government. However, the results of the technological development of the country do not provide competitiveness of the backbone industries and, thus, do not allow achieving the desired level of socio-economic development.

The analysis shows that among the reasons that underpin these results technological modernization and innovation infrastructure developed in Soviet Union and institutional structure of the economy of Belarus developed over the years of independence can be mentioned [1, 2, 3]. In modern conditions, when a key role in the economic development belongs to the fifth and the sixth technological tenor industries, they do not provide adequate conditions for economic agents.

For the development and testing new approaches to innovative development Polessky State University was established by the Presidential Decree in 2006, and some results

achieved by the university are presented in this publication.

**Methods and objects of study.** In order to study this aspect of economic development the techniques and methods of empirical economic analysis (description, measurement), and generally accepted in the scientific sphere principles of theoretical economic research are used.

Object of the study is the relationship between agents in the development and implementation of innovative projects.

**Results and their discussion.** Historically, the region of the Pripyat Polesye due to natural causes can be classified as the most problematic in the country. As a consequence, the level of human capital development, the main indicators of economic development do not allow creating favorable living conditions for the population.

In order to accelerate the development of the region the State program of socio-economic development and comprehensive utilization of natural resources of Pripyat Polesye was adopted and implemented. The main purpose of the State Program is to ensure sustainable socio-economic development of Pripyat Polesye based on the integrated use of natural resources, increase in exports and investment, maintaining the condi-

tions of reproduction of natural-resource potential and the creation of favorable conditions for the population.

To achieve this goal the State Program was aimed at fuller involvement of local natural resources in the region's economy; mobilization of export potential and attracting investment; more efficient use of improved land, including in the flood plain of the Pripyat River, prevention of degradation of land and agricultural landscapes; intensification of agricultural production and fisheries based on innovative technologies, taking into account natural and climatic characteristics of the region; preservation of unique natural complexes, environment and the reduction of natural and man-made risks.

On the instructions of the National Bank of Belarus in order to fulfill the Council of Ministers of the Republic of Belarus Order from October 5, 2010 Number 34/520-222, 310-476 "On the issues of creating scientific-technological park "Polesye" the concept to promote innovative development of Pripyat Polesye region was developed. The goal of regional development is defined as an increase in efficiency and structural transformation of the economy based on the sustainable use of production and resource potential of regions, districts and cities. A key role is assigned to the development of industries and activities directly related to the processing local resources, agricultural products, service for agriculture and forestry. As one of the necessary conditions for the solution of this problem the development of entrepreneurship and private farms was considered. The policy of the investment development of the region was dedicated to the implementation of targeted investment projects in key segments of the economy. Created industrial park was to provide appropriate support for innovative projects, including the development of a package of investment proposals and business plans, and guidance and methodological assistance to economic entities, which were initiating promising innovative projects.

The target of industrial park was the creation and development of regional infrastructure, focused on complex support of innovative enterprises in the region, and the commercialization of scientific ideas and developments in the field of high-tech sectors of the economy, the intensification of innovation activities.

The main activities are the development and implementation of energy efficient technologies, high-tech equipment, new materials, and scientific-technical products for the biomedical, bio-

energy, environment and other high-tech industries.

Industrial park was created to face the challenges of promoting the development of innovative industries that use high technologies, through the provision of innovative infrastructure and organization of promising forms of attracting investment (project and venture financing, etc.); to accelerate the implementation of the results of scientific research and development in the manufacturing, commercialization of innovations; involvement in the process of innovation of industrial and foreign trade activities of small- and medium-sized enterprises; supporting enterprises in the region to attract investment into high-tech industries; organization of development and implementation of integrated targeted investment projects in various spheres in accordance with the priorities of regional development; attracting foreign direct investment and new technologies for the development of industries and activities directly related to the processing of local resources, agricultural products, service of agriculture and forestry.

Founders of "Technology Park "Polesye" " were Polesky State University (82%); Belarus Innovation Fund (9.0%); subsidiary municipal unitary enterprise for capital construction "UKS of Pinsk" (9.0%). Technology park organizational structure includes Innovation-Technology Center; Center for Technology Transfer; Information and Advice Center (Business Support Center) and Center of Educational Services.

The main objective of the participation of Polesky State University in the innovative development of the region is the creation of scientific and industrial cluster represented by small- and medium-sized innovative enterprises, specializing in engineering services and the manufacture of new biotechnological products on the territory of the Pripyat Polesye [4.5].

In a relatively short period of time scientists of the University carried out the scientific research on the establishment of the cluster and its functioning and its scientific, industrial and educational components were elaborated and implemented in a pilot mode [6, 7, 8, 9, 10].

The main elements of the cluster as a system – Science and Technology Park "Technopark" Polesye"; "Start-up" movement; educational project "Business School" in the "start-up" movement; business event "Pinsk-Invest-Weekend" were elaborated and successfully implemented.

Innovation projects, which are being developed and implemented within the existing struc-

ture of the interaction of the main economic agents are mainly based on scientific research carried out in the research laboratories of Polesky State University (Table. 1).

Start-up movement creates the prerequisites of practice-oriented training of specialists for the emerging cluster around the university in the field of biotechnology, environment and green economy, represented by enterprises of V and VI technological tenor of economic structures.

To this end, the university is implementing the project “PINSK – INVEST – WEEKEND”, which includes elements of business education for students, undergraduates, graduate students and professors, as well as existing entrepreneurs in the business area of scientific-technological park “Technopark “Polesye” as a regional business support center (Fig.).

The cycle of educational and business events combines elements of trainings, workshops and seminars that promote an entrepreneurial culture

among young people, as well as the form of practice-oriented environment for training specialists, provides connectivity to businesses, local authorities and the implementation of research results made on the basis of the research laboratories of the University. These activities are carried out in accordance with the Plan for the organization of regional start-up-schools and holding regular online contests of innovative business projects for start-ups, approved by the Ministry of Economy of Belarus.

In 2014-2016 five final events were held, where potential investors, representatives of local authorities of Polesye region (9 districts of Brest and Gomel regions), banking and business community were presented the projects with mainly biotech and environmental focus, including those based on DNA and cellular technologies (Table. 2).

Table 1 – Scientific developments of the Polesky State University, mn BYR (Before denomination)

Types	years			
	2012	2013	2014	2015
Research, financed by funds	300,3	199,3	281,5	461,0
Research, financed by businesses	148,7	520,2	138,2	205,0
Sales of high-tech products	461,7	1 091,4	1 782,3	2 301,1
TOTAL	910,7	1810,9	2202,0	2967,1
Per one university instructor	4,8	9,1	11,4	16,1

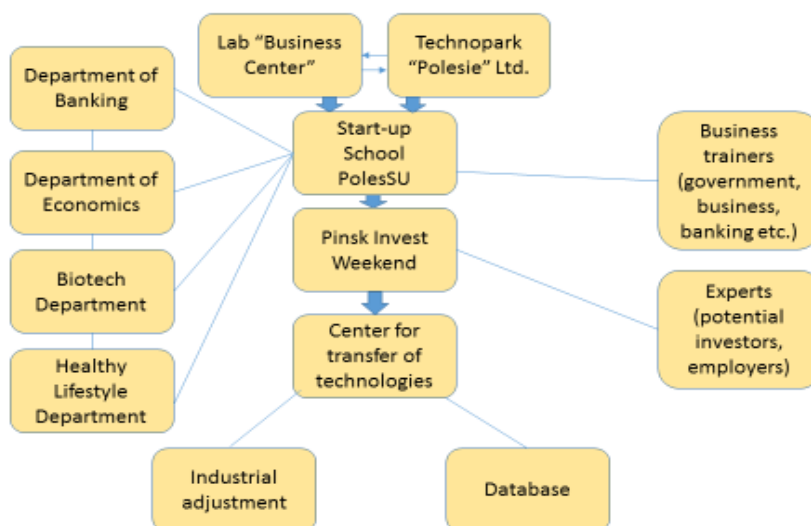


Figure – Structure of the start-up movement in the Polesky State University

Table 2 – Results of business activities «PINSK – INVEST – WEEKEND»

Indicator	Activity					Total
	№ 1 (May 2014)	№ 2 (December 2014)	№ 3 (May 2015)	№ 4* (November 2015)	№ 5 (June 2016)	
Number of presented projects	17	21	11	51	11	111
Implemented projects	2	3	2	4	2	13
Total number of participants	482	371	296	567	123	1839

\* – The event was held in the format of «The First National Forum of the youth start-up-movement» under the aegis of the Ministry of Education of the Republic of Belarus, with participants from other universities

Thus, created cluster elements and proven connections between them and university laboratories, where the R&D of competitive and secured by law scientific and technical areas suitable for commercialization is carried out, which allowed creating system of generation and selection of innovative projects and their improvements to be implemented in the form of innovative enterprises – residents of Technopark and search procedures for partners and investors.

As a model of innovative enterprise which approbated interaction between cluster members one can mention Plantarum – a resident of Technopark, founded by Polesky State University. Its main activity is the production of planting material of fruit and ornamental plants. The company is engaged in rearing and sales of seedlings of highbush blueberry (*Vaccinium corymbosum* L) based on cell technology (developed in the research lab of the university) in crop innovative technology micropropagation seedlings based on three scientific research: the method of clonal micropropagation in vitro plants; the use of plant growth regulators at stages in vitro micropropagation and in vivo; the use of lighting systems based on LEDs in vitro micropropagation phase and phase adjustment in vivo.

In the spring and autumn seasons, Plantarum provides work place for from 4 to 12 people (usually students and undergraduates of Biotechnological Faculty of Polesky State University).

In the short run, this resident of Technopark is planning to expand the range of products: fruits, berries, melons, hops, blueberries, cranberries, sprouts, seedlings and saplings, cuttings and slips of plants. The necessary scientific groundwork for this has been created in the university laboratories.

To ensure the success of the operation of created innovative businesses there are options of using open innovation and technology transfer through franchise and license agreement.

Thus, created on the basis of scientific developments of the university research and industrial cluster, as an important institute of innovative economy, can provide the human capital growth and, consequently, increase the socio-economic level of development of the Polesye region through the creation of conditions for opening new enterprises, modernization and growth of existing innovative companies and their effective interaction with other economic agents.

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## **ИННОВАЦИОННАЯ ИНФРАСТРУКТУРА НАУЧНО-ПРОМЫШЛЕННОГО КЛАСТЕРА**

*На основе анализа проблем создания и функционирования в Беларуси инновационной инфраструктуры делаются выводы о недостаточном уровне ее результативности.*

*Основное внимание уделяется анализу практики функционирования инновационной инфраструктуры, созданной на базе Полесского государственного университета как университета исследовательского типа для целей технологической модернизации экономики и распространения эффективных бизнес-практик в регионе Припятского Полесья в форме научно-промышленного кластера.*

*Изложено описание функционирования основных элементов создаваемого кластера как системы: научно-технологический парк; «start-up» движение; образовательный проект «Бизнес-школа» в рамках «start-up» движения; бизнес-мероприятие «Invest – Weekend».*

*Для создаваемых инновационных предприятий предложены модели, основанные на вариантах использования открытых инноваций, передаче технологий через франшизу, лицензионный договор, а также участие собственников инноваций в капитале новых компаний.*

*Сделан вывод о том, что создаваемый научно-промышленный кластер в качестве института экономики инновационного типа может обеспечить прирост человеческого капитала и, как следствие, повышение социально-экономического уровня развития региона посредством создания условий для открытия новых, модернизации и роста существующих инновационных компаний и их эффективного взаимодействия с другими экономическими агентами.*

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