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Studying the Mechanism of Infrastructure Support of High-tech Business as an Integrator of Innovation-investment Development

Un estudio del mecanismo de apoyo a la infraestructura de las empresas de alta tecnología como integrador de innovación-desarrollo de inversiones

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ABSTRACT:

The article analyzes the formation and development of the infrastructure support of high-tech business in the modern conditions of economic development. The main challenges and opportunities of developing the high-tech business as an integrator of innovation-investment development, as well as their influence on the formation of innovative and investment systems of various levels, have been presented and considered. The potential non-resource-based growth areas of the Russian economy have been studied on the basis of analyzing the regional structure and the primary trends of high-tech business development. The formation and development mechanism of the infrastructure support of the high-tech business companies has been analyzed and upgraded. The internal and external factors, directly influencing the growth prospects of high-tech business in Russia, have been studied. The problems of attracting investments to the high-tech sector and implementing the mechanism of state participation with the purpose of improving the operating efficiency and the investment attractiveness of the high-tech business

RESUMEN:

El artículo analiza la formación y el desarrollo del soporte de la infraestructura del negocio de alta tecnología en las condiciones modernas de desarrollo económico. Se han presentado y considerado los principales desafíos y oportunidades del desarrollo del negocio de alta tecnología como integrador del desarrollo de innovación-inversión, así como su influencia en la formación de sistemas innovadores y de inversión de diversos niveles. Las posibles áreas de crecimiento no basadas en recursos de la economía rusa se han estudiado sobre la base del análisis de la estructura regional y las tendencias principales del desarrollo empresarial de alta tecnología. El mecanismo de formación y desarrollo del soporte de infraestructura de las empresas comerciales de alta tecnología se ha analizado y actualizado. Se han estudiado los factores internos y externos que influyen directamente en las perspectivas de crecimiento de las empresas de alta tecnología en Rusia. Se han analizado los problemas de atraer inversiones al sector de alta tecnología e implementar el mecanismo de participación estatal con el fin de

have been analyzed. The degree of correlation between the efficiency of carrying-out the innovation-investment activity of an economic system and the high-tech business functioning in it as an active integrator of innovative and investment development of the economic system development has been identified. The measures to improve the mechanism of the infrastructure support of high-tech business with the purpose of ensuring its sustainable growth and functioning as a stimulant of innovation-investment development of economic systems have been suggested.
Keywords: high-tech business, infrastructure, integrator, innovation-investment development

mejorar la eficiencia operativa y el atractivo de inversión del negocio de alta tecnología. Se ha identificado el grado de correlación entre la eficiencia de llevar a cabo la actividad de innovación-inversión de un sistema económico y el negocio de alta tecnología que funciona en ella como un integrador activo de desarrollo innovador y de inversión del desarrollo del sistema económico. Se han sugerido las medidas para mejorar el mecanismo de apoyo a la infraestructura de las empresas de alta tecnología con el fin de garantizar su crecimiento y funcionamiento sostenibles como un estimulante de la innovación, la inversión y el desarrollo de sistemas económicos.
Palabras clave: negocios de alta tecnología, infraestructura, integrador, desarrollo de innovación-inversión

1. Introduction

The up-to-date conditions of the global society development create the need for the quick and efficient search for the new sources of economic growth, which should be implemented through the lens of innovative and investment development of economy and improving its competitiveness, first of all, by means of increasing the amount and quality of science-intensive production. So, it’s necessary to develop and update the potential non-resource-based growth areas of the Russian economy, taking into account the analysis of the regional structure and the primary trends of high-tech business development. So, one of the main factors of economic development is stimulating the high-tech sector of economy and increasing the share of science-intensive industries, which manufacture the high-technology products, conforming to the world standards.

Studying the problems of designing and substantiation of the mechanisms of infrastructure support of high-tech business is conditioned by enduing this business with special functions as an integrator of innovation-investment development of economic systems.

The high-tech sector contributes significantly to the Russian economy (about 22.3% of GDP, 36.6% of the number of employees, about 15% of the corporate profits taxes collection), plays a fundamental role in the import substitution and the national security protection. In modern conditions it is not enough to just have high growth rates of the national economy, and, taking into account the existing limitations in the import of technologies and equipment, the support of high-tech businesses in the regions of Russia becomes one of the most crucial tasks (Barinova etc., 2017).

In order to manage the innovative activity in economically developed countries the legal environment and infrastructure are formed, which stimulate the whole innovations process from fundamental research to commercialization of innovations (Markova & Kuznetsova, 2016; Doroshenko etc., 2016). The topical problems of activating the innovative and investment policy and ensuring the research and technological development of the innovative business entities can’t be solved without rendering the integrated infrastructure support to the innovations-oriented companies.

In conditions of the changes in the technological mode the social and economic risks increase, but the new economic growth prospects also appear, the rate and quality of which are now determined by the efficiency of digital economy formation and the implementation of bio-, nano- and cognitive technologies, which are nowadays the basis of the high-tech business as an integrator of innovation-investment development of the national economy in general. Implementation of capabilities of such integration is determined to a great extent by the regional authorities’ policy in stimulating the entrepreneurial initiatives and growing the technology leaders. So, the science-intensive business ecosystems are formed, in which all the participants of the high-tech economic sector actively cooperate: small, medium and large science-intensive businesses, higher education institutions and research establishments, and public authorities.

It should be pointed out that particular attention should be paid to creating the favorable institutional conditions of doing the high-tech business and to improving the availability of

the necessary infrastructure, including the innovative, investment and information-communication components (Doroshenko & Malykhina, 2016).

2. Methodology

The main methodological and methodical approaches, used in studying the challenges and opportunities of high-tech business development, have been considered in the works of foreign and domestic authors, namely P. Draker, R. Cantillion, A. Marshall, Y. Shumpeter, G. Markovic, N.D. Kondratyev, S.Yu. Glazyev, V.Ya. Gorfinkel, M.A. Bendikova, I.E. Frolova, A.I. Tatarkin, O.A. Romanova, V.V. Akberdina, G.I. Latyshenko etc.

By its very nature entrepreneurship is characterized with the novelty aspect, but the science-intensive business as a form of entrepreneurial activity is a most important source of innovations and innovative ideas; a large contribution in its development was made by the studies by A. Smith, J. B. Say and Y. Shumpeter, J. Galbrate, D. Bell, E. Toffler.

The regularities, challenges and opportunities of this development, the influence of the regional segment of national innovations system on high-tech business are presented in the works by such researchers as M. Miller, F. Modiliani, S. Ross, B. Terborg, V.V. Bocharov, Yu.A. Doroshenko, D.A. Endovitsky, I.V. Somina, E.N. Chizhova, A.G. Ivasenko, A.A. Rudychev, P.P. Taburchak, G.I. Gumerova, E.Sh. Shaimieva etc.

The problems of innovative infrastructure development, the state management and support of innovative ventures, and among them the small science-intensive businesses, including venture capital funds, have been highlighted in the works by M.D. Abramov, A. Bakhtizin, V.A. Kashin, N.N. Lebedev, A. Senin, Yu.A. Doroshenko, I.V. Somina etc.

3. Results

The companies are called the high-tech ones, if they have high growth potential, based on innovative products and the strategy of making profit from innovations. The statistics identifies not only the development trends of international high-tech enterprises, but also the peculiarities of the Russian high-tech companies. It should be pointed out that no more than a quarter of high-tech companies are passing a triennial, which is cumulatively conditioned by three key success factors: innovative ideas, highly professional personnel and investments.

Let’s consider the business activities in the Russian Federation, based on their technology level.

Table 1
The high-tech, high-level medium-tech and science-intensive activities, included in the high-tech economic sector in the regions of Russia (Barinova etc., 2017)

The high-tech activities
Pharmaceuticals production
Office equipment and computer facilities production
Electronic components, radio, television and communications equipment production
Medical products and devices production; measuring, control, maintenance and testing tools production; optical instruments production; photo and cine equipment production; watchmaking
Flying vehicles production, including space vehicles production
The medium-tech activities
Chemical production, except for pharmaceuticals production

Machinery and equipment production
Electrical machines and electrical equipment production
Motor vehicles production, trailers and semi-trailers production
Shipbuilding and ship repairs industry
Railway rolling stock production (locomotives, motor tram-cars and other rolling stock); bicycles and motor-cycles production; production of other transport vehicles and equipment, not included in other groups

According to the Russian Federal State Statistics Service (Rosstat) the share of high-technology sector in the gross domestic product (GDP) has achieved its highest value – 22.3% by 2016. In spite of the decrease of GDP by 0.248% in 2016, the volume of high-tech sector production increased by 3% from 13.2 to 16.3 trillion rubles (Barinova etc., 2017).

The science-intensive entrepreneurship is based on implementing the findings of scientific-research and experimental developments, scientific and technical innovations and their commercialization, while taking business and investment risks. Combining the concepts of science-intensive and high-technology entrepreneurship allows us giving a definition of the innovative entrepreneurship (innovative business) in scientific-research and scientific-technical spheres, as uniting the results of the scientific and technical activity in the entrepreneurship makes it such by default (Tribushnaya, 2011; Dudin, 2015).

The authors of the research, presented in the national report (Barinova etc., 2017) have identified the areas of the sustainable concentration of high-tech business (Moscow, St.Petersburg, Moscow Region, Republic of Tatarstan, Nizhny Novgorod Region etc.), which allows making a conclusion about the potential non-resource-based growth areas of the domestic economy. The indicators system, used by the authors of the report, is unique combination of evaluating the innovative and investment components of a region's development. But, unlike the existing methodologies of evaluating the investment attractiveness, this method takes into consideration the operating environment of the high-tech branch of economy, i.e. the most imports-depending part of economy – the high-technology sector.

Table 2
Evaluation of significance of development conditions
by high-tech companies (Barinova etc., 2017)

Conditions block from the rating	**The influencing factor**	**Average significance evaluation (0-1)**	**Average weighting factor of the block (0-1)**
Capital	Access to the investments	0.45	0.25
Labor resources and the attractiveness of the region	Availability of the labor resources with the required qualification	0.15	0.2
	Climate in the region	0.39	
	Amenities of living	0.53	
	Living conditions and social	0.39	

	infrastructure		
Institutions	Number and intensity of inspections	0.64	0.25
	Access to the non-state services	0.49	
	Informal payments	0.28	
Scientific potential	Access to technologies	0.19	0.1
Infrastructure	Access to the basic infrastructure	0.11	0.15
	Access to the innovative infrastructure	0.49	

In order to run the science-intensive and high-technology business it is necessary to constantly develop the infrastructure. We assume that the infrastructure support of the high-tech business as one of the most important sources of innovation-investment development of the country should consist in providing the material and technical conditions, required for the viable functioning of the business entities (Maltseva etc., 2011; The Innovations Development Strategy, 2011).

Implementing the innovations as objects of innovative activity for science-intensive industries requires the extensive and integrated support to even a greater extent, which is possible only at creating the innovative infrastructure as one of the key components of providing the integrated infrastructure support of high-tech business. The experience of the foreign countries demonstrates that the share of high-technology industries' products, supplied to the worldwide markets, is highly correlated with the level of the national innovative infrastructure. The innovative infrastructure in this case is more reasonable to be viewed as a set of structural elements, which contribute to carrying out the innovative process and implementing the innovative activity. With the purpose of support and integrated servicing of the high-tech business the innovative infrastructure contributes to the provision of innovative programs, which are a set of innovation processes and activities. At the same time they are accurately coordinated in terms of resources provision, performers and completion periods. The innovative infrastructure ensures the efficient solving of the problems concerning the designing, implementation and distribution of the breakthrough products and technologies.

At the same time the investment support is as an important aspect of a science-intensive industry's success, as the efficiency of its innovative activity. The innovative and investment development «go hand-in-hand», they are tightly intertwined, and that is why we use the term of «innovation-investment» development, which is the most illustrative of the unity of these processes. So, the investment infrastructure is meant to create the conditions for attracting the investments of various origins for innovative projects implementation.

We assume that among the variety of components of high-tech business infrastructure support as an integrator of innovation-investment development of economic systems, it's essential to single out the informational component, i.e. the information-communication infrastructure, which is presented by a set of organizations, rendering informational and consulting services.

The efficiency of organizational infrastructure functioning is also a key element of the targeted support of innovations-oriented companies. The essence of organizational support consists in coordination and assistance in the successful proceeding of the most important business processes, providing the means for the functioning development of high-tech enterprises and organizations (Simchenko, 2016).

The efficiency of integrated infrastructure support of high-tech business contributes to the high performance of innovations-active companies. In this regard the leading regions and

companies in certain high-tech branches of industry can be singled out.

Table 3
The leading regions and companies in certain high-technology branches of industry (2016) (Barinova etc., 2017)

The high-tech branches of industry	Regions with the highest added value	The major companies in terms of revenues
Pharmaceutical products (16% of the revenue from high-tech industrial activities)	Moscow Region, Moscow, Republic of Bashkortostan, Kaluga Region, St.Petersburg, Tomsk Region, Novosibirsk Region	«Katren», «R-Farm», «BIOTEK», «Farmstandart-Leksredstva», «Nizhfarm»
Electronic components, radio, television and communications equipment (22%)	Kaluga Region, St.Petersburg, Kaliningrad Region, Udmurtia, Moscow and Moscow Region	«Samsung Electronics Rus Kaluga», «Kompaniya Telebalt», «NIIME I MIKRON», GS Group
Office equipment and computer facilities (3%)	St.Petersburg, Moscow, Moscow Region and Republic of Bashkortostan	«FORMOZA-ALTAIR», «RAMEK-VS», «CRAFTWAY CORPORATION PLS», «T-Platformy»
Flying vehicles, including space vehicles (35%)	Moscow, Republic of Bashkortostan, Republic of Tatarstan, Rostov Region, Khabarovsk Territory, Moscow Region, Samara Region	«Corporation Irkut», «RSK MiG», «UMPO», «NPC Salut», «KnAAZ», «Kazansky VZ», «NPO Saturn», «ZEM RKK ENERGIYA»
Medical products, devices and measuring tools (24%)	Moscow, Moscow Region, St.Petersburg, Sverdlovsk Region and Ryazan Region	«DIKSION», «DRSK», «Gazprom avtomatizatsiya», «RN-Inform».

In high-tech production it is also essential to take into account if these products are exported; this is the most important result of the high-tech business activity at the territory of the region. This is an actual indicator of the competitiveness of the manufactured high-tech product, and not just arbitrary indicator, planned or given in statistics.

4. Conclusion

In conclusion we would like to point out that the implementation of the integrated support infrastructure for high-tech business should be based, first of all, on the efficient functioning of the innovation, investment, informational-communication and organizational infrastructures, which contribute to the generation of innovative ideas and the development of high-tech business, the successful commercialization of the results of innovative activity, the innovation and investment development of economic systems of all levels.

Inferences

Summarizing the above, the following should be pointed out:

1. The companies can be defined as the high-tech ones, if they have high growth potential, based

on innovative products and the strategy of making profit from innovations.
2. The science-intensive entrepreneurship is based on implementing the findings of scientific-research and experimental developments, scientific and technical innovations and their commercialization, while taking business and investment risks.
3. In order to run the science-intensive and high-technology business it is necessary to constantly develop the infrastructure.

The share of high-technology industries' products, supplied to the worldwide markets, is highly correlated with the level of the national innovative infrastructure development.

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