Business mechanism of innovation-driven development of the agricultural market infrastructure

Abstract. The article presents a mechanism of innovation-driven development of the agricultural market infrastructure, consisting of 5 subsystems: innovation customers, innovation suppliers, innovation activity objects, innovation process support, innovation regulations. Regional public institutions promoting investment activity establish formal rules for ensuring innovative development. Research institutions as innovation suppliers create innovative products for their further introduction into objects of innovative activity (agricultural sector enterprises in our case). Approbation of innovations and commercialization of inventions takes place with the help of investors and consumers who establish informal norms. The generated mechanism provides a range of positive effects from creation and use of innovations by each participant of the innovative system, which can be commercial, budgetary, social or ecological one.

Keywords: innovation-driven development; agricultural market; AIC; infrastructure; business mechanism; provision

JEL Classification: O13; O30; O38

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Организационно-экономический механизм обеспечения инновационного развития
инфраструктуры агропроизводственного рынка

Аннотация. Актуальность темы исследования обусловлена необходимостью применения инновационных разработок в качестве конкурентного преимущества субъектов агропроизводственного рынка. Цель научной работы состоит в обосновании теоретико-методологических подходов и системы, практических мер, обеспечивающих инновационное развитие инфраструктуры агропроизводственного рынка. Проведенное исследование выявило, что процесс инновационного развития отрасли зависит от механизма рыночной конкуренции и активной государственной политики в области фундаментальных научных исследований.

В статье представлен организационно-экономический механизм обеспечения инновационного развития инфраструктуры агропроизводственного рынка, состоящий из 5 подсистем: заказчики инноваций, поставщики инноваций, объекты инновационной деятельности, обслуживание инновационного процесса, правила обеспечения инноваций. Региональные институты власти, стимулирующие инвестиционную активность, устанавливают формальные правила обеспечения инновационного развития. Поставщики инноваций – научно-исследовательские организации – создают инновационные продукты с целью внедрения их в объекты инновационной деятельности – предприятия инфраструктуры АПК. Процессы апробации инноваций и коммерциализации разработок происходят при активном участии инвесторов и потребителей, формирующих неформальные нормы. Разработанный механизм предполагает получение полезного эффекта от создания и использования инноваций каждым участником инновационной системы, который может быть коммерческим, бюджетным, социальным или экологическим.

Ключевые слова: инновационное развитие; агропроизводственный рынок; АПК; инфраструктура; организационно-экономический механизм; обеспечение.

1. Introduction
In the context of global economic challenges and the transnationalization of capital by the Russian Federation government, the agrarians are faced with the difficult task of increasing the demand for and competitiveness of the domestic raw materials and foodstuff on the world markets. It is impossible to create a science-intensive and innovative product without large infusions in new technologies and advanced forms of industrial and administrative management.

The study of the state programs for the agriculture development and regulation of markets for agricultural products, raw materials and food until 2020 [1] showed the priority strategies for the social and economic development of agribusiness in the territory of the Russian Federation. Innovative technologies and approaches to managerial decision-making are the basis for the effective use of available resources, quality improving, reducing of prices for products and competitive standards establishing in production.

2. Brief Literature Review
There are various approaches and interpretations of the innovation concept in the economic literature. A significant contribution to the study of problems of innovative development of an enterprise was made by a lot of foreign and domestic scientists, such as J. Schumpeter (1934) [2], M. Porter (1998) [3], N. Kondratiev [4], A. Prigozhin [5].

The Austrian scientist Joseph Schumpeter was the first to write about innovation as entrepreneurship means of increasing profits in his «Theory of Economic Development» published in 1912.


3. Purpose

The conducted scientific research was focused on working out of business mechanism of innovation-driven development of the agricultural market infrastructure, which would reveal the specifics and demand for this segment of the market economy when analysed from the position of the system approach and institutional analysis. The main task of the above-mentioned mechanism is the identification of objects and subjects of innovation and investment processes taking place on the territory of the region and being financed by budget and extra-budgetary funds (investors) on terms of co-financing and self-financing.

4. Results

We consider business mechanism for ensuring innovation-driven development of the agricultural market infrastructure is a set of administrative and market regulators that ensure innovation-driven development and system interaction of the agricultural market entities.

Coordination and strategic development of any business entity, rational use of available resources and the introduction of innovative developments are ensured primarily by the mechanism of free market competition based on supply and demand for an innovative product. Consumers of agricultural products, raw materials and food vote with their wallets, thus stimulating the production of better and cheaper products, i.e. they establish informal rules and norms. As soon as the market does not provide social guarantees and equal conditions for running business, does not smooth out inflation or eliminate monopoly, the government should interfere, acting rather as a catalyst accelerating and facilitating complex economic processes.

The institutional approach involved for generating business mechanism for ensuring innovation-driven development imposes studying the peculiarities of economic behaviour of the market entities from the point of view of social control and the political structure of society, i.e. relations influenced not only by the market, but also by the whole system of dominant interrelated institutions which establish formal game rules (laws, decrees, contracts, instructions) and informal norms of social behaviour [14-19].

The agricultural market shall be understood as the relations that arise between agricultural producers and enterprises of the first and third spheres of the agricultural sector in the process of exchanging various types of resources (financial, information, labour, tangible and intangible assets) on the basis of free and mutual agreement, equivalence and competitiveness.

The infrastructure of the agricultural market is the organizational and economic system of institutions ensuring the interconnection between the structural elements of the agricultural market, and creating conditions for the smooth functioning of market entities.

Figure 1 shows the regional institutional system for ensuring innovation-driven development of the agricultural market infrastructure, consisting of 5 subsystems: innovation customers, innovation suppliers, innovation activity objects, innovation process support, and innovation regulations. Let us analyse the essence and functioning mechanism of each subsystem.

Fig. 1: Regional institutional system for ensuring innovation-driven development of the agricultural market infrastructure

Source: Original development by the authors

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The subsystem I *Innovation Customers*. This subsystem comprises, first of all, government institutions striving to increase the competitiveness of domestic products, raw materials and foodstuffs on the world markets. It also includes investors, i.e. financially interested legal or physical entities placing their own, borrowed or attracted funds for innovative projects in order to gain profit. Consumers are end users of innovative products.

The subsystem II *Innovation Suppliers*. Fundamental inventions made by research institutes are priority areas of state policy and, to a large extent, are realised under the state financial support. That is why, at the stage of scientific discovery or the birth of innovation, they are assessed based on their social significance. The commercialization of technological novelties results in capital consolidation: various forms of public-private partnership emerge. Applied scientific studies are carried out on the basis of innovation and technology centres, scientific departments of companies or by innovators. Such studies are financed, as a rule, through the profit gained from the sale of studies results [20-29].

The subsystem III *Innovation Activity Objects*. Agricultural market, represented by organizations producing means of production, agricultural producers, processing industry and infrastructure enterprises, is the investment object and the driving force of scientific and technological progress. Its infrastructure includes technology parks, warehousing facilities, packaging industry, centres for the collective use of high-tech equipment, wholesale and retail trade, integrated associations and cooperatives.

Government institutions (Subsystem I) finance fundamental scientific research, they stimulate, control, encourage innovations, i.e. establish formal rules (Subsystem IV *Innovation Regulations*), which are implemented through the Subsystem V *Innovation process support*, namely: credit and financial, regulatory, consulting, social [19; 21-23].

In their turn, investors and consumers (Subsystem I) when establishing customs, traditions, mentality and habits, do actively influence innovation rules (Subsystem V), establishing informal norms.

The number of organizations engaged in research and development for the years 2000-2016 on the territory of the Russian Federation, was about 4000 organizations (Table 1). Research institutions and educational institutions of higher education prevailed among others: 48% and 18% respectively for scientific research institutions and educational institutions of higher education for the years 2000-2016 on the territory of the Russian Federation, and other 447 represented processing industry.

It is worth mentioning that out of 4,032 organizations participated in R&D in 2016 only 33 belonged to the branch of agriculture, and other 447 represented processing industry. Personnel engaged in R&D in the agricultural branch counted for 279 people, and in processing industry - 43,567 people out of 370,379 of professionals who worked on R&D in Russia in 2016 [31].

In the agrarian sector in 2016, the financial structure of expenses for research and development was as follows: internal current costs - RUB 673,777,000.2 (EUR 9,201,468.29); out of which fundamental research - RUB 1,307,000.5 (EUR 17,849.12); applied research - RUB 193,808,000.5 (EUR 193,808,000.5); developments - RUB 478,661,000.2 (EUR 6,536,857.17) [31].

In general, in 2010-2016 internal current costs on R&D in Russia amounted to 1.13-1.10% of GDP. There is a strong tendency on importing of developments to the country which affects innovation activity and its systems at all levels and in the different sectors of the economy. Thus, the deficit of the balance of technology export-import in Russia skyrocketed from USD 798.1 million in 2010 to USD 2,124 million in 2017 [32].

The internal costs for research and development in respect of funding sources cumulatively increased 12 times and amounted to RUB 943.8 billion in 2016, including the 43 times increase in funds of private non-profit organizations.

Thus, the basics of the mechanism of innovation-driven development are as follows (Figure 2):

- the principle of efficiency, implying the comparison of costs for development and innovation with the results obtained from introduction of those innovations. Provided that the achieved useful effect can be commercial, social, budgetary or ecological ones;
- the principle of control and stimulation, relying on government institutions that stimulate, control, encourage for the introduction of innovations (formal rules);
- the principle of feedback, ensuring the demand for innovations, their commercialization through the formation of consumer demand for innovative products (informal rules).

### 5. Conclusions

The change-over to an innovative course of development is influenced by market competition and an active state policy in the sphere of fundamental research and private sector of the economy involved in innovation processes. However, the global growth in production is enabled by the government in the process of creating institutional conditions that activate innovation activities in the region. Accelerating the process of introduction of science and technology achievements into all spheres of financial and economic activity; creating favourable investment climate by improving the regulatory framework, reforming credit and taxation systems; and developing a monitoring and control system are strategic factors for ensuring innovation-driven development of the agricultural market infrastructure in the region.

### Tab. 1: Dynamics of organizations’ participation in R&D and internal costs for research and development by funding sources in the Russian Federation

<table>
<thead>
<tr>
<th>Total organizations</th>
<th>2000</th>
<th>2010</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Ratio between the years 2016 and 2000, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4099</td>
<td>3492</td>
<td>3604</td>
<td>4175</td>
<td>4032</td>
<td>98.4</td>
</tr>
<tr>
<td>Including</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>research institutions</td>
<td>2686</td>
<td>1840</td>
<td>1689</td>
<td>1708</td>
<td>1673</td>
<td>62.3</td>
</tr>
<tr>
<td>design organizations</td>
<td>318</td>
<td>362</td>
<td>317</td>
<td>322</td>
<td>304</td>
<td>95.6</td>
</tr>
<tr>
<td>design and survey organizations</td>
<td>85</td>
<td>36</td>
<td>32</td>
<td>29</td>
<td>26</td>
<td>30.6</td>
</tr>
<tr>
<td>development plants</td>
<td>33</td>
<td>47</td>
<td>53</td>
<td>61</td>
<td>62</td>
<td>187.9</td>
</tr>
<tr>
<td>educational institutions of higher education</td>
<td>395</td>
<td>517</td>
<td>702</td>
<td>1040</td>
<td>979</td>
<td>251.0</td>
</tr>
<tr>
<td>production organizations containing research, design and development departments</td>
<td>284</td>
<td>238</td>
<td>275</td>
<td>371</td>
<td>363</td>
<td>127.8</td>
</tr>
<tr>
<td>others</td>
<td>303</td>
<td>452</td>
<td>536</td>
<td>644</td>
<td>625</td>
<td>206.3</td>
</tr>
<tr>
<td>Total costs for research and development in respect of funding sources, RUB billion</td>
<td>76.7</td>
<td>523.4</td>
<td>847.5</td>
<td>914.7</td>
<td>943.8</td>
<td>increased 12 times</td>
</tr>
<tr>
<td>including in respect of the following funding sources:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>public funds of different levels</td>
<td>41.2</td>
<td>360.3</td>
<td>569.1</td>
<td>617.3</td>
<td>622.3</td>
<td>increased 15 times</td>
</tr>
<tr>
<td>internal funds</td>
<td>6.9</td>
<td>47.4</td>
<td>99.7</td>
<td>109.9</td>
<td>129.1</td>
<td>increased 19 times</td>
</tr>
<tr>
<td>funds provided by organizations of higher education</td>
<td>0.1</td>
<td>0.1</td>
<td>1.8</td>
<td>2.3</td>
<td>3.6</td>
<td>increased 16 times</td>
</tr>
<tr>
<td>funds provided by business enterprises</td>
<td>14.3</td>
<td>85.9</td>
<td>145.8</td>
<td>150.9</td>
<td>154.9</td>
<td>increased 11 times</td>
</tr>
<tr>
<td>funds provided by foreign sources</td>
<td>9.1</td>
<td>18.6</td>
<td>21.0</td>
<td>24.2</td>
<td>25.4</td>
<td>increased 3 times</td>
</tr>
<tr>
<td>funds provided by private non-profit organizations</td>
<td>0.03</td>
<td>0.6</td>
<td>1.0</td>
<td>1.3</td>
<td>1.3</td>
<td>increased 43 times</td>
</tr>
<tr>
<td>Others</td>
<td>11.97</td>
<td>10.5</td>
<td>9.1</td>
<td>8.8</td>
<td>9.2</td>
<td>76.8</td>
</tr>
</tbody>
</table>

Source: Compiled by the author based on the official statistics [30]
Innovators

- investing in both infrastructure facilities and venture capital projects in order to gain profit or other beneficial effects

Investors

- financing companies and paying the expenses of revenue gained from innovation sales

Companies supplying resources

- financial (banks, insurance companies, investment funds, budgetary and extra-budgetary funds)
- information (marketing centre centres, information and consulting services, analytical centres, consulting centres, ad agencies, statistical agencies)
- labour (personnel training and re-training, health care, work and recreation)
- material and non-material (suppliers and contractors)

Government institutions

- stimulate, control, encourage innovations establishing formal rules

Public and private partnership

- pooling of capital

Innovation suppliers

- scientific organizations
- scientific departments of companies

Applied innovations

- innovation centre
- innovators
- innovative project

Innovation market:

- technologically new product
- technology-enhanced product or process

Infrastructure of agricultural market

Technology parks
Warehousing facilities
Packaging industry
Technology development zones
Wholesale and retail trade
Integrated associations and cooperatives

Agricultural market

- enterprises and organizations providing agricultural products and food, processing enterprises, raw materials and food

Market of innovative food products

- informal norms

Consumers of agricultural products, raw materials and food

- vote with their wallets, thus stimulating the production of better and cheaper products (establishment of informal norms)

Development, creation and acquisition of innovations out of net profit, based on co-financing terms

Fig. 2: Business mechanism of innovation-driven development of the agricultural market infrastructure

Source: Authors’ original development

References


