Scientific basis for forecasting the innovative development of the agricultural sector of the region’s economy (on the materials of the Perm region)

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Abstract. The article discusses the concept of the need to change approaches in forecasting the innovative development of the agricultural sector of the Perm region with the requirements of digitalization of the economy and management of innovation processes. The factors that ensure the management of innovative activities of enterprises and organizations operating in the agricultural sector of the economy are considered. A model for forecasting the innovative development of the agricultural sector of the region’s economy is proposed. The results of a study of the dynamics of innovation activity in the agricultural sector of the Perm region economy are summarized, and factors affecting its increase are identified. On the basis of them, the authors propose the key areas of innovation, which should be focused forecasting innovative development.

1. Introduction
Forecasting the innovative development of the agrarian sector of the economy is based on identifying the factors and features of such development. [1, 2, 3, 4, 5]. When studying the totality of factors of innovative development of the agrarian sector of a constituent entity of the Russian Federation (region), it is advisable to rely on a set of studies aimed at identifying factors that ensure the management of innovative activities of enterprises and organizations, schematically presented in Figure 1, primarily focusing on technological innovations [6, 7, 8, 9].

From the point of view of sustainable development, innovations are divided into social, economic, environmental, institutional, and technological. Technological innovations should include not only technical, but also social, economic, and institutional technological innovations (social technologies, economic technologies, environmental technologies, and institutional technologies). In this case, the technology is understood in a broad sense as a regulated set and sequence of actions aimed at a predetermined (predicted) result.

A set of studies to identify the factors that ensure the management of innovative activities of business entities is an integral part of research conducted within the framework of the territorial (regional) marketing system to obtain basic data on forecasting innovative development of the agricultural sector of the region’s economy.
Methodologically, forecasts of the innovative development of the agrarian sector of the regional economy can be considered as a model as shown in Figure 2.

A model for forecasting the innovation development of the agricultural sector of the regional economy has been developed taking into account the fact that the regulatory and legal acts of the Russian Federation and the subjects of the Russian Federation provide for mandatory strategic and territorial planning, program, and project management for the implementation of strategic and territorial planning documents.

2. Research Methods
Monographic, statistical, theoretical generalizations; analysis and synthesis.

3. The Results of the Study
The innovative way of developing the agrarian sector of the regional economy and its features are considered in the works of Russian authors [10, 11, 12, 13, 14]. This study shows that it is determined by the elements of strategic and territorial planning, program and project management, which are reflected in the Perm Territory in a number of regulatory and legal acts:

1. The Strategy of Socio-economic Development of the Perm Territory until 2026 (Resolution of the Legislative Assembly of the Perm Territory dated December 1, 2011 No. 3046, as amended on December 6, 2012);
2. The Territorial Planning Scheme of the Perm Territory (Resolution of the Government of the Perm Territory dated 10/27/2009 No. 780-p as amended on October 30, 2017);
3. The State Program “Development of Agriculture and Sustainable Development of Rural Territories in the Perm Territory” (Resolution of the Government of the Perm Territory dated October 3, 2013 No. 1320-n as amended on January 12, 2017);
4. The State Program of the Perm Territory “Economic Policy and Innovative Development” (Resolution of the Government of the Perm Territory of October 3, 2013 No. 1325-p as amended on June 8, 2018);
5. The Law of the Perm Territory on Innovation Activity in the Perm Territory of June 11, 2008 No. 238-PK (as amended on March 14, 2016);
6. The Decree of the Governor of the Perm Territory of July 4, 2018 No. 59 on the Management System of the Digital Economy of the Perm Territory.

The listed regulatory legal acts contain both the approved forecast parameters of the innovative path of the agricultural sector development of the Perm region economy (sections 1-4) and features of the mechanism for forecasting innovative development (sections 5, 6).

The innovative way of development of the agricultural sector of the Perm region in accordance with the State Program “Development of Agriculture and Sustainable Development of Rural Areas in the Perm region” is formed in the following areas:

- Developing land reclamation for agricultural purposes and the sub-sector of crop production, processing and sale of crop production;
- Development of the livestock sub-sector, processing and marketing of livestock products;
- Support for small businesses;
- Technical and technological modernization, innovative development;
- Development of human resources, informational and organizational support for the development of the industry;
- Ensuring veterinary well-being in the Perm Territory;
- Sustainable rural development.
As a result of the implementation of the main measures stipulated by the state program (according to the published data of the Ministry of Agriculture and Food of the Perm Territory), taking into account the introduction of innovations, labor productivity in the agricultural sector of the Perm Territory should increase significantly (Figure 3).

**Figure 1.** A set of studies to identify the factors that ensure the management of innovation activities of enterprises and organizations of the agricultural sector of the economy.
Figure 2. The forecasting model of innovative development of the agricultural sector of the region.

Figure 3. Projected productivity growth in the agricultural sector of the Perm region (thousand rubles / person).
The managerial impact aimed at increasing innovation (sensitivity, ability and readiness for innovation) of the agricultural sector of the Perm Territory is carried out within the framework of the state program in the form of state and municipal support, primarily financial, with the involvement of extrabudgetary funds (Table 1).

**Table 1.** Financing the development of the agricultural sector of the Perm Territory in 2017-2020.

| Sources of financing                                      | Amount of financing (thousand rubles) |
|----------------------------------------------------------|---------------------------------------|
|                                                          | 2017       | 2018       | 2019       | 2020       |
| In total, including                                      | 22062659.6 | 22835763.7 | 23687071.1 | 25932340.1 |
| Budget of the Perm region                                | 2205605.4  | 2088531.0  | 2088531.0  | 3672468.8  |
| Including: Komi-Permyatsky District                      | 136050.5   | 156617.6   | 170639.2   | 194238.3   |
| Territories included in the Kizelovsky coal basin        | 117.1      | 130.1      | 136.1      | 148.9      |
| Federal budget                                           | 1378333.6  | 1313378.6  | 1293920.6  | 2184501.9  |
| Local budgets                                            | 172025.4   | 109529.1   | 179862.8   | 211769.5   |
| Extrabudgetary sources                                   | 18306695.2 | 19324325.0 | 20124756.7 | 19863599.9 |

In the crop industry, state support is aimed at increasing the intensity of cultivated areas (increasing yields) and increasing the acreage, developing land reclamation and involving unused land in agricultural circulation.

In the livestock industry, state support is aimed at reimbursing part of the cost of acquiring breeding animals, equipment, machinery and equipment, stimulating the production of meat, milk, paying interest on loans, paying insurance premiums under insurance contracts.

In the direction of “Technical and technological modernization, innovative development” in order to reequip the industry and strengthen the productive capacity of the agricultural sector of the economy, the Perm region is actively working with the state agro-industrial leasing company Rosagroleasing OJSC. So, in the framework of the cooperation agreement between the Perm Territory and RosagroleasingOJSC, in 2017, 22 contracts were concluded for the supply of 23 units of agricultural machinery, 40 heads of pedigree products, and livestock equipment per 1000 livestock. The total amount of contracts amounted to 47.3 million rubles (Table 2).

**Table 2.** Financial support in the direction “Technical and technological modernization, innovative development”.

| Sources of financing     | Amount of financing (thousand rubles) |
|--------------------------|---------------------------------------|
|                          | 2017       | 2018       | 2019       | 2020       |
| Total, including         | 321000.0   | 321000.0   | 321000.0   | 464000.0   |
| Budget of the Perm region| 32101.0    | 32101.0    | 32101.0    | 46400.0    |
Federal budget

|                | 0.0 | 0.0 | 0.0 | 0.0 |
|----------------|-----|-----|-----|-----|
| Extra budgetary sources | 288899.0 | 288899.0 | 288899.0 | 417600.0 |

Under the Decree of the Government of the Russian Federation of December 27, 2012 No. 1432 “On Approval of the Rules for Granting Subsidies to Agricultural Machinery Manufacturers” (hereinafter referred to as Resolution 1432), 233 contracts were registered for the purchase of 299 units of agricultural machinery at a 15% discount. The total amount of registered contracts is 411.24 million rubles, the savings of agricultural producers amounted to 73.4 million rubles.

Many agricultural enterprises use the imported equipment, such tractors, combines, and trailed units. In the Perm Territory there are two actively developing enterprises of agricultural engineering, namely the “Navigator - New Engineering” company and the Krasnokamsk Repair and Mechanical Plant. These companies produce machinery for procuring feed and are actively involved in the federal program under Resolution 1432. These enterprises are ready to supply equipment to the market at a 15% discount.

During 2017, human potential development activities were carried out. During the analyzed period, 882 students of higher and secondary specialized educational institutions of agrarian profile undertook practical training at 15 industrial training sites. Subsidies were paid in the amount of 6.1 million rubles.

The year of 2017 was marked with the participation of rural schoolchildren; also, students of higher and secondary specialized educational institutions of agrarian profile were involved in activities to improve the agro-educational process. Schoolchildren, students, and teachers of higher and secondary specialized educational institutions of the agrarian profile made a number of trips to successful agricultural enterprises of the region. 286 people took part in the events. The VI Forum of Rural Youth of Kama Region was organized and held, 145 people took part in the forum activities. The total number of participants was 431 people, including 58 schoolchildren. For these purposes, from the regional budget financial resources were provided for the implementation of measures to improve the agricultural process in the amount of 0.65 million rubles.

During 2017, on the basis of the Regional Center for Agricultural Consulting, 139 consultations (1,500 people / hour) were organized for 1,555 students. Consulting services on the 1C accounting program were organized in Kuiedinsky municipal district to assist in the preparation of accounting reports and business plans. The number of students covered with that program amounted to 44 people. For this event, 3 million rubles were spent.

In the reporting period, internships for 10 people were organized and conducted by managers and specialists of agricultural enterprises of the Perm region to advanced enterprises of the Nizhny Novgorod region (0.4 million rubles), 8 people travelled to the Hungarian Republic (1.5 million rubles) and Lower Saxony (10 people, 1.4 million rubles spent). Funding from the regional budget for the designated activities amounted to 3.3 million rubles.

Subsidies in the amount of 0.2 million rubles were paid for the reimbursement of costs to agricultural producers for improving skills of agricultural workers in the Perm region (45 people). At the end of 2017, a total of 560 people underwent advanced training.

In 2017, lump-sum and incentive payments were provided to 99 young professionals who were employed in agricultural organizations in the Perm Territory in the amount of 12.8 million rubles, including:

- One-time payments were received by 62 people in the amount of 7.9 million rubles; payments for higher professional education (150 thousand rubles) were made to 34 people (5.1 million rubles, in total); payments for secondary professional education (100 thousand rubles) were transferred to 28 people (2.8 million rubles in total);
- 37 people received incentive payments in the amount of 4.9 million rubles, with higher professional education (150 thousand rubles) – 24 people (the total number is 3.6 million
rubles), with secondary professional education (100 thousand rubles) – 13 people (1.3 million rubles in total).

The conducted studies allowed to clarify certain indicators characterizing positive dynamics of the innovative development of the agricultural sector of the Perm region in 2017 (Table 3).

Table 3. Indicators characterizing the dynamics of innovative development of the agricultural sector of the Perm region in 2017.

| Target / direct result indicator, units measurements | Plan value | Actual value | Deviation, % |
|-----------------------------------------------------|------------|--------------|--------------|
| Labor productivity index by previous year, %        | 109.0      | 110.0        | 100.9        |
| The number of purchased agricultural producers, organizations of the agro-industrial complex, regardless of their organizational and legal form, and consumer cooperation organizations of the Perm Territory units of machinery and equipment with the provision of state support measures in the framework of the event, units | 54 63 | 116.7 |
| The staffing of agricultural producers with personnel, % | 95.2 95.5 | 100.3 |
| The number of activities carried out aimed at establishing and strengthening of a positive image of agriculture in the Perm Territory and the promotion of products made by Perm agricultural producers, units | 8 10 | 125.0 |
| The number of young professionals employed in agricultural organizations of the Perm Territory who received state support, people | 87 99 | 113.8 |

With the outlined positive trends that indicate the transition of the agricultural sector of the Perm region to the innovative path of development, it should be noted that the current expenditures on research and development in the agricultural sciences are insignificant if compared to the total costs for the Perm region (Table 4) [15].

Table 4. Domestic current expenditures for research and development (including basic research, applied research and development), including Agricultural Sciences, mln. rub.

| Year | Total | Including Agricultural Sciences |
|------|-------|---------------------------------|
| 2010 | 6677.5 | 32.9 |
| 2011 | 7211.3 | 28.8 |
| 2012 | 8332.2 | 27.9 |
| 2013 | 10743.7 | 26.3 |
| 2014 | 10527.1 | 23.7 |
| 2015 | 11930.0 | 27.5 |
| 2016 | 12206.8 | 30.0 |

In the course of the study, factors affecting the increase in the innovativeness of the agricultural sector of the Perm Territory, which also occur in other constituent entities of the Russian Federation, were identified:
A limited access of agricultural commodity producers to the markets of financial, material, technical and information resources, the continuing imperfection of market and innovation infrastructures in the context of increasing monopolization of trade networks, weak development of cooperation in the production and sale of agricultural products, poor development of innovative ties of agricultural science, production and sales product innovation;

- The problem of the availability of bank loans for agricultural producers, the growth of interest rates on investment loans, including those aimed at innovative development;
- The low level of profitability of agricultural producers, which does not allow for the expanded reproduction using innovations;
- The low rates of technical/technological and structural modernization of the agricultural production in the agrarian sector of the regional economy, a low level of renewal and reproduction of resource and innovation potentials;
- The limited funding for Agricultural Science throughout the research chain: basic and applied research, research and development;
- The continuing shortage of qualified personnel caused by the low level and quality of life in rural areas;
- Insufficient rates of social and engineering development of rural areas, reduction of employment of rural residents with a weak development of alternative activities and, as a result, a decrease in motivation for the innovative development of the agricultural sector of the region’s economy.

Currently, one of the mechanisms for solving many problems is that the country’s leadership sees a way out of the current situation, characteristic of the country's economy as a whole, in its transformation on a digital basis [16, 17, 18].

In connection with this decree of the Government of the Russian Federation of July 28, 2017 No. 1632-p, the Federal Program “Digital Economy of the Russian Federation” was approved. The objectives of this program are:

- Creating the ecosystem of the digital economy of the Russian Federation, in which data in digital form is a key factor of production in all spheres of socio-economic activity and in which effective interaction is ensured, including cross-border, business, scientific and educational communities, the state and citizens;
- Creating necessary and sufficient institutional and infrastructural conditions, eliminating existing obstacles and restrictions for the creation and (or) development of high-tech businesses and prevention of new obstacles and restrictions both in traditional industries and in new industries as well as high-tech markets;
- Increasing competitiveness in the global market, both in individual sectors of the economy of the Russian Federation and the economy as a whole.

At the regional level, the Decree of the Governor of the Perm region of July 4, 2018 No. 59 on the Management System of the Digital Economy of the Perm Region was issued at the regional level in order to develop the digital economy of the Perm region as a necessary condition for improving the competitiveness of the region, including its agrarian sector.

Thus, it is assumed that conducting a set of studies to identify the factors that ensure the management of innovative activities of enterprises and organizations of the ASE (Figure 1), forecasting the innovative development of the agricultural sector of the regional economy (Figure 2) should be focused on the digitalization of both the agricultural sector and management systems of the ASE region.
4. Conclusion
The study, based on the example of the Perm region, allows us to conclude that forecasting the innovative development of the agricultural sector of the economy, taking into account the need for digitalization of the economy and management systems, should be focused on the three key areas of innovation:

- Markets of innovative agricultural products (food), agricultural sector of the economy and related sectors of the economy, where the interaction of specific subjects is insured (suppliers and consumers of innovative agricultural products);
- Innovative platforms and technologies, in which competencies are formed for the development of markets for agricultural products (food), the agricultural sector of the economy, and related sectors of the economy;
- An innovative environment that creates conditions for developing platforms and technologies and effective interaction between the subjects of the markets of innovative agricultural products (food), the agricultural sector of the economy, and related sectors of the economy, which covers regulatory, innovative, and information infrastructure, as well as personnel and information security.

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