

# Information and analytical support of innovations in agricultural production: Russian experience

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**Abstract**—Innovation is one of the key factors in modern agriculture development as it provides labor productivity growth, keeping the natural resources biocapacity. Smart farming is a priority in the world developed countries. It includes informing of the advanced science achievements and pollution consequences for mankind, energy saving and information technology implementation in traditional types of agricultural works. The necessity of investment in agricultural production development, advanced information technology implementation and ‘digital’ agriculture formation are admitted in the Russian Federation. At the same time, there is lack of information about the innovation scope in agriculture and knowledge exchange system in this sphere. It is necessary to form the innovation implementation basis considering significant differences in the agriculture specialization, its efficiency and the amount of the state support. In turn, it requires a current situation analysis and an information base creation. The research objective is to prove the monitoring concept of innovation implementation in agricultural production at the regional level. Systematic monitoring allows making more justified management decisions connected with the ‘digital’ agriculture in regions.

**Keywords**—*digital economy, innovations, monitoring, agricultural production, region, Russia*

## I. INTRODUCTION

In post-Soviet Russian times the scientific research was separated from economy and manufacturing enterprises had to finance applied scientific developments. The idea of foreign investors who would implement advanced technologies allocating funds for production development was propagandized. However, the practice has shown that the investment policy does not stimulate the innovation implementation in the domestic production, and, on the contrary, it is a restraining factor for the development. Especially sharp, this problem is shown in Russian agriculture. According to the Russian Federal State Statistics Service, 374722 million rubles were directed to the purposes of the agricultural production development in 2017 with a 3% increase than in 2016. It is only 3.1% of the investment total amount into the country fixed capital. At the same time, enterprises are the main investors (61.1% of investments are provided at the expense of enterprise own means in 2017, 59.2% - in 2015) [1]. These financial resources are obviously

not enough. It should be noted that an indeterminacy factor bounds to climatic changes and interferes with more significant investment growth into agriculture of the world-developed countries.

Hansen J., Hellin J., Rosenstock T. and other (2019) researches show that the advanced production technologies and effective mechanisms of risk management can protect assets from external shocks and stabilize production and income. The plant and animal selection, the organic agriculture development and the diversified production system (the system based on agroforestry) are possible to refer to innovative agro-technologies. The supporting role is played by insurance and social protection. Management of climate risks [2] has to become the purpose of innovation technology implementation.

There is comprehension in the world-developed countries that the agricultural activity has to be conscious. British scientists, Okumah M., Chapman P. J., Martin-Ortega J., Novo P. (2019), have proved that it can be achieved by increasing in funding of the pollution problem researches and informing farmers on consequences of nonrational natural resource use [3].

Knowledge dissemination about the innovations leads to conscious agricultural production. Innovative technologies often remain localized in the region (the certain country). Dey A., Gupta A.K. and Singh G. (2019) note that the interaction between existing institutes, technologies, and resources leads to risk reduction in production and promotes social, economic and ecological sustainability [4].

Having received a positive result in the separate enterprise or region, it is very important to extend this experience through the country. There were resource centers in the USSR where thematic seminars about scientific and technical achievements in agriculture were organized. Professional development of different level experts was carried out in large research and production centers in different regions of the country. Today the European Union countries and the United States of America have something similar to them. For instance, The Farm Advisory Services and The European Innovation Partnership in the European Union play a significant role in improving the competitiveness of

agricultural production and sustainable development of territories. It allows sharing knowledge and studying possibilities of advanced technology use in Europe [5].

Thus, information and analytical support of innovation implementation in agricultural production is recognized by the majority of the world countries. Apparently, this direction is also demanded in Russia.

## II. RESEARCH RESULTS

The Russian Federation is one of the leading global grain and poultry manufacturers. Arable land was 80048.7 thousand hectares, an increase of 1.8 % between 2015 and 2017. The number of all cattle categories was 18294.2 thousand, a decrease of 1.8 % between 2017 and 2015.

The livestock of pigs for the same period increased by 7.8 %, 23075.5 thousand, the poultry livestock increased by 2.2 %, 555827.2 thousand [6]. By expert estimates, Russian agriculture is more energy intensive (by 5 times), more metal intensive (by 4 times) and less labor productive (by 8-10 times) than in the USA, Canada and the EU countries [7]. The increasing gap between Russia and the leaders is the index of energy efficiency and 'green economy' development (Germany, Japan) [8]. Low-leveled 'digitalization' of productions in agriculture remains in our country. The Federal scientific and technical program of agricultural development for 2017 - 2025 (approved by the resolution of the Russian Federation Government, August 25, 2017, № 996) is adopted for the purpose of technological lag reduction. One of the target indicators is the increase in number of hi-tech jobs at the agro-industrial enterprises.

Despite made decisions, changes in the technical equipment of agricultural production happen heavily. The agricultural machinery park is reduced. During 2015-2017, the number of tractors was reduced by 7.2 %, cultivators - by 6%, combine harvesters - by 6.2 %, milking machines and units - 8.8% [1]. According to Rosstat, the load of one tractor during 2015-2017 increased by 2.6 %, a combine harvester - by 0.4 %. Energy supply per 100 hectares of acreage was reduced for 3 years by 0.8 % and it was 198 horsepower in 2017. The average age of rural, forestry, hunting, fishery and fish breeding equipment was 10.8 years in 2017 [9].

The changed economic conditions demand new approaches to farm management. Adoption of management decisions in the agrarian sphere assumes to justify financial expenses, assess estimated results of the new technology implementation, control the course of goals achievement in agricultural production. In this regard, systematic monitoring

of innovation implementation is increasing in all regions of Russia where agricultural production is developed.

The Rosstat is a main information source on the innovative activity of agricultural products producers. However, the published information is not complete; the regional section is poorly presented. On the Rosstat website there is an index system for statistical assessment of technological development level in economy branches [10] and only insignificant quantity of indexes is presented (in blocks 'macroeconomic statistics', 'investment statistics', 'energy efficiency statistics', 'fixed asset statistics') in Section A "Rural, forestry, hunting, fishery and fish breeding" in the Russian Standard Industrial Classification of Economic Activities (OKVED). The classification of high-tech economy industry selection is guided by the Rosstat [11], but this classification doesn't consider agriculture among high-tech industries. There is a beginning of the idea that agriculture is a traditional activity.

At the same time, many publications are devoted to the practical experience of technological, information innovation implementation in Russian and foreign literature. The large western companies track advanced achievements in agriculture for the purpose of technique and agrotechnology development [12]. According to us, there is a positive experience of innovation application in Russian regions [13].

An information support problems of happening changes and a prediction of 'digital' rural economic development arose with a change of priorities of the Russian state economic policy in 'digital economy' development. Thus, the statement of innovation implementation monitoring has strong reasons in Russian regions.

In the dictionary of modern economics, monitoring (Latin 'monitor' - reminding, supervising) is the process of checking whether individuals or firms are actually behaving as they should [14]. In practice, monitoring is, as a rule, treated not only as the collecting primary information but also as the system of the collected information analysis, the forecast creation for management.

Fig. 1 presents a conceptual model of sectoral monitoring at the regional level. The model is a systemic approach to the integrated use of the indicator and method system, means and tools. Monitoring includes recommendations for improving the monitoring system, analysis, and control of the innovation process.

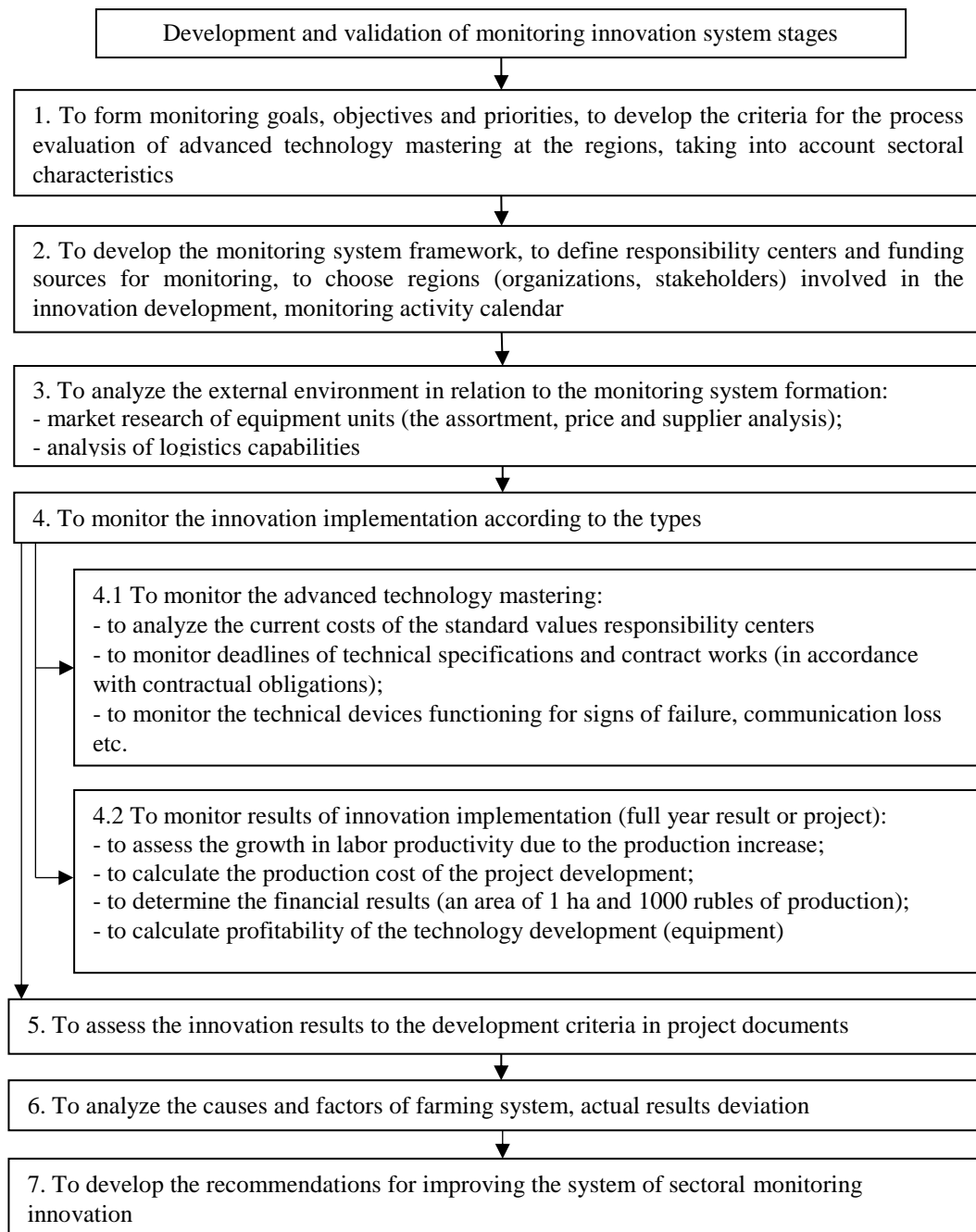


Fig. 1. The concept of innovation monitoring in agriculture

The conceptual model for monitoring includes a set of monitoring entities and objects, a subject area and an information technology description (Fig. 2).

The territorial bodies of the Rosstat, followed by aggregation of information at the Federal level should monitor innovations in agriculture. Information should be available to rural producers to disseminate the most effective projects for the innovative technology, equipment, technique

development. Regional unit powers of the Ministry of Agriculture in the Russian Federation develop proposals on the main directions of agrarian policy in the region, forecast, plan agriculture development, etc. Information obtained during monitoring will improve the Ministry of Agriculture efficiency.

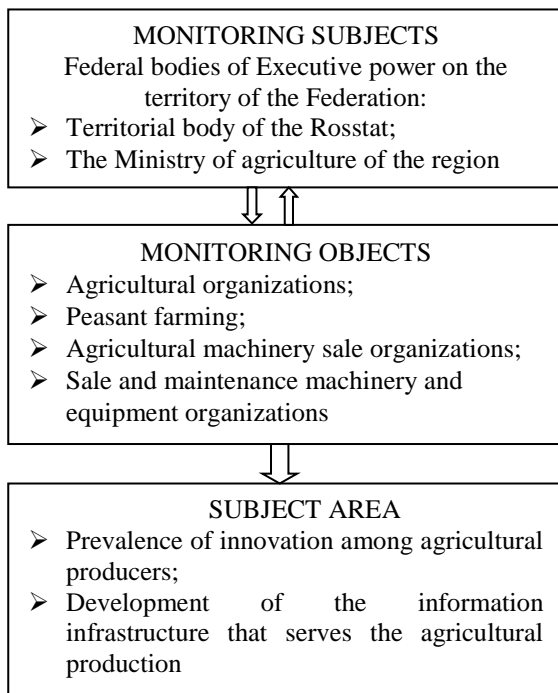


Fig. 2. The interaction between the elements of monitoring the innovation implementation in agriculture

### III. CONCLUSION

It is necessary to inform producers of geographic information systems and other specialized equipment about the needs of farmers to ensure large-scale innovation in agriculture and popularize the achievements in this field. According to experts, the ministry and office work on the collection, processing, and dissemination of information is poorly coordinated [15]. Innovation in Russia requires significant investment at the initial stage. However, as practice shows, the cost of specialized equipment will decline gradually with the spread of technology. Agricultural producers need extensive consulting support.

To accelerate the implementation of digital innovative technologies is required to have preparatory work for the detailed description of agricultural land, field map preparation, digitization of products selection, patent documents organization. It is necessary to prepare specialists and create an accessible information environment, allowing the positive experience spread. These activities will contribute to agriculture approach to the leading developed country level.

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