

ISCKMC 2022**International Scientific Congress «KNOWLEDGE, MAN AND CIVILIZATION»****STRATEGY FOR DIGITAL DEVELOPMENT OF FARMING
INDUSTRY IN NORTH CAUCASIAN FEDERAL DISTRICT**

Karina Mikhailovna Baliyants (a)*, Sergey Vladimirovich Dokholyan (b),
Kazbek Kerimovich Kurbanov (c), Elnara Migazhidinovna Eminova (d)

*Corresponding author

(a) Institute of Social and Economic Research Dagestan Scientific Center, Russian Academy of Sciences, 75, M. Yaragskogo Str., Makhachkala, Russia, reklama-ka@rambler.ru

(b) Institute of Social and Economic Research Dagestan Scientific Center, Russian Academy of Sciences, 75 M. Yaragskogo Str., Makhachkala, Russia, sergsvd@mail.ru

(c) Institute of Social and Economic Research Dagestan Scientific Center, Russian Academy of Sciences, 75 M. Yaragskogo Str., Makhachkala, Russia, kkurbanov@mail.ru

(d) Dagestan SAU, 180, M. Gadzhiev Str., Makhachkala, Russia, eminova@mail.ru

Abstract

The paper outlines a number of scientific attitudes proposed by leading modern scholars, experts and heads of farming enterprises operating in the Russian Federation to strategic planning of innovations with a focus on digitalization of the agrarian sector. The paper describes the current state of the regional farming industry in the North Caucasian Federal District, which, due to a slowdown of economic indicators, does not fully address related challenges – to reduce significant regional differentiation in rural and urban standards of living, to pay decent salaries, to train and retrain personnel, to provide institutional conditions for implementing state programs for digitalization of industries, to overcome rigid thinking of agricultural producers, to create a system for putting research by domestic developers into practice, to promote coordination of regional ministries and departments in the implementation of state agrarian policy, etc. With this in view, the state should place a premium on agricultural development, since it is the basis of national food security, promotion of health and working capacity of the population. It accentuates the role of the state in innovation activity in the farming industry based on strategic planning and creation of economic conditions to boost regional agriculture through cutting-edge digital and information technology. The authors deal with the impacts hindering the agrarian sector to be geared to improve production efficiency and contribute to the state tasks in the field of digitalization of the farming industry.

2357-1330 © 2022 Published by European Publisher.

Keywords: Digitalization, farming industry, regions, state regulation

1. Introduction

The North Caucasian Federal District is one of the most important regions of Russia for food production. Given that providing the population with high-quality and affordable food is the principal task of agricultural production, it is challenging to provide an uninterrupted supply of food throughout the year and generate reserves. Therefore, the state should seek to ensure food security, identify priority sectors of agriculture, and take measures to raise their innovative and investment attractiveness.

To address the food issue in Russia, so that the country could provide itself with food, it must produce food in sufficient quantities. Agricultural produce should be imported into the country if it is expedient. Despite the fact that imports seem to solve the food problem, foreign-funded procurement activities do a lot of harm to the national economy. It is also necessary to pay attention to export operations related to the sales of food only as raw materials; growing industrial processing of agricultural raw materials and food resulted in surplus value in the price of exported commodities.

Thus, in order to achieve stable food self-sufficiency, it is necessary to upgrade domestic farming industry and move on to the development of innovations. To ensure sustainable farming industry, this process should be based on a planned strategic approach geared to come up with and quickly integrate a number of innovations that can significantly increase agricultural production through modern methods. One of these areas of innovative development is the principles of the digital economy incorporated into the agrarian sector, which would enable an institutional environment tailored to meet modern requirements, reduce transaction costs, and ensure the sustainable development of the agrarian sector of the economy.

2. Problem Statement

In Russia, there have been multiple studies on strategic innovative development of regional farming industry in the light of market economy for several decades. These include the scientific publications by I. Sandu, A.I. Altukhov, L.P. Silaeva, V.F. Fedorenko, D.S. Buklagin, E.L. Aronov, scientists of the Higher School of Economics N.V. Orlova, E.V. Serova, D.V. Nikolaeva, A.S. Khvorostyanoy, Yu.A. Novikova, E.V. Yavkina, etc. R. Bucht, R. Hicks introduced the theory of digitalization of the economy. In recent times, the main theoretical attitudes to the innovative and, in particular, digital agrarian economy have further expanded to embrace in-depth research by scientists from regional research institutes and universities, as well as specialists from ministries and departments and practical leaders of agricultural activities. At present, studying the sectoral economy with a view to integrating digital innovations is significant in Russian science. The topic has been given much attention for the last 8 years, with various studies to be carried out and presented in numerous scientific reports in many regions of the Russian Federation. The paper attempts to explore current strategic attitudes to shaping an innovative agrarian economy of the region based on its digitalization, to identify factors hindering its effective development. Given that the regions of the North Caucasian Federal District are agrarian-oriented, have a weak industrial and infrastructural base, a downward trend in the rural population and its employment at the place of residence, it can be

assumed that these factors explain those weak prerequisites for effective digital innovations to be integrated in the agro-economy of the region. The strategic digital development of the agro-economy requires significant financial material and personnel investment that is quite problematic to achieve in conditions of significant subsidization in most regions of the district, as well as ongoing intractable socio-economic problems. However, successful innovative digital development of the regional farming industry can be ensured by digitalization as one of the key areas of strategic planning and practical implementation of innovation policy.

3. Research Questions

An innovative model of the farming development strategy should be based on state long-term development programs. To date, there is a serious technological and technical lag. Machinery, equipment and technologies at enterprises are outdated, there is a low commitment for modernization at agricultural enterprises, rural youth are leaving the villages, as rural labor has become unattractive and low-paid. In addition, the lack of developed infrastructure and social benefits has a negative impact. Therefore, the state should first of all increase innovative activity in the farming industry. This is due to the fact that the public sector of the economy should become “an active source through which innovations will be generated” (Sandu, 2010, p. 73). Sandu (2010) identifies the following strategic trends for the implementation of the innovative model for the development of the farming industry (See Figure 1).

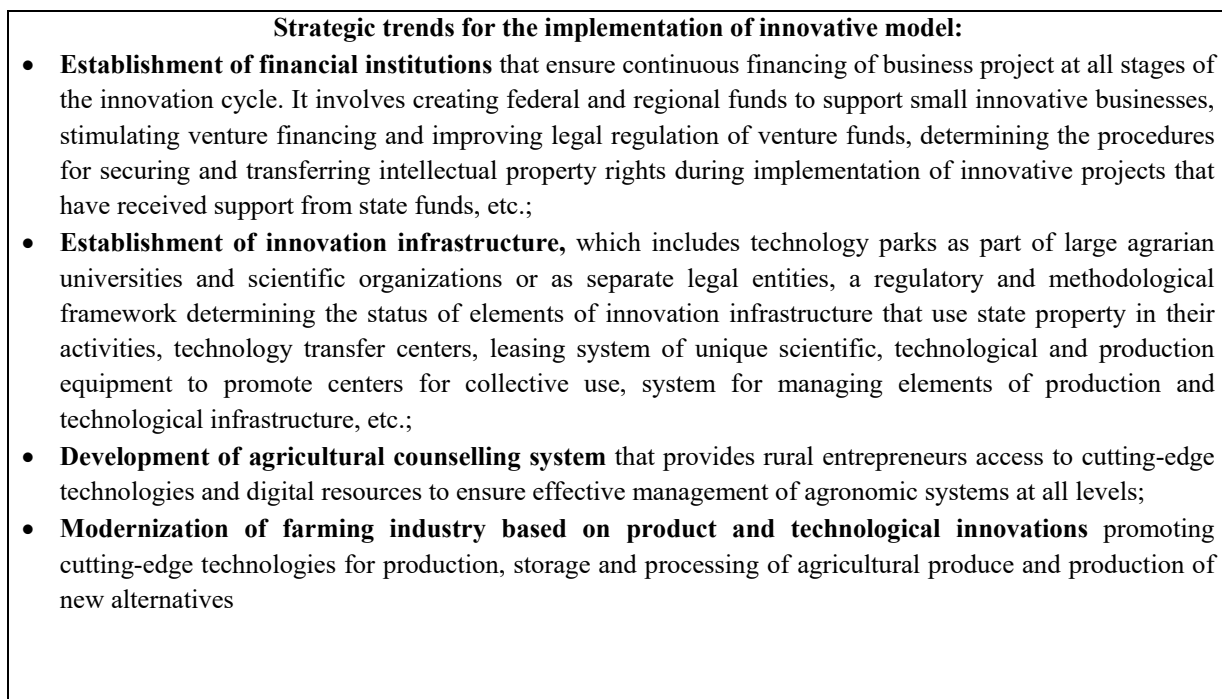


Figure 1. Strategic trends for the implementation of innovative model

A strategy for innovative development in the farming industry calls for a comprehensive approach that would involve factors fostering production and setting the tone for innovative activity (Altukhov & Silaeva, 2020).

The innovative capacity of the farming industry is a combination of innovations that help, in a certain context, perform innovative activities geared to address social and economic challenges through commercialized agricultural innovations in production and economic activities.

Innovative capacity is subject to quantitative and qualitative criteria. Each region features natural, historical, ethnic, social conditions and has its own regulatory framework.

Growing environmental tensions, pollution of the environment is associated with inept intensification of agricultural technologies. As a consequence, in Russia and abroad, intensification of production is accompanied with biologization of agriculture that significantly reduces negative implications, thereby enabling agricultural products and avoiding environmental disorders (Dokholyan, 2019).

Fertile soils is an advantage of the region. This is due to the fact that fertile soils, on the one hand, make the region innovatively attractive, and, on the other hand, expand the region's innovative capacity, resulting in growing reserves of processing industries and increased volumes of domestic products on the market. Food and demographic problems are solved from a social standpoint.

Innovative strategy for the farming industry should feature innovative susceptibility of the consumer. The Russian consumer is characterized by conservatism. However, together with this, the Russian consumer is increasingly dependent on innovative products. Thus, there is a growing demand for waste-free and digital technology.

To make the consumer become more receptive to innovative technologies, the state should support joint projects in which the state and business representatives are partners, support the integration of new innovative technologies and share risks with business. State aid will reduce the risk of integrating innovations in the farming industry, and raise the innovative attractiveness.

The strategy for the innovative development of the agro-industrial complex has its own goals and objectives, presented in Figure 02:

Innovative strategy for the farming industry has its goals and objectives presented in Figure 02:

Strategic objectives of the innovation model:

- **build** human capital in the field of science and education for the farming industry, innovative consciousness;
- **raise** public awareness of innovations;
- **enhance** innovative business activity;
- **promote** state innovative activity, create innovative climate;
- **develop science**, production of advanced technologies and innovative products;
- **strengthen the role** of the state in areas characterized by low attractiveness for private enterprises;
- **avoid monopolization** in the farming industry and create effective competition

Figure 2. Goals and objectives of innovative strategy for farming industry

Among a variety of modern scientific attitudes related to innovative development strategies, three possible options are worthy of note.

The first option is based on inertial import-oriented technological advancement. This attitude features low costs for innovation and scientific frontiers. Here, investments are made only by the state and solely in those sectors that are less expensive. However, with this attitude, the national economy will be dependent on foreign innovations and technologies. And this, in turn, will weaken the national innovation system.

The principle of catch-up development underlies the second attitude. It implies borrowing new advanced technologies that have already been adopted abroad. However, the advantage of this attitude is that here the most profitable research, development and innovations are invested. The disadvantage of this option is that the most valuable research products are often patented by the country in which this development is made. With this option, it is cheaper to purchase second-order research products, since they are more accessible, although less profitable. However, this option should not be considered negative, as it also has some positive dimensions. With this option, innovation risks are minimal, which is due to the use of already proven technologies, the economic effect is achieved in a shorter time if you introduce your own innovation. Modern conditions are such that, utilizing foreign technologies, without developing own innovations, national research potential will degrade. It will take decades to fill this gap. As a result, the national economy will weaken, while the foreign economy, on the contrary, will thrive.

The third attitude implies developing national innovation framework, conducting frontier research and integrating technologically new products. This attitude is the most costly. However, this is the only way to ensure independence from imported innovations and create national innovation system to update the agricultural sector of the economy, develop fundamental science and highly qualified personnel capable of implementing innovative products. This attitude is the most forward-looking, allowing the country to strike a confident tone both in the economic and political world arena (Fedorenko et al., 2010).

Having considered all the attitudes to innovative development to be adopted in Russia, it is possible to use mixed options. Mixed attitude will allow the state to identify priority sectors and support them accordingly. Thus, a balance is struck that stabilizes the development of innovations in the farming industry. The state should be closely engaged in innovation policy, allocating additional financing, subsidies or guarantees, especially in the part that is devoted to the production of agricultural products and processing technologies.

At present, transformations are continuing in the agro-economy of Russia and its regions. However, these processes are not on a steady upward trend. Following a burst of development in 2010-2016, economic growth of agriculture began to slow down, and since 2017, it has rolled back – below the level of 2010. In 2020, it decreased significantly, with the pandemic to have made its contribution (See Table 1).

Table 1. Agricultural production indices (in farms of all categories; in comparable prices; as a percentage of the previous year)*

	2010	2014	2016	2017	2018	2019	2020
North Caucasian Federal District	103.2	103.8	106.8	101.5	99.3	101.3	94.2
The Republic of Dagestan	104.1	109.6	105.8	105.3	101.1	100.7	101.3
The Republic of Ingushetia	101.5	108.1	112.8	87.6	111.5	101.3	98
The Kabardino-Balkarian Republic	109.6	99.9	104.9	104.7	103.1	104.9	108.4
Karachay-Cherkessia	97.7	94.5	101.9	99.4	101.5	100.7	87
The Republic of North Ossetia-Alania	102.5	90.8	90.9	97.1	108.8	112.7	107.2
The Chechen Republic	99.4	98.4	109.5	111.5	97.0	110.8	101.8
Stavropol region	102.6	106.1	110.0	99.0	95.4	98.2	83

* (Rosstat, 2021)

Table 1 shows that agricultural production indices have declined in recent years not only in the region as a whole, but in almost all of its subjects as well. The only exceptions are the Republic of Dagestan and the Kabardino-Balkarian Republic. This can be attributed to the fact that large investment projects are being implemented in these subjects aimed at growing fruit and berry and viticulture products. In other subjects, the situation is much worse, and this trend still persists.

In these recent conditions, when there has been a clear trend towards stagnation of the agro-economy and a decline in production, a question comes up as to what strategic innovative areas should be systematically integrated in the farming industry. Current products have elicited a great deal of completely different innovative areas to be applied in the farming industry. Among them, one of the progressive areas is digitalization of all spheres of activity in agriculture, from technology to accounting and management of agribusiness.

To date, the use of digital technology is of great importance to provide the competitiveness of products and is considered as one of the key opportunities for intensive growth of the agro-economy. Moreover, in this case, it is not about extra consumption of hard-to-recover resources, but about the sustainable use of existing resources, optimizing costs, reducing the use of fertilizers, herbicides and pesticides to the maximum required level, water conservancy, reducing crop losses, improved management organization and planning, both for employees and heads of enterprises and associations.

Even today, with the integrated use of information technology and digitalization, the enterprise is fully prepared to submit reports to government agencies. This is especially true for large enterprises. Thus, according to 1C Company, an independent software developer, the integration of such a common information system at large agricultural enterprises could reduce labor costs in various areas from 40 to 85 %, raise labor productivity up to 30 %. (ITAIC, 2019). The federal state information system in the field of veterinary medicine – VetIS is already functioning today. The system allows users to control the entire chain of commodities moving from the manufacturer to the final consumer, both domestic and imported. Most of the available systems are designed to embrace the areas of accounting, management and control in the agrarian sector, they skip many routine operations and divert the free time of users to search for relevant solutions. The heads of agricultural holdings note that, despite the above, information technology should be introduced in a more balanced way, avoiding the imposed urgent digitalization, meeting the needs of production and business as a whole. So and in no other way, they will blend seamlessly and smoothly into the agro-economy. In Russia,

there are enough companies involved in the development and implementation of software and equipment for agricultural enterprises, for various scales of economic activity and interactions of various areas of the farming industry. Based on the experience of farms that have introduced modern information systems and equipment in their production, there are the following main problems:

- partial and chaotic (patchwork) informatization and automation of production;
- lack of a system for phased implementation of IT architecture at enterprises, which causes mistrust and resistance from managers when they contact the relevant IT firms;
- insufficient mechanisms of state support for small and medium-sized enterprises, research activities and specialized educational institutions in the field of digital technology;
- costly hardware, software and implementation services;
- lack of stable Internet connection in many areas of the country.

These are only the most common bottlenecks spoken up by modern experts engaged in IT technologies and digital devices in recent years. Most of these challenges are characteristic not only of the Russian Federation a whole, but also of the agrarian sector of the North Caucasian Federal District in particular. They are complemented with the challenges specific to this region:

- broadband Internet offers poorer coverage in rural areas;
- lack of qualified personnel to implement digitalization in the farming industry;
- overall economic backwardness of agricultural production, storage, logistics, processing industries. As a result, out of season, the subjects are forced to import a number of foods from other regions, although, based on Rosstat data (2021), the region almost completely provides its population with staple foods and has surpluses.

As shown by the studies, the extreme rate of depreciation of fixed assets (up to 40 % for a number of indicators) (Baliyants, 2021), and a high need for basic (not even state-of-the-art) new specialized vehicles, tractors, implements, as well as basic automation of production processes, forcing agricultural producers to invest small amounts of available resources in innovation, mainly to update the machine and tractor fleet, and use software and hardware only for accounting, Internet searches, e-mailing, etc.

Thus, informatization and digital technology cannot be introduced at the agricultural enterprises out of the blue, i.e. with no general and particular (local) prerequisites. Therefore, the solution is not seen in the imposed introduction of digital innovations that the regional agricultural producer is not yet ready for. For this, there must be prerequisites that are few in the subjects of the North Caucasian Federal District today.

Based on the above, information and digital technology in the agro-economy of the region should be developed with a state strategic systematic attitude. A continuous growth should underpin the development strategy of the region, starting with renovating the infrastructure and preparing prerequisites that will move the industry towards digitalization.

In this regard, the following areas of activity are proposed, which should be coordinated within each entity at the level of ministries and departments, as well as between the subjects of the region at the level of heads of the region or heads of government:

- coordination of state agencies to provide infrastructure in rural areas; all initial efforts should be directed to it, since it is useless to digitalize agricultural enterprises if there is no stable power supply and broadband Internet in the area, or it is so low that it does not allow this equipment to be operated. In this case, the most advanced digital technology turns into just a pile of metal;
- state support for small and medium-sized farms involved in agricultural production (they play a crucial role in agricultural production in the region), by providing the necessary equipment, fuel and lubricants, tractors, fixed assets, high-quality seed and planting material and animal breeds, as well as promoting, storing and selling products (including online trading platforms, fairs, storage facilities, processing enterprises, branding of regional agricultural products);
- provision of tax incentives and special tax regimes for investors at agricultural enterprises (Babaeva, 2018).

At this stage, it is advisable to involve information and consulting services to work at the request of agricultural enterprises under the Ministry of Agriculture and Food of the NCFD subjects, to attract qualified staff through state programs for the training and retraining of personnel, and accumulate requests from enterprises for internships and job placement for them. Thus, prerequisites will be created to boost the farming industry through digital technology (Yunusova, 2014).

Digitalization and automation of agricultural processes opens up the broadest opportunities for agricultural producers, subject to a targeted state attitude and state support and coordination of all these processes, offering an adequate price with high quality and competitiveness of agricultural products.

4. Purpose of the Study

The paper aims to determine the need for a strategic attitude to the development of the regional farming industry based on an analysis of theoretical approaches, identify problems that hinder digitalization of the agrarian sector in the region. It proposes priority areas for state regulation that will contribute to speedy transition of the farming industry to advanced intensive technologies of production, organization and management.

5. Research Methods

Based on Russian and foreign publications, Rosstat official statistical data, analytical data gathered by research institutes, researchers of higher education institutions, authors, proceedings of Russian and international conferences and others, the volume of data is analyzed and summarized, enabling to identify a slowdown in growth rates and falling indicators of agricultural production, low rates of automation and digitalization tools into the agro-economy at the regional level. Methods of logical and statistical analysis, dynamic series, empirical approaches were used, which resulted in conclusions and directions to be drawn up to make the best of the situation.

6. Findings

The study showed that over the past 5 years, the economy of agriculture of the region, despite higher production indicators in absolute terms, shows a slowdown in growth rates, a decrease in agricultural production indices, and a persistent downward trend in the value of fixed assets in a number of subjects. There is also a drop in production indicators for a number of staple foods. Agricultural enterprises have an extremely low level of profitability (no more than 5 % excluding subsidies) (Baliyants, 2021).

This data suggests that in order to stir up the industry and integrate digital technology, the state needs to coordinate ministries and departments to create and improve the infrastructure in rural areas, train senior and middle managers and create jobs in rural areas. It is necessary to create a profitable economic environment for efficient production of farms, develop standards for consistent automation and achieve the level of accurate digital production and organization of activities by agribusiness enterprises.

7. Conclusion

Informatization and digitalization of agriculture and farming industry should be considered not as an independent direction of development, but as a large set of measures based on state financial, regulatory and coordination support. To ensure the breakthrough development of the regional farming industry, it is necessary to make the agro-sphere a strategic priority for state policy. Based on the principles of consistency and regularity, domestic research IT products and equipment should be implemented. The identified problems that impede innovations – poor infrastructure in rural areas, lack of the required personnel and competencies, creation of economic conditions for the profitable functioning of agricultural production, uniform development of all areas of the farming industry need to be addressed.

Acknowledgments

Carried out with the financial support of the Russian Foundation for Basic Research within the framework of the scientific project No. 20-010-00965A.

References

- Altukhov, A. I., & Silaeva, L. P. (2020). The priority of agriculture should not be one-time, but a strategy for its development. *Proceedings of the XV international scientific-practical conference, dedicated to the 60th anniversary of the Faculty of Economics of the Kuban State Agrarian University "Innovative development of the agro-industrial complex: economic problems and prospects"*. Compiled by A. I. Trubilin, K. E. Tyupakov, A. A. Adamenko. (Krasnodar, May 14–15, 2020). KubSAU.
- Babaeva, Z. S. (2018). Development of Methods of Financial Support for Investments. *Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development*, 18(3), 27–34.

- Baliyants, K. M. (2021). Implementation of Innovation Development Models in Agrarian Sphere of Economy at the North Caucasian Federal, Russia. *Bioscience Biotechnology Research Communications*, 14(4). <https://doi.org/10.21786/bbrc/14.4.38>
- Dokholyan, S. V. (2019). Prospects for implementing innovative technology in enterprises within the agro-industrial complex. *Scientific Papers Series-Management, Economic Engineering in Agriculture and Rural Development*, 19(3), 189–195.
- Fedorenko, V. F., Buklagin, D. S., & Aronov, E. L. (2010). *Innovative activity in the agro-industrial complex: state, problems, prospects*. FSBSI Rosinformagrotech.
- ITAIC (2019). *ITAIC-2019: Theory and Practice of Digitalization of Agrarians*. <https://www.connect-wit.ru/itapk-2019-teoriya-i-praktika-tsifrovizatsii-agrariev.html>
- Rosstat (2021). *Regions of Russia. Social and economic indicators*. http://www.gks.ru/bgd/regl/b16_14p/Main.html
- Sandu, I. (2010). Formation of an innovative model for the development of agriculture. *AIC: economics, management*, 11, 72–76.
- Yunusova, P. S. (2014). Information resource of the agro-industrial complex of the Republic of Dagestan. *Issues of structuring the economy*, 1, 9–14.