

# *Improving the AIC Competitiveness of Russia under the Terms and Conditions of Development of Information Digital Systems*

Alexander Kurdyumov

Ural State University of Economics  
Ekaterinburg, Russian Federation  
kurdyumov@usue.ru

**Abstract** – The Article covers the issues of improving the competitiveness of the agro-industrial complex of Russia in the information aspect and in the context of the digital economy. The importance of the article is due to the advancement of the development of the information and digital economy and its impact on all sectors of the economy. The purpose of the article is to consider the issue of improving the competitiveness of the agro-industrial complex of Russia in the development of the digital economy and the introduction of information and communication technologies. The article analyzes the main indicators of the scientific and technological potential of the agro-industrial complex as the basis of state economic security and the problems of introducing artificial intelligence in the agricultural sector of the Russian Federation. The article considers the concept of “Internet of things – IoT” and the peculiarity of its implementation in the Russian agriculture. The possibilities and directions for improving the competitiveness of the agro-industrial complex of Russia, based on the use of information digital systems, are identified.

**Keywords** — *competitiveness; agro-industrial complex; digital information systems.*

## I. INTRODUCTION

The issues of increasing the competitiveness of the agro-industrial complex (AIC) of Russia are increasingly being raised at all levels. Modern challenges and threats in the global food market, sanctions, an increase in the world's population, and an increasing demand for food pose new challenges for the country's leadership.

The implementation of instructions from the Government of the Russian Federation on increasing the competitiveness of the Russian agro-industrial complex is directly dependent on the introduction of innovative technologies.

As part of the development of the digital economy paradigm in agriculture, it is necessary to take into account socio-economic features and provide for the solution of the

issues of the release of labor, their employment and other social issues. Compliance with the balance of employment in agriculture and the introduction of information and communication systems remains on the agenda of the state, business, the scientific community and citizens.

Along with the significant amount of research in the field of ensuring the sustainable development of the system of the agro-industrial complex of Russia, one should note the lack of conceptual economic and legal solutions to the problem of managing the competitiveness of the Russian agro-industrial complex from the standpoint of assessing the impact of the development and integration of information-digital systems.

Firstly, there is no formed theoretical base in the stated field of study, in particular:

- analysis of research allows to state the absence of a formalized methodology for improving the competitiveness of the agro-industrial complex of Russia in the conditions of development and integration of information-digital systems;
- no scientific developments have been discovered that systematize the toolkit for assessing the level of competitiveness of the agro-industrial complex of Russia in the conditions of development and integration of information digital systems, including the transition to advanced digital, intelligent production technologies, robotic systems, new materials and methods for designing large volumes data, machine learning and artificial intelligence.

Secondly, an empirical base has not been formed that would make it possible to assess the level of competitiveness of the agro-industrial complex of Russia in the context of the development and integration of information-digital systems, both internal and external.

Thirdly, the regulatory legal framework for the regulation of information-digital technologies of the Russian economy, both in general and in the agricultural sector, in particular, has not been formed.

Accordingly, in the conditions of the development of world competition, it is necessary to develop new theoretical and methodological approaches to improving the competitiveness of the agro-industrial complex of Russia.

## II. RESEARCH METHODOLOGY

The methods of economic-statistical and regression analysis, a systematic approach, as well as other methods of scientific research, generalization and processing of information, due to specific tasks. The study is based on the methodological principle of the increasing role of the influence of information-digital systems on ensuring the competitiveness of the agro-industrial complex.

Investigating the competitiveness of the agro-industrial complex of Russia, one should take into account the peculiarities of agricultural production, which consist in regulating natural-economic laws in comparison with other sectors of the economy.

Therefore, it is necessary to consider competitiveness using a synergistic approach that allows describing both the stages of stable development and the zone of unsustainable development.

Therefore, the participation of government regulation and financial support for the agricultural sector plays a leading role.

The foregoing justifies the need to use, in addition to a synergistic, socially-oriented approach in the disclosure of the essence of the competitiveness of the agro-industrial complex.

In view of the foregoing, consideration of the competitiveness of the agro-industrial complex from the standpoint of socially-oriented and synergistic approaches allows defining the object under study as the ability to carry out economic activities ensuring food security and social stability both on the basis of rational use of the country's socio-economic and climatic conditions and other means of doing business including the development and integration of digital information systems eat.

## III. PRACTICAL RELEVANCE, SUGGESTIONS AND RESULTS OF IMPLEMENTATION

The issues of competitiveness and increasing the efficiency of the agro-industrial complex, development at the federal and regional levels are the subject of ongoing research. Particular attention should be paid to research that allows you to reveal the fundamentals of competitive relations in a strategic plan, and also contain methods and algorithms for obtaining competitive advantages with the methods of implementation in practice and justification of their effectiveness.

In the works of Russian scientists, various aspects of improving the competitiveness of the agro-industrial complex of Russia and at different levels of its formation were considered [1, 2, 3].

The current stage of development of the world economy determines new conceptual solutions to the problem of ensuring the competitiveness of industries and economic entities based on the use of internal, intangible assets [4, 5, 6].

## IV. RESULTS AND DISCUSSION

The introduction of information-digital technologies in all sectors of the national economy is rapidly changing the perception of their qualitative state. In comparison with the branches of the "new economy", the Russian agro-industrial complex, which is the basis of national security in the food aspect, is not developing intensively enough.

Due to the current unstable situation in the global food market and the sanctions regime in relation to Russia, the state's attention to the agro-industrial complex has increased, both in the industry as a whole and in the introduction of information technologies, in particular.

One of the most significant risks in the field of food security is technological risks mediated by the low level of technological development of the production base of Russia in comparison with developed countries.

To ensure stable growth of agricultural production and leveling threats, the Federal Scientific and Technical Program for the Development of Agriculture until 2025 has been developed. It is expected to reduce the level of import dependence and increase the share of high-tech agricultural producers in the industry by 30%.

The implementation of a set of measures will ensure the transition to highly productive and environmentally friendly agriculture, the introduction of systems of rational use of protection in crop production and livestock, storage and efficient processing of agricultural products, the creation of safe and high-quality food.

It should be noted about the additional risks of the implementation of the Federal Scientific and Technical Program for the Development of Agriculture up to 2026 due to the dependence on the means of financing in the amount of RUB 36.7 billion at the expense of the State programs "Development of science and technology for 2013-2020" RUB 3.3 billion until 2026 (FANO of Russia), "Development of agriculture and regulation of agricultural products, raw materials and foodstuffs for 2013-2020" RUB 4.7 billion (FANO Russia) and RUB 9.5 billion (Ministry of Agriculture of Russia), "Development of education for 2013-2020 RUB 7.4 billion until 2026 (Ministry of Education and Science of Russia), "Development of industry and increasing its competitiveness" RUB 11.75 billion until 2026 (Ministry of Industry and Trade of Russia).

The main trends of the domestic AIC (agro-industrial complex): robotic application of production, selection and genetics, informatization.

An important role belongs to the scientific community in solving the existing problems of ensuring the effective functioning of the agro-industrial complex, which must be provided with appropriate conditions for the formation and implementation of competitive scientific and technical results in the national economic system.

Building up the scientific and technological potential of the AIC of Russia will make it possible to systematically reduce import dependence on technologies and resources.

Historically, the agrarian sector of the economy has a low attractiveness for investors due to the high degree of risks

associated with a long production cycle, natural and technological risks, the inability to automate biological processes and the lack of progress in improving productivity, innovation and the widespread use of information and communication technologies.

For the period from 2010 to 2016 the volume of investment in fixed assets in agriculture in which intellectual property objects are included (expenditures on research, development and technological works; on the creation and acquisition of computer software; on the creation and acquisition of inventions, utility models and industrial designs; on exploration work) there has been a slight increase, and for the production of food products, including beverages, and tobacco, a decline of 17%.

In terms of the number of the registered patents the Russian Federation ranks 18th.

Structural changes are observed in the structure of investments in intellectual property over the period from 2013 to 2016: a decrease in funding for exploration of the subsoil and an assessment of mineral reserves by 8% (in 2016 30.5%), research (development) – on 7% (in 2016, 16.3%); an increase of 17% – software, databases (in 2016, 45.8%).

The use of digital information systems in the agro-industrial complex of Russia was previously limited to the use of computers and software mainly for financial management, statistical reporting and tracking of commercial transactions.

In 2016, in the structure of investments in fixed capital in agriculture, attracted sources of financing account for 42%, of which budget 3.9% is a large proportion of which at the expense of the federal budget 2.3%. The share of funding for research and development from sources attracted is 46.4%, of which budgetary 32.1% is a large proportion of which is due to the federal budget 31.1%

In 2016, the share of foreign property in the structure of investments in fixed assets in agriculture was 2.8%, and 3.4% in financing research and development.

The analysis of the factors limiting the investment activities of organizations for the period from 2010 to 2016 showed structural changes. The highest indicators reached their values for 2016 due to lack of own funds 61%, uncertainty of the economic situation in the country 61%, a high percentage of commercial loans 56% and investment risks 50%. The growth over the study period is observed due to such factors as the unsatisfactory condition of the technical base 17% (4 times), an imperfect regulatory framework governing the investment processes by 17% (3.7 times), the uncertainty of the economic situation in the country by 29% (1.9 times), a complex mechanism for getting loans for investment projects by 31% (3.2 times), investment risks by 27% (2 times), a high percentage of commercial loans 25% (1.8 times), low profitability of investments in fixed assets by 9% (1.8 times), lack of product demand by 8%,

The costs of technological innovations of organizations in food production for the period 2010-2016 have increased, of which product innovations 4 times, process innovations 2 times.

The dynamics of growth in the volumes of innovative goods shipped, works and services of food production

organizations in the manufacturing industry is negative, which indicates the lag of agriculture from other industries.

The use of digital technologies in agriculture for monitoring crops, livestock and various elements of the agricultural process is point-and-point at the level of individual farms.

In particular, Leningrad Region is the leader in the informatization of dairy herds. Informatization covered 64.4% of the farms in this region, this is almost all breeding (97%) and about half (40.5%) of commodity farms, the number of farms using automated accounting increases from year to year [7].

An example of the organization of effective informatization is CJSC Slavyanskoye, Verkhovskiy district of the Oryol region. More than ten years ago, this farm began to engage in dairy cattle breeding and is now a competitive milk producer.

All systems at the dairy complex of CJSC Slavyanskoye are computerized and automated. Monitoring is carried out. Informatization of the dairy herd allows you to track not only its technological parameters, but also contributes to the adoption of economic decisions, as well as the implementation of the forecast of financial indicators (profit, profitability, costs, etc.).

At the initial stage of the formation of dairy cattle breeding at CJSC Slavyanskoye, they milked 1 ton of milk per day, now over 15 tons. Over ten years, productivity has increased 10 times [8].

According to scientists, due to the quality and operational implementation of information systems, production costs are reduced by 6-10%, the costs of circulation by 7-20%. The effectiveness of the use of information systems at the firm level reduces inventories by 3-4 times, working capital by 7-10% [9].

An indicator of scientific and technological progress can be used technology Internet of Things – IoT, consisting in a combination of basic research in the field of data analysis (Data Science) and applied research – the introduction of artificial intelligence (machine learning), and other innovative achievements, including the development of sensor networks and unmanned technology [10]. The use of scientific developments and innovations allows data collection, control and management of objects, including using control systems and network solutions.

In the agricultural sector, the market share as of January 2017 amounted to 6% of all projects implemented in the world in the field of the Internet of things.

The consultants of J'son and Partners Consulting believe that with the development of the market, the use of Internet of Things technologies will be widely used in various devices, technical and information systems [11].

In Russia, single projects are known in agriculture, which can be attributed to the Internet of Things and as long as they are experimental. Fulfillment of the objectives of the roadmap for the introduction of technologies of the Internet of things in the agro-industrial complex of Russia will make it possible to increase the economic efficiency of the activities of

agricultural enterprises; expand the capacity of traditional domestic markets and product sales; create new niches for agricultural products; to bring products of domestic agriculture to international markets; to ensure environmental management.

According to the Roadmap events, by 2019 the share of Russian enterprises using the Internet of Things in the AIC will reach 30% against the current 0.05%.

Due to the complex digitalization of the Russian agricultural sector and the introduction of IoT technologies, the following indicators will be achieved:

- the trade margin on foodstuffs at the wholesale and retail level has been significantly reduced without degrading product quality by several times;

- the amount of food consumption in Russia in natural terms has been increased by several times;

- to introduce elements of automated resource management and reduce the influence of the human factor at all stages of agricultural production;

- the productivity of labor in agriculture will be multiplied and the cost of production will be reduced by accelerating the delivery of products to the end user and increasing the level of mechanization and automation of farming and individual farms.

Having studied the Russian experience in introducing information technologies for agricultural producers, it was possible to identify key areas for the development and integration of information digital systems in the agro-industrial complex.

Talking about the digital maturity of the agricultural sector in Russia is premature, but it can be said with certainty that intelligent digital solutions should help the agricultural industry cope with the problems of increasing productivity and sustainable development.

## V. CONCLUSION

In spite of the tasks assigned to accelerate the development and application of technologies that increase productivity in the agricultural sector of Russia, an analysis of the level of development and integration of information digital systems in the agro-industrial complex allows us to conclude that there is a lack of systematization and insufficient coordination in this area.

In case of the current economic situation in Russia, digitalization may drastically affect the reduction of costs and final prices for agricultural products, increase profits and competitiveness of both specific enterprises and the agricultural sector as a whole due to pass-through automation of processes.

To increase the competitiveness of the agro-industrial complex of Russia, an effective mechanism of state regulation of the agricultural sector should be created, taking into account the creation of conditions for the development of

scientific activity and the introduction of their results, attracting investment, creating and implementing information-digital systems in the production, processing and storage of agricultural products, raw materials and food.

The developed recommendations to improve the competitiveness of the agro-industrial complex of Russia in the conditions of development and integration of information-digital systems will allow forming an effective mechanism of state regulation of the agricultural sector as the main function of ensuring the food security of the population.

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## References

- [1] Astratova G. V., Syomin A. N. (1999) Marketing of the consumer market of food products: questions of the theory and practice. Yekaterinburg: Prod. to the Ural state agricultural academy.
- [2] Syomin A.N., Tretyakov A.P. (2017) Tendencii novoj industrializacii v sel'skom hozyajstve sovremennoj Rossii, *Agroprodovol'stvennaya politika Rossii*, No. 2 (62), pp. 25-33.
- [3] Mataeva B. T.; Mukhambetova Z. S.; Tolysbaeva M. S. (2018) Innovations in agrarian sphere and agriculture, *Bulletin of the national academy of sciences of the republic of Kazakhstan*, No. 3, pp. 186-191.
- [4] Klochan Vyacheslav, Klochan Iryna (2018) Improvement of the mechanism of state regulation of investment in the innovative development of the agrarian sector, *Baltic Journal Of Economic Studies*, Vol.4, No. 2, pp.99-105.
- [5] Masner Jan, Vanek Jiri, Jarolimek Jan (2016) Prototype of a Content Creation and Updating Application Module for Agrarian Sector and Regional Development, *25-th International Scientific Conference on Agrarian Perspectives, Global and European Challenges for Food Production, Agribusiness and the Rural Economy. Czech Univ Life Sci, Fac Econ & Management*, Prague, Czech Republic.
- [6] Berthet Elsa T., Hickey Gordon M., Klerx Laurens (2018) Opening design and innovation processes in agriculture: Insights from design and management sciences and future directions, *Agricultural Systems*, Vol. 165. pp. 111-115.
- [7] IT in agro-industrial complex of Russia [Electronic source]: Retrieved from [www // tadviser.ru](http://www.tadviser.ru)
- [8] Grudkina T.I. (2016) Informatization of dairy herd as factor of innovation development and competitiveness of milk producers: regional experience, *Informatization in AIC: state, tendencies, prospects, Encyclopedia of Russian villages*, pp. 15-17.
- [9] Zhantemirov Sh., Zhantemirova A. (2015) Information as part of agricultural modernization, *Journal "Transport business in Russia"*, Moscow. No. 1.
- [10] Xu Yunbi, Li Jiayang, Wan Jianmin (2017) Agriculture and crop science in China: Innovation and sustainability, *Crop Journal*, Vol. 5, No. 2, pp 95-9.
- [11] Maziliauskas Antana, Baranauskiene Jurgita, Pakelienė Rasa (2018) Factors of effectiveness of European innovation partnership in agriculture, *Management theory and studies for rural business and infrastructure development*, Vol. 40, No. 2, pp. 216-231.