

# DIRECTIONS OF INCREASING THE EFFECTIVENESS OF INNOVATIVE ACTIVITIES IN AGRICULTURE IN THE CONDITIONS OF DIGITAL ECONOMY

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## ABSTRACT

*Target research is in developing theoretical provisions and practical recommendations revealing mechanism, ways and tricks state regulation innovative time of volition APK in conditions digital transformations. The scientific hypothesis of the study is the assumption that in the context of digital transformation, which encourage participants in the economic system to continuous innovative development, state regulation tools that can activate the innovative potential of traditionally conservative, pro -crastinating industries, such as the agro-industrial complex, are of particular importance. and technological update national economy. The object of the study is the agro-industrial complex ecosystem, which is developing in the context of digital transformation and needs state regulation as a factor in ensuring innovative development. The subject of the study is the organizational, managerial and socio-economic relations that arise in the process of state regulation of the innovative development of the agro-industrial complex ecosystem in the context of digital transformation. Scientific novelty results research consists in decision an important scientific problem - theoretical and methodological support for making effective managerial decisions in the field of state regulation of the innovative development of the agro-industrial complex ecosystem in the context of digital transformation.*

**KEY WORDS.** *digital economy, Directions for improving the efficiency of innovation activity in agriculture in the conditions*

## 1. INTRODUCTION

The formation and development of an ecosystem of any level and type involves the activation of internal settings that trigger the self-organization mode. However, the experience of market reforms and the market institutions themselves do not imply the abandonment of state regulation. Recognizing the need for state regulation as a factor of innovative renewal, financial and economic support and risk minimization, the functioning of the ecosystem in various situations needs state intervention to a greater or lesser extent. The influence of the state is largely determined by the socio-economic situation in the country, and also depends on the type of economic activity as an object of support. There are traditionally subsidized industries, the regulation of which is part of the national security policy. Such an industry is, for example, the agro-industrial complex (AIC), which belongs to procrastinating, technically and technologically backward activities. The low level of innovative activity of agribusiness organizations determines the lack of competitiveness of its ecosystem and largely hinders the implementation of an innovative and breakthrough scenario for the development of the national economy, traditionally oriented towards the agricultural sector. In the context of digital transformation, innovative nihilism manifested in the agro-industrial complex is a serious problem that can cause the loss of food security in our country, which necessitates the development and implementation of effective methods of state regulation of the innovative development of the agro-industrial complex aimed at activating and increasing its innovative potential.

## 2. MATERIALS AND METHOD

Need achievements delivered goals demanded solutions following **tasks**: justify \_ mechanism state regulation innovative development ecosystems APK in conditions digital transformations; develop a methodology for assessing current index states and prospects for innovative development ecosystems APK; develop conceptual provisions state regulation of the innovative development of the agro-industrial complex ecosystem in the context of digital transformation; form system activities on stimulate innovative development of the agro-industrial complex ecosystem.

### 3. RESULTS AND DISCUSSION

The increment of scientific knowledge in the field of innovation management is happening rapidly. This is largely due to the fact that each new study begins with a clarification of the terminology, and first of all, with the definition of innovation as a basic category. A huge number of developments that have given rise to new definitions create a solid, yet not contradictory, categorical “foundation”, but it is necessary to clarify which of the characteristics of innovations is of particular importance in order to or other research. In the framework of this work, innovation is understood as the use of the results of intellectual production of a new property, function, etc., which subsequently leads to obtaining benefits in form of profit. In the agro-industrial complex, innovations are the result of the application of scientific achievements in economic practice, manifested in the form of development new varieties plants, breeds and species animals and much another, allowing to increase the efficiency of agro-industrial production.

The importance and significance of innovations have allowed researchers to raise the question of expedient activities related to the application of innovations, which have a long-term focus - innovative development. With regard to the agro-industrial complex ecosystem, we propose the problem of innovative development consider in next planes: innovative development as a process; innovative development as a factor of compliance with the requirements of digital transformation.

Innovative development has a positive connotation, but there are issues that require clarification. First, being an initiative activity, innovative development is associated with errors that inevitably occur in people and which are possible in the work of even the most intelligent machines. Secondly, digital transformation is new installations, regulations which before end not defined, a means, not clear, on the com and what kind a responsibility should lie at use information and communication technology, formation network structures, establishing intellectual connections. Thirdly, innovative development should not be opposed to extensive way production, So how such comparison is too much primitive. However on the practice, most often, exactly So and occurs, which reduces the level of pretentiousness in the development and implementation of innovations. Fourthly, in relation to the agro-industrial complex, it is not worth making an indulgence, allowing preservation more low level innovative development industry enterprises in comparison with enterprises of other industries, as this will lead to the degradation of the industry and the loss of food security for the country. AT the present time noted unstable situation in agro-industrial complex ecosystem. Level innovative development fluctuates at this sustainable no growth observed, patent activity in industries, in in general, decreases digital technologies are used fragmentarily and their application is focal .

way ensure innovative development in conditions formation of the digital economy as a new institutional environment is digital transformation. Digital transformation - this is efforts economic agents aimed at ensuring the effective use of information and telecommunications technologies that meet the requirements of the new institutional conditions. Intensity and success of digital transformation provided innovative susceptibility actors and their ability deploy in all spheres his life digital technology.

The study found that in order to ensure high speed and intensity of innovative development in the context of digital transformation, it is necessary to carry out effective state regulation, especially in industries traditionally characterized by conservatism and technological backwardness. Such sectors are agriculture, industrial processing of agricultural raw materials and other types of economic activity related to the agro-industrial complex. The methodology developed in the study for assessing the index of the current state and prospects for the innovative development of the agro-industrial complex is based on official data from the Economic Commission for Europe. The forecast values of indicative indicators of the development of the agro-industrial complex were obtained on the basis of the forecasting methodology of the Economic Commission for Europe, which makes it possible to operate with up-to-date information and even make medium-term forecasts.

The current state and prospects for the innovative development of the agro-industrial complex are proposed to be assessed on the basis of the developed system of indicators, united in five areas:

- Direction 1. Human resources of the agro-industrial complex (number of people employed in the agro-industrial complex);
- Direction 2. The socio-economic situation of the agro-industrial complex (production of agro-industrial complex products in farms of all categories; investments in the fixed capital of the agro-industrial complex; average monthly nominal accrued wages per 1 employee of the agro-industrial complex; the ratio of the average monthly wage of agribusiness workers to the average monthly wage payment for the economy as a whole);
- Direction 3. Material and technical base of the agro-industrial complex (sown areas in farms of all categories; livestock of cattle in farms of all categories; agro-industrial complex equipment park; application of mineral fertilizers per 1 ha of agricultural land);
- Direction 4. Export-import activities of the agro-industrial complex (export of agro-industrial complex

goods; import of agro-industrial complex goods);

- Direction 5. Efficiency of the agro-industrial complex (profitability of crop production; profitability of livestock products).

The selection of the number and composition of these indicators was made on the basis of the principles of measurability, regularity, sufficiency, accessibility, reliability and comparability of information. We purposefully excluded expert assessments and options for questionnaires and surveys in order to include them in the methodology only quantitative indicators. source such indicators have become official open publications of the statistical departments of the UN and ECE.

**Table 1 Heat map of country clustering by level of current state and prospects development of the agro-industrial complex**

Country	2017	2018	2019	2020
Russian Federation	4.24	4.07	5.43	7.17
Republic Belarus	5	4.19	5.07	6.25
Republic Uzbekistan	3.85	3.24	6.17	7.22

The category of countries with a high level of current status is highlighted in green and prospects development APK, yellow – with medium level, red

– with a low level. It can be seen from the heat map what in 2020 Russia and Uzbekistan manage to improve the state of their agro-industrial complex. However, the agro-industrial complex of the Republic of Uzbekistan must make a breakthrough from the category with a low level of development to the category with a high level of development. One of the factors contributing to this process is the high profitability of agricultural products in the Republic of Uzbekistan. The agro-industrial complex of the Republic of Belarus throughout the entire period under review is in the category with an average value of the index of the current state and development prospects.

The presented methodology, based on a factor analysis of the system of indicators and directions for assessing the index of the current state and prospects for the development of the agro-industrial complex, makes it possible to identify the following dominant strategies for the innovative development of the agro-industrial complex: increasing the production and technical potential, including through the implementation of the departmental project "Digital Agriculture"; cost reduction (which will affect the profitability of crop and livestock products); increase in production volume.

In the course of the study, conceptual provisions were formulated that reveal the need, content and features of state regulation of the innovative development of the agro-industrial complex ecosystem in the context of digital transformation:

1. The reasons hindering the innovative development of the agro-industrial complex ecosystem are sectoral disproportions, manifested in a significant lag of agriculture from other sectors of the agro-industrial complex, against the backdrop of a low technological level; territorial disproportions in the innovative development of the agro-industrial complex ecosystem, which are not as pronounced as the structural sectoral disproportions, but have place to be; minor specific the weight of innovation processes that fall on the agro-industrial complex as a structural component of the national socio-economic system.

2. innovative development ecosystems APK ensured in as a result of the interaction of several groups of participants: elements of the ecosystem, directly participating in production innovation (consumers of innovative products from among enterprises and organizations of various fields of the agro-industrial complex, outsourcers, insurance companies, etc.); elements of the ecosystem that regulate production, financial and marketing relations that accompany the production and diffusion of innovations (executive government bodies, namely the departments of agrarian policy, departments of digital and innovative development; tax, customs and other authorities); elements of an ecosystem that spontaneously affect it. The result of the effective interaction of these elements is the formation of a more perfect system.

3. The set of rules and guidelines that determine the content of interaction between the elements of the agro-industrial complex ecosystem, aimed at ensuring its innovative development, is relevant strategy. AT progress research us have been singled out innovation development strategy, innovation-oriented, and systems-oriented strategy.

4. To implement the strategy for the innovative development of the agro-industrial complex ecosystem, it was proposed to use a set of measures to stimulate innovation:

1) institutionally significant activities - activities to conduct exploratory R&D, promote technologies and

introduce innovations into the practice of real agribusiness,

2) measures to create a favorable innovative environment for agro-industrial production,

3) development of a culture of introducing innovations and their use. These tools represent a wide range of possible

stay, various combinations whom allow reach desired result

— innovative development of the economic system of the agricultural sector as the most important subsystems of the national economy.

5. From numerous studies on national innovation systems, the following conclusion follows: if the state does not support the demand for innovation, limits or is unable to provide full access to additional knowledge and skills, and is not able to adequately finance the development of innovative projects, then the national innovation system in In this case, it is weak and cannot generate the required efforts for breakthrough development in the direction of a new technological order. This circumstance is of particular importance in traditionally conservative, procrastinating industries, such as the agro-industrial complex. In order to realize the potential of the agro-industrial complex, a sectoral policy of innovative development should be developed, aimed at generating the necessary amount of investment for the development of basic knowledge, contributing to protection of innovations through the implementation of legislation on intellectual property rights, which makes it possible to identify and eliminate systemic problems that hinder the innovative development of the agro-industrial complex ecosystem.

6. State agricultural regulation and other sectors of the agro-industrial complex in the context of ensuring its innovative development should be carried out in accordance with the priority areas for enhancing innovative activity:

- economics, organization and management of agro-industrial production (intensification of resource use, competence enrichment, use of end-to-end technologies corresponding to the current list);

- production of crop products (intensification of the use of biotechnologies, overcoming the processes of degradation and destruction of the natural environment, ecologization of production);

- mechanization, electrification and automation of agro-industrial production (mobile energy resources elevated power, ERP, GPS and etc.);

- processing industries of the agro-industrial complex (solving the problem of food security, increasing the availability of quality food);

- production of livestock products (intensification of the use of the biological block of innovations, improvement of the genetic potential, the use of modified feed resources, the development of resource-saving technologies).

7. The unsystematic nature of state support measures for the implementation of innovative capacity organizations APK led to to that what is needed will cover the top 10 in the world in terms of the level of digitalization of agriculture, since only 5-10% of industry organizations use digital technologies or their individual elements. In this regard, state regulation of innovation development ecosystems APK offered realize With taking into account the dynamics indicators development national agro-industrial sectors, their comparison with the values obtained in other countries and in the direction of ensuring the total use of digitalization tools that meet the requirements conditions digital transformations.

With the development of theoretical and practical ideas about the content of innovative activity, the idea of possible tools for stimulating innovative development has expanded. In the course of the study, carried out on the example of the agro-industrial complex ecosystem, the necessity of using three groups of tools, differentiated depending on the strategic goals of the innovative development of the considered (or other) ecosystem, was substantiated.


AT quality strategic goals innovative development ecosystems (including the agro-industrial complex ecosystem) it was highlighted: the creation of innovations; formation of digital competencies; growth of innovative opportunities, ensuring complementarity; growth demand on the innovation; framework improvement. The specified list of strategic goals was formed taking into account their special significance in the context of digital transformation. Thus, the achievement of the strategic goal - the formation of digital competencies in the context of digital transformation is beyond doubt. In modern agro-industrial production, artificial intelligence technologies have already found wide application, represented by agricultural robots, crop and soil monitoring, predictive analysis, neural sensors, and animal tracking systems. In addition to artificial intelligence technologies, significant interest represents Internet of things, which the with regard to to the ecosystem of the agro-industrial complex can provide invaluable intellectual support in the management of agricultural technology, precision farming, agronomy, in the creation of smart industries. These and other technologies in the agro-industrial complex reveal amazing prospects for the development of the industry. Their

competent use can lead to large yields, a new quality of raw materials, and the provision of high-quality food to the population. Each progressive technology involves the acquisition of specific knowledge and skills about the possibilities of its use. The modern system of education and knowledge acquisition should be aimed at the formation of digital literacy in the field of digital technology and cybersecurity. The implementation of the state approach in this direction should be focused on restructuring the education system, modernizing its infrastructure in order to prevent the polarization of society and potential unemployment, and reduce social tension.


In conclusion, it should be noted that the formation of digital competencies and the achievement of other strategic goals of innovative development seems possible on the basis of state regulation through the application of the principle of consistency in management, taking into account the involvement of certain types of agro-industrial production in the structure of the entire complex. Given circumstance testifies to the validity of copyright approach, according to which the industry complex (AIC) was considered as an economic system, which is characterized by self-development. In the context of digital transformation, development receives an innovative orientation, however, the conservatism of the agro-industrial complex and the motivational nihilism of its participants do not allow innovative transformations to gain the necessary speed. In this regard, it is necessary to apply a system of measures to stimulate the innovative development of the agro-industrial complex ecosystem presented in the study.

The matrix of coordination of tools and goals of innovative development is shown in fig. 3. The systematization of innovative development tools was carried out in connection with the need to justify the directions and means of developing a new technological order, positioned as a digital economy.

Groups activities to encourage innovation in development of the agro-industrial complex ecosystem	Tools	strategic ie goals innovative development				
		Creating Innovation	Formation of digital competencies	Growth of innovative opportunities, security complementarity	Growth in demand for innovation	Framework improvement
Institutionally significant events	tax incentives, on-encouraging conducting R &D	Green	Yellow			
	Measures straight support innovative activity	Green	Yellow			
	Technological foresight	Green			Orange	Orange
Measures to form a culture of implementation innovation and their use	System learning, get -nia skills and competencies _ _		Green		Yellow	
	culture entrepreneur - Telsky activities		Green		Yellow	
	Innovative consal - ting		Green		Yellow	
Measures to form a favorable innovation environments	innovative infra-structure agribusiness		Orange	Green		
	Private -public partnership	Yellow		Green		
	Network innovative structures		Orange	Green		
	Private demand on the innova - tions	Orange			Green	
	State purchases	Orange			Green	
	standards, regulation, protection of intelligence. own - veins		Yellow		Orange	Green

 Greatest conformity

 Conformity in average

 Least conformity

**Rice. 1. Matrix strategic tools state support innovative ecosystem development APK**



#### 4. CONCLUSION

In the course of the study devoted to the problem of state regulation of the innovative development of the agro-industrial complex ecosystem, the tasks set were consistently solved and the following conclusions were drawn.

To ensure the innovative development of the agro-industrial complex ecosystem as a sphere that hinders the speed of innovative transformations of the national economy in the process of its digital transformation, it is necessary to carry out state regulation that contributes to the activation of the innovative potential of the most receptive and deserving targeted support of industry participants. The organizational and institutional parameters of such support are determined by the order and content of the events, which include the mechanism developed by the author state regulation of the innovative development of the agro-industrial complex ecosystem in the context of digital transformation. Essential increment in development theoretical and methodological provisions innovative activities, concerning improvement forms and ways to study innovative processes in economic systems, became the rationale for the approach to determining the subject of state support by identifying innovative capacity organizations APK and definitions \_ prospects his implementation With taking into account possible sources funding, and also definitions level innovative development ecosystems APK With results \_ his innovative activities and estimated values estimates innovative activity.

The article systematizes the normative support of innovative development and digital transformation of the agro-industrial complex at the level of national goals, national, federal and departmental projects, strategies and government programs; benchmarking of world and domestic experience in assessing the innovative development of the agro-industrial complex was carried out, as a result, methodological support for the innovative and scientific and technological development of the agro-industrial complex ecosystem was proposed and tested in terms of developing a methodology for assessing the index of the current state and prospects for the innovative development of the agro-industrial complex, which made it possible to substantiate a number of recommendations for its intensification, scaling and improvement.

In the course of substantiating the prospects for state regulation of innovation development ecosystems APK in conditions digital transformation in research was synthesized totality provisions specifying author's views on the given issues, revealing peculiarities combinations and combining tools and processes aimed at enhancing innovation in the industry.

As an institutional environment for the development of the agro-industrial complex ecosystem, the paper considers digital economy, becoming which in quality new technological \_ way of life going on through digital transformations. Explore way directions and means of developing a new technological mode of economic systems, the articles systematized measures to stimulate the innovative development of the agro-industrial complex ecosystem, compositionally represented by the following groups: activities; activities on formation favorable innovative environment; activities to create a culture of innovation and their use.

Based on the positioning of the agro-industrial complex as an ecosystem, the activities of each group were focused on achieving a synergistic effect in a strategic perspective by ensuring innovative development in the following basic areas: the creation of innovations, the formation of digital competencies, the growth of innovative opportunities, ensuring complementarity, the growth framework.

Prospects for further research, in our opinion, lie in the development of projects for the innovative development of the agro-industrial complex ecosystem that correspond to the list of end-to-end technologies to be integrated into the system of plans and programs for the development of the national economy.

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