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INNOVATIVE DEVELOPMENT OF AGRICULTURAL ENTITIES

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Annotation. The goal of the present study is to analyze current trends, identify concerns and perspectives of innovatization of Russian agrarian entities. At present, the scientific and innovative infrastructure of the agricultural sector shows a weak capability to introduce high-tech innovative digital technologies into production. The existing situation is exacerbated by the high share of small industries within agro-industrial complex of Russia, low financial, investment and HR potential of entrepreneurs-farmers, and the lack of effectiveness in their support system. The search for factors constraining innovative processes in the country's agriculture system, formulation of proposals for their leveling was made using methods of comparative analysis, synthesis, generalization and interpretation of the study findings. To resolve these issues, the activities of large and small agro-entities which are potential triggers of digital economic growth in the economy, have been studied. It was found that it is necessary to use the accumulated foreign experience of digital transformation of small business forms and minimize the lag. One of the key issues related to innovations development in the agricultural sector is staff training through creating an effective infrastructure and with an appropriate financial support from the government. Using the example of Volgograd State Agrarian University, the article describes transformations of the training process and the academic base to improve the supply of agricultural entities with highly qualified personnel with digital competencies. In conclusion, the article determined that the main key factors enhancing innovative digital transformation of the agricultural sector are: building a high-quality and effective innovation infrastructure accessible both to large and small businesses, and improving educational activities in training of IT specialists for the agricultural sector.

Keywords: innovation, agriculture, digital transformation, personnel training, agricultural entities.

Introduction.

When shifting to innovations, agricultural enterprises face many challenges that has to be overcome, since in the current conditions only innovations will enable agricultural entities to increase production, maintain competitiveness

and profitability. Based on forecast of global population growth from 7.6 billion people in 2018 to 9.6 billion in 2050, there will be a significant increase in food demand. The limited natural resources, such as fresh water and fertile arable land, are becoming a particularly urgent issue for next generations. It is believed that at present, agricultural products are enough to feed the world, but 821 million people suffer from hunger [1].

Transition to a new technological level "Agriculture 4.0" provides for the optimization of resource consumption, including labor resources; intensification of production in low-productive regions where all resources for agricultural production are available; enhancing selection activities to develop zoned crops and animal breeds resistant to pests and diseases; improving logistics and reducing waste in the food supply chain [2].

A large number of scientific papers has been dedicated to the issue of innovative development of agriculture. It should be noted that a significant part of these studies reveals certain aspects of introducing certain innovative technologies in the agro-industrial complex. A number of studies evaluate the effectiveness of agricultural innovatization [3], as well as analyse individual factors reducing the pace of innovation [4, 5]. But under the current circumstances, researchers are mainly focused on modern strategic direction of innovation - digitalization of agriculture. Studies of economic scientists confirm that innovative digital technologies of the 21 century have a huge potential for economic growth due to accuracy, automation and new management capabilities. The issues of efficiency from using digital technologies by foreign states are described in surveys of M.I. Ivanova, A.F. Razin, O.V. Rossinskaya, A.V. Soldatenko, M.V. Shatilov [6]; priorities of the agro-industrial complex in digital economy are described in studies of S.M. Pshikhachev [7].

Methods.

The methodology of the study comprises the use of general and special methods of scientific cognition: analysis, synthesis and comparison, as well as statistical data analysis, time series analysis.

Results and Discussion.

A lot of studies by researchers of Volgograd Agricultural University describe the peculiarities and difficulties of digital transformation in Russian agriculture [8,9,10, etc.]. Home scientists note that at this stage Russia is behind the leading countries in terms of preparation for the digital economy and being the 41st in the world ranking. The specific feature of agrarian sphere of the Russian economy is first of all in the heterogeneity of types and forms of agricultural entities; researchers point a large share of small industries – personal plots and small farms with production leading to an increased unit costs, growing price of goods and slowing down the introduction of innovative and information technologies [11]. Statistical data (Table 1) show that the share of agricultural organizations within gross agricultural output began to increase after 2014, when Russian counter-sanctions were imposed as a response to foreign sanctions in the form of a food embargo. At the same time, the share of farms doubled every decade.

Table 1 – Structure of gross agricultural output by categories of farms in the Russian Federation [12]

	1990	1995	2000	2005	2010	2015	2021
Farms of all categories	100	100	100	100	100	100	100
including							
agricultural organizations	73.7	50.2	45.2	44.6	44.8	54.0	58.3
households	26.3	47.9	51.6	49.3	48.0	34.5	27.4
peasant farms (farmers)	…	1.9	3.2	6.1	7.2	11.5	14.3

1) - preliminary dataFollowing 2016 All-Russian Agricultural Census, about 36.1 thousand agricultural organizations operated in Russia, including 7.6 thousand large, 24.3 thousand small, 4.2 thousand subsidiary agricultural enterprises and non-agricultural organizations, 174.8 thousand peasant farms (farmers) and individual entrepreneurs, and 23.5 million private subsidiary farms and other individual farms of citizens. According to experts, no more than 10% of 40,000 farms apply innovative technologies on a permanent basis [13].

Large agricultural entities, having significant resource and financial potential, can form a relevant infrastructure and be able to connect to a single information platform of the region, purchase necessary expensive software and digital equipment. Access to modern innovative and digital technologies enables agricultural holdings to create optimal soil-agrotechnical and organizational-territorial conditions, which will increase in yields, labor productivity and reduce material and labor costs while maintaining soil fertility and ensuring environmental protection. For small agribusiness, most of the advantages of production digitalization remain inaccessible due to a shortage of own sources of innovation financing. Solving this issue requires the use of accumulated experience of digital transformations in small agribusiness in countries like Germany where agrarian policy encourages digitalization and creation of equal infrastructural opportunities for all agricultural producers; Ireland with launched state program "Smart Farming" which employs about 2 thousand farmers; Switzerland with the demonstration of farms organized at the expense of the state budget [14].

Another barrier in promoting innovative technologies in agricultural entities is lack of human resources. Currently, the poor skills specialists – graduates of agricultural universities who are not ready to work under digital economy, has become especially apparent. Scientists and owners of agricultural entities note the weak practical training of future agronomists, zootechnicians, technologists due to the lack of a modern educational basis in universities of the Ministry of Agriculture. In addition, there is an ongoing process of reducing the number of agricultural universities resulting in many target programs not reaching the intended performance [15].

To eliminate this gap, Federal Law No. 403-FZ which is called "practice-oriented", on amendments to Federal Law "On Education in the Russian Federation" and certain legal instruments of the Russian Federation was adopted on December 2, 2019, addressing legal regulation of the practical training of students. For instance, the said law defines the concept of "practical training" and establishes that "practical training can be organized directly in organization involved

in educational activities, including in its structural subdivision intended for practical training, as well as in organization operating in the profile relevant to curriculum, including in its structural subdivision intended for practical training, based on agreement between these organizations" [16].

Innovative transformations in the agricultural sector of the economy reveal many other significant issues in training industry personnel. The new technological order "Agriculture 4.0" is based on the widespread introduction of digital technologies, therefore, the defining criterion for the quality of specialists and managers training is their digital literacy and universal and hybrid competencies. The shortage of agricultural personnel with modern professional competencies is felt today both in the top and middle management of agricultural enterprises.

Table 2 - Characteristics of management personnel and specialists within Russian Ministry of Agriculture [17]

Post title	Number, people			in % of employees					
	By staff table	Actual number	Job openings	With higher education	With secondary professional education	Practitioners	Below 30 y.o.	Retirement age	Turnover
Heads of Agricultural companies	26667	26155	512	66.2	25.7	8.1	3.9	19.6	5.2
Full-time Deputy heads	5809	5122	687	79.8	15.8	4.4	4.2	15.7	13.8
Chief specialists	49400	45640	3760	70.8	26.1	3.1	6.1	15.9	10.3
TOTAL	81876	76917	4959	69.8	25.3	4.9	5.2	11.2	8.8

The top managers include heads of agricultural organizations and full-time deputy heads (Table 2). As of 01.01.2019, the Russian Ministry of Agriculture in general had 26,155 managers and 5,122 full-time deputy heads. Of the heads of agricultural companies, a bit more than 66% have higher education, about 26% have secondary professional education. 8% of managers (about 2,000 people) do not have a professional education, these are so-called "practitioners". Almost a fifth of managerial staff are at retirement age, and only 4% of managers are under 30. Full-time deputy heads show slightly better educational and age indicators, but there is a high turnover of managers in this category: about 14% were replaced within a year. The largest cohort of managerial personnel are the chief specialists of agricultural organizations: agronomists, zootechnicians, engineers, vets, economists, financial officers. Managerial functions are prescribed in their job duties. The number of chief specialists is about 46,000 people. Among them, 71% have higher education, 26% have secondary professional education, 3% do not have professional education (practitioners). Among working chief specialists, more than 7,000 people (16%) are people of retirement age. The turnover in this category is more than 10% (4,685 people per year). In addition, the actual succession of managers and their deputies is 96%, and that of chief specialists - 92%. About 5,000 jobs are open. Assuming that managers, their deputies and chief specialists should have a higher education pursuant to official requirements, then there are about 50,000 managerial personnel missing in the agricultural sector [18].

These data clearly show that agrarian transformations shows the decline of professional qualities of managerial staff in terms of education, a high proportion of age-related specialists, as well as specialists without higher education. These unfavorable factors have a negative impact on the profitability of agricultural production, reduce the attractiveness of working in the agricultural sector, this explains the high level of managers turnover in the industry.

The current trends run counter to the requirements of time, since the organization of labor in the conditions when agribusiness shifts to innovative digital technologies requires creativity, possession of project and digital management competencies, scaling of the most promising management solutions that allow distant working which have become the most relevant under pandemic conditions.

An important aspect in solving the staffing issue is the readiness of graduates to organize agricultural production and manage agricultural enterprises. Today, a successful production and economic activity presumes a high level of professional training of managers and a conscious understanding of professional competence: a creative approach to work, original thinking, and the moral component of a specialist [19].

To increase the number of highly qualified specialists in agricultural entities, universities must use modern interactive education methods and innovative educational equipment to train personnel.

Volgograd State Agrarian University has already started this, applying both the methodological and practical training base for modern specialists for the digital agro-industrial complex. At the moment, the educational process of University uses software of more than 180 domestic and foreign vendor companies, such as Samsung, Microsoft, Cisco, Oracle. For example, Volgograd State University has signed a long-term agreement with Samsung to open an Academy students will use the company materials to study the Internet of Things, – a technology which is of particular prospectivity and demanded for agricultural entities. Based on acquired knowledge, the University graduates will be able to complete their graduate theses which have practical significance in the field of innovation and digital transformation for specific agricultural producers and defend them before representatives of software and hardware developing companies.

The Volgograd State Agrarian University provides training and consulting support within programs "Beginner Farmer", "Family Livestock Farm", "Building a cooperative" implemented at the federal and regional levels. Table 3 shows targets of implementing the regional project "Building a system to support farmers and development of rural cooperation" in the Volgograd region, whose level indicates the project relevance [20].

Table 3 - Targets of implementing the regional project "Building a system to support farmers and development of rural cooperation" in the Volgograd region

Name of indicator	Target value at the end of the year					
	2019	2020	2021	2022	2023	2024
The number of newly involved into small and medium-sized enterprises in agriculture of the Volgograd region by 2024, units.	342	306	322	479	688	808
The number of accepted members of agricultural consumer cooperatives (except credit) from small and medium-sized enterprises and personal subsidiary households, units.	210	204	200	320	493	586
The number of newly created small and medium-sized enterprises in agriculture, including peasant farms (farmer) and agricultural consumer cooperatives, units.	104	76	96	115	133	156

The University trains bachelors and specialists in applied computer science, undergraduates may study management of support and projects for building information systems that automate tasks of organizational management tasks and business processes.

In 2019, the University opened a center for innovation and advanced research with main focus in laboratory of robotic technologies and digital adaptation of agricultural machinery. The objectives of this research center are to give trainees theoretical knowledge and applied skills in digital transformation of agriculture, in particular, in the development of hybrid competencies while training IT agronomists, IT technologists, etc. The created center will help to adapt the curriculum potential to specific requirements of modern digital agriculture and the formation of digital competencies, to create a system of continuous updating and replenishment of the professional potential of industry specialists that is so crucial for the agro-industrial complex.

Conclusions.

The conducted research demonstrates the unrealized potential of Russian agriculture due to the lack of high-quality and effective innovation infrastructure. Further enhancement of the scientific and innovative potential of the country's agricultural entities should involve instruments of state and institutional support for innovation processes, as well as mechanisms to create a network for innovative knowledge dissemination among farmers. Therefore, the innovative development of Russian agricultural entities requires significant transformations in scientific and educational activities, transfer of these areas to the digital aspect in order to build high-quality, efficient agricultural production competitive in the conditions of the world market.

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INDUSTRIAL PARKS: DEVELOPMENT FINDINGS

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Abstract Integration processes are one of the most effective methods to improve performance in any sector of the economy. Integration processes are of particular importance in industry, which was the basis for developing all other types of activity. The adoption of the Federal Law on industrial policy has provided with opportunities to open industrial parks aimed at effective use of lands owned by both regional and municipal authorities and operating industrial corporations, to ensure the investments inflow into the region, by increasing employment and boosting the development of the industrial sector of the economy. To date, since 2014, according to Industrial Parks Association (AIP), there are more than 393 parks with various spaces for their activities, the composition of participants, the volume of investments, forms of private ownership, managing companies performing various functions. All these conditions in one way or another affect the final result; such influence requires creation of a methodology based on indices showing the mutual influence of factors, the dynamics of development, which is ultimately in the focus of this article. The study of statistical indicators presented by the AIP geoinformation system allowed to formulate relative indicators and their development trends based on data provided by Vorsino Industrial Park for the period of 2011 to 2020, and to conduct a comparative analysis by similar parks.

Introduction. Industry is an important basis for economic development, as evidenced by the industrialization experience for the period of 1928 to 1941 when the Soviet government implemented the first three five-year plans, which allowed to strengthen the industry of the USSR, as well as to ensure the independence of the military-industrial complex and the main elements of the economy from Western countries. The catalyst for the development after the military and modern economy is industry as well. One of the forms of industrial development at the present stage are industrial parks (IP) whose creation is envisaged by the Federal Law on industrial policy [1]. The creating industrial parks has become one of the vectors of industrial development. Along with numerous forms of business integration, IPs are intended to attract investment to the regions through placing offices and facilities on consolidated land territories which belong either to territorial formations (region, oblast, etc.), or by private or state-owned enterprises. Both from the point of view of regional formations and enterprises, the IPs creation enables to use vacant land, production and office facilities, by providing them to IP residents for lease and/or sale to develop their own business. All this enables effective use of existing resources and ensure effective production growth.

The issues of creating industrial parks and their development strategies are considered not only in the scientific community, but are legally prescribed by regulatory instruments. In 2016, AIP issued a compendium of legal texts re-