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FORMATION AND IMPLEMENTATION OF THE AGRICULTURE SUSTAINABLE DEVELOPMENT STRATEGY UNDER ECONOMY DIGITALIZATION CONDITIONS

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Abstract

A sustainable development strategy is a compromise between multidirectional targets: social, economic and environmental. It is formed at the state level and is reflected not only in agricultural and regional policy, but also in other areas of the country's socio-economic development. Moreover, sustainability is becoming a guiding principle for development at all levels of management and planning. The main trend in the sustainable development strategy of the Russian Federation is digitalization. This direction is aimed at introducing and improving the use of new technologies in all spheres of the state's life. Agriculture in the Russian Federation has always been one of the most important areas in the economy, so technological development is very important. The main directions of digitalization of agriculture should be: the use of unmanned aerial vehicles, smart tractors and combines, GIS technologies, rural e-commerce, distance learning in education and professional retraining of agricultural specialists in the agricultural business, the development of all kinds of IT services in social life.

Key words*: agriculture, directions, digitalization of the economy, strategy.*

INTRODUCTION

Attainment sustainable development goals requires the introduction of a wide range of new technologies, especially in the field of agriculture. One of the most promising technological trends in the agricultural sector is digitalization, which can significantly affect the growth of crop yields, increase labor productivity, reduce production costs, stimulate the implementation of sustainable land use practices and, in general, harmonize the operation of food systems.

Digitalization in agriculture includes robotics technologies, big data analysis, artificial intelligence, e-commerce.

Assuming systemic changes, the digitalization of agriculture can facilitate the simplification of relations between agricultural producers and the state (facilitating document circulation, obtaining preferential loans, gaining access to digital platforms), improving the situation in the supervision and certification of products, environmental control, and the development of the educational sphere.

In Russia, in recent years, much attention has been paid to the development of the digital economy in general and digital agriculture in particular. So, in 2019, a national project was approved "Digital Economy of the Russian Federation" and a departmental project has been developed "Digital agriculture", one of the goals of which is the introduction of digital technologies and platform solutions to ensure a technological breakthrough in the agro-industrial complex and achieve a 2-fold increase in productivity at digital agricultural enterprises by 2024.

The rapid and widespread introduction of digital technologies in modern conditions requires a conceptual and methodological substantiation of the modernization process, taking into account the peculiarities of the transition to the digital economy, including by identifying the degree of readiness of agribusiness entities and the system of sectoral digital transformation management. The digitalization of the economy is primarily focused on improving efficiency and competitiveness. Thanks to digitalization, the costs of servicing the production of products are reduced (by 10.0-40.0%), equipment downtime (by 30.0-50.0%), time to market (by 20-50%) and maintenance costs. product quality (by 10.0-20.0%), storage costs (by 20.0-50.0%), etc. (Shumilina, 2020).

Over the past five years, under the influence of geopolitical factors, agriculture has become a driver of the domestic economy, while not being a high-tech type of economic activity and not showing a significant increase in productivity and labor efficiency. The digital inequality of territories, manifested in unequal access to digital infrastructure, does not allow the use of a uniform standard set of measures for different regions and territorial entities.

Along with the basic conditions, there are a number of important factors contributing to the digitalization of agriculture:

- the use by farmers and extension workers of the Internet, mobile and social networks;
- the rural population has the skills to use digital technologies;
- a cultural environment that encourages rural entrepreneurs to adopt digital technologies and innovations.

Building a digital agriculture ecosystem requires an enabling environment for farmers and entrepreneurs to embrace innovative approaches. In particular, funding is increasing and cooperation is expanding within the framework of agricultural digitalization projects, startups are beginning to attract the interest of international investors and the media. (Digital technologies).

MATERIALS AND METHODS

Rural territories of the Russian Federation are the country's most important resource, the value of which is rapidly growing in the context of deepening globalization, while the importance of natural and territorial resources is increasing.

The development of rural areas is extremely uneven. Despite the dynamic growth of the agro-industrial complex, the level and quality of life of the rural population as a whole lag significantly behind the standard of living in cities, the population's access to the services of social organizations is narrowing, the information and innovation gap between urban and rural areas is deepening, which leads to an increase in the migration outflow of rural population, to the loss of development of rural areas.

The strategy for sustainable development of rural areas of the Russian Federation (Order of the Government, 2015) for the period up to 2030 is aimed at creating conditions for ensuring a stable improvement in the quality and standard of living of the rural population based on the advantages of the rural lifestyle, which will preserve the social and economic potential of rural areas and ensure their fulfillment national functions - production, demographic, labor resource, spatial and communication, preservation of the historical and cultural foundations of the identity of the peoples of the country, maintenance of social control and development of rural areas.

RESULTS AND DISCUSSIONS

The agricultural sector, which occupies a dominant position in the rural economy, is multifunctional and not only produces marketable products, but also ensures the reproduction of socially significant values that are not always quantifiable or valued. (Kukharev, 2015). The agricultural sector makes a decisive contribution to maintaining the vitality of rural areas, preserving the agricultural landscape and cultural heritage, preserving agrobiologically diversity and maintaining ecological balance in the biosphere. Agriculture plays an important role in preserving soil fertility and protecting land from erosion and other negative natural and man-made phenomena. These non-food aspects have the characteristics of public goods, but are not traded and cannot be fully measured by market performance criteria.

In 2019, agricultural production increased by 4.0%, amounting to about 5.9 trillion. rubles, including growth in crop production amounted to 6.1%, in animal husbandry - 1.6%. The country's GDP increased by 1.4% in 2019 compared to 2018.

The gross grain harvest in 2018 amounted to 120.7 million tons, the yield of the main oilseeds - sunflower, soybeans and rapeseed - reached a record 22.4 million tons, the production of sugar beet increased by almost 21.0% to 50.8 million also, new records were recorded in the collection of vegetables (14 million tons), fruits and berries (3.4 million tons).

The production of livestock and poultry in live weight at all farms increased by 1.9% to 15.2 million tons. The main driver of the sector is still pig breeding (an increase of 5.1%, which

amounted to more than 5 million tons). Production of cattle for slaughter increased by 0.8% to 2.8 million tons, poultry - by 0.6% to 6.7 million tons. Production of sheep and goats for slaughter last year decreased by 4.3% up to 462.2 thousand tons. The gross milk yield in 2019 was 2.4% more than in 2018, amounting to 31.3 million tons, including in agricultural organizations - increased by 4.4% and amounted to almost 17 million tons. Egg production last year decreased by 0.1% to 44.86 billion pieces.

Society is interested not only in increasing the level of food self-sufficiency in the country, but also in maintaining the multifunctionality of agriculture, the historical way of life of the rural population, and improving the environment (Fudina, 2020).

Sustainable rural development will ensure the improvement of the rural way of life, the more complete fulfillment by the village of its national functions - production, socio-demographic, cultural, recreational, environmental, social control over the territory, the convergence of living conditions in the city and in the countryside (Figure 1).

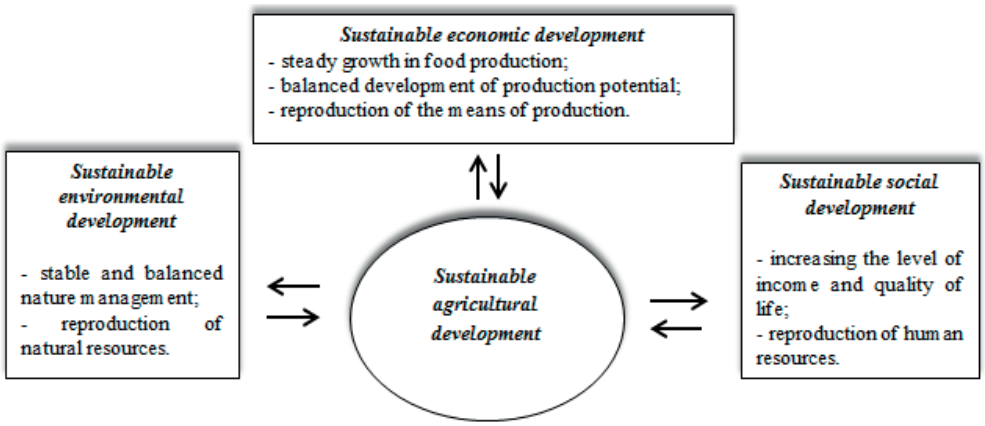

Figure 1. Interrelation of the components of sustainable agricultural development

Agriculture has always been and remains the most important resource of any state, influencing the natural, economic, human and ethnocultural potential. Most regions of Russia have a pronounced agrarian character (Kukharev, 2015). At the same time, the development of agriculture and rural areas is extremely uneven. Multifunctionality of agriculture is one of the components of ensuring national well-being and determines the need for state support in ensuring conditions for sustainable development of rural areas. Agricultural production indices are presented in Table 1.

Table 1. Indices of agricultural production of the leading constituent entities of the Russian Federation in 2019 (in comparable prices; in % to 2018)

Region	Farms of all categories	including		
		agricultural organizations	households	peasant (farming) households, individual entrepreneurs
RUSSIAN FEDERATION	104.0	105.8	98.1	110.2
Krasnodar region	108.3	108.9	99.0	116.1
Rostov region	105.4	103.2	99.7	117.2
Voronezh region	106.1	111.0	95.1	109.3
Chelyabinsk region	97.1	98.9	92.4	101.0
Astrakhan region	101.8	122.3	92.3	105.0
Republic of Tatarstan	103.0	105.2	97.1	120.8
Republic of Bashkortostan	102.0	103.8	98.9	108,7

The analysis of the development of agriculture in the regional context allows us to note that:
- Krasnodar Territory occupies a leading position in grain collection, as well as 4th place in all other indicators of agricultural development;
- The Rostov region is a leader in fish production (or in the fish industry), is in second place in the ranking for the production of grain and eggs, and is in fifth place in the vegetable and dairy industry;
- Voronezh region - one of the five leaders in grain harvest and potato yield;
- The Chelyabinsk region has high rates of livestock and poultry raising, as well as egg production;
- The Astrakhan region maintains a leading position in the fish and vegetable industries;
- The Republic of Tatarstan and the Republic of Bashkortostan are the leading regions in the production of dairy products and the cultivation of potatoes.

The profitability of crop production in Russia as a whole from 2005 to 2019 increased 2.9 times and reached 32.4% in 2019.

The level of profitability in animal husbandry is lower than in crop production, which is explained by significant costs and disparity in prices for raw materials of livestock products. For the same period 2005-2019, in Russia, profitability increased from 4.7% to 12.8%.

In the period from 2005 to 2019, the ratio of the shares of products in the total volume of production in farms of all categories changed by 6.5 percentage points, namely, the share of crop production increased from 47.8 to 54.3% and the share of animal husbandry decreased from 52.2 to 45.7%. Moreover, in agricultural organizations, crop production is 43.2%, and livestock - 57.4% of the total; in households - 22.3% and 38.7%, respectively. It follows from this that agricultural organizations are of decisive importance in the development of the agro-industrial complex and the life support of the rural population.

The efficiency of production of grain and leguminous crops per organization increased by 33.5% and amounted to 55.0 thousand centners; per 1 hectare of harvested area - by 20.1% to 16.7 centners/ha. Also, the yield of potatoes increased by 3.2%, perennial grasses for hay by 26.5%.

The efficiency of milk production per organization increased by 40.5%, or 333.8 centners, on average, but per 100 hectares of agricultural land, this figure decreased by 7.4%, or 4.3 centners.

In animal husbandry, the second important area is the raising of animals and poultry for meat. In the dynamics over the past 13 years, the cultivation of livestock and poultry for slaughter in live weight as a whole decreased by 4.4% and in 2019 amounted to 222.5 thousand tons. This was mainly due to a decrease in the number of animals in households and peasant (farm) farms, as a result, the production of livestock and poultry for slaughter in live weight decreased by 41.4% (or 45.7 thousand tons) and 18.7% (or 1.4 thousand tons), respectively. At the same time, it should be noted a significant increase in this indicator in agricultural organizations, which amounted to 32.1%, or 36.9 thousand tons, which indicates the development of not only dairy, but also beef cattle breeding. In the period from 2005 to 2019, the total volume of meat production in Russia increased by 33.0%. This was mainly due to an increase in the production of poultry meat by 4.0 times, as well as an increase in the production of semi-finished meat products by 2.4 times. At the same time, during the analyzed period, there is a significant reduction in the production of chilled and frozen cattle meat by 84.2%.

In recent years, activities aimed at import substitution have been actively carried out as a response to the current anti-Russian sanctions (Fudina, 2018). A wide range of whole milk products is produced in Russia, including not only drinking milk, but also fermented milk products (kefir, fermented baked milk, bifidok and others), butter, cheese and raw products, cottage cheese and ice cream. In the total volume of manufactured products, it should be noted that the producers of cheese and dairy products benefited from the imposed sanctions, their production volumes in 2019, compared to 2005, increased by 4.5 and 2.4 times, respectively. The production of butter for the same period increased slightly - by 5.6%.

In the rating of the regions of the Volga Federal District in terms of the index of the physical volume of agricultural production, the Penza region occupies a leading place (Table 2).

Table 2. Indices of agricultural production of the constituent entities of the Volga Federal District (for January-September 2019 (in farms of all categories; in comparable prices; as a percentage of 2018)

Region	December 2019			
	January-August		January-September	
	IFO	rating	IFO	rating
Penza region	113.3	one	117.9	one
Mari El Republic	107.4	2	110.7	2
Saratov region	95.5	8	106.6	3
Republic of Mordovia	100.3	four	105.8	four
Samara Region	*	-	105.6	five
Perm Territory	*	-	102.9	6
Republic of Tatarstan	100.2	five	102.5	7
Ulyanovsk region	*		102.5	8
Udmurt republic	99.2	7	102.4	9
Nizhny Novgorod Region	101.4	3	102.3	ten
Chuvash Republic	*	-	102.0	eleven
Kirov region	*	-	101.5	12
Republic of Bashkortostan	99.3	6	100.0	thirteen
Orenburg region	92.7	9	93.5	14

CONCLUSIONS

Thus, digitalization, being the basis of socio-political and economic sustainability, leads to optimization of management processes, improvement and increased transparency of political processes, increased efficiency and competitiveness in all types of economic activity, provides the creation of high-performance jobs, contributes to the development of social infrastructure and the preservation of the environment. Wednesday.

A new technological standard of work is being formed in the agricultural regions. "Smart" technologies are fundamentally changing the possibilities and conditions of management, which ensures the preservation of rural areas, improves the demographic situation.

The future of agricultural regions is sustainable development, high quality of life of the population based on constant technological progress and comprehensive digitalization.

REFERENCES

Digital technologies in the service of agriculture and rural areas: a background document [electronic resource]. Url:http://www.fao.org/3/ca4887ru/ca4887ru.pdf

Fudina, E.V. (2019). Directions for the implementation of state policy to support agriculture/ E.V. Fudina //International Agricultural Journal. V. 62. No. 4. 68 - 75.

Fudina, E.V. (2020). Actual problems and prospects for the development of the agro-industrial complex of Russia/ E.V. Fudina //International Agricultural Journal. V. 63. No. 1. 127-133

Ivanov, V.A. (2011). Methodological bases of sustainable development of the agricultural sector / V.A. Ivanov, A.S. Ponomareva // Branch and regional economics. No. 4 (16). 109 - 121.

Kukharev, O.N. (2015). Economic and energy efficiency assessment in agriculture/ IS HE. Kukharev, E.V. Fudina. - Penza State Agricultural Academy. Saarbrucken, 117.

Kukharev, O.N. (2015). The technical solution for a laminated coating on a rounded surfaces / ON Kukharev, IN Semov, EG Rylyakin // Contemporary Engineering Sciences. Vol. 8. No. 11. 481-484. Url:http://dx.doi.org/10.12988/ces.2015.5270

Order of the Government of the Russian Federation of February 2, 2015 No. 151-r “On approval of the Strategy for sustainable development of rural areas of the Russian Federation for the period up to 2030 (as amended on January 13, 2017). [electronic resource]. Url:http://docs.cntd.ru/document/420251273

Shumilina, T.V. (2020). The role of information in agriculture in the development of digital economy / T.V. Shumilina, O.F. Pyatova // Collection of scientific papers of the II National scientific and practical conference "Development of the agro-industrial complex in the digital economy". - Kinel:Samara State Agrarian University. 83-86.