

The Modernization of the Multifunctional Agrarian Sector and Development Outlooks in the Region

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Abstract – Nowadays, issues related to the revivification of rural areas, the increase in the level and quality of life of local population and the insurance of food safety in the whole country are of crucial importance. The main aim of the research was to identify the relation between modernization in agriculture and its multifunctional nature as well as the development outlooks of the rural areas of the Omsk Region. The article presents a brief theoretical analysis of possible trends in the development of agriculture, its transformation and impact on rural areas based on both domestic and foreign practices. On the basis of statistic data analysis, a brief description of the current socio-economic state of the Omsk Region as a typical representative of agro-industrial territories is presented, while the characteristics of the development of its rural areas are highlighted. A trend towards technical and technological re-equipment in agriculture, an increase in funding volumes in plant and animal production with the substitution of obsolete tractors, combined grain and feed harvesters and the modernization of livestock farms and enterprises based on digital technologies are indentified. The impact of agrarian production on the multifunctionality of agriculture and development of rural areas is determined. The necessity to train highly qualified staff for the local agrarian sector in the light of the conditions of the sectoral labor market is legitimated. Forecast possibilities regarding the development of the Omsk Region are presented taking into account the modernization and technological re-equipment of agriculture.

Keywords—*modernization, multifunctionality, agriculture, development, digitalization, staff.*

I. INTRODUCTION

The concept of multifunctional agriculture first appeared in the last decade of the XX century in developed countries where the challenge of food supply was basically met and society began to care about food quality, social issues and the environment.

The insurgence of multifunctional agriculture in Russia in practical terms can allow for the comprehensive development of rural areas and the eradication of negative phenomena such as:

- significant deterioration or absence of engineering infrastructure;
- obsolete facilities and equipment in agricultural organizations;
- weak modernization process and introduction of digital innovations in agrarian production;

- shortage of sectoral specialists with digital competences in rural areas;
- low income of rural population;
- underdeveloped cultural and recreational sector and community services in rural areas;
- active migration outflow from rural areas; and others.

Thus, according to the Strategy for the Development of Agricultural Education of the Russian Federation until 2030 [1], the agricultural sector needs specialist with professional competences which meet the requirements of the current technological and science-driven production (especially in the fields of genetic engineering, robotization of production, precision farming and others).

According to the authors, the modernization of agrarian production can increase its efficiency, guarantee the execution of its main functions on part of the agricultural sector, thus allows for meeting the crucial macroeconomic task of posing the conditions for an increase in the quality and level of life of rural population and the preservation of the socio-economic potential of rural areas.

II. LITERATURE REVIEW

Over the last few years many scholars have analyzed regional development based on the transformation of agrarian production in their works. Research has been carried out in different countries as well as in several regions of Russia [2, 3], in particular socio-economic development through industrialization has been determined [4] and the impact of small business and entrepreneurship in regional socio-economic development has been estimated [5]. Works in which the authors consider the diversification of private farms and integrated cultivation and livestock production systems are of particular interest [6, 7].

Scholars assign a significant role as well to research on the systemic aspects of multifunctional agriculture and to new approaches in the management of rural territories [8, 9]. Several researchers especially focus on the development of digital economy and on human resourcing in the agro-industrial complex within the framework of the strategic interrelation and outlooks of multifunctional agricultural development [10].

According to the authors, a work dedicated to the study of the peculiarities of the development of rural areas based on alternative employment of rural population, its problems

and human resource potential is of particular interest [11], as it reveals the possibility to improve the quality of life of the residents of rural areas and an increase in their income.

In addition, the potential of innovation technology in agriculture and its impact on rural development in the light of multifunctionality, which can become the main factor in the solution of current issues and in life improvement in rural areas, has not been studied well enough.

III. METHODS

The theoretical and methodological basis of the current research is represented by the works of renowned Russian and foreign scholars, strategic and programmatic documents in the field of agricultural development and development of rural areas.

The information and empiric basis of the study is composed by statistical data from the Russian Statistic Agency and its local branches and from the Ministry of Agriculture and Food of the Omsk Region, as well as by information obtained by the authors as a result of their research.

The following methods have been applied: theoretical analysis of scientific literature and online materials; statistic observation during the collection of raw data; statistic elaboration of the collected data, their analysis, comparison and generalization. The visual clarity of the results of the analysis was guaranteed by means of a graphic method. The calculation of estimated figures was realized on the basis of econometric forecasting.

IV. RESULTS

Research has shown that the driver in the development of agricultural multifunctionality is represented by the processes of modernization and introduction of current “ground-breaking” technologies in agrarian production, which can guarantee an increase in its efficiency and profit growth. Such processes allow for an increase in tax liabilities in the regional budget, enable the realization of target-oriented investment projects in rural areas and, by doing so, the formation and reconstruction of rural infrastructure, the improvement in the quality of life of local population, the development of the socio-economic sphere and the preservation of the ecosystem.

One of the main tasks while managing the efficiency increase in agrarian production is guaranteeing the realization of its main productive, social, ecological and economic functions. According to the authors, the realization of each function is reflected by the overall state of rural areas, which are known to significantly differ both between different regions and within a single one.

The Omsk Region is included in the Siberian Federal District and represents an important agro-industrial area. The region is characterized by a high level of agricultural development. In 2015-2018 its share in the general structure of the gross regional product amounted to 42.9-43.1%. As far as the volume of agricultural production is concerned, in 2018 the Omsk Region ranked No. 3 in the Siberian Federal District and No. 20 among the subjects of the Russian Federation.

The Omsk Region includes 32 municipal districts, 26 urban settlements and 365 rural settlements. It should be noted, however, that not all districts are equally efficient in agrarian production. A significant diversification among agrarian ter-

ritories can be highlighted in the region, and several types can be identified according to the level of multifunctional development of agriculture:

- steadily developing districts with a high level of socio-economic development and large-scale agrarian enterprises which apply current innovative technological solutions (ground-breaking areas);
- districts with an average level of socio-economic development, expansion of entrepreneurial activity in the agro-industrial sector, increase in the quantity of recently founded private farms, agrarian start-ups, family-operated livestock farms, processing facilities (growing points);
- districts where stagnation and degradation processes are observed in both production and socio-economic fields (depressing areas).

As a part of the current research, the main features of the socio-economic development of different types of rural areas were analyzed (Table 1).

Different types of areas show significant differences in their level of development. In depressing areas the volume of agricultural production is far less than in ground-breaking ones: 24 times as low in plant production, 318 times in livestock production. In general, in low-performing districts entrepreneurial activity is lower and the efficiency of agricultural organizations is thrice as bad. Furthermore, due to low production volumes, collateral degradation processed can be observed in such districts: the salary level is twice as low, the volume of employment is 10 times as low, and the migration balance is twice as high.

TABLE I. FEATURES OF MULTIFUNCTIONAL DEVELOPMENT OF AGRICULTURE AND RURAL AREAS OF THE OMSK REGION IN 2018 ^a

Feature	Type of rural area		
	Ground-breaking	Growing points	Depressing areas
Gross output, mln rubles:			
- plant production	16,419.6	12,816.9	680.4
- livestock production	26,217.2	4,375	82.5
Rate of return of agricultural organizations (taking subsidies into account), %	28.4	20.1	9.3
Share of profit-making organizations in the total amount of agricultural ones, %	86.3	77	16.7
Tax and non-tax revenues, mln rubles	2,559	1,240.1	253.3
Average monthly nominal wages for agricultural workers, rubles	26,458.5	22,789.2	13,373.4
Volume of economically active population, working in rural areas, ppl.	60,949	28,420	6,201
Migration balance, %	-4.8	-5.1	-9.2

^a. Elaborated by the authors according to data contained in [12]

It should be also noted that the insufficient development of agriculture negatively influences the conditions of other vital areas, for example 10 times as low tax and other revenues enter the district budget. In return, this does not allow the district to develop the social sphere in villages, which is mostly responsible for the cultural component and living comfort of the population in rural areas.

Currently in the region different measures are being taken for the modernization of production in the agrarian sector, consisting in technical and technological re-equipment, application of paramount innovation computer technologies, power-armed combined harvesters and tractors. Every year

up to 3 billion rubles are spent for such goals in the region. In addition, state support is provided to farmers as regards the repayment of part of the expenses related to the technological modernization of agrarian production. Thus in 2018 more than 250 million rubles were released as subsidies which were used to acquire more than 300 units of machinery. It should be noted that an increase can be observed in the share of updated combined grain harvesters by 3.2%, while in combined feed harvesters it amounts to 5.2%.

Over the last decade a significant re-equipment has happened in the agricultural organizations of the Omsk Region, the quantity of agricultural machinery units has almost halved and currently there are 3,920 tractors, 269 combined feed harvesters and 1,269 combined grain harvesters (Table 2).

TABLE II. PRESENCE OF AGRICULTURAL MACHINERY IN THE AGRICULTURAL ORGANIZATIONS OF THE OMSK REGION ^a

Feature	Machinery, units		Deviation, %
	2008	2018	
Tractors (excluding units where digging, land-improving and other machines are mounted)	7,569	3,920	-48.2
Combined grain harvesters	2,699	1,269	-53.0
Combined feed harvesters	474	269	-43.2

^b. Elaborated by the authors according to data contained in [12]

This testifies that producers are liquidating non-efficient, obsolete machinery in favor of new machinery with a higher generative capacity up to 100 ha of plow land.

280 million rubles from the federal budget were invested in 2019 in the modernization of livestock farms and integrated enterprises of the region, 190 million rubles were invested from the regional budget. In the last decade over 10 hi-tech milking parlors of the “Karusel” and “Elochka” type based on digital technologies, which allow for the personalization of milking management, animal feeding and husbandry, have been installed.

Technical and technological modernization guarantees a more precise control of production processes, allows for a rational exploitation of the available resources, enables the creation of optimal conditions for the development and growth of the yielding capacity of agricultural crops, the improvement of the breeding capacity of animals and poultry, the accomplishment of the planned level of agricultural production and the realization of higher profit.

It should be noted that growth in the revenues of agricultural enterprises enables an increase in the tax revenues of the regional budget, the improvement of entrepreneurial activity and investment appeal. Prerequisites for investment in the improvement of the socio-economic situation in rural areas and the rectification of discontinuous development and degradation of the rural territories in the region have been posed.

Active growth and development of the multifunctional nature of agriculture require the introduction of promising information technologies in the agro-industrial sector. The corporate project “Digital Agriculture” has been released for realization between 2019 and 2021, its aim is the digital transformation of agriculture by means of introduction of digital technologies and platform-based solutions for the provision of a technological breakout in the agro-industrial

sector and the achievement of a twofold growth of work productivity in “digital” agricultural enterprises [13].

However, the realization of modernization processes needs staff with corresponding qualification. Thus, for example, according to the data of the All-Russian Rural Census of 2016 [14] the managers of agrarian enterprises are basically people over 50 years old, which often do not possess any knowledge as regards the management of agriculture with paramount technologies and innovations.

The level of education in different age categories of acting managers of agro-industrial enterprises of the Omsk Region is presented in Figure 1, it testifies the severe staff shortage which represent a barrier for the realization of the modernization of agricultural production.

It is well-known that the level of education has an overall impact on production efficiency. As a result of the present research, it has been established that among the acting managers of agro-industrial enterprises of the Omsk Region only 66.2% (544 people) have completed higher education, 25.2% have completed secondary education and 8.6% primary professional education.

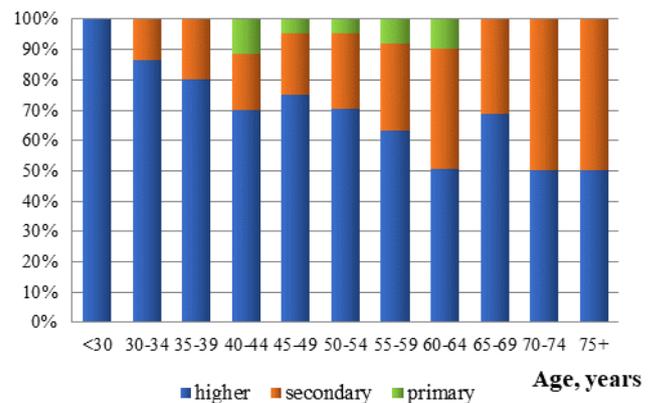


Fig. 1. Share of the managers of agro-industrial organizations of the Omsk Region with different levels of education in different age categories as of 2018 (elaborated by the authors)

As a part of the research, a forecast on the renewal of staff was projected, according to which by 2025 almost 300 managers and more than 8,000 qualified specialists capable of working with ground-breaking technologies will be needed.

Within the framework of the realization of the May Presidential Decrees of 2018 [5] and the achievement of the outlined aims, such as “the creation of an updated and safe digital educational environment, which enables the high quality and availability of education in all its forms and levels” and “the provision of the accelerated introduction of digital technologies in the economy and the social sphere”, the Omsk State Agrarian University is supporting the economic activity of agro-industrial subjects in the main areas of education, science and consulting services.

The engagement of producers in the scientific and educational process is realized taking into account their level of development. With specialists from “weak” farms, refresher courses and retraining are realized in the first place. In farms with an average level of development, consultations on the introduction of innovations are carried out along with training activities. In well-developed profit-making organizations,

standard models of management are elaborated for the further translation of successful practices in the handling of matters in the agro-industrial sector of the region (Figure 2).

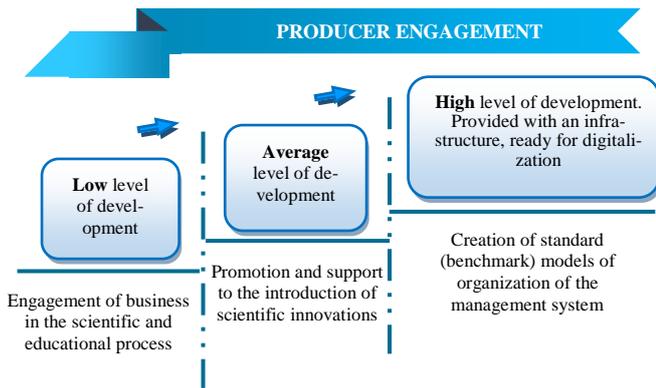


Fig. 2. Scheme for the engagement of agricultural producers in the process of scientific consulting support and continuous education of agro-industrial specialists (elaborated by the authors)

Under the conditions of market competitiveness, economic subjects from rural areas need different types of information, especially when introducing innovations and modernizing their production, such as scientific and technical, financial, market-related, innovation-related and other types of information. Scholars from the Agrarian University assign a significant role to consulting for different organizations and rural population as one of the acting mechanisms that allow for an increase in the efficiency of agricultural commodity producers and the development of rural areas. The main consumers on the market of consulting services are agricultural and processing enterprises, private subsidiary farms, gardeners and truck farmers. In addition, an important sector in agrarian consultation is represented by agricultural entrepreneurs, such as grant holders and peasant (farm) holdings, family-operated livestock farms and agrarian start-ups. This is due to the fact that the majority of them have completed only secondary professional education and not always in an agrarian major. Among grant holders this level of education amounts to 36% or 121 people in the Omsk Region.

In order to increase the awareness of agricultural commodity producers in the field of innovation results, it is necessary to organize different events where innovative tools and ground-breaking digital technologies will be presented.

Over the last decade a significant transformation of the agro-industrial sector has been happening both in the Omsk Region and in Russia as a whole. Significant results in staff training for agriculture have been achieved by applying information and digital technologies. An innovation base for agrarian production has been formed. However, the currently elaborated partial fragments (information and analytic materials, scientific elaborations of scholars from Omsk State Agrarian University) in different areas of activity of agricultural organizations do not embrace the problems of the wholesome development of agrarian production and processing of agricultural products in the region. For this reason, a unified regional information and analytic system of digital support for enterprises, agricultural departments of municipal formations and governing bodies of the regional agro-industrial sector is being created on the basis of the Agrarian University, which will enable the accumulation of analytic and scientific information, planning of the development of

the activity of agricultural organizations, projection of spatial and sectoral forecasts at regional and local levels.

The advantages of such supporting activity for agricultural commodity producers consist in the possibility to obtain information in accelerated terms and using it in an online regime. The authors believe that such agricultural support system can enable a more active realization of the modernization process of the agro-industrial sector of the region, the results of which are as follows:

- optimization of technological processes and minimization of production risks in agriculture, among others with the introduction of paramount resource-saving technologies;
- farmers' cost cutting;
- growth in production efficiency;
- improvement of the socio-economic conditions in rural areas;
- engagement of young staff in agribusiness.

It should be noted that there currently is a great amount of sources where different kinds of information are presented. One of these resources for providing the participants of the agrarian market with information about innovative projects in agriculture and for the promotion of consulting services is the educational online platform for agrarian education and science "A University Open to the Region!", available on the official website <http://open.omgau.ru> (Figure3).



Fig. 3. A screenshot from the online platform "A University Open to the Region!"

As a part of the scientific support, research works of theoretical and applied nature commissioned by local enterprises are being carried out in the region, innovation projects in agriculture are being supported among others as regards the application of digital technologies and platform-based solutions in farm management ("Smart Field", "Smart Herd", "Smart Greenhouse").

It should be highlighted that the above-presented trends have enabled the active development of small and medium-sized entrepreneurship in the Omsk Region over the last few years. Thus in 2018 a 1.4% increase in the number of private entrepreneurs and microenterprises was registered in comparison to the level of 2017. A trend towards an increase in

the efficiency of small companies thanks to the modernization of their productive capacity and the introduction of innovation technologies can be observed. By the end of 2018 the share of the average staff number of employees working in the field of small and medium-sized business in rural areas increased by 20.4% if compared to the previous period.

The main constraining factors for innovation processes, which characterize most agro-industrial regions, are represented by the limited possibilities of stimulating investment and entrepreneurial activity using budgetary funds and by infrastructural limitations.

The realizations of events related to the crucial directions of scientific support and education, state aid to production and social projects in rural areas enables to ensure a more efficient accomplishment of its function on part of agriculture and to increase the level of socio-economic development of rural territories. The main forecast features of agricultural development in Omsk Region are presented in Table 3.

TABLE III. FEATURES OF THE FORECAST DEVELOPMENT OF AGRICULTURE AND RURAL AREAS IN THE OMSK REGION^C

Feature	Average in the region	
	Factual data	Forecast by 2025
Gross output, mln rubles:		
- plant production	36,388.8	48,273.5
- livestock production	32,115.2	45,567.4
Rate of return of agricultural organizations (taking subsidies into account), %	20.7	37.6
Share of profit-making organizations in the total amount of agricultural ones, %	67.1	82.7
Tax and non-tax revenues, mln rubles	5,187.8	6,213.2
Average monthly nominal wages for agricultural workers, rubles	20,221.3	30,378.2
Volume of economically active population, working in rural areas, ppl.	122,843	158,786
Migration balance, ‰	-6.6	+0.3

^C Elaborated by the authors

The achievement of the forecast features in the agro-industrial region will be guaranteed by the accomplishment on part of agriculture of its crucial functions and by the realization of a series of events, including:

- improvement of the management mechanism for the development of the multifunctional nature of agriculture (management function);
- improvement of grant support to farmers (production, economic and social functions);
- promotion of business subjects for investment in the development of the social sphere in rural areas and environmental protection (social, ecological and economic functions).
- development of the human resource potential of agriculture (production and social functions).

In the future the increase of the production features in agriculture and the growth of the profit of enterprises, which is the source of efficient development of any kinds of rural areas, are awaited. The achievement of the forecast features will guarantee the accomplishment on part of agriculture of its crucial functions (Table 4).

TABLE IV. EFFICIENCY MATRIX OF THE ACCOMPLISHMENT OF ITS FUNCTIONS ON PART OF AGRICULTURE IN THE OMSK REGION^D

Accomplishment efficiency	Functions of agriculture				
	Production	Social	Economic	Ecological	Management
1. Very high	W			W	
2. High	V	C	V		V, C, W
3. Average			W		
4. Low					

Awaited level in 2025

Factual level in 2018

V – improvement of grant support to agricultural producers;

W – activity of human resource center;

C – realization of social projects.

^D Elaborated by the authors

The efficient development of rural areas is possible by means of correct strategic management of the multifunctional nature of agriculture and the accomplishment of its ecological, social and economic functions based on modernization processes using paramount digital technologies.

V. CONCLUSIONS

To sum up, it should be noted that the long-term economic growth and flourishing of rural areas is not possible without the participation of entrepreneurs, which can become the drivers of economic growth in rural areas. New small enterprises, apart from playing a determinant role in the strengthening of competitiveness in the agrarian sectors of economy, possess a determinant significance for the economic growth and innovation potential in many agro-industrial regions. Moreover, the main strategic interests are represented by the creation of working places, economic growth and poverty reduction among rural population. By doing so, an increase in the multifunctionality of agriculture can ensure the liquidation of its main problems and the rational exploitation of the available potential of rural areas, the increase of the efficiency of agrarian economy and the accomplishment of the main strategic tasks which encompass rural inhabitants.

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