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## **Sustainable Development of the Agri-Food Sector: Russia's Priorities and Directions to Adapt Agenda 2030 to Russian Conditions**



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**Abstract.** In 2015, at a UN Summit, the 2030 Agenda for Sustainable Development was adopted; it contains 17 sustainable development goals crucially important for any country in the world. The scientific significance of solving the problem of sustainable development consists in the urgent task to adapt the sustainable development goals (SDGs) to national conditions of different countries and to form a mechanism for their achievement in various economic sectors. Since the central place in the Agenda is devoted to food security and sustainable development of agriculture, we identify the possibility of applying the system of SDGs to promote further sustainable development of Russian agricultural sector. The main scientific idea and goal of the present paper is to determine national priorities in the field of sustainable development on the basis of meaningful analysis of the current state of the agri-food complex; besides we search for possible directions to adapt the global Agenda 2030 to Russian conditions so as to improve existing agriculture development strategies and programs, taking into consideration the UN SDGs. We use system approach and statistical analysis to identify and specify relevant socio-economic and environmental issues in the Russian agri-food sector and to systematize them on the basis of the UN methodology. We believe that the proposed grouping of agri-food sector problems and their relationship with the UN SDGs can serve as a basis for constructing a concept for its sustainable development. We show that in order to adapt the 2030 Agenda it is necessary to conduct an in-depth analysis of existing strategies and programs for development of the agri-food sector by comparing their goals, objectives and indicators with the global SDGs, identifying their inconsistencies and the possibilities to adjust them.

**Key words:** sustainable development, national economy, agri-food sector, UN sustainable development goals, Russian priorities, indicators, adaptation.

**Introduction.** In recent years, the world science has used sustainable development and economy with clear social and environmental priorities as a basic model up to 2030. An important feature of the new model of economy (“green” economy) should be the environmental and economic transformation and social welfare of each person in the society [1].

The term “sustainable development” was introduced by the UN World Commission on Environment and Development “Our Common Future” in 1987 to characterize development where meeting the needs of the present does not undermine the ability of future generations to meet their own needs.

The scientific approach to the problem of sustainable development is based on decisions of UN conferences related to the adoption of Sustainable Development Goals (SDG). In

2015, the UN General Assembly adopted a resolution a/RES/70/1 which contains the document “Transforming our world: the 2030 Agenda for Sustainable Development” [2] (hereinafter – the Agenda). The document contains specific directions to form a new economy focused on economic growth, ensuring social welfare of an individual in the society, as well as reducing environmental risks [3]. World leaders came to an agreement in terms of 17 SDGs and objectives, as well as means to implement them [2].

Issues related to achieving SDGs in agriculture are covered in works of researchers from around the world. They pay special attention to individual goals and activities aimed at achieving sustainable development, as a rule, in a particular state. In particular, the work by M. Qadir and co-authors examines in detail SDG 6 related to providing the residents

of countries experiencing fresh water scarcity with clean water [4].

Sustainable development in rural territories in Pakistan is covered in the article by I. Padda and A. Hameed [5], which focuses on the first and, in their opinion, the main SDG aimed at ending poverty. Based on the assessment of different levels of deprivation and poverty among the rural population of Pakistan presented in the work, researchers justify the need for additional state funding for social security, education, sanitation, water supply, and agricultural development in the country. SDG 7 (affordable and clean energy) is studied in detail by the researchers supervised by M. Kurata [6]. The researchers concluded that renewable energy sources (RES) used in rural households without centralized electricity supply in Bangladesh are recognized as promising technologies to mitigate energy shortage in these areas. The importance of renewable energy development is stated in the article by J. 7. Terrapon-Pfaff et al. [7]; here, the authors recognize the relations between water, energy, and food resources as a conceptual framework for effective achievement of SDGs.

The organizational aspects related to achieving SDGs were analyzed by C. Allen, G. Metternicht, and T. Wiedmann [8]; the publication emphasizes the need to adopt evidence-based approaches to achieving SDGs. The authors recommend systematically monitoring national progress to ensure that the scientific community promptly responds to the challenges of the time.

The issues of sustainable development, particularly in agriculture, are reflected in works of Russian researchers: Yu.A. Akimova [9], O.Yu. Antsiferova and A.G. Strelnikova [10], E.F. Muzdin [11], V.M. Belousov [12],

A.V. Sobolev and N.I. Raimzhanova [13], E.V. Serova [14], N.I. Shagaida [15] etc. They put an emphasize on food security, improving living standards of the rural population, providing them with drinking water etc., which generally coincides with seventeen UN goals of sustainable development up to 2030.

It is noteworthy that one of the most significant SDGs is SDG 2 related to issues of ending hunger, poverty, ensuring sustainable development of agriculture, food security and nutrition, sustainable management of natural resources, development of rural areas and the agri-food sector. According to forecasts, by 2050 the world will be home to about 9 billion people. Therefore, the demand for food will increase. According to estimates of the UN Food and Agriculture organization (FAO), in order to provide the world's population with proper food it is necessary to increase its production by 60%. Provided that farming is managed through the same methods and means, additional 40% of water and energy will be required. However, given the limited basic natural resources and the ongoing climate change on a planetary scale, this increase in food production is not evident.

Currently, Russia like other countries is facing a global environmental challenge. Ensuring economic growth in Russian territories and economic sectors directly affects the quality of the environment. At the meeting of Russia's State Council on Environmental and Economic Development it was shown that the anthropogenic load on ecosystems in certain spheres has reached critical values and annual damage is about 6% of gross domestic product, and taking into account the cumulative effect of pollution and consequences for human health-up to 15% per year [16]. The relevance

and importance of ensuring environmentally sustainable development in Russia as a whole and in various economic sectors is one of the long-term priority objectives of the country's development. This is also important for the agri-food sector. Thus, the Strategy of sustainable development of rural areas in Russia up to 2030 [17] notes that the environmental characteristics of rural areas deteriorate at the same time with a fairly dynamic growth of the agro-industrial complex, the standard of living and the quality of life of the rural population as a whole significantly lags the standard of living in cities, the population's access to social services is declining, the information and innovation gap between urban and rural areas is deepening, which leads to increased migration outflow of the rural population and underdevelopment of rural areas.

In this regard, issues of increasing welfare, employment growth, ending poverty, defining the ways of economic and social development are becoming a priority for scientific and applied research worldwide, including in Russia. It is obvious that there is an urgent need for correct adaptation of SDGs to the Russian socio-economic systems and economic sectors. At the national level, efforts are already being made to analyze the relations and meaningfully reflect SDGs in relevant key documents outlining the country's development in various areas of socio-economic and environmental development up to 2030. The most significant result in this area is the annual research carried out by the Analytical center under the Government of the Russian Federation – a report on human development in Russia for a specific year, where researchers maximally adapt the main priorities of UN SDGs for 2015–2030 to Russian conditions and prospects. In particular, the authors

of the report for 2016 – S.N. Bobylev and L.M. Grigoriev – made an attempt to interpret and use the UN methodology for Russian conditions, pointing out that the country, having a sufficient number of data and indicators reflecting the performance of the socio-economic components of sustainable development, has experienced a shortage of statistics and indicators on the economic greening [18].

It is obvious that such studies are required for specific economic sectors, including the agri-food sector. The appeal to the problems and prospects of its sustainable development is explained by the fact that it is the leading system-forming sector of the country's economy, which ensures its food and economic security. Thus, the purpose of the article is to search for national priorities and guidelines for sustainable development of the agri-food sector of the economy, as well as to identify the possible areas to adapt the Agenda 2030 for Sustainable Development to the Russian conditions to subsequently improve the existing strategies and programs for agriculture development.

The principal novelty of the author's view on the problem lies in the systematic research and development of the scientific framework to construct the concept of sustainable development in the Russian agri-food sector taking into account the adopted Agenda, as well as to justify the need to create a national system of indicators to monitor and assess progress in the development of the economic sector under review.

**Research methodology and rationale for its selection.** As indicated earlier, achieving SDGs as a whole will require their achievement in separate sectors. In this regard, the authors of the article attempt to consider SDGs in relation

to the Russian agri-food sector based on analysis of key interrelated problems characteristic of agriculture, as well as systematize them according to SDGs.

It should be recalled that Sustainable Development Goals adopted by the world community in 2015 up to 2030 have somehow become a “successor” to the Millennium Development Goals (MDGs), expanding and deepening them. In addition to the goal of ending poverty and hunger, which was the main objective of MDGs, the 2030 Agenda focuses on sustainable development and includes actions that have an impact on the environment, social sphere and economy [19]. In order to build the SDG system, the hierarchical structural approach “goals—objectives—indicators” used in MDGs was retained.

The current Agenda is universally applicable to both developed and developing countries. It implements the principles of sustainability, complies with international law, takes into account national peculiarities, opportunities and priorities, and includes priorities and goals that have been developed by the world community. The document proposes 17 sustainable development goals to implement which 169 objectives and more than 240 indicators were developed. The proposed SDG system is fairly balanced as it achieves a certain balance between economic, social, and environmental objectives. Many goals combine several components of sustainability [20]. In turn, each of 17 SDGs contains a set of indicators to be achieved by 2030.

At the present stage, the evaluation sustainable development is a rather complex issue as all its aspects must be taken into account. For all its diversity, sustainable development is a dynamic concept with economic, social, and environmental

phenomena developing at a different pace [21]. In the world practice, there are two main approaches to assessing sustainable development: construction of a system of indicators and aggregation of a cumulative indicator-index [22]. The first approach involves construction of a system of indicators: environmental, economic, and social [23]. Examples of this approach are systems of indicators of the United Nations, the European Union, the World Bank, etc.

The second approach involves the calculation of a cumulative index, which comprehensively assesses the sustainability of socio-economic development. The cumulative index is defined as a geometric mean of the three group indices of economic, social, and environmental sustainability. Indicators are converted to a comparable form by comparing them with the reference value or with the highest indicator value in the sample of territories under review [24].

Of course, to measure progress in achieving sustainable development at the national level it is required to adapt the goals and objectives of the Agenda, as well as develop a system of indicators for Russia. To this end, a special section called “Sustainable development goals” was created at the official website of the Federal State Statistics Service to systematize information on statistical accounting and monitoring of SDG indicators [25]. Although the resource is currently being developed, it is already used as a national thematic report platform on sustainable development. It is noteworthy that to develop a national SDG system Rosstat retained the formulation of goals and objectives of the Agenda proposed by the UN, significantly changing both qualitative and quantitative system indicators. In particular, most of the 244 proposed global indicators –

156 (64%) – are not developed in our country as they are not typical for Russia and do not have a methodology developed and coordinated at the international level. Nineteen (7%) are in being developed together with their methodology; the range of agencies responsible for providing data is being defined. Only 69 (28%) of indicators are reflected in the UN definition; all of them are included in the federal statistical work plan.

SDG and the degree of development of UN indicators in Russia are clearly demonstrated in *Figure 1*.

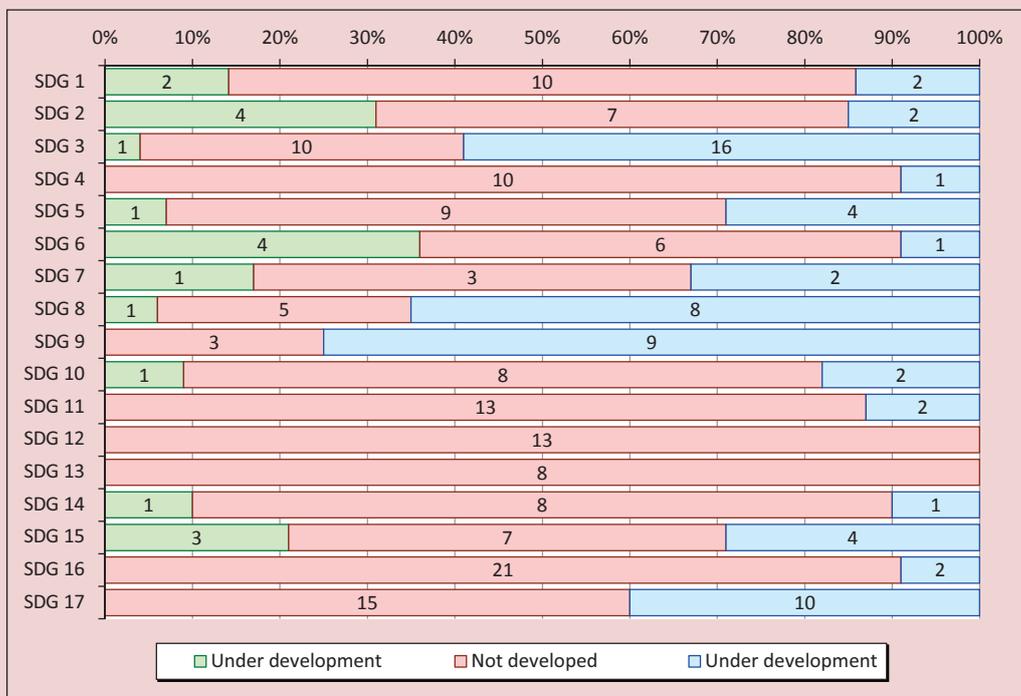
Thus, the proposed UN Agenda in its original form only retains 69 indicators. All others are formed taking into account the national priorities and availability of statistical reports. At this stage, the national system of indicators within SDG is proposed for discussion at the Rosstat website; more than 30

federal executive bodies take part in the work on forming statistical information on these indicators.

**Research results and their analysis.** In order to search for national priorities and guidelines for sustainable development in the agri-food sector in Russia we describe its socio-economic and environmental problems based on official statistics and empirical facts (*Table 1*).

According to the table, during 2000–2016, the share of the agri-food sector in Russia comprised 3.5–4.7% of GDP (in 2016 – 4.5%). Indeed, in recent years, domestic agri-industrial sector has demonstrated fairly high rates of economic growth: in 2015 – 3%, in 2016 – 4.8%. The volume of agricultural products in 2016 reached 5.5 trillion rubles, including products of crop farming – 3 trillion, and animal farming – 2.5 trillion rubles.

Figure 1. Sustainable Development Goals and degree of development of UN indicators



Source: compiled from [25].

Table 1. Performance of indicators characterizing state and development of agriculture and rural areas in 2000–2016

Indicator	2000	2005	2010	2011	2012	2013	2014	2015	2016	Deviation (+; -) 2016 to 2000
<b>Macroeconomic and sectoral economic indicators</b>										
Share of GVA of agriculture, hunting and forestry in total GVA in basic prices, %	n/a	4.7	3.6	3.8	3.5	3.6	3.9	4.3	4.5	-
Agricultural products in all types of farms (in actual prices), billion RUB, including:	742.4	1380.9	2587.8	3261.7	3339.2	3687.1	4319.1	5164.9	5505.7	4763.3
crop farming	394.7	669.8	1191.5	1703.5	1636.4	1918.8	2222.5	2791.4	3035.8	2641.1
animal farming	347.7	711.1	1396.3	1558.2	1702.8	1768.3	2096.6	2373.5	2469.9	2122.2
price index	1	1.90	3.11	3.30	3.52	3.75	4.18	4.72	4.98	-
Agricultural products in all types of farms (in comparable prices adjusted for inflation), billion RUB, including:	742.4	726.8	832.1	988.4	948.6	983.2	1033.3	1094.3	1105.6	363.2
crop farming	394.7	352.5	383.1	516.2	464.9	511.7	531.7	591.4	609.6	214.9
animal farming	347.7	374.3	449.0	472.2	483.7	471.5	501.6	502.9	496.0	148.3
Performance of capital investment under foreign economic activity "Agriculture, hunting, and forestry" (in actual prices), billion RUB	34.8	142.3	303.8	446.9	476.4	516.6	510.3	505.8	605.8	571.0
Performance of capital investment under foreign economic activity "Agriculture, hunting, and forestry" (in comparable prices adjusted for inflation), billion RUB.	34.8	74.9	97.7	135.4	135.3	137.8	122.1	107.2	121.7	86.9
Depreciation of fixed capital under foreign economic activity "Agriculture, hunting, and forestry", %	n/a	n/a	38.1	37.3	38.2	38.8	39.7	40.7	41.1	-
Energy security of agricultural organizations (generating capacity per 100 ha of cultivated land), h.p.	329	270	227	212	211	201	201	197	200	-129
<b>Environmental and economic indicators</b>										
Application of mineral fertilizers per ha for crops in agricultural organizations, kg	19	25	38	39	38	38	40	42	49	30.0
Application of organic fertilizers per ha for crops in agricultural organizations, tons	0.9	0.9	1.1	1.0	1.1	1.1	1.3	1.3	1.4	0.5
Share of agricultural land treated with pesticides in total agricultural area, %	14.8	20.5	26.7	31.6	33.3	35.4	36.1	36.8	39.2	24.4
Water intake from natural water bodies for use under foreign economic activity "Agriculture, hunting, and forestry", million m <sup>3</sup>	21060	16084.7	14858.9	13996.6	15183.0	14639.8	14858.9	13996.6	13785.1	-7274.9

End of Table 1

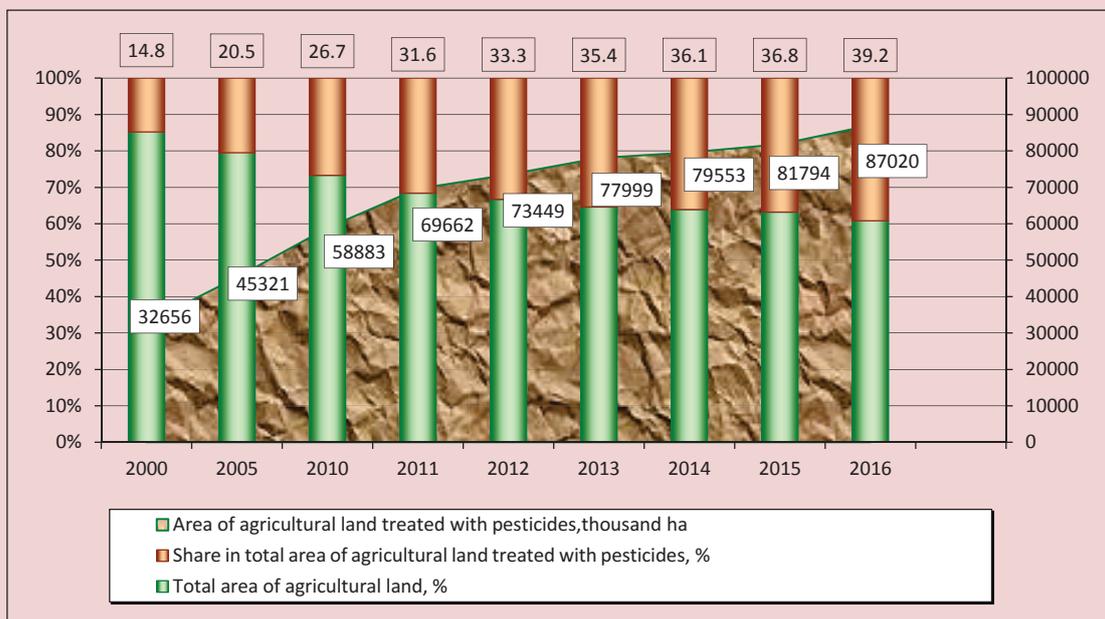
Indicator	2000	2005	2010	2011	2012	2013	2014	2015	2016	Deviation (+; -) 2016 to 2000
Water loss during transportation under foreign economic activity "Agriculture, hunting, and forestry", million m <sup>3</sup>	690.0	605.4	480.9	612.4	523.9	498.3	573.6	549.9	561.3	-128.7
Discharge of contaminated wastewater into surface water bodies under foreign economic activity "Agriculture, hunting, and forestry", million m <sup>3</sup>	1408	1035.5	842.1	891.6	853.2	819.4	783.0	771.9	816.8	-591.2
<b>Socio-economic indicators</b>										
Share of rural population, %	26.9	26.9	26.2	26.0	25.8	26.0	25.9	26.0	25.9	-1.0
Total increase (decline) of rural population per year, %	-0.6	-0.52	-0.87	-0.35	-0.23	-0.30	n/a	-0.26	-0.30	0.3
Share of employed in agriculture, hunting, and forestry, %	13.9	11.2	9.8	9.7	9.5	9.4	9.2	9.2	n/a	-
Unemployment rate among rural population, %	11.2	11.4	11.1	10.0	9.0	8.7	8.2	8.4	n/a	-
Ratio of average monthly wage of agriculture workers to the average Russian level, %	44.3	42.6	50.9	53.3	53.1	52.8	54.5	58.0	59.3	15.0
Share of the poor living in rural settlements, %	32.6	37.6	39.1	37.7	39.1	39.5	37.1	36.1	36.0	3.4
Proportion of extremely poor people living in rural settlements, %	n/a	n/a	n/a	50.8	44.9	47.1	45.4	45.7	48.6	-
Average age of the rural population, years	37.3	38.1	38.7	38.8	39.0	39.1	39.2	39.4	39.5	2.2
Natural increase (decline) of the rural population, per 1,000 people	-7.3	-7.6	-2.1	-1.1	-0.1	-0.02	-0.1	-1.6	-2.0	5.3
Share of rural population over working age, %	22.7	21.4	22.2	22.6	23.1	23.7	24.3	24.6	24.9	2.2
Source: compiled from [25, 26, 27, 28, 31].										

However, experience shows that increased intensification of agricultural production leads to serious negative consequences for the environment. In particular, the problem of safe use of plant protection chemicals remains unresolved. *Figure 2* indicate that the area of agricultural land treated with pesticides increased by 54.364 thousand ha during 2000–2016, and the share of agricultural land treated with pesticides in the total area of agricultural land increased by 24.4% over the same period.

The figure also clearly shows that during 2002–2016 the area of arable land treated with chemicals increased almost 3 times, its share in the total area of agricultural land comprises 15–40%.

The fact that, as a result of intensive use of land resources and the reduced amount of land reclamation and fertilization in almost all regions of the country, the content of humus and nutrients in soils has decreased is also alarming. Thus, according to the Ministry of

Figure 2. Area of agricultural land treated with pesticides, 2000–2016



Source: compiled from [26].

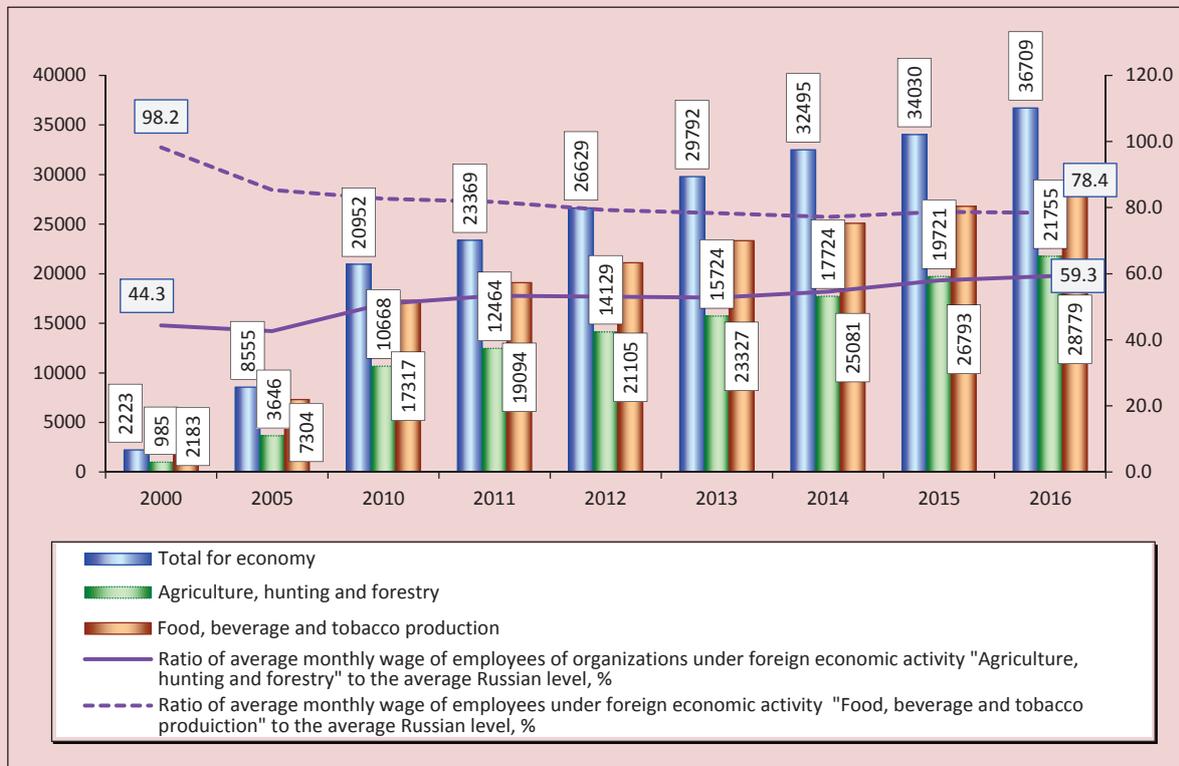
Agriculture of the Russian Federation, 35% of arable lands have high pH, 31% – low humus content, 22% – lack phosphorus [27].

It is well known that agriculture is an economic sector most exposed to the effects of climate change. Increased frequency of adverse hydrometeorological phenomena is associated with climate change. Over the past two decades, the number of meteorological hazards has more than doubled. According to Roshydromet (Federal Service of Russia on Hydrometeorology and Monitoring of the Environment), 590 cases of dangerous meteorological phenomena were registered in the country in 2016 [27]. Of course, such processes cause changes in crop farming zones and entail a decrease in productivity in warm climate zones. It is also noteworthy that in recent decades the average ground air temperature in our country has been rising at a rate of 2.5 times faster than globally. Higher

temperatures and associated extreme weather phenomena such as droughts and increased aridity in a number of regions contribute to accelerated soil degradation. For the same reason, the majority of Russian territories are facing the problem of earlier ice clearance of rivers and water bodies, which leads to further flooding of agricultural land.

We cannot ignore the fact that the agri-food sector is the main consumer of water resources. With the existing technologies of agricultural production there are significant water losses in irrigation systems. Data of Rosstat demonstrate that during transportation water loss in agriculture is about 60% of the all-Russian loss. Moreover, intensive use of water resources in agriculture leads to their pollution as a result of wastewater discharge. At the same time, the main sources of pollution are discharges of processing plants and large stock breeding complexes, and flushing rain

Figure 3. Performance of average monthly wage of employees at organizations by type of economic activity, RUB.



Source: compiled from [30].

streams of toxic chemicals and fertilizers from fields [28]. Modern agricultural production is characterized by high energy consumption and low energy efficiency, the country's agriculture currently retains a high degree of dependence on centralized energy supply. Due to large scarcely populated agricultural areas there exist problems associated with long networks and dispersion of rural consumers.

According to experts, as a result of the impact of natural and anthropogenic factors, Russia annually experiences shortage of agricultural products in the amount of 47 million tons (in cereal equivalent) [29]. At the stage of consumption, there are also significant food losses: 56 kg of food waste per year per one

Russian citizen. About a quarter of all products remain unused and are disposed before use [14].

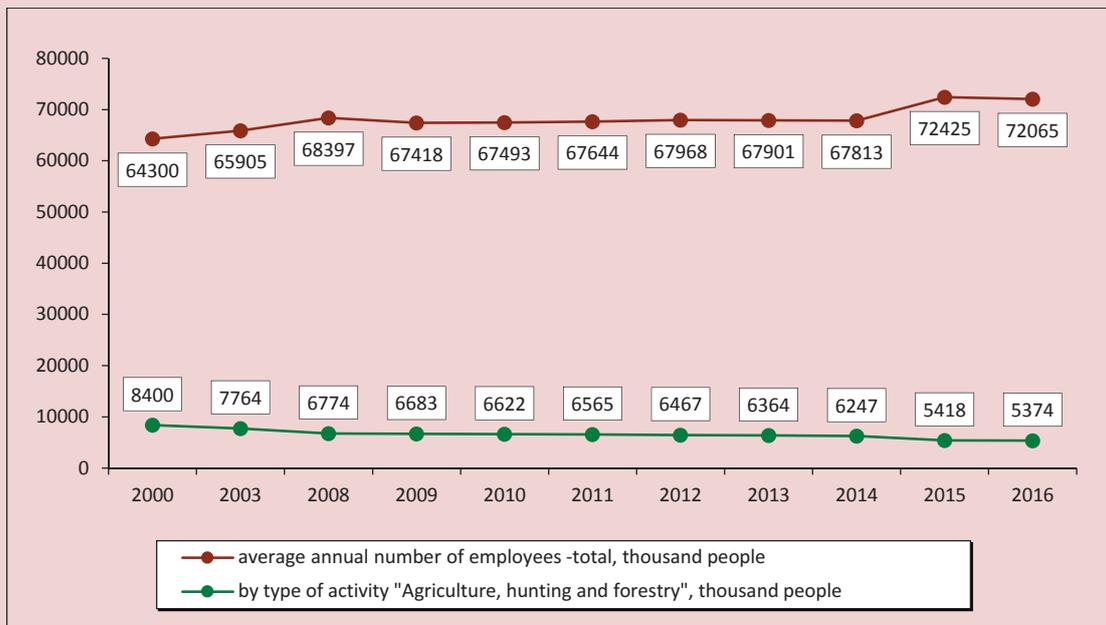
At present, the problems of unemployment and depopulation in rural areas are particularly relevant for Russia's agri-food sector since the quality of life and the standard of living of the rural population differs significantly from those of urban residents. Table 1 demonstrates that the share of employed in main sectors of the rural economy (agriculture, hunting, forestry) has decreased from 13.9 to 9.2 % in recent years.

Figure 3 shows the performance of average monthly wages of employees at organizations by economic activity "Agriculture, hunting, and forestry" and "Food processing".

The data demonstrate that despite the increase in average monthly wage of agricultural workers in actual prices by almost 10 times (21,755 RUB) in 2016 compared to 2000 (2,223 RUB) it still remains 40% lower than the average in the economy. The increase in wages in this sphere of economic activity adjusted for inflation during the period under study (see Table 1) has only doubled. It is because of low wages that the rural population accounts for more than a third of the country's poor (36%) and almost half of the extremely poor (48.6%), while the rural population accounts for only a quarter of the total Russian population [30]. Mass migration of rural population, especially young people, to cities has serious negative demographic consequences since young people is the most employable population group and account for three quarters of births.

The number of women per 1,000 men, including women of reproductive age, has declined significantly over the past 20 years. It is a well-known fact that women in rural areas, compared to men, are largely engaged in hard unpaid work doing housework and supporting private farms. According to the Federal State Statistics Service, in 2015 the share of women whose main job was related to agricultural production in their own household accounted for 52% in the country (the share of men – 24%). Women still do not have equal access to decision-making processes, distribution of financial results, etc. compared to men. The existing obstacles to gender equality in employment and mobility of rural women in the labor market directly depend on women's limited access to acquiring professional skills and knowledge,

Figure 4. Performance of average annual number of employed in total and by type of economic activity "Agriculture, hunting, and forestry", thousand people



Source: compiled from [20].

Table 2. Systematization of key problems of Russia's agri-food sector according to UN Sustainable Development Goals

Goal of the global Agenda	Problem articulation
SDG 1. Ending poverty	Low income level of rural population and people employed in agriculture
	Violation of rights of land (share) owners
SDG 2. No hunger and sustainable agriculture	Malnutrition in all forms
	Limited physical availability of food
	Limited economic access to food
	Food safety; reduced quality of food
	Unsustainable food production
	Heavy dependence on imports of genetic resources
	Lack of funds of agricultural producers for modernization and expanded reproduction
SDG 3. Good health and well-being	Underdeveloped organic production; lack of market regulation for organic products
	Increased morbidity rate
	Alcohol abuse
SDG 5. Gender equality	Limited access to healthcare services
	Restrictions of rights of rural women; hard working conditions in households
SDG 6. Clean water and sanitation	Misuse of water resources
	Discharge of contaminated wastewater into water bodies; low level of recycling and sustainable use of water resources
	Low availability of drinking water of standard quality, water supply system and sewage
SDG 7. Affordable and clean energy	Limited access to modern energy sources; low energy efficiency
SDG 8. Decent work and economic growth	Reducing employment rate, unemployment, outflow of young qualified personnel
SDG 9. Industry, innovation and infrastructure	Unstable infrastructure*
	Limited access to financial resources and marketing channels for small-scale agricultural producers
	Outdated equipment and technology
	Weak innovation and research activities
SDG 10. Reduced inequalities	Difference quality of life in rural and urban areas
	Low activity of the rural population (mainly elderly and older) in social, economic and political life
SDG 11. Sustainable cities and communities	Poor transport infrastructure
	Urbanization; spontaneous development of suburban and rural areas
SDG 12. Responsible production and consumption	Production losses during production and consumption at various stages
	A large amount of production wastes, a weak level of recycling secondary raw materials
SDG 13. Climate action	Negative impacts of agriculture on climate change; impacts of climate change on agriculture
SDG 14. Conservation of marine resources	Misuse and pollution of marine ecosystems; reducing marine bioresources
SDG 15. Conservation of land resources	Degradation of the natural environment due to disruption of technological processes; reduction of biodiversity and increased sensitivity of crops to pests and diseases
* The term "unstable infrastructure" refers to the underdeveloped rural infrastructure characterized by low road quality, poor provision of modern systems of energy and water supply, telecommunication systems, limited access to public transport. Source: compiled by the authors.	

on infrastructure development in pre-school education and household services, transport communications, etc. Of course, the current trend is a significant barrier to the formation of the HR base for the development of the country's agri-food sector. The situation is aggravated by the consistently high level of alcohol consumption among the rural population, which causes numerous negative social and medical consequences, leads to physical and moral degradation. It is noted that people of working age with low income level living in rural areas and having abuse alcohol particularly often.

It is known that rural territories, especially small settlements, have the prevailing share of elderly and old people characterized by adaptive-passive behavior, commitment to preserving a traditional rural way of life and poorly motivated to change the way of life. All these conditions and factors lead to low social and economic activity of the rural society.

Unfortunately, depopulation in rural areas has reached a critical point, directly affecting the replenishment of agricultural sectors with labor resources. *Figure 4* reflects the performance of the average annual number of employed in total and by type of economic activity "Agriculture, hunting, and forestry" for 2000–2016.

According to the figure, over the past 16 years the average annual number of people employed in agriculture and forestry decreased by almost 40% – from 8.4 to 5.3 million people. The information and innovation gap between urban and rural areas continues to grow, leading to the underdevelopment of rural areas. In recent decades, there has been a significant increase in the area of residential lands, with detrimental effects on peri-urban and rural

areas. Unplanned urbanization not only occurs on agricultural land and natural habitat, but also leads to increased travel distances, deterioration in resource use per capita, increased emissions, and dispersion of production factors. The underdeveloped transport infrastructure in rural areas is explained by lack of funds for road construction, repair, and maintenance, purchase of new equipment, as well as lack of qualified engineering and technical personnel.

Thus, analysis of the agri-food sector development has revealed a number of socio-economic and environmental problems that currently exist in agriculture. Despite the fact that they are peculiar, they are still largely similar to the global problematic issues. In this regard, we have made an attempt to systematize the identified problems in national agriculture according to SDG adopted by the 2030 Agenda.

*Table 2* presents final research results: we formulate and systematize the key problems of the agri-food sector according to SDG, which the authors specify as relevant to the Russian agriculture.

According to the table, 14 goals are directly or indirectly related to the problematic state of the agri-food sector and its development (1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15). Within the framework of these goals, the authors identify 78 relevant targets (46%). Note that none of the goals can be achieved separately from others; all of them are related to the proposed targets. At the same time, the balance and correlation between the three dimensions of sustainable development is reflected not only at the level of goals, but also at the level of targets.

*Figure 5* shows the targets of the Agenda identified by the authors as relevant to the agri-food sector.

Figure 5. Goals and targets of the Agenda relevant to the agri-food sector

SDG 1	SDG 2	SDG 3	SDG 5	SDG 6	SDG 7	SDG 8	SDG 9	SDG 10	SDG 11	SDG 12	SDG 13	SDG 14	SDG 15
1.2	2.1	3.4	5.a	6.3	7.1	8.1	9.1	10.1	11.2	12.1	13.1	14.1	15.1
1.4	2.2	3.5		6.4	7.2	8.2	9.3	10.2	11.a	12.2	13.2	14.2	15.2
1.5	2.3	3.8		6.6	7.3	8.3	9.4			12.3	13.3	14.3	15.3
	2.4	3.9		6.b	7.a	8.4	9.5			12.4		14.4	15.4
	2.5	3.d			7.b	8.5				12.5		14.5	15.5
	2.a					8.6				12.6		14.6	15.6
	2.b					8.8				12.7		14.7	15.7
	2.c					8.9				12.8		14.a	15.8
						8.b				12.a		14.b	15.9
										12.b		14.c	15.a
													15.b
													15.c

Source: compiled by the authors based on [32].

The provided information suggests that the greatest number of challenges relevant to the agri-food sector will need to be addressed under SDG 2 (Ending hunger and sustainable agriculture), SDG 8 (Decent work and economic growth), SDG 12 (Responsible consumption and production), SDG 14 (Conservation of marine resources) and SDG 15 (Conservation of land resources). At the same time, actions aimed at solving relevant targets and achieving one goal will be directly related to achieving other goals. In this sense, Sustainable Development Goals function as an interrelated system, regardless of whether they are considered at the national, regional or sectoral (sectoral) level.

The interrelation of the identified problems of the agri-food sector, the goals and targets of the adopted UN Agenda is presented below. Goal 1, for example, aims to end poverty. The issue of poverty is not relevant to our country, yet there is a high share of the poor with incomes below living wage. Given the fact that almost half of the extremely poor live in rural

areas, it is clear that this goal cannot be achieved without increasing rural employment rate (Goal 8) and rural incomes (Goal 2, 2.3). Therefore, there will be a need to increase productivity and income in agricultural production the short term, as well as significantly increase non-agricultural employment rates in rural areas. At the same time, expanding the scope of social security systems is crucial not only for creating new jobs in rural areas, but also for expanding agricultural production.

Target<sup>1</sup> 2.3 of Goal 2 aims to double agricultural productivity and incomes of small-scale food producers by 2030. Russia possesses considerable potential to increase agricultural productivity. In particular, the country can achieve a significant increase in crop yields by extended use of means of increasing fertility,

<sup>1</sup> Target 2.3: by 2030 double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.

biological in particular, as well as by introducing more efficient agricultural technologies and equipment. It is also possible to double the productivity and income of family farms, this will be critical to achieving target 2.3. Moreover, a significant increase in the income of small farmers can be achieved by better distribution of income along value added chains [33]. Finally, we believe that there is a need to increase access to services, knowledge, markets, resources and finance for small farmers and family farms in order to increase their productivity and income.

When discussing the issue of food security (SDG 2), Russia has traditionally talked about the volume of production, rather than the need to ensure economic access to food. The priority of production over access is expressed in ranking targets of the national food security Doctrine and in criteria for assessing its status. Thus, the targets to ensure physical and economic accessibility, as well as food safety (target<sup>2</sup> 2.1) are at the end of the list, and criteria are actually self-sufficiency coefficients of own production [15, 34].

Although the extent of the problem of malnutrition (SDG 2) in Russia is considered relatively insignificant, in some regions specific populations remain vulnerable to food insecurity. Access to food is adversely affected by difficult economic conditions and lack of decent jobs. To ensure that all, especially the vulnerable poor, have year-round access to "safe, nutritious and decent food" urgent action on target 2.1 is required. Obesity remains the most important target among various aspects of malnutrition, including in Russia. Eating disorders also include a significant level of micronutrient deficiency. The problem in this

<sup>2</sup> Target 2.1: by 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.

context is related to target<sup>3</sup> 2.2 of Goal 2 which appeals for ending all forms of malnutrition [35]. To scale down this problem it is required to significantly improve diet and change lifestyles. In this regard, the introduction of healthy diets in pre-school, school and public institutions, at work and in every family should be encouraged.

Goal 8 deals directly with issues related to employment and livelihood. The agri-food sector is the main source of employment in many regions of our country; therefore providing full employment, decent working conditions and equal wages in these regions will depend crucially on the development of agriculture as an industry [35]. In this regard, priority measures in increasing employment and regulating the labor market in rural areas should be the following: create new modernized jobs and conditions for attracting qualified young professionals to rural areas; develop entrepreneurship, self-employment and forms of family employment based on private farms and consumer cooperation, etc. [17].

It is known that sustainable functioning of the agri-food sector implies economic sustainability, environmental integrity, and social well-being. For example, the sustainability of incomes of food producers and workers in a food supply chain and reduction of losses and waste in agri-food systems implies economic sustainability. Its security is reflected in the framework of SDG 2 and SDG 12. For example, target 2.3 of SDG 2 relates to increasing the income of small food producers, while target 12.3<sup>4</sup> of SDG 12 aims to reduce

<sup>3</sup> Target 2.2: by 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons..

<sup>4</sup> Target 12.3: by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

losses and waste in the food system. The current situation in food production and distribution systems is both a challenge and an opportunity to strengthen the economic sustainability of the agri-food sector. Social sustainability refers to ensuring basic rights and decent living conditions for people working in the agri-food sector. These aspects are addressed in target<sup>5</sup> 8.5 of SDG 8: achieve full and productive employment and decent work for all [35].

Environmental sustainability involves sustainable use of natural resources and minimization of negative human impact on the environment. Goal 2, targets 2.4 (Sustainable food production<sup>6</sup>) and 2.5 (Biodiversity<sup>7</sup>), Goal 6, target 6.4 (Water use efficiency<sup>8</sup>), Goal 12, targets 12.1 (Sustainable production and consumption<sup>9</sup>), 12.2 (Rational resource management<sup>10</sup>), as well as various targets under

<sup>5</sup> Target 8.5: by 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.

<sup>6</sup> Target 2.4: by 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

<sup>7</sup> Target 2.5: by 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.

<sup>8</sup> Target 6.4: by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

<sup>9</sup> Target 12.1: to implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries.

<sup>10</sup> Target 12.2: by 2030, achieve the sustainable management and efficient use of natural resources.

Goal 13 (Climate change), Goal 14 (Oceans and marine resources) and Goal 15 (Forests and land) address various aspects of environmental sustainability within the agri-food sector [35].

Goal 13 covers climate change and climate action. In Russia and worldwide, climate change has already increased the number of cases of heat stress and led to extreme weather conditions. The agri-food sector is experiencing all effects of climate change, with an increasing number of extreme weather phenomena and natural disasters such as flooding, droughts, and landslides. These effects have already led to degradation of natural resources, changes in water availability and loss of biodiversity. One of the most important objectives for the Russian agri-food sector in this sphere is to reduce the anthropogenic impact on the environment.

The targets of Goal 14 also remain relevant for our country, as despite the efforts of the government illegal fishery of marine bioresources and illegal exports of fish products abroad continue to expand. Criminalization processes in extraction of marine resources continue to advance [36]. Marine ecosystems are contaminated by oil and petroleum products, waste water, industrial and domestic waste. Goal 14 contains the main patterns of development related to oceans, seas and marine resources. The implementation of these patterns will ensure efficient production management, prevent illegal fishing and destructive fishing practices. The harmonization of national policies with the various targets under Goal 14 will contribute to the conservation and sustainable use of marine resources.

Recognizing the importance of forests for rural development, biodiversity, bioenergy and addressing climate change, it is necessary to update the state forestry development program

in our country with a focus on sustainable forest management. Target<sup>11</sup> 15.3 under Goal 15 reflects the problems of land degradation, which affects a significant part of the Russian regions. Combating land degradation requires target investment and technological support to improve land and water management.

Such, according to the authors, should be the main priorities in the process of transition of the Russian agro-food sector to sustainable development and, accordingly, possible directions of adaptation of the Agenda to national conditions taking into account the identified problems in agriculture.

**Conclusion.** Let us formulate the main conclusions and research results.

1. In modern Russia, based on key political documents determining the country's development in socio-economic and environmental development up to 2030, efforts are being made to identify national priorities and opportunities for adapting the 2030 Agenda. Of course, the concept of the UN SDG provides a good opportunity for a systematic attempt to adapt the global goals to Russian conditions taking into account the relatively high level of the country's development as a whole and its separate economic sectors. In some cases, SDG recommended by the UN, including specific indicators, have already been achieved in the Russian context. However, at present, we have to talk only about certain guidelines that could become an important element of the national debate on future sustainable development of the country's economy and its individual sectors. In our opinion, in order to achieve sustainable development as a whole it must be achieved

simultaneously in all spheres and economic sectors. At the same time, given the ambitious and comprehensive nature of the 2030 Agenda, we expect that all ministries and departments of national governments will have to harmonize their policies and programs, as well as integrate the SDG targets into them.

2. An attempt is made to systematize the problems existing in the agricultural sector of the national economy according to Sustainable Development Goals (SDG) and targets of the 2030 Agenda. We believe that 14 goals are directly or indirectly related to the problematic state of the agri-food sector and its development (1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15). In the framework of these goals 78 relevant target (46%) are identified. The greatest number of challenges relevant to the agri-food sector will need to be addressed under SDG 2 (Ending hunger and sustainable agriculture), SDG 8 (Decent work and economic growth), SDG 12 (Responsible consumption and production), SDG 14 (Conservation of marine resources) and SDG 15 (Conservation of land resources). At the same time, actions aimed at solving the relevant targets and achieving one goal will be directly related to achieving other goals. In this sense, Sustainable Development Goals function as an interrelated system regardless of whether they are considered at the national, regional or sectoral level. Thus, the proposed systematization of problems in agriculture and their correlation with the UN SDG can serve as a research framework for constructing a concept of sustainable development of the studied sector of the national economy.

3. It is demonstrated that achieving sustainable development requires not only identification of problems and their solution, but also the accompanying development of appropriate indicators to measure progress in

<sup>11</sup> Target 15.3 under Goal 15: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

this sphere. Rosstat has proposed a national system of indicators of sustainable development, for most of which statistical information is available. A number of indicators developed by Rosstat are also relevant for the agri-food sector, although this issue is the subject of scientific discussions. Thus, first of all, it is necessary to study the system of indicators for their possible application to monitor progress in sustainable development of the agri-food sector specifically. This will require an in-depth analysis of the existing strategies and programs for agriculture development by comparing their goals, objectives and indicators with global SDG to identify inconsistencies and opportunities for change.

4. The promising area for further research will be an in-depth analysis of the existing programs for the development of the agri-food sector and their comparison with global SDG and targets to identify inconsistencies and opportunities for change, as well as improvement and development of specific indicators for monitoring and assessing progress in the development of a particular economic sector. Such an area of future research is certainly of scientific interest and will require the future creation of an interactive tool that would combine statistics in order to develop a national system of indicators to measure the sustainability of the country's agri-food sector.

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