

Investigation of development trends of fat-and-oil subcomplex in the regions of the Southern Russia

Investigación de las tendencias de desarrollo del subcomplejo grasas y aceites en las regiones del sur de Rusia

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ABSTRACT:

Current status of agriculture cannot be considered without characterization of one of its basic features, namely crop production. Problems that have become up-to-date due to a systemic crisis in the economy, force looking with a fresh perspective on the need to elaborate new approaches and practical recommendations for the development of fat-and-oil subcomplex, which is one of the most important in the crop-growing sector. The present research aims at studying fat-and-oil subcomplex, which is a system organization of integrated type. It is an open system having several subsystems (servicing, manufacturing, commercial, and other subsystems). At the same time this system is itself a subsystem of a higher level system, which is an agribusiness food complex. In addition, fat-and-oil subcomplex is integrated into a market environment, food reserves redistribution sphere, infrastructure services and sectoral management, as well as is involved in relationships with suppliers and contractors from other industries and economy sectors. Effective management of this subcomplex will allow creating a sustainable socio-economic environment of the region and balancing the production process of agro-producers. Scientific novelty of the present research consists in a systematic study of the functioning conditions and

RESUMEN:

El estado actual de la agricultura no puede considerarse sin la caracterización de una de sus características básicas, a saber, la producción de cultivos. Los problemas que se han actualizado debido a una crisis sistémica en la economía, obligan a mirar con una nueva perspectiva a la necesidad de elaborar nuevos enfoques y recomendaciones prácticas para el desarrollo del subcomplejo de grasas y aceites, que es uno de los más importante en el sector de cultivos. La presente investigación tiene como objetivo estudiar el subcomplejo de grasa y aceite, que es un sistema de tipo integrado. Es un sistema abierto que tiene varios subsistemas (servicios, fabricación, comercial y otros subsistemas). Al mismo tiempo, este sistema es en sí mismo un subsistema de un sistema de nivel superior, que es un complejo alimentario de agronegocios. Además, el subcomplejo de grasa y aceite está integrado en un entorno de mercado, en la esfera de redistribución de reservas de alimentos, en servicios de infraestructura y gestión sectorial, así como en relaciones con proveedores y contratistas de otras industrias y sectores económicos. La gestión eficaz de este subcomplejo permitirá crear un entorno socioeconómico sostenible de la región y equilibrar el proceso de producción de los productores agrícolas. La novedad científica de la presente investigación

development trajectories of the fat-and-oil subcomplex in the regions of Southern Russia.
Keywords: agrarian economy, fat-and-oil subcomplex, socio-economic development, economic efficiency.

consiste en un estudio sistemático de las condiciones de funcionamiento y las trayectorias de desarrollo del subcomplejo de grasa y aceite en las regiones del sur de Rusia.
Palabras clave: economía agraria, subcomplejo de grasas y aceites, desarrollo socioeconómico, eficiencia económica.

1. Introduction

The crisis processes and phenomena in economy and social sphere have touched all sectors of agriculture. In these new conditions, featured by the decline in the purchasing power of the population, its real disposable incomes, as well as the volatility of exchange rates, agriculture acts as a "point of growth".

Indeed, a felicitous political and conjunctural, as well as socio-economic combination of factors and conditions of contemporary functioning of agriculture casts it in the role of catalyst for positive changes in the economy and the social sphere. We distinguish two factors that underlie this statement. Firstly, the devaluation of the ruble made the export of the crop products (especially fat-and-oil products) economically feasible. Secondly, the food embargo imposed on a number of basic food products made it necessary to activate national production as well as increase its volumes.

In general the established management model of agro-industrial complex and fat-and-oil subcomplex in particular, is a combination of subjective and objective relationships of different level and nature. Links are formed and developed along different trajectories resulting from multicomponent combination of social, economic, environmental, legal, and institutional factors. In this regard, the milestones of the model have a situational multidimensional nature, though the main objective remains unchanged and consists in the food supply of the region. The main objective of the present research concerns analyzing, system diagnosing and monitoring of basic functioning parameters of the fat-and-oil subcomplex of agrarian regions of the Southern Russia.

2. Methods

2.1. General provisions of the methodical approach

General provisions of the methodological research basis were formulated by the authors in the light of specially prepared conceptual-theoretic framework, which was developed based on scientific works of Russian and foreign researchers involved in the development of agrarian relations (Atkeson and Kehoe 1997; Bacchetta and van Wincoop 2002; Ketels 2003; Leamer 1984; Marshall 1980; Davis and Weinstein 1999). The authors studied theoretical and methodological recommendations of the research institutions on the issues regarding functioning and studying of agricultural branches, as well as legislative and regulatory acts of the Russian Federation on the development of the agricultural sector of the economy.

Methodological basis of the research was presented by a set of fundamental methods of scientific knowledge, which included analysis, synthesis, as well as dialectical unity of qualitative and quantitative evaluation, systemic and hierarchical approaches, induction and deduction. In the course of substantiating theoretical propositions, regularities and determinants of the development of the subcomplex under study, drawing conclusions and recommendations, the authors used diverse instrumental methodical approaches consisting of abstract-logical, monographic, computational and constructive, economics and statistics analysis, methods of systemic and comparative analysis, as well as analytical and graphical techniques.

Information and empirical base consisted of data available from the Federal State Statistics Service of the Russian Federation, territorial body of the Federal State Statistics Service of the Rostov Region, scientific sources, information of periodic printed publications, expert assessments, as well as the results of the authors' calculations.

Fundamental research on the issues concerning development strategy formation of individual

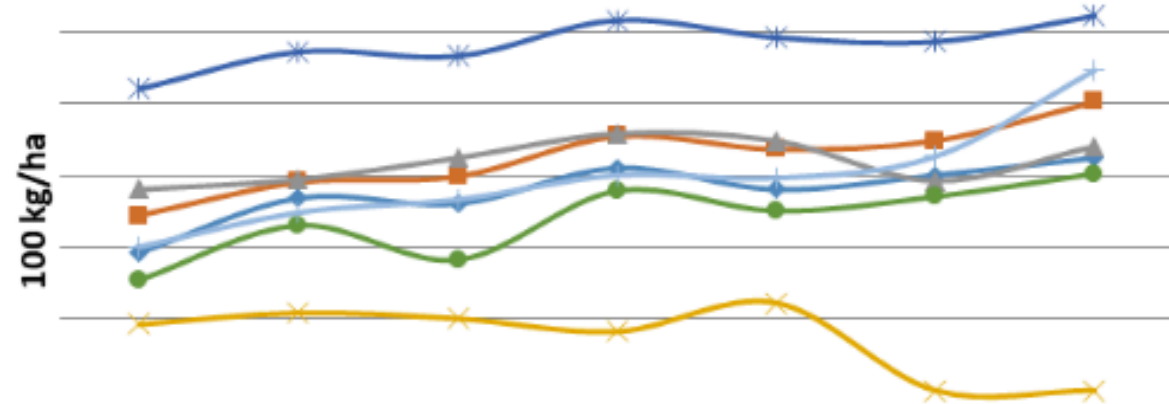
agribusiness subcomplexes formed conceptual framework of this research. Selected issues of considered problematics were presented in the works of the following authors: V.V. Kurennaya (2014), H. Garretsen and R. Martin (2010), M. E. Edwards (2007), K. Head, and T. Mayer (2004).

2.2. Resource potential monitoring of the fat-and-oil subcomplex of the Southern Russia

The Southern Federal District is an agriculturally-oriented region with a pronounced territorial and resource imbalance. The eastern area of the region is almost unsuitable for efficient commercial agriculture, while southern and central parts, on the contrary, being favorable for farming, are actively cultivated for the purpose of plant cultivation and vegetable growing. Among the leading regions for the grain and leguminous crops production, the Rostov Region occupies a key position in terms of the scope of the basic raw materials, i.e. the availability of agricultural land resources. In 2016 this figure amounted to 4536 thousand hectares that was by 22% more than that in the Krasnodar Region and by 49% more than that in the Volgograd Region. In the total structure of crop acreages of the Southern Federal District the percentage share of the Rostov Region in 2016 amounted to 36%, while in the structure of the all-Russian indicator, it amounted to 5.6%.

In the context of the apparent reduction in the acreage sown by sunflower among the leading regions, it is expedient tracing the dynamics of its yields. The maximum yield is observed in the Krasnodar Region and is characterized by the gradual growth of this indicator (26.1 centner/ha, or dt/ha in 2016) that evidences about the optimum climatic and technological conditions of sunflower cultivation. In recent years of observations the Rostov Region has also considerably increased this figure, and reached record level of 22.3 dt/ha in 2016 that was two times higher than in 2010. Also, noteworthy is the high yields in the Republic of Adygea (17 dt/ha in 2016) that is attributed to the growth in crop acreage.

Figure 1
Sunflower yield in the regions of the Southern Federal District for the period of 2010-2016, dt/ha.



	2010	2011	2012	2013	2014	2015	2016
◆ Russian Federation	9.1	13.1	13.1	15.1	14.1	15.1	16.1
■ Southern Federal District	12.1	14.1	14.1	17.1	16.1	17.1	20.1
▲ Republic of Adygea	14.1	14.1	16.1	17.1	17.1	14.1	17.1
✕ Republic of Kalmykia	4.1	5.1	5.1	4.1	6.1	0.1	0.1
✱ Krasnodar Territory	21.1	23.1	23.1	25.1	24.1	24.1	26.1
● Volgograd Region	7.1	11.1	9.1	13.1	12.1	13.1	15.1
+ Rostov Region	10.1	12.1	13.1	15.1	14.1	16.1	22.1

In the Southern Federal District, sunflower production is carried out everywhere in different

2016	19.6	86.4	92.4	0.0	92.5	-	117.3	90.3
1. Consumption of sunflower oil per capita per year, kilograms								
2010	13.4	15.1	12.5	11.4	16.9	13.4	12.2	15.5
2011	13.5	15.0	11.3	11.5	17.0	11.7	12.7	15.3
2012	13.7	15.1	12.4	11.9	17.3	11.7	12.7	15.3
2013	13.7	15.1	11.9	12.0	17.4	11.5	12.5	15.3
2014	13.8	15.3	12.1	12.2	17.5	11.8	12.8	15.6
2015	14.1	15.0	12.4	12.0	17.3	12.0	13.0	15.7
2016	14.2	15.2	12.5	12.3	17.5	12.2	13.1	15.8
Balance (1-2)								
2010	3.2	64.6	85.2	-5.1	71.8	-13.4	60.3	79.4
2011	17.1	81.8	88.2	1.1	73.5	-11.7	125.9	93.2
2012	11.5	66.8	122.2	-5.6	75.9	-11.7	70.6	70.2
2013	19.6	78.5	115.9	-6.6	80.3	-11.5	124.8	71.1
2014	14.1	72.0	105.4	-6.4	73.9	-11.8	115.5	65.4
2015	14.3	70.5	68.6	-9.7	66.0	-12.0	116.2	72.1
2016	5.4	71.2	79.9	-12.3	75.0	-12.2	104.2	74.5
Number of enterprises producing sunflower oil								
2016	-	-	12	3	54	-	31	92

Table 1 presents summary balance sheet by the Southern Federal District regions in terms of per capita production volumes and the existing consumption level.

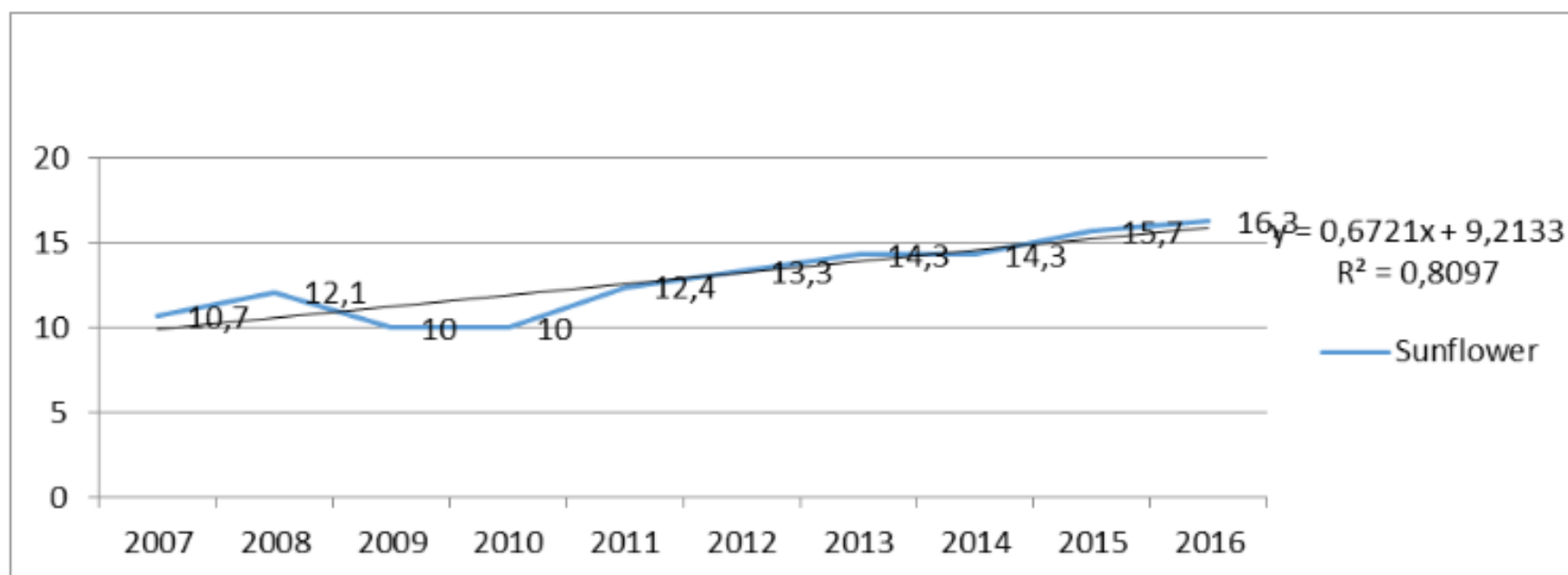
The presented data reveal that:

- there are surplus regions (the Republic of Adygea, the Krasnodar Territory, the Volgograd Region, and the Rostov Region) and scarce regions (the Republic of Kalmykia, and the Astrakhan Region);
- the production volume significantly exceeds the consumption: significant amounts of overproduction have been noted in the Volgograd Region (by 10 times in 2011), the Rostov Region (by 6 times in 2011), the Krasnodar Region (by 4.6 times in 2013), and the Republic of Adygea (by 9 times in 2012). Surplus forms the trading mass of the oilseed subcomplex for sale in both domestic and external markets;
- the maximum number of sunflower oil producers that has reached 92 was noted in the Rostov Region, as well as 54 in the Krasnodar Region, and 31 in the Volgograd Region.

2.4. Analysis of the fat-and-oil subcomplex of the Rostov Region

Following the research logic, it is advisable to proceed to the analysis of the oilseed subcomplex in the Rostov Region. The major proportion of the crop acreage belongs to agricultural enterprises (892.2 thousand tons), which accounts to 70% of the total volume; 29% of acreage (364 thousand tons) belong to family farms; while personal subsidiary plots make up just 0.7% (8.3 thousand tons). This distribution is associated with the specifics of crops production and storage. Large volumes of sunflower can be produced by companies with sufficient production and technical potential (equipment, depositaries, protection means, and fertilizers), as well as crop acreages that allow creating environmentally sound rotation. Households cultivate oilseeds at subsidiary plots or allotments for personal subsidiary farming primarily for feed purposes, providing forage for poultry and cattle (Fig. 2).

Figure 2
Dynamics of sunflower productivity in all categories of farms, dt/ha.



Production volumes depend directly on the level of productivity. Figure 2 shows a plot of sunflower yields in the Rostov Region for the period of 2007-2016. The minimum level of 10 dt/ha was observed in 2009-2010, which was followed by a gradual increase with a maximum level of 16.3 dt/ha in 2016. In turn, yield level depends on a number of factors such as seed material, agricultural technology, natural climatic conditions, adaptability of hybrids to the regional specifics, the use of effective plant protection means and fertilizers.

Table 2 presents fixed assets of large and medium-sized agricultural enterprises. For the period from 2011 to 2016 the cost of funds was gradually increasing, and by the end of 2016 had amounted to 65809.2 million rubles that was by 1.4% higher than that in the 2011. The main part was made up by machinery and equipment (32750.3 mln rubles or 49.8%), as well as by buildings (18754.3 mln rubles or 28.5%).

Table 2
Fixed assets of large and medium-sized agricultural enterprises, mln rubles

Indicators	Years						
	2011	2012	2013	2014	2015	2016	2016 to 2015
Total fixed assets	51830.4	53183.2	54677.2	61567.2	64929.1	65809.2	101.4
including: buildings	15020.4	14882.6	14724.1	17422.9	18810.6	18754.3	98.9

structures	6226.1	6311.9	6178.3	7277.7	7384.8	7438.5	100.7
machinery and equipment	24633.7	25835.9	27618.1	30324.2	31218.8	32750.3	104.9
transport vehicles	3378.2	3587.8	3488.0	3816.8	4394.9	4589.4	104.4
production stock	481.8	345.9	322.1	331.7	331.5	320.4	96.7
other	2090.2	2219.1	2346.9	2393.9	2788.5	3180.2	114.0

The availability of fixed assets is a prerequisite for efficient production in agriculture. At that, there are significant differences among large, medium-sized and small enterprises.

3. Results

3.1. Ranking score of regions in the Southern Federal District in terms of fat-and-oil subcomplex development

The Southern Federal District served the basis to form not only a solid production base, but also the network of processing enterprises, which were the main domestic consumers of sunflower seeds. Enterprises such as LLC Oil Extraction Plant "South of Russia" and JSC "Aston" are large industrial segments with modern technical equipment, depositaries, and logistics network. The range of products is represented by advanced lines of sunflower oil and byproducts (oil cake and meal).

In the framework of food security policy implementation it is needed to maintain a strategic reserve of basic food in each region. A seed fund is formed in the end of each year and is implemented during the winter-spring period for the purposes of the processing industry. In 2016, nationwide reserves based on the Southern Federal District regions were formed by just 40%. At that, in Southern Federal District the growth in 2016 relative to 2015 amounted to 22%, while as noted, throughout Russia it had declined by 0.3%. A significant increase in reserves of sunflower seeds (in 2016 relative to 2014) was noted in the following regions: the Republic of Adygea (by 58%), the Krasnodar Region (52.8%), the Volgograd Region (13%), and the Rostov Region (twofold).

Export turnovers were compared in terms of sunflower oil (bottled and bulk). The half of the total export in 2016 consisted of the output produced at the enterprises of the Rostov Region (95.4 thousand tons), while 21% of that were produced by the enterprises of the Krasnodar Region. Quite significant export growth in 2016 relative to 2014 was observed in all producing regions of the Southern Federal District, exceeding the nation average. According to rating of the regions in terms of exports, in 2016 the Rostov Region was ranked first, the Krasnodar Territory occupied secondplace, the Volgograd Region was third, while the Republic of Adygea ranked fourth.

The research results are shown in the consolidated Table 3, which presents integrated rating of the development level of sunflower based oilseed subcomplex. Sunflower is a flagship agricultural product growing in the regions of the Southern Russia. The ranking was formed based on a number of above discussed indicators. Places were distributed depending on the maximum and minimum levels (Mamchenko, Vdovkina and Gulyaeva 2013).

Table 3
Ranking score of the oilseed sector development in the Southern Federal District regions according to data for 2016

Indicators / Regions	Republic of	Republic of	Krasnodar	Volgograd	Rostov

	Adygea	Kalmykia	Territory	Region	Region
1. Cropacreage	5	4	2	3	1
2. Acreage under oilseeds	4	5	3	2	1
3. Acreage under sunflower	4	5	3	2	1
4. Yield of sunflower	3	5	1	4	2
5. Gross harvest of sunflower	4	5	1	3	2
6. Number of enterprises processing sunflower	4	5	2	3	1
7. Sunflower stocks	4	5	1	3	2
8. Export of sunflower oil	4	5	2	3	1
Final ranking	4	5	2	3	1

3.2. Calculating production efficiency of sunflower in the Rostov Region

A detailed understanding of the sunflower production and consumption in the Rostov Region is given by balance presented in Table 4 composed based on data of 2015-2016.

Article-by-article analysis of the balance allows drawing the following conclusions:

- the Rostov Region is increasing the production volumes as well as carry-over stocks;
- the import of sunflower is unstable; according to 2016 it amounted to 43.2 thousand tons, and was imported mainly from Ukraine;
- in 2016, the amount of losses has increased from 9.8 to 10.2 thousand tons; the main losses were associated with low culture of agricultural production, outdated technologies, natural climatic conditions, and force-majeure circumstances;
- personal consumption of sunflower has slightly increased (by 4.6%);

Table 4

Sunflower production and consumption balance in the Rostov Region, thousand tones

Articles	2015	2016
I. Resources		
Opening stocks	268.5	339.8
Production	828.6	1264.5
Carriage inwards, including imports	62.5	43.2
Total resources	1159.6	1647.5
II. Consumption		

Consumption for production purposes	102.1	145.8
Losses	10.2	9.8
Carriage outwards, including exports	362.9	539.8
Personal consumption	344.6	360.4
Total consumption	840.2	921.8
Closing stocks	339.8	448.5
For reference:		
Consumed by agricultural producers in total	688.3	898.5

To analyze economic efficiency of sunflower production in the Rostov Region we consider Table 5, which reflects the results of oilseed subcomplex operation for 5 years.

The implementation of new technologies and application of modern machinery resulted in reduction of work efforts by 55%, however, at small farms, this figure was still quite high (about 16 person/hour per ha), while at large agricultural enterprises it was gradually reduced to 8 person/hour per ha.

The average level of production costs in 2016 was 8767 rubles per 1 ton that was higher than 2012 level by 48.8%, while total cost (cost of sales) amounted to 9340 ruble that was higher than that in 2012 by 34.8%.

Annual average level of prices on sunflower in the Rostov Region in 2016 was hold fixed at 21000 rubles that was below the previous year by 12.5%, however it was by 87% above the level of 2012. Sales revenues in 2016 also increased relative to 2012 by 2.7 times, and by 14% relative to 2015.

Profit performance from sales had also increased in 2016 showing growth by 42% comparing to 2015, and by 95% with respect to 2012. Level of sunflower profitability on average in the Rostov Region in 2016 amounted to 224.9%.

The main economic objective of producers is reducing cost in the total cost of production. The cost figure is formed based on a certain set of fixed and variable, as well as direct and indirect costs.

Table 5
Sunflower production and consumption
efficiency in the Rostov Region

Indicators	Years					2016 to 2012, %
	2012	2013	2014	2015	2016	
Yield, dt/ha	13.3	14.3	14.3	15.7	16.3	122.6
Work efforts, person-hour per ha	18	17	16	13	10	55.6
Production costs, rubles per ton	5890	6945	7450	7908	8767	148.8
Full cost, rubles per ton	6928	7056	7680	8563	9340	134.8
The selling price per ton, rubles	11200	12000	15000	24000	21000	187.5

Total sales volume, thousand tons	620.7	656.8	617.7	688.3	898.5	144.8
Total sales revenues, mln rubles	6951.8	7881.6	9265.5	16519.2	18868.5	By 2.7times
Profit on sales, mlnrubles	4300.2	4634.4	4643.9	5893.9	8391.9	195.2
Level of profitability, %	161.8	170.0	199.5	280.3	224.9	138.9
Profit per 1 ha of crops, rubles	6922.4	8269.8	8286.8	11031.1	14070.1	By 2 times

4. Discussion

During the discussion of research results obtained in the present study with experts on the branch regional economy, comparison of the results with retrospective studies and related fields of knowledge (Yunusova and Dokholyan 2017; Ersoy and Taylor 2012; Kurennaya 2014; Ketels 2003; Ketels 2013; O'brien 2004; O'brien 2008) we have formed the vision of further scientific research of organizational and practical nature. This vision substantiates recommendations of target-oriented and institutional issues towards improving regional support system of sectoral economy, which include changes in approaches to development of infrastructure, research, innovation and other components, as well as establishment of municipal business incubators to increase the investment attractiveness of the regional agribusiness. The research on developing approaches on improvement of interaction mechanisms between oilseed producers and processors, as well as elimination of conflicts among the actors involved in the agricultural sectors seems to be quite promising as well. These studies will allow mitigating cross-sectoral, institutional, and intersubjective contradictions.

According to the scientific community (Soulie 1989; Levushkina, Miroshnichenko, Kurennaya and Agalarova 2016; Picot 1998; Upton, Cissé and Barrett 2016), undeniable is the need to improve incentives of some of the most efficient productions, and the subsequent creation of specialized clusters on the basis of the flagship enterprises, that will allow fully obtaining synergetic and innovative effects of agricultural production. In this context, development of organizational and methodical approaches in creating clusters and their implementation in the agricultural sector of the economy are recognized to be relevant and timely.

5. Conclusion

Summarizing the results of the conducted study, it should be noted that the fat-and-oil subcomplex accumulates a number of important socio-economic functions and is a promising agricultural sector in agribusiness of the Rostov Region. The subcomplex development prospects are associated with the implementation of special measures towards direct and indirect impacts on the system-forming factors of its formation and development. Special attention should be paid to the communicative processes among the actors of the fat-and-oil subcomplex that have monetary consequences in the form of lost benefits. In addition, the measures to address intraindustry and intraregional production and logistic imbalances are needed. In this regard, the diagnostic approach proposed by the authors can be a significant supplement to the analytical and methodological support of the research concerning fat-and-oil subcomplex of the agribusiness. The developed methodological framework is universal and can be used everywhere to determine reserves for increasing economic efficiency of agricultural production. The research results can be useful to sectoral management bodies, public unions of agricultural producers, and the corporate sector when developing strategic directions and substantiating development programs of agricultural industry.

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