

**ANALYSIS OF INTER-INDUSTRY PROPORTIONS OF THE AGRO-  
FOOD COMPLEX IN RUSSIAN REGIONS UNFAVORABLE FOR  
AGRICULTURAL PRODUCTION**



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*Summary:*

The purpose of the study is to assess the proportion of the development of related sectors of agriculture and food industry in the regions that are unfavorable for agricultural production. All regions are divided into three groups, due to territorial differences in the conditions of economic activity: regions of the European part of Russia, regions of the Urals, Siberia and the Far East, and regions with developed mining industry, which were excluded from the relevant groups on a territorial basis. For the analysis of the developing proportions of sectors of agriculture and the food industry in the regions, unfavorable for agriculture, there were used statistical and abstract-logical methods of research, including the analysis of absolute cost statistical indicators: gross production of agriculture and volume of the shipped goods in the food industry, and also a number of relative indicators, including: the ratio of production of the food industry and agriculture,

gross production of agriculture on one employee; the volume of shipped products of the food industry per employee. The difference between the volume of shipped products of the food industry and agriculture per employee in the economy of the region is analyzed. It is revealed that the food industry of the studied regions is characterized by a low level of development because of the peculiarities of the production process (seasonality, underutilization of capacities, a high degree of depreciation of fixed assets, etc.), and of close links with underdeveloped agriculture. Thus, achievement of proportions of development of agricultural industries and the corresponding industries of the food and processing industry has to become the defining factor in development of measures for state support of regions that are unfavorable of agriculture.

*Keywords:* regions unfavorable for agriculture, food industry, related industries, proportions, production.

## **Introduction**

Under conditions of Russia's membership in the World Trade Organization, there is a need for a legislatively fixed initiative of targeted state support for agriculture in a number of regions of the Russian Federation. In this connection, amendments were made to the Federal Law No. 264-FZ "On the Development of Agriculture" [1], specifying the criteria for classifying the region as territories that are unfavorable for agriculture and requiring additional measures of state support. The Order of the Government dated December 26, 2017 No. 2952-R "On Amendments to the Decree of the RF Government of January 26, 2017 No. 104-R [2]" specified the list of regions (37 regions) referred to this group. However, in the official documents there are no criteria for the development of the food and processing industries of these regions, as the main consumer of the raw material base produced in agriculture. This problem is of particular importance in the development of the domestic agro-industrial complex as a balanced system that is connected with all the links of the reproductive chain. In addition, in our opinion,

the food industry being the main consumer of products, should affect the development of the agricultural sector in the region. In this regard, the development of measures to support the regions unfavorable for agriculture should be carried out in close connection with the food industry that is one of the elements of a unified technological chain on the path of transformation of the agricultural product into a finished product for the final customer.

### **Literature review**

The classification of a given region as an unfavorable agricultural entails considerable difficulties in selecting the criteria on the basis of which the subjects of the Russian Federation are ranked. The set of criteria is constantly changing, and the list of regions that are classified as unfavorable for agricultural production is also adjusted with it. An attempt to weigh the pros and cons of the set of criteria proposed by different departments was made by S.Yu. Barsukova [3]. According to the author, it is necessary to significantly improve the methodology for classifying the territory as unfavorable, and it is also necessary to develop a more flexible state support scale based on the analysis of the practices of the EU countries, as well as geographical and climatic features of the regions. V.Z. Mazloeff and M.G. Ozerova [4] also propose their own method of classifying the territory as unfavorable for agriculture. In addition, separate methodological issues of classifying regions as unfavorable for agricultural production are developed by the staff of the Russian Academy of Agricultural Sciences [5]. Works of T.A. Borodina, A.N. Adukova, A.N. Prostenko, R.A. Yusufova, G.G. Urbanskaya are devoted to separate aspects of support and regulation of various agricultural industries in unfavorable regions.

A number of scientists deal with the problems of the regional development, as well as in the food and processing industries. In particular, the works of O.V. Konanykhina, E.A. Belyaeva, I.G. Vidyaev, A.Yu. Gusev, S I. Kovaleva, D.I. Ryakhovsky and others are devoted to various aspects of managing the innovative

climate of the regions, as well as industrial regional specifics of innovation and investment.

Many economists agree that the food industry is the basis for growth, both for the entire Russian economy and for individual regional economies. This statement is also confirmed by the calculations of N.Kh. Sadekova [6], based on a comparison of the dynamics of indices of social and economic indicators of various sectors of the national economy. The development level of the food industry in the regions is assessed by A.V. Pryakhin, D.V. Serdobintsev, N.V. Pokrashinskaya, V.S. Kirillov, G.F. Shaikhutdinova, T.D. Degtyareva, E. A. Chulkova and others [7,8]. Employees of the Institute of Agrarian Problems of RAS use the inter-sectoral approach in the development of food chains in the agro-industrial complex [9].

At the same time, there are a lot of undeveloped problems of modeling of a balanced interaction and justification of the optimal proportions of agriculture and the food industry, both at the national level and at the level of individual regions. In addition, it is required to clarify the specifics of these processes for the subjects of the Russian Federation, that are unfavorable for agricultural production.

## **Methods**

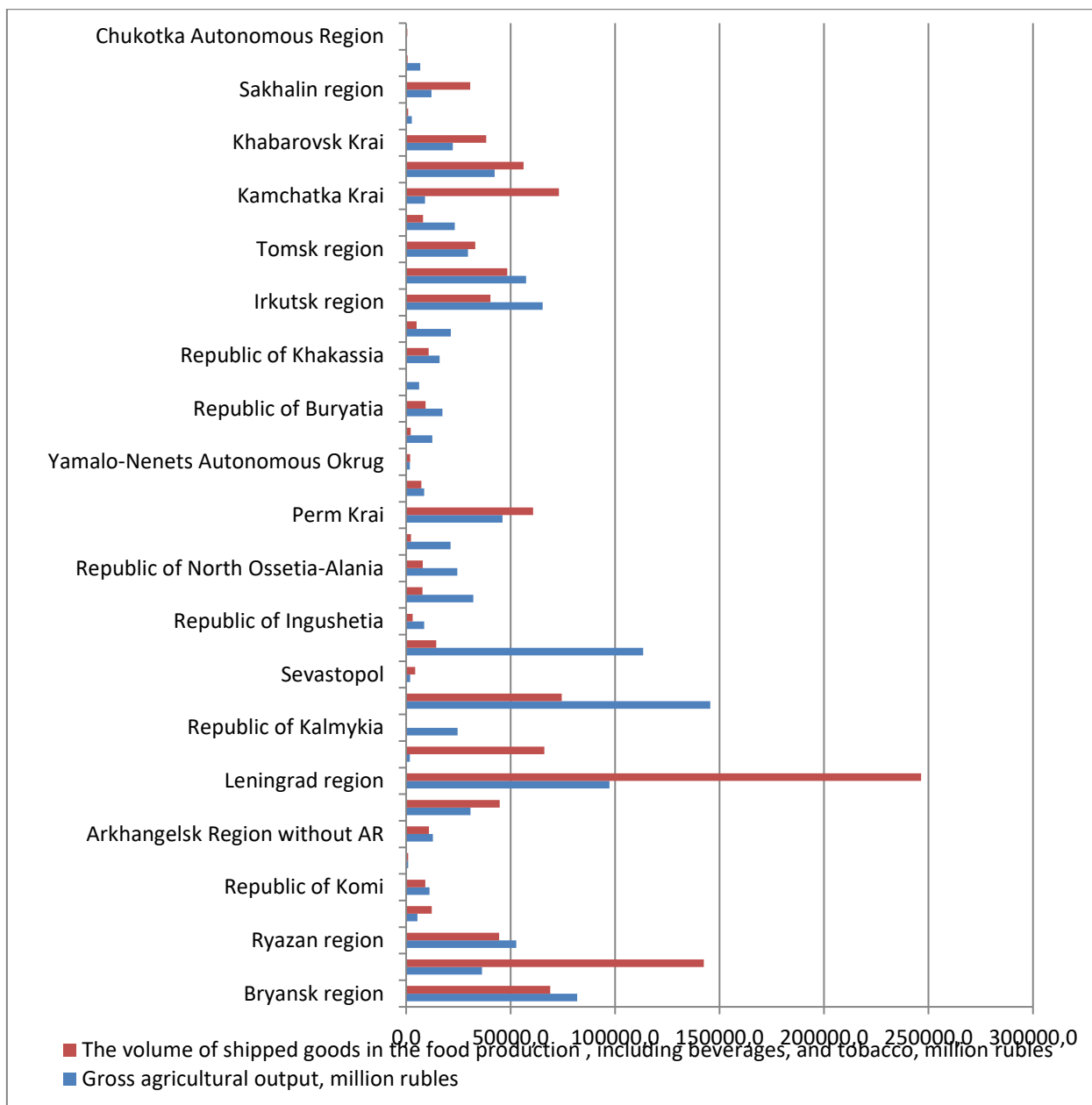
For the analysis of the developing proportions of agricultural industries with the related ones of the food and processing industries in the regions unfavorable for agriculture, we used statistical and abstract-logical methods of research, including the analysis of absolute statistical indicators: gross production of agriculture and volume of the shipped goods in the food industry.

In addition, a number of auxiliary indicators were tested: 1) the ratio of production of the food industry and agriculture, calculated as the ratio of the volume of shipped goods in the food industry to the gross agricultural output; 2) the gross agricultural output per employee (thousand rubles); 3) the volume of

shipped food products per employee (thousand rubles); 4) the difference between the volume of shipped food and agriculture products per person (thousand rubles).

To compare results obtained in the analysis, we considered territorial differences in the conditions of economic management, all regions, unfavorable for agriculture, are united in three groups. The first group includes all regions of the European part of Russia, the second one – the regions of the Urals, Siberia and the Far East, and a separate group includes regions with developed mining industry, which were excluded from the relevant groups on a territorial basis. The last group of regions includes the Komi Republic, Nenets Autonomous Okrug, Khanty-Mansi Autonomous Okrug-Yugra, Yamalo-Nenets Autonomous Okrug, the Sakha Republic (Yakutia), and the Sakhalin oblast.

Figure 1 shows the ratio of gross agricultural output and the volume of shipped goods in the food industry in some regions, unfavorable for agriculture in 2016. Comparing the data by region, we can conclude that the situation in the proportions of the development of agriculture and food industry has been ambiguous.



According to: [10], [11].

Figure 1 - The ratio of gross agricultural output and the volume of shipped goods in the food industry in some regions, unfavorable for agriculture in 2016

In some regions, there is a certain excess of the volume of the food industry shipment over the volume of agricultural industry, even taking into account the export of agricultural raw materials. In the food industry, which is geographically close to the raw material source in order to reduce transaction costs, the added value should be formed at the highest possible level, which contributes to the innovative component of enterprise development. This situation is observed only

in several European regions (Vladimir, Leningrad regions, Perm Krai), characterized by a high level of the food industry development and by a lack of agricultural raw materials. Formally, this group may include regions of the Far Eastern Federal district, however, both the high share of food products and significant volumes of gross agricultural products are primarily associated with the extraction and industrial processing of fish, which is determined by the geographical location of the regions.

In most cases, there is either underutilized capacity of the food industry enterprises, or the full absence of the industry in the region. This phenomenon is typical for the regions of the North Caucasus Federal district, which is characterized by developed agriculture and lack of processing of agricultural products with a high level of added value. In other cases, problematic farming involves a low level of the food industry development.

If there are representatives of the processing industry in the region, their products are mainly aimed at meeting their own needs. Basically, these are representatives of the sub-sectors for the production of perishable goods, in particular, the bakery and dairy industries. In regions with severe climatic conditions, the raw material supply of the food industry is carried out by imported raw materials. In this case, the industrial orientation of the region is associated with the mining industry, mechanical engineering, metalworking, production and distribution of electricity, etc. In this situation food prices in the regions are significantly higher than the average prices for food analogues in Russia, and per capita consumption of basic food products is much lower than the approved medical standards.

## **Results**

In the course of the study, the task was to assess the current proportions of the food and agriculture industries and to determine the degree of mutually beneficial relations between related industries of agriculture and processing in the regions

unfavorable for agricultural production. For this purpose, a number of indicators comparable in the analysis process were calculated.

Table 1 shows the indicators that characterize the ratio of food industry and agriculture production in federal districts and subjects of the Russian Federation, unfavorable for agriculture in 2016. Analyzing the ratio of volumes of food industry and agricultural production in certain regions, we focused on the average Russian value (1,76) and assumed that to meet the domestic needs of the processing industry with local agricultural resources, the value of the calculated indicator should not be less than 1, and the production processes in the food industry should be characterized by high added value. At the same time, it is necessary to take into consideration complex interregional links in the processes of export-import of raw materials, as well as the processes of population self-sufficiency in food products private households. This fact is practically not reflected in official statistics. However, during our analysis, it is acceptable to ignore these processes, because our purpose is a general, rather than an accurate quantitative assessment of the proportions between agriculture and industrial processing of agricultural raw materials. Thus, the analysis of the calculations of this indicator confirms the conclusions made earlier, based on the assessment of the absolute value indicators of the results of the production process in the studied industries. Almost all regions of Siberia, the Urals and the Far East have a value below 1, which characterizes the low level of development of the food industry, associated with underutilization of capacity, work seasonality, insufficient innovative level of production development, as low level of investment in production. The exceptions are the regions concentrated on fish production and industrial processing. Mining regions are also characterized by a value below 1, with some exceptions (Nenets, Yamal-Nenets Autonomous districts, Sakhalin region), where the values of the calculated indicator vary near the boundary level. The current situation depends on the insignificant level of absolute output indicators, and on undeveloped agriculture in the regions. In the regions of the



European part of Russia is a similar situation that is connected with the problems in providing the food industry with local raw materials. The only exceptions are Vladimir, Vologda, Leningrad regions, Republic of Karelia, Sevastopol, and Perm Krai, where the ratio of agricultural production and food industry is quite adequate with the value of the calculated proportions from 1.32 to 3.92. The suspiciously high value of the indicator in the Murmansk region (37.4) can be explained either by the high impact of any investment project of the regional food industry, or by inadequate data in official sources of statistical information.

Table 1 – The indicators that characterize the ratio of food industry and agriculture production in federal districts and subjects of the Russian Federation, unfavorable for agriculture in 2016

Administrative division	The ratio of food industry and agriculture production	Gross agricultural production per employee, thousand rubles	Volume of shipped products of food industry per employee, thousand rubles	The difference between the volume of shipped products of the food industry and the gross output of agriculture per employee, thousand rubles
<b>Russian Federation</b>	<b>1,175809</b>	<b>76,39964</b>	<b>89,83136</b>	<b>13,43172</b>
<b>Central Federal District</b>	<b>1,816492</b>	<b>65,15256</b>	<b>118,3491</b>	<b>53,19653</b>
Bryansk region	0,842414	151,4996	127,6254	-23,8742
Vladimir region	3,916504	56,16605	219,9746	163,8085
Ryazan region	0,845597	104,1268	88,04936	-16,0774
<b>Northwestern Federal District</b>	<b>4,180736</b>	<b>34,69225</b>	<b>145,0392</b>	<b>110,3469</b>
Republic of Karelia	2,260693	19,09133	43,15962	24,0683
Republic of Komi	0,824472	26,45827	21,81411	-4,64416
Nenets Autonomous district	1,095836	27,05422	29,64699	2,592771
Arkhangelsk region without AR	0,852933	24,89872	21,23693	-3,66179
Vologda region	1,453701	55,37567	80,4997	25,12402
Leningrad region	2,532562	118,6617	300,5181	181,8564
Murmansk region	37,39654	4,659031	174,2316	169,5726
<b>Southern Federal District</b>	<b>0,690349</b>	<b>132,9289</b>	<b>91,76738</b>	<b>-41,1615</b>
Republic of Kalmykia	0,009788	219,3304	2,14675	-217,184
Volgograd region	0,512255	126,7761	64,94166	-61,8344
Sevastopol	2,270247	11,02977	25,0403	14,01053
<b>North-Caucasian Federal District</b>	<b>0,339904</b>	<b>119,2598</b>	<b>40,53692</b>	<b>-78,7229</b>

Republic of Dagestan	0,1274	106,2644	13,53809	-92,7263
Republic of Ingushetia	0,362581	52,92237	19,18866	-33,7337
Karachai-Cherkess Republic	0,243551	187,3285	45,62408	-141,704
Republic of North Ossetia-Alania	0,326622	85,25244	27,84533	-57,4071
Chechen Republic	0,106898	43,45163	4,644898	-38,8067
<b>Volga Federal District</b>	<b>0,807785</b>	<b>90,42086</b>	<b>73,04058</b>	<b>-17,3803</b>
Perm Krai	1,319242	38,24917	50,45992	12,21075
<b>Ural Federal District</b>	<b>0,967487</b>	<b>50,90687</b>	<b>49,25175</b>	<b>-1,65512</b>
Khanty-Mansiysk Autonomous districts - Yugra	0,841789	8,383655	7,057271	-1,32638
Yamal-Nenets Autonomous district	1,108277	4,329529	4,798318	0,468789
<b>Siberian Federal District</b>	<b>0,779675</b>	<b>76,09099</b>	<b>59,32621</b>	<b>-16,7648</b>
Republic of Altai	0,176255	147,9494	26,0768	-121,873
Republic of Buryatia	0,533773	44,25971	23,62463	-20,6351
Republic of Tyva	0,054269	59,63566	3,236357	-56,3993
Republic of Khakassia	0,672763	68,80111	46,28685	-22,5143
Zabaykalsky Krai	0,230463	45,12645	10,39998	-34,7265
Irkutsk region	0,616773	57,87908	35,69828	-22,1808
Kemerovo region	0,844425	47,01524	39,70085	-7,31439
Tomsk region	1,118815	60,69414	67,90549	7,211349
<b>Far Eastern Federal District</b>	<b>1,320084</b>	<b>53,55185</b>	<b>70,69292</b>	<b>17,14107</b>
Republic of Sakha (Yakutia)	0,350552	48,08564	16,85654	-31,2291
Kamchatka Krai	8,112924	54,18712	439,616	385,4289
Primorski Krai	1,325081	42,96025	56,92582	13,96557
Khabarovsk Krai	1,718726	32,14858	55,25461	23,10603
Magadan region	0,365937	29,27549	10,71297	-18,5625
Sakhalin region	2,523549	42,62904	107,5765	64,94743
Jewish Autonomous Oblast	0,095803	96,04304	9,201176	-86,8419
Chukotka Autonomous Region	1,768344	10,279	18,1768	7,897806

Calculated according to [11].

In turns of the considered problem, it is interesting to analyze the correlation between the relative indicator of average annual volumes of agricultural and the food industry production per employee in the economy of the region (Table 1). Nationwide the difference between the given indicators is about 13 thousand rubles in favor of the processing industry. At the same time, a similar positive correlation was only in the Central, North-Western and Far Eastern federal districts. In all other cases, there is a negative relationship. In almost all the regions unfavorable for agriculture, the volume of shipped food products per employee is less than that for agriculture, which confirms earlier conclusions about the underdevelopment of

the relevant industries of processing of agricultural raw materials with low added value products. Exceptions are the regions of the Far East, Perm Krai, Sevastopol, Vladimir, Vologda, Leningrad and Murmansk regions. This fact requires close attention from the authorities of both regional and federal levels.

### **Discussion**

Due to the incompleteness of the regional statistical base, which is necessary and sufficient for estimating the proportions between the industries of agriculture and the food industry, the analysis is very difficult. In this regard, it was necessary to resort to a number of assumptions related to the comparability of the indicators. Practically in all investigated regions weak interrelations between adjacent branches of agriculture and processing are revealed. On the one hand, it is connected with the underdevelopment of agriculture, represented in these regions by traditional forms, the support of which is determined by the preservation of crafts identity, as well as the employment of local people. On the other hand, the lack of a full raw material base for the food industry leads to its degradation and in some cases to the total absence of local production. At the same time, modern processing of agricultural resources is characterized by a low level of added value associated with the seasonality of production, undercapacity, depreciation of fixed assets and, as a result, a low level of innovative activity (or its lack) of enterprises. In this connection, the demand for food products is affected on account of imported goods at prices significantly higher than the average for Russia. In this situation, it is inexpedient to develop measures of state support, aimed only at agricultural production. The food industry should be considered as the main source of demand for agricultural raw materials in the studied regions and should be a stimulating force for agricultural development.

### **Conclusion**

In the process of analysis, it was revealed that in conditionally divided groups of regions unfavorable for agriculture, there are similar trends in the development of the food industry, as well as similarities in the proportions between agriculture and the food and processing industries of the region. In general, the food industry of the studied regions is characterized by a low level of development, related both to the specifics of the production process (seasonality, unutilized capacity, high depreciation of fixed assets, etc.) and close links with underdeveloped agriculture. Exceptions are some regions of the European part of Russia, which are characterized by a high level of the food industry development, whose needs are mainly ensured through intraregional agricultural raw materials: Leningrad, Vologda, Vladimir regions. It is necessary to separate a group of regions in the Far East, where the links between related industries involved in the extraction and industrial processing of fish are the strongest. However, this does not apply to the situation with agriculture and other branches of the regional food industry. A special situation has developed with the regions of the North Caucasus Federal District, where relatively developed agriculture cannot maintain local sales of raw materials due to the degradation of food industries within the region. Thus, measures to support the regions unfavorable for agriculture should not be limited only to the agricultural industries. A balanced sustainability of all sections of universal reproduction chain for the production of the final product is very important. These sections include the development, justification and observance of the agricultural development proportions and the corresponding branches of the food and processing industry.

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## References

1. Federal Law dated 29.12.2006 (ed. 28.12.2017) No. 264-FZ “On Agricultural Development”. URL: <http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=LAW&n=286510&fld=134&dst=1000000001,0&rnd=0.03862264109195834#08943567253537293>
2. Order of the Government of the Russian Federation dated 26 December 2017 No, 2952-r “On Amending the Order of the Government of the Russian Federation dated 26 January 2017 No. 104-r. URL: <http://www.garant.ru/products/ipo/prime/doc/71745924/#ixzz53u7CZIwo>.
3. Barsukova S.Yu. Definition of regions unfavorable for agriculture, or how in Russia are going to help agriculture in the conditions of WTO membership. In: EKO, 2014, No. 3 (477). P. 89-104.
4. Mazloev V.Z., Ozerova M.G. Territorial and economic typification of the agrarian sector of the region as an instrument of targeted state support. In: Agro-Food Policy of Russia, 2016, No. 7 (55). P. 10-15.
5. To develop methodical approaches to the typification of rural areas with the definition of regions with unfavorable natural and economic conditions for agriculture / Adukov R.KH., Adukova A.N., Baklazhenko G.A., Medvedev A.V., Ruvil' V.S., Molchanova A.V., Semayeva I.A., Abryandina V.V., Prostenko A.N., Yusufov R.A., Noskova M.V., Zakharov R.V. / Research report No 25 dated 01.01.2012 (Russian Academy of Agricultural Sciences).
6. Sadekova N.Kh. Prospective directions for food industry development in the region. In: Topical issues of economics, management and innovation: Proceedings of the International research and training conference. Nizhniy Novgorod State Technical University named after R.E. Alekseev, 2016, P. 296-299.
7. Pryakhina A.V. Assessment of the development of the food industry in the country and in the region. URL: <http://www.iprbookshop.ru/60252.html>.

8. Degtyareva T.D., Chulkova E.A. Food industry in the region: state and development prospects. In: Corporate governance and innovative development of the economy of the North: Vestnik of the Research Center of Corporate Law, Management and Venture Investments of Syktyvkar State University, 2011. No. 1, P. 37-45.

9. The development of the product chains in the agro-food complex: cross-sectoral aspects / O. V. Ermolova, V. V. Kirsanov, N.A. Yakovenko, I.S. Ivanenko, T.V. Ostapenko and others; under the General editorship of O.V. Ermolova. - Saratov: publishing House "Saratov source", 2017, 156 p.

10. Russian statistics yearbook. 2017: statistical book /Rosstat. Moscow, 2017, 686 p.

11. Russian Regions. socio-economic indicators. 2017: statistical book /Rosstat. Moscow, 2017, 1402 p.

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