

The importance of the territorial factor for strategizing the agricultural sector

Denis Samygin^{1*}, *Lyubov Vinnichek*², *Dzhamilya Magomedmirzoyeva*², and *Anton Shapovalov*¹

¹ Penza State University, Institute of Economics and Management, Krasnaya, 440026, Russia

² Saint-Petersburg State Agrarian University, Faculty of Economics and Management in the Agro-Industrial, Peterburgskoe shosse, 196601, Russia

Abstract. The problem of the influence of the territorial factor on the development of the agro-food sector is considered. The goal is to determine the directions of territorial planning of the agro-food sector for the rational use of the competitive advantages of the regions. Information resources - a spatial database on the cadastral value of 1 hectare of agricultural land in the context of the regions of the Russian Federation (2017-2019). The method of statistical groupings is applied. Five groups of regions of equal aggregate were formed (the first 20% of the regions with the lowest, the last - 20% of the regions with the highest cadastral value). New knowledge about the influence of natural and economic conditions on the formation of physical and economic accessibility of products has been obtained. In the transition from the first group of regions to the fifth, there are significant differences in the results achieved in terms of production and consumption of products per capita. It is advisable to strengthen the specialization of regions in those types of products that are characterized by pronounced strategic advantages in the formation of the physical and economic accessibility of products.

1 Introduction

In the field of food security, a fundamentally new strategic task has been formulated to achieve the physical and economic accessibility of food products that meet rational consumption standards. For this reason, strategic planning is currently focused on ensuring food security and the development of the agri-food sector as a complex issue. In this problem today, the international concept of strategizing pays special attention to the sustainability of agriculture to natural factors, which, as a result, have a significant impact on global and national food security. In the latest studies [1], weather and climate are elevated to the rank of a force that determines the level of development of agriculture. According to the Economist Research Center (New York, USA), its level in many countries is largely determined by climate-forming factors (Figure 1).

* Corresponding author: vekонт82@mail.ru

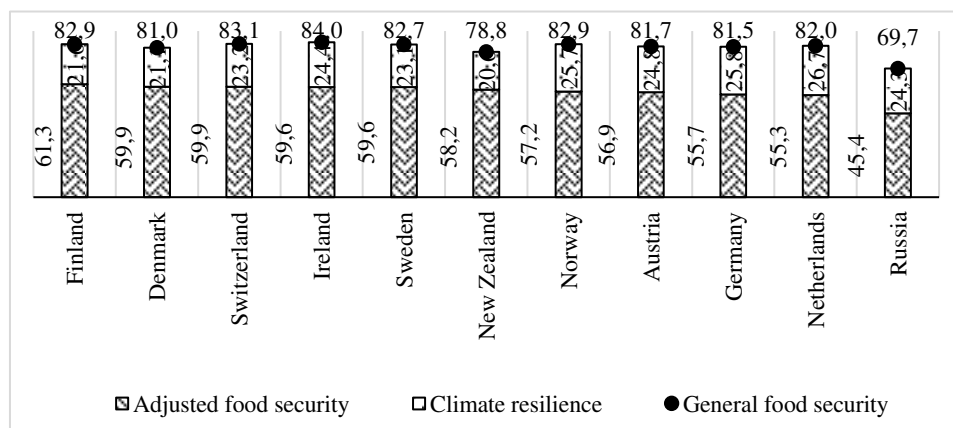


Fig. 1. The impact of natural resource sustainability on food security on average in 2019-2021 (fragment), percent.

In Russia the influence of natural factors reduces the achieved level of general food security from 69.7 to 45.5 points. As a result, taking into account climate resilience, adjusted food security is less than 50% of the maximum possible value. Considering that the food security indicator is compiled on the basis of integration of indicators characterizing physical and economic accessibility, it can be argued that their formation is also subject to the influence of natural environment resources. Western countries are trying to compensate for the weak resistance of food systems to natural and economic factors by strengthening the technical and technological equipment and material security of the agricultural business. At the same time, in Russia, an important support is the presence of vast agricultural areas. The rational use of the agricultural potential of these territories opens up strategic opportunities for reducing the influence of natural factors. To prepare an adequate response to the challenge of the natural environment and to embed the conceptual provisions on the influence of natural and economic conditions into the system of strategic planning of agriculture, additional research is required.

In the work, the authors proceeded from the hypothesis that climate-forming factors determine not only the level of economic, but also social and environmental development of agriculture and, accordingly, put pressure on the formation of physical and economic accessibility of quality products. In order to mitigate the impact of these factors on aspects of national food security, it is necessary to study their impact first on business conditions, and then on performance indicators.

2 Materials and research methods

At the present stage, research by Russian and foreign scientists on this issue is mainly related to the assessment of climate change scenarios, the identification of climate risks and the consequences of their impact on the development of agriculture and the sustainability of agro-food systems [2]. According to experts, the scale of threats to reduce food security and the loss of food independence are of strategic importance for the country [3]. All this confirms the need to take into account natural and economic conditions in the process of making strategic decisions not only on the production of products, but also on their consumption and, ultimately, on ensuring convergence between them at the level of rational norms.

The work used the cadastral value of one hectare of farmland to assess the natural and economic conditions. The cadastral value includes many factors, including soil fertility,

technological properties of the land plot and location in relation to markets. Within the country, cadastral value varies considerably between regions. For example, the ratio of the cadastral value of regions to the average estimate for the country can vary from 6% to 646%. In addition, significant fluctuations in this indicator are also observed between municipal districts within regions [4]. Such differences in agricultural potential entail differences in the results obtained. Thus, in a number of constituent entities of the Russian Federation, the difference in the levels of costs and output between farms reaches 10 or more times [5], which contributes to the differentiation of incomes between producers operating in different natural and economic conditions. The work carried out a statistical grouping of regions according to the cadastral value of 1 hectare of farmland, on the basis of which five groups of equal population were obtained, the first of which contains 20% of the regions with the lowest, the last - with the highest cadastral value of 1 hectare of farmland. The base of initial data has a spatial structure in the context of the subjects of the Russian Federation for the period 2017-2019. In the context of ensuring food security, statistical research methods reveal the relationship between natural and climatic conditions and economic and social aspects. It is logical that under the best conditions, it is required to spend less money, for example, on melioration, irrigation, soil chemicalization, the use of various growth enhancers, etc., which improves the quality of products, reduces its final cost and, together with an increase in the income of workers, increases economic accessibility. Where the conditions are the most favorable, there the consumption of products should be higher and vice versa.

3 Research results

At the first stage, an analysis was made of the prerequisites for the formation of physical accessibility in groups of regions that differ in the cadastral value of 1 hectare of farmland. Such an assessment shows that the differences in conditions and performance between the group with the best conditions and the group with the worst conditions sometimes reach 11 times. Regions with the best natural and climatic conditions have the best indicators of agricultural development. The volume of production per 1 hectare of agricultural land in the first group is 2.5 times, and the profit is 7 times more than in the fifth group. The share of manufactured products in the first group accounts for only 7%, the profitability is almost 4 percentage points lower, and there are 5 percentage points more unprofitable farms than in the fifth group (Table 1).

Table 1. Groups of subjects of the Russian Federation by cadastral value of 1 hectare of agricultural land.

Indicators	First	Second	Third	Fourth	Fifth
The cost of 1 ha of agricultural land, rub.	3899	11023	15862	21006	43234
Manufacture of products per 1 ha of agricultural land, rub.	21651	25485	32133	34156	59212
Share of manufactured products, %	7	14	21	22	36
Share of unprofitable farms, %	20	19	19	18	15
Profit per 1 ha of agricultural land, rub.	482	630	741	844	3412
Product profitability, %	12	15	12	11	17

According to scientists, regions with worse conditions are distinguished by a relatively higher level of instability of profitability, even taking into account the measures taken in recent years to increase subsidies for unfavorable territories.

In addition, the fifth group of regions (Table 2) has a better resource endowment compared to the first group of regions. Funding is 65 thousand rubles. per 1 hectare of

agricultural land, which is more than 2 times more than in the first group. Similarly, there is an increase in labor productivity in the transition from the first to the fifth group of regions. For this reason, the group with the most favorable conditions contains a significant share of fixed assets (36%), labor resources (29%), subsidies (36%) and fixed capital investments (43%).

Table 2. Resource supply in groups of constituent entities of the Russian Federation by cadastral value of 1 hectare of agricultural land.

Indicators	First	Second	Third	Fourth	Fifth
Funding, thousand rubles / ha	29	32	33	36	65
Labor productivity, thousand rubles / person	859	906	994	1049	1290
Capital-labor ratio, thousand rubles / person	1144	1132	1042	912	1414
Energy supply, hp / ha	0.4	0.5	0.6	0.7	1.0
Amount of support per 1 ha of agricultural land, thousand rubles	0.7	0.7	1.1	1.2	1.9
Share of fixed assets, %	9	16	18	21	36
Share of investments in fixed assets, %	9	12	18	18	43
Share of agricultural land, %	14	20	22	22	22
Share of livestock, %	15	19	20	28	19
Share of employed workers, %	9	16	20	26	29
Share of support, %	8	12	20	24	36

In general, based on the data in Table 2, it can be noted that the conditions for the formation of physical accessibility of products are obviously better in the group with favorable natural and economic factors.

At the second stage, an analysis was made of the prerequisites for the formation of economic accessibility in groups of regions that differ in the cadastral value of 1 hectare of farmland. A similar picture can be observed in the purchase prices of the main types of products, which vary between groups of regions (Figure 2). As the natural and economic conditions improve, the purchase prices for all types of products, including those belonging to the fourth group, decrease. Although prices for products in the fifth group are slightly higher than in the fourth, they are still lower than in the first group. This is due to the fact that the fifth group is formed mainly by regions with a higher standard of living and incomes of the population.

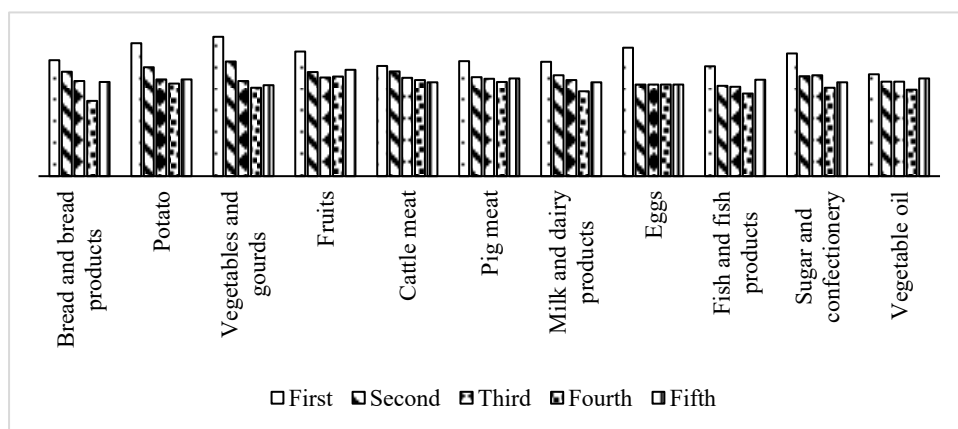


Fig. 2. The ratio of purchase prices of the main types of products with the average Russian price level in groups of constituent entities of the Russian Federation at the cadastral value of 1 hectare of farmland, percent.

There is a relationship between the cadastral value of farmland and the change in the price index for agricultural products, its relationship with the price index for industry, as well as the ratio of the average salary of industry workers and the average salary in the regional economy. In more favorable conditions, prices for products and resources rise more slowly, and incomes of workers approach the average level in the region. For example, the producer price index in the first group is 102.3%, and in the last - 95.8%. In the first group, the ratio of the average salary of workers and the average salary in the region is about 59%, while in the fifth group this ratio exceeds 87%. Thus, as natural and economic factors improve, there is an increase in conditions for the formation of physical and economic accessibility and quality of agricultural products. All this leads to differentiation between regions not only in the level of production, but also in the level of food consumption per capita (Table 3).

Table 3. Production, consumption and quality of sold agricultural products in groups of regions according to the cadastral value of 1 ha of agricultural land.

Indicators	Groups of regions by cadastral value of 1 ha of agricultural land				
	1st	2nd	3rd	4th	5th
Production per capita, kg/person per year					
Grains	439	429	328	564	1180
Potato	115	143	126	214	145
Milk	152	211	211	245	230
Vegetables	43	115	79	86	101
Livestock and poultry meat	55	64	48	64	101
Eggs	169	342	238	309	257
Consumption of products per capita, kg / person per year					
Bakery products	93	94	95	108	97
Potato	51	57	58	64	62
Dairy products	227	248	264	257	273
Vegetables	80	88	101	97	108
Meat products	80	85	84	86	88
Eggs, pcs/person	207	225	225	223	228
Quality of sold products, %					
Milk of the highest grade	25	58	62	64	76
Chilled milk	83	89	89	96	96
Meat of cattle of the first category of fatness	63	63	69	71	78
Meat of pigs of the first category of fatness	34	35	35	39	43
Poultry meat of the first category of fatness	49	61	68	79	86

In the best natural and climatic conditions, the consumption and production of the main agricultural products per capita is higher, which is reflected in the comparison of the first and fifth groups. Between regions and within regions between population groups with different income levels, these differences are even more significant.

An analysis of some indicators of the quality of sold products also shows their increase as the natural and economic conditions of economic activity improve. In the first group of regions, top-grade milk 25%, chilled 83%, and in the last group 76% and 96%, respectively, were sold. The situation is the same for the sale of cattle, pigs and poultry of the first category of fatness for slaughter. In the first group, cattle 63%, pigs 34% and poultry 49%, in the last group - 78%, 43% and 86%, respectively.

Thus, the influence of natural and climatic conditions is manifested in all aspects of the development of the agro-food sector. In better conditions, accessibility, affordability, and quality are higher than in worse conditions.

At the same time, as the analysis showed, the share of the most fertile agricultural land with a favorable climate is only 22%. The agricultural resources of farms with the best lands and favorable natural and climatic conditions are not enough to balance supply and demand to the level of rational consumption rates. Therefore, it is necessary to use the agricultural potential and competitive advantages not only of the regions with the most suitable territories.

4 Discussion

In 2015, the Government of the Russian Federation approved the rules for classifying territories as unfavorable and established a list of such regions in order to subsequently provide them with appropriate state support. However, as scientists note, so far the approved list of such regions has not been used in the preparation of documents for territorial planning of agriculture and the organization of differentiated support for regions [6]. The most consistent solution to this problem can be provided with the allocation of subsidies to equalize the profitability of producers as an independent measure of the state program [7]. In order to reduce the differentiation of agricultural business entities in terms of the level of socio-economic development and the results of economic activity in various natural and economic conditions, scientists [8, 9] tend to optimize the location of agricultural production by type of product, taking into account the competitive advantages of commodity producers. This would help level the starting conditions for doing business in agriculture.

The key role here is played by state regulation of the processes of rational distribution of industries, deepening specialization and increasing the concentration of production [10]. The spatial development of the agro-food sector should be focused on low cost and high quality products. So it was in the pre-reform period, so it is in countries with more developed economies. In the USA, with the help of agrarian policy measures, it was possible to lead to a deepening of specialization and an increase in the concentration of production in 8 "wheat", 5 "corn" and 3 "sorghum" states, in which the bulk of these products is produced. In combination with other factors, such an organizational restructuring made it possible to increase the efficiency of production in all branches of the agro-industrial complex by 1.5-3 times [11]. Since market regulators act towards the development of favorable regions and the stagnation of less favorable ones, the task of territorial planning is to ensure priorities for regions with the best conditions for the development of a particular industry [12].

5 Conclusion

Thus, the results of the study show that regions with favorable factors of the natural and climatic environment have superiority over regions with less favorable rent-forming conditions in the level of formation of physical and economic accessibility of quality products. At the same time, the agricultural resources of the regions are not enough to ensure the necessary level of food security aspects throughout the country. It is strategically important to find reserves in regions with less favorable lands and climate. Their agricultural potential should be unlocked through the orientation of agribusiness towards growing products that are most resistant to these climate risks. In this, the authors of the article see the role of strategic planning of agriculture. On the basis of state support funds, it is advisable not to compensate for the shortcomings of the market mechanism and the natural environment, but to aim the regions at realizing those competitive advantages, due

to which the products are most efficient for producers, high-quality and cheap for consumers.

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