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# Peculiarities of natural and economic conditions influencing food security of the region population

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**Abstract.** The author of the paper made an attempt to analyse from the scientific point of view certain objective aspects that directly affect the provision of the population of Krasnoyarsk Territory with complete and sufficient food products. The relevance of studying the characteristics of both natural and economic conditions in relation to the food supply system of the region is not only theoretical, but also of practical importance. This issue is confirmed by the fact that without an objective analysis, a significant number of problems of economic and managerial relations in the food sector can arise. The publication examines how the natural and economic conditions affect the definition of the volume, structure, location and specialization of agricultural production in the region under study.

## 1. Introduction

The strategic factor for the sustainable development of any region is its geographical, economic and geopolitical position. Krasnoyarsk Territory belongs to the flagship regions of the Russian Federation. Moreover, it is one of the leaders among all the constituent entities of the Russian Federation in terms of the most important macroeconomic indicators, such as: population, gross regional product (GRP), industrial production, construction, investment in fixed capital and their contribution to the overall development indicators of the country.

The purpose of the study is to show the peculiarities of the natural and economic conditions that influence the development of the food supply system in the region on the basis of a systematic and integrated approach. The object of the study is the state of the regional food market, which can be characterized by the absence of real threats that are different in nature, that is, these are the vital interests of the population of the region in meeting the need for basic, high-quality and safe food products. As a methodological basis, traditional methods of scientific analysis, abstract-logical, economic-mathematical, monographic, methods of system, structural and comparative analysis, induction and deduction, modelling and analogies were used.

## 2. Results and discussion

The vector of progressive development of productive forces in the Siberian Federal District (SFD) depends on the effective implementation of economic problems in the Krasnoyarsk Territory, among



which a special place is given to the development of agriculture. First of all, it is objectively aimed at forming its own regional food base, and second, at exporting food from the region and abroad.

The region under consideration is distinguished both by the diversity and wealth of its natural conditions and resources. Geographically, it occupies a strategic position, since it is located in Eastern Siberia, almost in the very centre of the Eurasian continent. It should be noted that the territory of the region could act as one of the strategic factors of its socio-economic development. In the north of the Krasnoyarsk Territory, its mainland is bounded by the Kara Sea and the Laptev Sea. In the south, the territory is bordered by the Eastern and Western Sayan Mountains, the Abakan Range and the Kuznetsk Alatau. In the west, the border of the Krasnoyarsk Territory runs along the watershed of the Ob and the Yenisei Rivers, and in the east it spreads along the Central Siberian Plateau, where the Lower and Podkamennaya Tunguska Rivers directly approach in their upper course. The political and administrative border of the region in the west adjoins the Tyumen, Tomsk and Kemerovo regions and the Altai Territory; in the east, the Krasnoyarsk Territory is adjacent to the Republic of Sakha (Yakutia) and the Irkutsk Region, and in the south to the Republic of Tyva and the Republic of Khakassia.

The territory of the Krasnoyarsk Region is 2,366.8 thousand km<sup>2</sup>. Its share in the total territory of Russia is 13.86%. The length of the region from the north to the south is about 3,000 km, from the west to the east it is 1,250 km. In terms of population, the region is the largest one of the Russian Federation in Siberia and the Far East. As of January 1, 2018, 2,876.5 thousand people lived in the region, which is about 15% of the population of the Siberian Federal District and 2% of Russia, with a population density of 1.2 people per km<sup>2</sup>. 2,226.1 thousand people live in cities (there are three cities with a population of 100 thousand people and more: Krasnoyarsk – 1,091.6 thousand, Norilsk - 179.6 thousand, Achinsk - 105.3 thousand), in rural areas 650.4 thousand people live. The share of urban population in the region in relation to the total population is 77.4%; rural one - 22.6%.

The solution of the task aimed at providing high-quality, affordable and full-fledged food products to the population of the region is possible with a rational combination of the activities of large agricultural commercial agricultural organizations, agricultural holdings, agro-industrial groups and small business forms (peasant farms and personal subsidiary farms of citizens). In the future, this will contribute to an increase in the volume of food products aimed at the full satisfaction of the citizens living in the Krasnoyarsk Territory according to recommended medical standards in food and the export of its surplus products outside the region.

It should be noted that the development of the regional agrarian sector of the economy is seriously affected by the scale and heterogeneity of the territory of the region, uneven settlement of the population, significant differences in climate and soil. One should also take into account the current level of specialization and concentration corresponding to natural and economic conditions.

The draft Strategy of the socio-economic development of the Krasnoyarsk Territory until 2030 distinguishes six large macro-districts: Northern, Priangarsky, Central, Western, Eastern and Southern, taking into account the geographical location, the peculiarities of natural and climatic conditions, features of the mineral and raw material potential, historically established specialization, the presence of stable and intensive economic and social relations in the region. Two latitudinal belts are distinguished: North and South. The Northern latitudinal belt includes two macro-districts: the Northern and Priangarsky; and four remaining macro-districts (the Central, Western, Eastern and Southern) are included into the Southern latitudinal belt.

Information about the number of municipal units of the Krasnoyarsk Territory is given in the Law of the Krasnoyarsk Territory of June 10, 2006 No 10-4765 “On the list of administrative-territorial and territorial units of the Krasnoyarsk Territory”. The Krasnoyarsk Territory includes forty-four municipalities and sixteen cities. For example, the Northern macro-district covers the territory of the regions of the Extreme North with very difficult and harsh natural and climatic conditions. It consists of the Taimyr Dolgan-Nenets, Evenk, Turukhansk municipal districts and the city of Norilsk. And Taimyr Dolgan-Nenets, Turukhansk municipal districts and the city of Norilsk are included into the Arctic zone of the Russian Federation.

The territory of the Russian Federation in question is located in the risk farming zone with a low bioclimatic potential (BCP) (0.46–0.48, with 1.0 on average in the Russian Federation). Almost the entire territory of the Krasnoyarsk region (more than 90 %) is located in the zone of fairly severe climate discomfort. It should also be taken into account that the natural areas located within the boundaries of its territory are quite different from each other. A A Kolesnyak correctly pointed out that the differences in the agro-climatic conditions of agricultural production, especially for crop production, which are the objective reason for differentiation and living conditions, are extremely large among the regions of Russia [1]. The main factors that actually determine the efficiency of agricultural production are the provision of heat, moisture and soil fertility. They form a bioclimatic potential, the value of which ranges from 40 points on the northern border of the agricultural zone of the state to 199 points in the most favourable places of the North Caucasus [2].

Basing on the differentiation of the regions of the Russian Federation by soil and climatic conditions Krasnoyarsk Territory was included by A A Kolesnyak into the fourth soil-climatic zone with extreme natural conditions (BCP from 22 to 110) [3]. At the same time, a number of municipal districts, such as: Taimyr Dolgan-Nenets, Evenki, North-Yenisei, Turukhansky, Boguchansky, Yeniseysky, Kezhemsky and Motyginsky, are included into the fifth soil-climatic zone with especially extreme natural conditions (BCP from 19 to 82). Eight municipal districts listed above indicate that the Krasnoyarsk Territory is characterized by considerable unevenness in the development of its territory, which is characterized by the seasonal nature of transport accessibility (the northern delivery of food and other vital goods for the resident population). In municipalities with particularly extreme natural conditions, the economic and physical accessibility of food products has a number of features that depend on the specific place where these goods are produced. Therefore, this property affects the prices, volume and structure of the food products sold.

A very large part of the Krasnoyarsk Territory is located in high latitudes with the lowest average January temperature in comparison with the other regions of Russia. In the harsh climatic conditions of the Far North, the population needs more high-calorie foods, a warmer shelter, for heating of which much more energy is needed, more warm clothes, etc. The harsh climate significantly limits the development opportunities not only of regional agriculture, but also of the region as a whole. In this context, the French Scientist E Reklu was quite right when he wrote that territories with an average annual temperature below two degrees below zero or located at an altitude of more than 2000 m above sea level are practically unsuitable for living.

One of the main provisions for the differentiation of regions is the degree of compliance of soil and climatic conditions with the requirements of agricultural production, as the main source of food production (cultivation). It is also impossible not to take into account economic factors - the boundaries of the benefits for residents of the Far North of the Krasnoyarsk Territory, compensating for the direct influence of adverse climatic conditions.

With regard to the specialization of agricultural production in the region, grain production is of federal importance, animal husbandry and poultry farming are of regional importance, all other sub-sectors are of intra-regional importance.

The Krasnoyarsk Territory is divided into 5 zones according to its natural economic conditions: Prigorodnaya (Central), Achinsk forest-steppe, Kansk forest-steppe, Southern forest-steppe, Northern subtaiga. The soil cover of the Krasnoyarsk Territory is extremely diverse. According to the mechanical composition the soil of the region is mainly heavy.

The climate is continental in the region. In the territory there are three climatic zones: arctic, subarctic and temperate. The average January temperature is from - 30 to - 36 ° C in the north and the Central Siberian Plateau and from - 18 to -22 ° C in the Yeniseisk, Krasnoyarsk and south regions. Summer in the central regions is moderately warm, in the south – warm.

The total land area of the Krasnoyarsk Territory as of 01/01/2017 is 236,679.7 thousand hectares. In the structure of the land fund of the region, agricultural land constitutes 16.80%. By area of agricultural land (39760.9 thousand hectares as of January 1, 2017), the Krasnoyarsk Territory ranks first in the Siberian Federal District. In the structure of agricultural land, arable land occupies 2,959.8 thousand

hectares (60.2%), deposits - 124.4 thousand hectares (2.5%), perennial plantings - 25.9 thousand hectares (0.5%), hayfields - 666.9 thousand hectares (13.6%), pasture area is 1,142.8 thousand hectares (23.2%). The area of non-agricultural land in the structure of agricultural land of the region amounted to 34,841.1 thousand hectares. Land plots with tundra vegetation that were not included into other lands in the territories of the Taimyr Dolgan-Nenets and Evenki municipalities, which are used by small indigenous peoples of the North for breeding deer and fishing (hunting, fishing), are assigned to non-agricultural land. Other non-agricultural land is 1,8459.9 thousand hectares or 46.4% of agricultural land.

This category of land is about 10% of the area of the Siberian Federal District, including 2.9 million hectares of arable land. The provision of arable land in it is much higher than in other regions of Eastern Siberia, on average twice, but lower than in Western Siberia by 70%, and in Russia as a whole by 20%.

**Table 1.** Distribution of agricultural land in the Krasnoyarsk Territory by ownership, thousand hectares.

Years	Total land area agricultural use	In private property of citizens	Owned by legal entities	In state and municipal property
2012	39,871.8	2,355.9	139.7	37,376.2
2013	40,622.8	2,246.8	180.8	38,195.2
2014	39,758.3	2,209.3	231.9	37,317.1
2015	39,760.5	2,195.2	248.2	37,317.1
2016	39,760.9	2,183.6	256.4	37,320.9

Agricultural land in the total structure of land resources of the studied region is 12.4%. It is noteworthy that the highest proportion of agricultural land among the lands of the region is characteristic of such zones as: Central (66.9%), Achinsk (66.2%), Southern (64.2%) and Kansk (56, 6%). In the modern period of time there is a reduction of agricultural land used by agricultural organizations and citizens for the production of agricultural products. In 2016 compared to 2012, their area decreased by 110, 9 thousand hectares.

Currently, more than one million hectares of agricultural land is not used in the Krasnoyarsk Territory; in practice just over 60% of arable land is involved in agricultural use. It is noteworthy that a high level of its involvement (more than 80%) takes place in the Kuraginsky district of the southern macrodistrict, in the Uzhursky, Nazarovsky, Sharypovsky, Novoselovsky districts of the Western macrodistrict. In the other municipal districts of the Krasnoyarsk Territory, more than 50% of arable land is not cultivated.

The structure of use of arable land and acreage does not correspond to the recommended one. In accordance with the recommendations of scientific institutions, it is advisable to occupy 51–57% of the area under the above-mentioned cultures. At the same time, grain and leguminous crops in 2012–2016. occupied by macro-regions of the region from 35.6 to 55.2% of the area of arable land used. In the Western and Central macroregions, the proportion of these crops corresponds to scientific recommendations.

The high proportion of the Krasnoyarsk Territory in sown areas in Siberia causes a high proportion of the region in the structure of the gross crop of agricultural crops in the Siberian Federal District.

**Table 2.** Sown areas of crops by categories of farms in 2016 in the Krasnoyarsk Territory (thousand hectares).

	All sown area	Including grain and leguminous crops	Including industrial crops	Including potato and vegetable and melon crops	Including feed crops
Households of all categories, including:	1559.4	1054.0	35.5	82.1	387.9

agricultural organizations	1251.6	866.0	31.9	5.3	348.4
households	78.1	3.1	0.0	73.0	2.0
peasant farms	229.7	184.9	3.5	3.9	37.5

The qualitative functioning of the agro-industrial complex of the region is directly determined by the quantitative and qualitative characteristics of the agricultural machinery used by agricultural producers.

In the modern period of time, the overall level of agricultural mechanization in the Krasnoyarsk Territory is quite low. Moreover, new agricultural machines, combines, pedigree cattle and equipment by agricultural producers of the region due to difficulties with financial resources are purchased from most of them in minimal quantities.

The technical potential of agricultural machines that are in the use of agricultural producers in the Krasnoyarsk Territory is not only physically worn out, but also morally obsolete.

During the study period, the availability of tractors for 1,000 hectares of arable land from 2013 to 2017 was reduced from 3.0 to 2.0 units, combine harvesters per 1000 hectares of sowing (planting) remained at the same level of 3.0 units, potato harvesters per 1000 hectares seeding (planting) decreased from 21 units to 15 units (table 3.). The above indicators are significantly inferior to those in developed foreign countries. For example, per 1,000 hectares of arable land in the United States accounts for 27.6 units, and in Germany - 79.4 units.

The load of arable land for 1 tractor for the specified period increased from 354 hectares to 432 hectares, on 1 combine harvester from 321 hectares to 381 hectares, for 1 potato harvester - from 48 hectares to 65 hectares.

**Table 3.** Provision of agricultural organizations with tractors and combine harvesters in the Krasnoyarsk Territory (at the end of the year).

	2013	2014	2015	2016	2017
Tractors for 1000 hectares of arable land, pcs.	3	3	2	2	2
The load of arable land on one tractor, ha	354	386	407	424	432
There are combines for 1000 hectares of crops (planting) of the respective crops, pieces:					
grain harvesting	3	3	3	3	3
potato harvesters	21	16	19	18	15
It is necessary to plant (plant) the corresponding crops for one combine, ha:					
grain harvesting	321	343	356	369	381
potato harvesting	48	62	54	56	65

The main reason for the permanent decrease in the machine-tractor park is the lack of financial resources from food producers. In the context of the ongoing financial crisis, the amount of agricultural equipment purchased is much less than its write-down due to wear. The apparent insecurity of food producers with tractors, combines, mowers, balers, cultivators and other agricultural equipment leads to lower efficiency of agricultural production: an increase in the period of field work, a significant increase in losses of agricultural products and a decrease in yield.

### 3. Conclusion

As a result, it can be concluded that the above-mentioned features of the natural and economic conditions of the Krasnoyarsk Territory should be taken into account when solving the problem of food supply of the population of the region for the near future.

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