

Identifying threats and assessing the interaction of factors of economic growth in the regions of Russia

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Abstract — The authors of the article proposed a methodology for assessing the food security of the region, whose methodological tools were tested on the example of the Volgograd region. In contrast to the concept of “standard of living”, which focuses on the quantitative aspects of providing people with consumer goods, quality of life, by the very meaning of this concept, is intended to draw attention to those aspects of people's lives that do not fit into the concept of standard of living, but are so important that their life can lose all meaning. In recent years, there is a conviction that the quality of life should be adequately assessed and become one of the main indicators of the results of the socio-economic policy of the state and the activities of public organizations. The tasks of improving the quality of life of the population of a region cannot be considered in isolation from the need to provide people with the most necessary - healthy, adequate food. Therefore, issues of ensuring food security come to the fore in the formation of the socio-economic policy of regional authorities. The approach proposed by the authors is based on the understanding of food security in the region as a complex indicator consisting of physical accessibility of food, economic affordability of food, the balance of nutrition, sustainability of the food system. Each of the criteria for food security in the region is described by a set of indicators, the number and ratio of which is optimal for research purposes. An assessment of the dynamics of changes in changes in the basic processes in the food sector has been conducted. It is revealed that the Volgograd region had a sufficient level of food security for 2012-2016. The areas that require intervention by regional authorities that may arise in the future are highlighted: an insufficient level of production of meat and dairy agricultural products; a significant deterioration in the quality of nutrition of the population of the Volgograd region, depends mainly on the low consumption of animal products; growth of the population with incomes below the subsistence minimum; reduction of the share of the population employed in agriculture, one of the reasons may be an insufficient level of wages; low level of technical modernization and innovative development of the agro-industrial complex.

Keywords— *quality of life, food security of the population, socio-economic development of the region, socio-economic policy, rating system of assessment*

I. INTRODUCTION

Nowadays, in economically developed countries, a huge number of statistical indicators characterizing the society from various sides are calculated and published, both at the current moment and in retrospect. The effectiveness of economic and social policy in the modern world, as is well known, largely depends on the quality of the indicators used in its development [1, 2]. However, the aggregate indicators, currently calculated by official statistical bodies, leave a wide scope for different interpretations. If the goal of a country's socioeconomic development is formulated in terms of such indicators, such as, in particular, the achievement by some of them of a new higher level (for example, doubling GDP over the next 10 years), then the natural question that arises is whether the indicated growth will mean a corresponding improvement in the life of the population. In such measuring systems, indicators describing the food security of the territory, as well as evaluating the effectiveness of the regional authorities' policies to achieve food security are practically absent [3, 4]. However, the category of “quality of life” in relation to the development of Russian regions should now be interpreted in a narrower sense of satisfying people's nutritional needs, housing, security, education, sustainable heat, energy, and water supply, the functioning of housing and communal services [5 - 7]. These people needs are top priorities of the strategic development of the majority of regions since the degree of their satisfaction is still insufficient for the majority of the population [8, 9].

This can be confirmed by the fact that in many strategic plans of the Russian regions, quality of life is usually understood as a combination of the most urgent needs of residents: wages in excess of the subsistence minimum, necessary social guarantees for the disabled population, quality of housing and utilities, safety of the living environment residents, etc. Therefore, the assessment of the quality of life of the population is impossible without

measuring the food security of the territory, as well as the effectiveness of the regional authorities' policies to achieve food security [10, 11].

The country's food security is an integral part of its national security, which is a priority of state policy, as it covers a wide range of national, economic, social, demographic and environmental factors.

Ensuring food security contributes to a sustainable social climate in society. In the absence of the necessary reserves and reserves in the regions, it can lead to social tensions in society, which makes it possible to consider the food problem as the most important structural element ensuring the national security of the country.

It should be noted that to ensure sustainable and dynamic development of the Russian economy, it is necessary to maintain a stable level of food security in each region of the country, which is characterized by partial independence and integration with the interests of the country [12].

At the same time, the economic development of the region has its specific features that influence the methods for assessing the state of food security. Due to the instability of the domestic and foreign policy of the country, adjustments are needed in monitoring indicators and their interpretation.

These circumstances make it difficult to determine general principles for assessing the level of food security in the region and threshold values for each indicator of the system. This fact indicates the relevance of the study of regional aspects of food security and the need to develop new mechanisms for assessing or modifying existing ones that take into account the economic specifics of the region.

The purpose of this study is to assess and monitor the state of food security in the Volgograd region.

The objectives of this study are:

- develop a methodology for assessing food security at the regional level;
- evaluate the dynamics of changes in the main processes in the food sector of the Volgograd region;
- identify problem areas characteristic of the Volgograd region and suggest possible measures to eliminate negative phenomena

II. MATERIALS AND METHODS (MODEL)

In this paper, the authors proposed a method for assessing the state of food security in the Volgograd region based on the calculation of the integral indicator measured in points.

To assess food security, the authors proposed a system of indicators consisting of four groups of indicators, allowing to analyze the level of security in the region, namely:

1. Physical accessibility:
x1 - self-sufficiency ratio;

x2 - the coefficient of dependence on imports;

2. Economic accessibility:

x3 - poverty ratio,%;

x4 - the ratio of actual consumption%;

x5 - income concentration ratio (Gini index);

3. Balanced nutrition:

x6 - the ratio of caloric intake,%;

x7 - power adequacy ratio;

4. Sustainability of the food system:

x8 - the proportion of people employed in agriculture in the total number of the employed population,%;

x9 - the average wage of those working in agriculture in relation to the average wage in the region;

x10 - the level of profitability for all activities of agricultural organizations, including subsidies from budgets,%;

x11 - the share of unprofitable organizations in the total number of agricultural organizations,%;

x12 - the power capacity per 100 hectares of a sown area, hp;

x13 - the coefficient for updating equipment,%;

x14 - investment in the fixed capital of the agro-industrial complex (excluding forestry), mln. rub.

The physical availability of food assesses the availability of food in the region and their accessibility to the population. This group is estimated using an indicator of self-sufficiency and food import dependency ratio.

Self-sufficiency rate (K_s) describes how fully the region meets the needs of the population in various types of food products through local production:

$$K_s = \frac{q}{nq_p}$$

The calculation of the indicator is based on data on the actual production of the main types of agricultural products in the region for the reporting period (q), information on the population living in the region (n) and the amount of food required for the region in accordance with established rational consumption rates (q_p).

The coefficient of food import dependence (K_{im}) is calculated as the ratio of the difference in imports (including imports) and exports (including exports) of main food products to their consumption in the region.

The economic accessibility of food products implies access to them by all segments of the population due to the existing effective demand. According to the Doctrine [13], the economic affordability of food is determined by the possibility of purchasing food at the prevailing prices in quantities and assortment that are not less than the established rational consumption standards, which are provided with an appropriate level of income of the population. This criterion of food security in the region is determined by the level of economic and social development of the state. It determines the ability of various segments of the population to consume food in the required

volume and range, purchasing them at market prices, producing them in their own farms, etc.

The economic accessibility of a region is expressed in terms of poverty rates (K_a), purchasing power of incomes of the region's population (K_b) and income concentration ratio (K_c). The coefficients are calculated by federal and territorial organizations of state statistics.

Nutrition balance implies the consumption of high-quality food in sufficient quantity for maintaining an active and healthy life with the appropriate content of macro-and micronutrients for a balanced diet. This criterion of food security in the region is assessed by the coefficient of sufficiency (calorie) nutrition and the coefficient of the sufficiency of nutrition.

The coefficient of sufficiency (caloric) nutrition (K_d) is determined by comparing the actual caloric level of food included in the daily diet of a person with a crisis value.

The coefficient of actual food consumption (K_f) is used to assess the level of satisfaction of the physiological needs of the population in food. This indicator is calculated as the ratio of the actual level of food consumption for a certain period of time (q_{fact}) to rational consumption norms (q_{norm}):

$$K_f = \frac{q_{fact}}{q_{norm}}$$

The sustainability of the food system is determined by the ability to provide the population with the necessary amount of food of adequate quality (taking into account the state food reserves) in both normal and emergency conditions (wars, natural disasters, man-made disasters). Sustainability means that the food system is developing in the mode of expanded reproduction. It is provided by a high level of social and economic development of the state, positive economic changes, stable functioning of the agro-industrial complex.

Thus, the food security of the region is a complex character and is a system that consists of 4 groups of indicators: physical accessibility of food, economic affordability of food, balanced nutrition, and sustainability of the food system.

The proposed system of indicators for assessing the food security of the region meets the basic requirements for a system of indicators:

- the number of indicators does not exceed the optimal number of input indicators, which should not be more than 25;
- the balance between diagnostic and strategic indicators

To calculate the integral indicator of food security in the region, a rating system will be used. The choice of this method is due to the fact that:

- no standard assessment intervals are set;
- the system of indicators consists of indicators that have a different nature and are not always completely specific.

Since the rating is a multi-point system for assessing any activity or condition, it is necessary to build a rating scale

that takes into account the peculiarities of the distribution of values of indicators of food security in the region. To obtain interval estimates, a statistical approach will be used in the work. For each indicator x_i (i is the index number of the indicator), the average indicator is calculated using the formula:

$$\bar{x}_i = \frac{\sum_{j=1}^{j=N} x_{ij}}{N},$$

where x_{ij} is the value of indicator i for a j region; N is the number of subjects (regions).

The area of change the index of i [$x_i^{min}; x_i^{max}$] was divided into n intervals with centers at the point \bar{x} . For the length of the segment, the following value was chosen: $\delta = \alpha \sigma_{x_i}$, where σ_{x_i} is the standard deviation for the indicator x_{ij} and α is the empirical coefficient, which is chosen to be the same for all types of indicators.

The first indicator (or the last one) is assigned a rating value of 0, and the last one - M (M is the maximum rating value). For each indicator is determined by its own number of intervals.

The integral indicator of food security will be calculated as the sum of the ratings of the selected subsystems:

$$I_{fs} = PA + EA + BN + SFS,$$

where PA is physical accessibility, EA is economic affordability, BN is the balance of nutrition, SFS is the sustainability of the food system.

III. RESULTS AND DISCUSSION

For the Volgograd region, an assessment was made of the dynamics of changes in the main processes in the food sector from 2012 to 2016. The problem areas characteristic of the Volgograd region were identified and possible measures were proposed to level them or eliminate negative phenomena.

Volgograd region belongs to the regions of agrarian type, most of the land has an agricultural purpose. At the same time, the region has a favorable economic and geographical location, a developed transport network and the availability of natural resources.

To calculate the level of food self-sufficiency in the Volgograd region, we consider the actual production volumes of the main types of food in the region.

As can be seen from Table I, the production of some types of agricultural products has increased since 2012, production increased in volumes: potatoes by 3.6%, vegetables by 11.8%, fruits and berries by 19.7%, and eggs by 2.4 % At the same time, the production of milk (by 1.1%) and meat (by 2.1%) decreased.

TABLE I. VOLUME OF FOOD PRODUCTION IN THE TERRITORY OF THE VOLGOGRAD REGION FOR 2012–2016. (THOU. TONS)

Indicator	2012	2013	2014	2015	2016	Ratio of 2016 to 2012, %
Potatoes	401,1	385,2	399,7	428,3	415,7	103,6
Milk and dairy products	521,2	529,6	523	511,3	515,6	98,9
Meat and meat products	145,6	142,5	151	146,9	142,6	97,9
Vegetables and gourds	1057,2	1015,1	1050,8	1 127,6	1182,3	111,8
Fruits and berries	158,5	191,9	191,7	188,4	189,7	119,7
Egg, mln	778,3	734	754,7	761,2	796,6	102,4

TABLE II. THE LEVEL OF FOOD SELF-SECURITY BY FOOD IN THE VOLGOGRAD REGION FOR 2012-2016.

Indicator	2012	2013	2014	2015	2016	Ratio of 2016 to 2012, %
Potatoes	1,73	1,67	1,74	1,87	1,82	105,6
Milk and dairy products	0,62	0,63	0,63	0,62	0,63	100,8
Meat and meat products	0,77	0,76	0,81	0,79	0,77	99,8
Vegetables and gourds	2,92	2,82	2,94	3,16	3,33	114,0
Fruits and berries	0,61	0,75	0,75	0,74	0,75	122,0
Egg, mln	1,16	1,10	1,14	1,15	1,21	104,3
Average value	1,30	1,29	1,33	1,39	1,42	108,9

TABLE III. DEPENDENCE OF THE VOLGOGRAD REGION ON THE IMPLEMENTATION OF VARIOUS TYPES OF FOOD FOR 2012-2016. (%)

Indicator	2012	2013	2014	2015	2016	Difference between 2016 and 2012, %
Potatoes	40,24	44,22	41,80	34,34	28,57	11,7
Milk and dairy products	8,72	9,03	5,61	3,17	0,50	8,2
Meat	25,98	27,78	21,22	21,42	24,96	1,0
Vegetables and gourds	-130,82	-128,19	-125,42	-141,62	-163,07	32,2
Fruits and berries	39,01	32,40	30,69	22,18	23,66	15,3
Egg, mln	9,80	13,98	17,89	13,12	7,67	2,1

TABLE IV. TABLE IV. LEVEL OF ECONOMIC ACCESSIBILITY OF THE VOLGOGRAD REGION FOR 2012-2016.

Indicator	2012	2013	2014	2015	2016
Poverty ratio (%)	13,60	13,60	14,00	14,70	15,30
Consumption rate (%)	27,38	33,70	31,52	31,91	31,40
Index Gini	0,37	0,37	0,36	0,36	0,34

TABLE V. TABLE V. INDICATORS OF THE STABILITY OF THE FOOD SYSTEM OF THE VOLGOGRAD REGION FOR 2012-2016.

Indicator	2012	2013	2014	2015	2016
The share of the population employed in agriculture, %	17	17,1	16,3	15,3	13,7
The average wage of workers in agriculture in relation to the average wage in the region, %	0,61	0,61	0,67	0,70	0,75
Profitability level for all activities of agricultural organizations, including subsidies from budgets, %	16,50	13,50	27,60	26,80	30,90
The share of unprofitable organizations in the total number of agricultural organizations, %	26,80	21,90	12,70	14,40	8,20
Energy capacity per 100 hectares of cultivated area, hp.	184	186	179	174	155
Update rate of equipment, %	2,60	2,50	3,20	3,30	3,30
Investments in fixed capital of agro-industrial complex, mln. rubles	6583,5	5758	5169,5	3953,5	5370,6

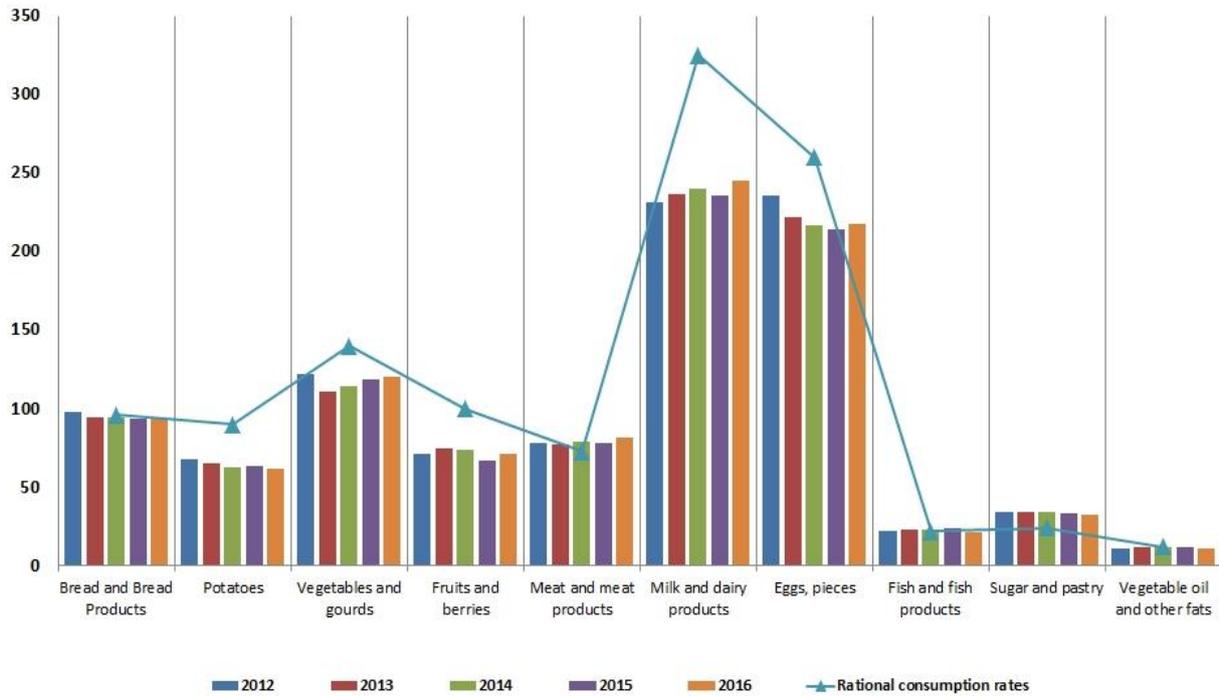


Fig. 1. Level of actual consumption of basic foodstuffs in the Volgograd region for 2012–2016, kg

TABLE VI. ASSESSMENT OF THE CONDITION OF FOOD SECURITY OF THE VOLGOGRAD REGION FOR 2012-2016, IN BALLS

Evaluation criterion	2012	2013	2014	2015	2016
Physical accessibility					
Self-sufficiency ratio	2	2	2	2	3
Import dependency ratio	3	3	3	3	3
Economic accessibility					
Poverty ratio	2	2	2	2	2
Consumption factor	3	2	2	3	3
Coefficient Gini	4	3	3	3	3
Balanced nutrition					
Actual Consumption Ratio	2	2	2	2	2
Calorie Coefficient	2	2	2	2	2
Sustainability of the food system					
Proportion of population employed in agriculture	3	3	3	3	3
The average wage working in agriculture in relation to the average wage in the region	2	2	2	2	2
The level of profitability for all activities of agricultural organizations, including subsidies from budgets	3	3	4	3	4
The share of unprofitable organizations in the total number of agricultural organizations	2	2	3	2	3
Energy capacity per 100 hectares of cultivated area	1	1	1	1	1
The coefficient updates technic	1	2	2	2	2
Investments in fixed capital of agro-industrial complex	3	2	2	2	2
Food Security (I_{fs})	33	31	33	32	35

In accordance with the data in Table II, the overall level of self-sufficiency has increased by 8.9% in 2016 compared to 2012. Potatoes, vegetables, and eggs are produced in sufficient volume on the territory of the Volgograd region. At the same time, there are three times more vegetables and melons that are necessary for consumption by the population of the region.

However, not enough milk and dairy products are produced on the territory of the Volgograd region (an average of 63% of the products required for consumption), as well as of meat and meat products (78%), and of fruits and berries (72%).

There is a negative trend in the production of meat and meat products, until 2014 the value of the indicator grew, but by 2016 it returned to the previous level. In turn, the production of milk and dairy products has remained almost unchanged for five years.

Analyzing the dependence of the Volgograd region on the import (including imports) of basic foodstuffs (see table III), there is a positive trend in reducing the volume of food imports to the region in 2016 compared to 2011: 11.7% - potatoes, 8.2% - milk and dairy products, 1% - meat, 15.3% - fruits and berries, 2.1% - eggs. At the same time, Volgograd region is an exporter of vegetables and melons. In 2016, 63% more vegetables were exported from the territory of the region that is needed for consumption by the population of the region.

To calculate the level of economic affordability of food, consider the dynamics of three indicators (see Table IV): the number of people with incomes below the subsistence minimum (poverty ratio); the share of expenditure on the purchase of food in the structure of consumer spending of the population (consumption coefficient); the degree of uneven distribution of the population by income level (Gini index).

Analysis of table IV showed that since 2012, the proportion of the population with incomes below the subsistence minimum has increased by 13%. Despite the fact that the poverty ratio is growing, the degree of uneven distribution of the population by income level has decreased. At the same time, expenditures of the population on the purchase of foodstuffs increased by 15%. However, in general, the value of this indicator is quite good.

The actual consumption of basic foodstuffs in the Volgograd region is characterized at a satisfactory level (see Table V).

In the region, there is insufficient consumption of potatoes, milk, fruits, and berries; the population of the region is about 25% more than necessary by the established medical standards. The actual consumption of vegetables and eggs is reduced by 15%.

The dynamics of indicators characterizing the sustainability of the food system in the region is presented in Figure 1. In accordance with the data presented in the table, it can be concluded that in the agro-industrial complex of the Volgograd region there are both positive and negative trends.

The share of employees in the agricultural sector decreased from 17% in 2012 to 13.7% in 2016. The level of energy capacity per 100 hectares of sown area decreased by 16%,

investment in fixed capital of the agro-industrial complex decreased by 18%.

Positive changes in the agro-industrial complex of the Volgograd region are the growth of the average wages of agricultural workers, increasing the profitability level of agricultural organizations by 87% in 2016 compared to 2012. The number of unprofitable agricultural organizations decreased three times (from 26.8% in 2012 to 8.2% in 2016), and the level of renewal of agricultural equipment increased by 27%.

With the help of a rating evaluation system, the level of food security of the Volgograd region was analyzed (see Table VI).

Analyzing the results, we can conclude that during 2012-2016. Volgograd region had a fairly high level of food security.

In accordance with the assessment, the problem areas of the food sector are highlighted:

- there is an insufficient level of production of meat and dairy agricultural products;
- a deterioration in the quality of nutrition of the population of the Volgograd region due to low consumption of animal products is recorded. Low consumption of protein products and valuable carbohydrates inevitably affects the health of the population of the region;
- there is an increase in the population with incomes below the subsistence minimum;
- the share of the population employed in agriculture is declining, where one of the possible reasons may be an insufficient level of wages;
- There is a low level of technical modernization and innovative development of the agro-industrial complex.

In accordance with the Decree of the Administration of the Volgograd Region, the state program "Development of Agriculture and Regulation of Markets for Agricultural Products, Raw Materials and Food" was adopted. The implementation of this program is aimed at solving the following tasks:

- an increase in the production of agricultural products to ensure food security of the Volgograd region;
- improving the competitiveness of local agricultural products;
- improving the financial sustainability of producers of the agro-industrial complex;
- improving the efficiency and rational use of land resources in agriculture;
- development of the fishery complex;
- increasing the marketability of agricultural products through the creation of conditions for its seasonal storage and part-time work

According to this program, measures will be taken to solve not only the problems identified through analysis, but also a number of issues related not only to food security, but also the development of the agro-industrial complex of the region.

IV. CONCLUSION

Food security is one of the priorities of national security. However, the effective functioning of the state economy is impossible without maintaining a stable level of development of each region of the country. Therefore, ensuring a high level of food security in the region is currently an urgent task. However, achieving a sustainable state of the system is impossible without regular analysis.

In the present study, based on the methodology developed by the authors, the state of food security of the Volgograd region was assessed.

It is revealed that the Volgograd region is characterized by a fairly high level of food security.

Problems in the food sector that require intervention by regional authorities that may arise in the future are highlighted: there is an insufficient level of production of meat and dairy agricultural products; deterioration in the quality of nutrition of the population of the Volgograd region due to low consumption of animal products; the increase in the proportion of the population with incomes below the subsistence minimum; reducing the proportion of the population employed in agriculture; low level of technical modernization and innovative development of the agro-industrial complex.

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