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Food security of the Arctic zone regions in the Russian Federation: formation of methodological principles and performance indicators

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Abstract. The paper is devoted to the formation of a system of indicators for monitoring threats to food security in the regions of the Arctic zone of the Russian Federation (AZRF). The theoretical basis for the study included the results of the analysis of the accumulated foreign experience and current Russian practice on food safety assessment at the federal and regional levels. Focusing on the studied approaches, taking into account the identified advantages and disadvantages, the authors have compiled a list of methodological principles, on the basis of which a comprehensive system of indicators and indicators for assessing food security in the Arctic regions has been proposed. The results of the study can be used by regional and federal government to monitor risks and threats in the food sector of the Arctic territories, as well as to adjust existing regulatory and strategic documents and improve the mechanisms for ensuring food security in the Russian Arctic.

1. Introduction

Food security is the most important structural element of the economic security system, and, accordingly, an integral part of the national security of the state. Improving the provision of the population with food is an important socio-economic problem, the solution of which is of paramount importance at all levels of the organization of power. So, being the most important component of state policy, food security comprehensively affects various aspects of the life of an individual, village, city, region and the state as a whole. Here the key problems of macroeconomic growth intersect with the development of the economy of the country, the region, and the municipality.

The territory of the Russian Federation has some vulnerable regions for which the problem of food security is extremely relevant due to the specifics of the economic and geographical situation, natural and climatic conditions and socio-economic development. These are regions of the Russian Arctic.

A significant increase in the problem of food security is caused by the socio-economic transformation of the Russian economy, which began in 1991, which led to a sharp deterioration in the economic situation in the country, and also affected the decrease in transport accessibility and the deterioration of food supply in the Arctic regions which were carried out from the southern regions of Russia. For these and other reasons, the food supply of small indigenous peoples remains in dire straits. Therefore, the formation and development of the food supply system of the Arctic territories requires the solution of a complex of technical, technological, economic and organizational issues.

Over the past decade, the minimum necessary package of regulatory acts controlling various aspects of the implementation of the state policy regarding the Arctic zone and the Northern Sea Route has been



formed in the Russian Federation. On the other hand, the current program documents on the development of the Russian Arctic are characterised by the following: the achieved level of socio-economic development of the Russian Arctic is not defined; there is no analysis of the current situation and significant imbalances of the macro region, including in the context of Russian entities identified in the Russian Arctic; there is no target indicator system for assessing threats to the economic (including food) security of the Russian Arctic and their threshold values [1].

In studies of foreign and Russian scientists there is no comprehensive scientific substantiation of the methodological support for assessing threats to food security in the Arctic and subarctic territories, where agricultural production operates in difficult and unfavourable extreme conditions. As a result, many tasks of the organizational and economic substantiation of the food supply system in the Arctic territories of the country remain unresolved. Based on the above, the purpose of the study is to develop a comprehensive system of assessment indicators aimed at identifying threats to food security in the regions of the Arctic zone of the Russian Federation, taking into account all the features inherent in these territories.

2. Methods

Maintaining an adequate level of socio-economic development and the quality of life of the population of the territories of the Arctic zone of Russia is the main objective of the functioning of the food security system and all its structural elements. An objective assessment of the achievement of this goal is reflected through an analysis of the current state of implementation of the economic policy in the field of food safety of the object of study. An applied tool for assessing the level of food security and identifying threats is a system of criteria and indicators. The system of assessment indicators in the framework of regional studies should be based on their specificity, reflect the current sustainability of the socio-economic situation and promising interests in the area of food security, characterize the level and quality of life of the local population.

World experience in assessing the level of food security indicates the need to use a single indicator, presented in the form of an aggregated index. Composite indicators aimed at the synthesis of various aspects characterizing food security are as follows [2]: the Global Food Security Index (GFSI), the Global Hunger Index (GHI), the Poverty and Hunger Index (PHI). Private indicators of global food safety assessment indices, as a rule, boil down to indicators characterizing economic and physical accessibility, as well as food quality and safety. As additional criteria for assessing food security can be used: the state of public health [3]; the stability of food supplies [3]; degree of safety of food components and/or pollutants [4]; food vulnerability/sustainability [2].

On the other hand, aggregated indicators are rather difficult to synthesize and interpret [8]; there are difficulties in translating an aggregated index with an established list of particular criteria to the sub-federal level.

In the Russian Federation, the Food Security Doctrine [5] officially establishes three groups of assessment criteria: 1) the scope of consumption; 2) the sphere of production and national competitiveness; 3) the scope of organization and management. The Doctrine also states that for assessing the state of food security, the criterion is determined by the proportion of domestic agricultural, fishery products and food in the total volume of commodity resources (taking into account transfer stocks) of the domestic market of relevant products, which has established threshold values. The Government of the Russian Federation approved a list of indicators in the field of food security, which includes target indicators of the state of food security, indicators of monitoring of the state of food security and indicators of forecasting the state of food security [7]. In fact, these basic criteria form the basis for the formation of methodological approaches to the assessment of food security at the regional level [8-10].

Summarizing the above, we can conclude that these indicators can only serve as a basis for comparing the state of food security in the country as a whole, however, not all indicators are applicable to the regional level, and even more so to the municipalities. Here it is worth making an important comment: the difficulty to find the optimal system of indicators and attempts to adapt them to the regions of the Russian Arctic is that the Arctic zone consists not only of the regions whose territory is fully included

in the Arctic zone (4 regions), but also of regions whose territories are partially related to the Arctic (5 regions). Therefore, it is necessary to take into account the possibility of adapting the indicators to the level of the region and municipality.

3. Results

Basing on the identified advantages and disadvantages of the studied approaches, as well as taking into account the restrictive criterion of accessibility of official statistics, according to the authors, it is advisable to build a system of indicators for assessing the food security of the regions of the Arctic zone on the basis of the following principles:

- target orientation - the direction of the assessment procedure to achieve a specific goal that meets strategic interests in accordance with established strategic priorities in the context of the socio-economic development of the Arctic macro-region;
- systematic - taking into account each of the indicators in the assessment system as a private indicator characterizing one of the aspects of the entire population; carrying out a procedure for interpreting the results of the assessment both in the context of an independent indicator, and in conjunction with others;
- complexity - a comprehensive reflection of the assessment of food security, including: the level of self-sufficiency and food independence; food quality; physical and economic accessibility; technological, investment and transport infrastructure components;
- comparability - the ability to compare data at the municipal, regional and federal levels;
- time orientation - carrying out an assessment procedure with reference to a specific time horizon, which is caused by the necessity of comparing data with previous periods, forming a time series and calculating the level of food security in order to identify changes that allow to anticipate the consequences, as well as the possibility of implementing the forecast;
- information and analytical security - assessment based on statistical data provided by official systems of information and statistical accounting and analysis;
- reliability and transparency - a guarantee of a system of indicators of reliability of the results obtained that are suitable for use, which are adequate to modern socio-economic processes. The calculated indicators are accessible and understandable to external users in order to implement the functions of external control;
- practice-oriented importance - the ability to use a system of indicators and assessment indicators by regional and federal government bodies to adjust strategic, regulatory and legal documentation and improve food safety mechanisms.

According to the authors, the formation of a system of indicators and organizational procedures for economic evaluation in accordance with the outlined methodological principles can guarantee obtaining the necessary accuracy and reliability of the calculations.

Proposed by the authors in accordance with table 1, the system for assessing the food security of the regions of the Arctic zone of the Russian Federation is a set of assessment indicators differentiated by groups of specific threats taking into account the principles developed.

Table 1. Justification of the choice of indicators of food security according to specific threats to the Arctic zone.

Food safety threats	Indicators	Thresholds
Absolute inability of the regions to ensure food security through their own production	Self-sufficiency ratio of main types of food	At least 0.5 ^a
	Import coverage ratio	At least 0.3 ^a
	The cost of the minimum set of food	Analysis in dynamics

High food prices due to increased “northern” costs	The coefficient of purchasing power of population income	Not more than 0.7
	Poverty ratio	Not more than 0.2
	Gini index	Not more than 0.4
Lack of food consumption in accordance with rational norms of the energy content of nutrients	Calorie ratio	At least 1520 k/cal
	Power structure ratio	At least (-30)
Low quality food due to the long delivery time on the territory of the Russian Arctic	Quality ratio (proportion of rejected goods)	Not more than 0.2
The economic inaccessibility of food for low-income people, especially rural; significant income differentiation of the Russian Arctic; the expansion of the zone of depression and poverty of the Russian Arctic	The minimum subsistence level	Differentiation Analysis in dynamics
	Per capita income	Analysis in dynamics
	Proportion of population with incomes below the subsistence minimum	7%
Non-compliance with the rational in quantity and quality of food consumption by the majority of the population of the Russian Arctic	Actual consumption ratio	At least 1
	Food balances for each region	-
A high degree of technological lag and wear and tear of the basic production assets of agricultural enterprises of the regions of the Russian Arctic	The degree of depreciation of fixed assets in the agricultural sector	Not more than 60%
Underdevelopment of the transport infrastructure of the Russian Arctic	The ratio of the average for the Russian Federation density of public railways to the regional	-
Low quality food due to the long delivery time on the territory of the Russian Arctic	The ratio of the average in the Russian Federation	-
The economic inaccessibility of food for low-income people, especially rural; significant income differentiation of the Russian Arctic; the expansion of the zone of depression and poverty of the Russian Arctic	the density of public roads to the regional,	At least 20% ^a
	The share of transport in the region's GRP,%	-
	Load capacity of the economy (ratio of freight turnover in tkm to GRP), tkm / 100 rub. GRP)	At least 40% ^a
Non-compliance with the rational in quantity and quality of food consumption by the majority of the population of the Russian Arctic	The share of investment in the development of transport	Analysis in dynamics

^a The threshold value is proposed by the authors and can be changed depending on the specifics of the territory.

Note: Source: the table is compiled by the authors.

It should be noted that this list should be systematically reviewed, possible changes and additions by expert experts engaged in relevant activities. According to the authors, a prerequisite is the presence of both absolute and relative indicators in the evaluation system. The system of absolute indicators allows determining the dynamics of development, identifying changes and factors of influence, ensuring the possibility of the realization of the forecast. The system of relative indicators is aimed at levelling the quantitative differences between the objects of assessment while maintaining their qualitative homogeneity.

4. Conclusion

The concept for assessing the food security of the regions of the Arctic zone proposed by the authors and based on the formation of methodological principles and a system of indicators reveals the

interrelationships between them and imparts a complex nature to their totality, as well as assess the level of food security comprehensively, including: self-sufficiency and food independence; food quality; physical and economic accessibility; technological, investment and transport infrastructure components.

Monitoring based on the proposed indicators is aimed at achieving specific goals set in accordance with strategic priorities in the context of the socio-economic development of the Arctic macro-region. In the assessment process, it is possible to set a different planning horizon (short, medium and long term) depending on the scale of the objectives of state authorities at the macro, meso and micro levels (state, region, municipality). The calculation of the final values of the indicators guarantees the reliability of the results obtained, adequate to the modern socio-economic processes. Estimated indicators are accessible and understandable to external users. Interpretation of assessment results can be carried out both in the context of an independent indicator, and in conjunction with others.

The methodological principles and evaluation indicators developed by the authors determine the need to form an integrated methodology for assessing threats to food security in the Arctic zone of the Russian Federation, which can later be used by regional and federal government bodies to monitor threats in the food sector of the Arctic territories, as well as to adjust existing regulatory legal, strategic documents and improved mechanisms both baking food security in the Russian Arctic.

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