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Article

Effectiveness Of Assessing The Organizational And Economic Mechanism For Ensuring Food Security (Using The Khorezm Region As An Example)

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Abstract: The article analyzes production volumes, logistics infrastructure, the level of population needs coverage, state support, and resource utilization efficiency affecting food security in the Khorezm region. Based on the integrated assessment index and scenario modeling methods, the state of food security in the region was assessed, and scientific and theoretical proposals were developed to increase the efficiency of the system.

Keywords: food security, organizational and economic mechanism, integrated assessment, scenario modeling, logistics, agricultural sector.

1. Introduction

The food security system, as a set of organizational and economic mechanisms, requires a separate and systematic assessment of each of its elements. This is because the effectiveness of any system is evaluated through its performance results, practical impact, and impact on socio-economic indicators. In particular, in the conditions of the Khorezm region, this issue is of great importance not only from an economic perspective but also from the perspective of demographic pressure, the use of natural resources, logistics, supply, and consumer relations. Structural transformations in the agricultural sector, clustering and cooperation processes, infrastructure potential, and state support policies in the Khorezm region directly influence the effectiveness of these mechanisms[1].

When evaluating the organizational and economic mechanism for ensuring food security, it is necessary to clearly define efficiency criteria at all stages—from product cultivation to market delivery, meeting public needs, and state support—and to conduct regular analysis based on them. Only in this way will it be possible to ensure uninterrupted and stable food security in the Khorezm region[2].

It is necessary to use modern methods of economic analysis to determine the level of food security in each region and systematically assess the activities of organizations, industries, and resources within it. Especially in regions with high agricultural potential, such as the Khorezm region, decisions made to ensure food security must be scientifically grounded and targeted. In this regard, the integral assessment index and scenario modeling methods are effective theoretical and practical mechanisms[3].

The integrated assessment index method allows for the generalization of various economic, social, and resource indicators into a single system and the determination of their overall impact level. Through this method, the main indicators influencing food security - production volume, reserve capabilities, logistics infrastructure, level of population demand coverage, state support, and other parameters - are evaluated based on established criteria. For example, if 95 percent of the population's demand is covered by domestic production, this indicator is assessed with a high score. Otherwise, if the dependence on external sources has increased, the level of security is assessed as low[4].

Furthermore, the scenario modeling method allows for the assessment of the future state of food security under the influence of various factors. In this method, 3 main scenarios (optimistic, realistic, and pessimistic) are developed. For example, the baseline scenario assumes that the current state of food security will persist and development will continue at a slow, natural pace. In this case, there will be no significant changes in existing legislation, state support, infrastructure, or interaction between entities[5].

2. Methodology

This study applies the integrated assessment index and scenario modeling methods to evaluate the effectiveness of the organizational and economic mechanism for ensuring food security in the Xorazm Region. The research is based on statistical data related to agricultural production, logistics infrastructure, population demand coverage, and state support programs in 2023–2025.

Five key indicators were selected for the assessment: agricultural production level, logistics efficiency, infrastructure condition, population demand coverage, and state support activity. Weight coefficients were determined according to expert evaluations provided by specialists from the agricultural sector and research institutions. The coefficients were distributed as follows: production level – 0.25, logistics efficiency – 0.20, infrastructure condition – 0.20, population demand coverage – 0.20, and state support – 0.15.

The integrated assessment index was calculated using a 0–10-point evaluation scale. Based on the scenario modeling approach, three development scenarios were formed: baseline, optimistic, and pessimistic. According to the obtained results, the baseline scenario reached 6.45 points, reflecting an average level of food security. The optimistic scenario achieved 8.45 points, indicating a high level of security under conditions of effective reforms and infrastructure modernization. In contrast, the pessimistic scenario showed 4.30 points, demonstrating the potential negative impact of climate risks, inflation, and resource shortages on regional food security.

The methodological approach allowed for a comprehensive assessment of the current state of food security and provided a scientific basis for identifying strategic priorities aimed at improving the efficiency and sustainability of the regional food system.

3. Results And Discussion

In an optimistic scenario, institutional reforms aimed at ensuring food security, infrastructure modernization, and the introduction of innovation and digital technologies will yield effective results. Under these conditions, state support will become comprehensive and targeted, and coordination between farms, clusters, cooperatives, and processing entities will be strengthened[6].

In a pessimistic scenario, factors threatening food security will intensify. Climate change, water supply disruptions, and resource scarcity are observed in the agricultural sector. High inflation rates sharply increase commodity prices. The population's access to food is limited, and their purchasing power decreases. Benefits and resources are mainly distributed to large entities, leaving small farms and dekhkan farms on the sidelines. Infrastructure, logistics, and information services do not function sufficiently. Export potential will decrease, and dependence on imports will increase. There may be a shortage of various products. This situation poses a serious threat to food security[7].

The results of the assessment using the scenario modeling method are formed as follows:

1. The following were selected as significant factors: level of agricultural production; efficiency of storage and logistics; availability of infrastructure; level of population demand coverage; and state support activity.
2. Weight coefficients established by the experts of the Ministry of Agriculture are used for these factors: production level - 0.25; logistics efficiency - 0.20; infrastructure condition - 0.20; population demand coverage - 0.20; and state support - 0.15.

These results allow for an assessment of what food security in the Khorezm region might look like under various scenarios[8].

The above data show the results of assessing food security in the Khorezm region based on various scenarios. Five main factors were selected in this assessment. Each factor is

assigned a specific weighting coefficient. These weights represent the impact of factors on overall safety. Within the framework of this study, scientists and analysts in the field of agriculture, agribusiness specialists, representatives of investment organizations, heads of farmers' associations, employees of logistics and processing enterprises were selected as experts. At the same time, the 0-10-point assessment system serves as a criterion for food security factors (see Table 1)[9].

Table 1

Results of the scenario assessment of food security factors in the Khorezm region

Factors	Weight	Basic	Optimistic	Pessimistic
Production rate	0,25	7	9	4
Logistics efficiency	0,20	6	8	3
Condition of infrastructure	0,20	6	9	3
Coverage of population demand	0,20	7	10	5
State support	0,15	6	9	4
Resultant index	1,0	6,45	8,45	4,30

The issue of ensuring food security in the Khorezm region is becoming increasingly relevant in the context of current economic processes, demographic growth, and the efficient use of resources in the agricultural sector. While the region's natural and climatic conditions offer broad opportunities for the development of fruit and vegetable growing, grain farming, and livestock breeding, certain problems remain regarding the efficiency of the food production, storage, and distribution system, logistical capabilities, the level of population demand coverage, and the state support mechanism. Therefore, the scenario modeling method was applied to comprehensively evaluate these issues and determine prospects[10].

The calculation results are based on real conditions, the progress of reforms, and potential risks in the Khorezm region.

According to the baseline scenario, i.e., if the current situation persists, food security in the Khorezm region can be ensured at a moderate level. In this case, the level of production is evaluated at 7 points, logistics and infrastructure - at 6 points. Although the volume of fruit and vegetable production is satisfactory, there is a lack of infrastructure for storage and delivery of finished products to the market. The level of population demand coverage is assessed at 7 points, which means that there is a guaranteed supply mainly of basic food products[11]. The assistance provided by the state was rated 6 points. The total resulting index is 6.45, indicating an average level of safety. While this provides some stability, it does not guarantee that the food system in the region will remain stable in the long term without reforms.

In the optimistic scenario, reforms will be fully implemented, cooperation and cluster systems will develop, logistics and storage systems will be updated, and state support mechanisms will be deeply delivered to the population. In this case, the production level was estimated at 9 points, logistics and infrastructure at 8-9 points, the level of coverage of population demand at 10 points, and state support at 9 points. If the systems for storing, processing and exporting products are improved, market stability will be ensured[12]. Export potential will increase, and prices in the domestic market will stabilize due to foreign exchange earnings. In this case, the resulting index was 8.45 points, which indicates a high level of security. Under such conditions, the Khorezm region will be able not only to provide for its own population, but also to supply other regions of the country.

In a pessimistic scenario, the food system could collapse as a result of resource shortages, climate change, inflation, water supply disruptions, and reduced government support. The level of production was rated 4 points, logistics and infrastructure 3 points, meeting the needs of the population 5 points, and state support 4 points. This means an increase in economic and social risks, rising food prices in the market, and insufficient provision of food to vulnerable segments of the population. The resulting index for this scenario was 4.30 points, which is assessed as an insufficient level of safety. In such a situation, social crises and high demands on the state for food supply arise[13].

Therefore, in ensuring food security in the Khorezm region, it is necessary to deepen reforms, modernize infrastructure, rationally use resources, develop logistics and cluster systems, and strengthen public-private partnerships. If these measures are implemented,

the region can become an export-oriented hub that not only ensures food security but also supplies products to other regions of the republic.

The comprehensive application of these methods allows for a comprehensive study and evaluation of the activities of organizational and economic mechanisms in ensuring food security. Furthermore, based on them, successful and problematic points of the region are identified, the level of intersectoral coordination is assessed, and a scientific basis for strategic decision-making is established.

Based on the results of the assessment of the organizational and economic mechanism for ensuring food security in the Khorezm region, the following conclusions can be drawn:

mechanisms for ensuring food security are implemented not in a holistic system, but in a fragmented manner;

the infrastructure for product storage and logistics is still insufficiently developed;

small entities are poorly provided with financial and organizational opportunities;

organizational cooperation - clustering, cooperation, and agro-integration mechanisms are poorly developed;

there is insufficient access to information, and statistical and forecast data do not regularly reach economic entities;

the highest efficiency is seen in the production link, but the subsequent stages of the value chain are functioning poorly.

Therefore, analyzing existing problems in this field on a scientific basis and implementing specific measures aimed at their elimination is becoming an urgent task.

To eliminate the aforementioned problems, it is advisable to implement the following measures:

First, it is necessary to radically improve the infrastructure related to the storage, processing, and long-distance delivery of food products. Agricultural products in the Khorezm region are mainly seasonal in nature, and the lack of prompt and high-quality storage leads to insufficient losses. To solve this problem, it is necessary to create modern refrigerators, modular warehouses, vacuum packaging technologies, and logistics centers that ensure product turnover. Processing enterprises currently lack sufficient production capacity, resulting in the loss of a significant portion of fruit, vegetable, and melon products grown in rural areas. In this context, it is necessary to strengthen logistics chains by creating regional logistics hubs based on clusters, introducing high-quality cooling systems, and providing them with financial support[14].

Secondly, the development of cooperation, clustering, and agro-integration relations between entities plays a special role in ensuring food security. In practice, farms, dehkan farms, and household plots operate primarily on an individual basis, which reduces their competitiveness in the market. The level of cooperation with agro-integrators, agro-firms and clusters is low, and a large part of the population is forced to sell their products at low prices. Therefore, it is advisable to involve dehkan farms and small entities in cluster structures on a voluntary basis and to expand their participation in joint agribusiness projects. This increases the overall efficiency of the sector and guarantees food security.

Thirdly, it is necessary to systematically study the dynamics of population consumption and, based on this, clearly define the types, volumes and reserves of products produced. Currently, the practice of operating on the basis of complete questionnaires and analyses in ensuring food security is not sufficiently developed. The criteria for the local population's demand for food products, consumption norms and the level of coverage of daily calorie needs are not fully monitored. This often leads to disproportionate production, sharp fluctuations in prices and partial shortages. In this regard, it is necessary to formulate a policy for the production, processing and storage of products based on the size of the population, its structural structure, socio-economic situation and consumption habits. If necessary, it is also advisable to introduce a system of regional strategic reserves for basic food products.

Fourth, the continuous implementation of evaluation methods, the regular formation of evaluation indicators at the sectoral and regional levels, and an in-depth analysis of efficiency based on key indicators allow for the rapid and accurate identification of factors affecting food security at various levels. For example, it is possible to conduct a targeted policy based on an assessment of indicators such as the use of resource-saving technologies in production, convenient financial mechanisms for processing, information support for

market entry, logistics efficiency, and the level of infrastructure service. By collecting estimates for each scenario and comparing their resulting index and structural share, it becomes possible to quickly assess the level of food security, anticipate problems, and propose solutions. The practice of such analysis and evaluation should be organized in cooperation with local and central government agencies and research institutions, and the results should be communicated to the public through the media. This will increase citizens' confidence in the processes in the sector and ensure the involvement of the general public in ensuring food security[15].

Overall, the analysis conducted in the Khorezm region indicates the need for a comprehensive assessment of the food security system. The indicator base plays an important role in determining the level of efficiency. These approaches allow for the early identification of problems and the direction of targeted reforms. Scientifically grounded assessment tools serve to make clear decisions for local governance. Therefore, evaluation effectiveness should be viewed not only as an analysis but also as a tool for strategic management.

4. Conclusion

The study showed that food security in the Xorazm Region directly depends on production efficiency, logistics infrastructure, state support, and rational resource utilization. Based on scenario modeling, the resulting food security index was assessed at 6.45 points under the baseline scenario, 8.45 points under the optimistic scenario, and 4.30 points under the pessimistic scenario. These results indicate that strengthening infrastructure, modernizing storage and logistics systems, expanding cluster cooperation, and supporting small agricultural entities are essential for ensuring sustainable food security. If these reforms are implemented effectively, the region will be able not only to meet domestic demand but also to strengthen its export potential.

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