Agricultural Communication

Substantiation of Priority Areas to Ensure Food Security in the Russian Federation: A System-Cognitive Analysis

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ABSTRACT

Currently, the Russian population's need for vegetables is satisfied due to domestic production only by 87percent (at a rate of at least 90percent), fruits and berries – by 40percent (at a rate of at least 60percent), and milk – by 84percent (at a rate of at least 90percent). The present work clarifies the defining role of agricultural production taking into account the calculated indicators of food security. The analysis of the population's provision with basic foodstuffs has led to the need to strengthen the competitiveness of Russian agricultural producers. The article predicts managerial decisions that would allow improving the performance efficiency of economic entities on the example of the agricultural sector of the Krasnodar Territory. The article presents an automated system-cognitive analysis of the effect of various factors on the efficiency of agricultural organizations. The degree and areas of the influence of various factors were assessed using SWOT analysis based on empirical data, namely, financial and economic indicators of agricultural enterprises of the Krasnodar Territory. The results of the automated system-cognitive analysis confirmed that subsidies for reimbursement of part of the costs of purchasing agricultural machinery and equipment, as well as subsidies aimed at increasing the productivity of farm animals have a significant impact on profits in the production of livestock products. The problem of modernization of agricultural production is associated with the problem of information and consulting services of agribusiness. The article substantiates the necessity of preparing a spiral scheme of the food security model, as well as emphasizes the importance of establishing and developing various service-providing consulting centers.

KEY WORDS: FOOD SECURITY, FOOD SELF-SUFFICIENCY, INNOVATION, STATE SUPPORT, STRUCTURAL TRANSFORMATION OF AGRIBUSINESS.

INTRODUCTION

Food security should be considered as the most important priority task facing Russia. The solution to this problem is mainly associated with eliminating the negative effects of earlier agrarian reforms, updating the economic, technical, and technological potentials of economic entities, and increasing the competitiveness of Russian producers. Despite the implementation of the state policy of import substitution, the risk of reducing Russia's food security remains. The current economic situation in the Russian agro-food market requires urgent measures that can support the agro-industrial sector of the economy. The competitiveness of Russian food producers is weakened due to the dominance of foreign goods, as well as price disparity (Gaiduk et al. 2017; Gaiduk et al. 2018; Gaiduk et al. 2020a).

Keyzer and Wesenbeeck (2007) point out that "implementing economic, organizational, and legislative measures will ensure an increase in the level of food security, namely, will improve the general conditions for the functioning of agriculture, especially animal husbandry, create prerequisites for sustainable development of rural areas, increase the efficiency of land use and its reproduction, ensure the development of agricultural technologies and increase the competitiveness of agriculture" (Keyzer and van Wesenbeeck 2007). The current research is aimed at developing and substantiating scientific and practical recommendations towards developing managerial decisions and forecasting measures in the agricultural sector of the economy in the food security system. The solution to many problems of food security in various regions is not only

Article Information:*Corresponding Author: bcintermarket@yandex.ru
Received 12/10/2021 Accepted after revision 15/12/2021
Published: 31st December 2021 Pp- 1806-1812

Available at: https://bbrc.in/ DOI: http://dx.doi.org/10.21786/bbrc/14.4.63

theoretical but also, above all, a practical issue (Gaiduk et al. 2020b).

The reasons for the lack of confidence that such security will be ensured are the insufficient theoretical elaboration of the problems, the need to clarify the specific scientific, methodological, and legal support of the comprehensive state measures in the agricultural sector. The works of many researchers are devoted to solving the problems facing agriculture, creating organizational and production structures within the framework of achieving food security (Pingali 2005; Keyzer 2007; Fischer et al. 2008; Alston et al. 2009; Diouf 2009; Campbell 2009; Altieri et al. 2012; Charles et al. 2014; Castro and Chirinos 2015; Buks et al. 2016; Pérez-Escamilla et al. 2017; Cole 2018). According to Cole et al. (2018), "massive food imports into a country with significant production potential destroys not only domestic production, poses a threat of its deficit in the future, but also ruinously affects the overall balance of payments. Food imports are paid for by massive exports of raw materials and energy carriers, and its increase, respectively, will cause the need to increase exports, significantly reducing other import opportunities" (Cole et al. 2018).

MATERIAL AND METHODS

Studying the agricultural sector of the economy in the food security system was carried out on the basis of conducting cluster-constructive analysis of classes and factors, their meaningful comparison, and studying the system of determination of states of the simulated object (Lutsenko and Korzhakov 2011; Loiko et al. 2012).

RESULTS AND DISCUSSION

When ensuring food security, the state should consider qualitative characteristics and ensure the following: effective development of the agribusiness; foreign economic activity in the agricultural sector; income of the population; balanced diet. As a rule, indicators of economic and physical availability of food, threshold values of food independence, and compliance of food products with the requirements of the legislation of the Eurasian Economic Union on technical regulation are used as indicators for assessing food security (Trubilin et al. 2020).

Table 1. Food independence of Russia by main types of activity

Product type	The threshold indicator in the Food Security Doctrine, percent	2015	2016	2017	2018	2019
Meat	not less than 85	88.7	90.6	93.5	95.7	97.4
Food grains	not less than 95	149.0	160.0	171.0	148.0	154.0
Milk	not less than 90	79.9	80.7	82.3	83.9	83.9
Potato	not less than 95	102.1	93.2	91.1	95.3	95.1
Vegetables and cucurbits	not less than 90	86.8	87.4	87.6	87.2	87.7
Fruits and berries	not less than 60	32.5	36.5	33.1	38.8	40.2

Source: Data of the Federal State Statistics Service (2020).

According to the Decree of the President of the Russian Federation dated January 21, (2020), No. 20 "On the approval of the Food Security Doctrine of the Russian Federation", thresholds of food independence for meat and meat products (in terms of meat) are at least 85percent (The decree of the President of the Russian Federation of January 21 2020); for milk and dairy products (in terms of milk) – at least 90percent (Table 1). Currently, the Russian population's need for vegetables is met by only 87 percent due to domestic production, fruits and berries – by 40percent, milk and dairy products – by 84percent. The current economic situation in the Russian food market requires urgent measures that will be able to support the agro-industrial sector of the economy (Trubilin et al. 2020).

The level of self-sufficiency in basic foodstuffs of the country's population is growing (Table 2). This trend is due to the state policy aimed at import substitution, as a result of the embargo imposed in response to the sanctions of the EU and the USA. Currently, growth in the production of crop and livestock products is unstable. The restrictions on imported products in the context of economic sanctions contribute to the expansion of the market niche of Russian commodity producers in the domestic market due to the growth in production volumes. We consider it necessary to predict managerial decisions that would improve the efficiency of economic entities drawing on the example of the agricultural sector of the Krasnodar Territory (Gaiduk et al. 2017; Trubilin et al. 2020).

It is important to simulate the impact of factors (financial, economic, natural, and energy) on the results of the development of the agro-food sector in the context of food security. It is proposed to solve the problem of decision-making when choosing main paths for increasing the efficiency of the agricultural sector based on automated system-cognitive analysis (ASC-analysis), of the Eidos

system software product. The ASC analysis allows identifying the behavior of a multiparametric system under the impact of factors measured in various types of scales and measurement units. The financial and economic indicators of 658 agricultural organizations of the Krasnodar Territory for 2019 were taken into account in the calculations (Gaiduk et al. 2017; Trubilin et al. 2020).

Table 2. Indicators of Russia's food security in 2020

Products	Food independence in 2020, percent	Threshold indicator of the Doctrine, percent	Deviation of the actual value from the threshold indicator of the Doctrine
Food grains	167.6	93.1	2.2 times higher
Sugar	99.9	not less than 90	1.8 times higher
Vegetable oil	195.9	not less than 90	2.2 times higher
Meat and meat products	99.4	not less than 85	higher by 14.4 p.p.
Fish and fish products	149.7	not less than 85	1.8 times higher
Potato	86.1	not less than 95	lower by 8.9 p.p.
Milk and dairy products	84.1	not less than 90	lower by 5.9 p.p.
Edible salt	65.9	not less than 85	lower by 19.1 p.p.
Vegetables and cucurbits	87.1	not less than 90	lower by 2.9 p.p.
Fruits and berries	41.2	not less than 60	1.8 times lower

Source: Data from the Final Report of the Ministry of Agriculture of the Russian Federation (2021)

At that, the following factor indicators were used: profit from the sale of livestock products, thousand rubles; profitability of livestock products, percent; revenue from livestock products, thousand rubles; net profit (loss), thousand rubles; return on sales, percent; profitability of core activities, percent; return on production assets, percent; capital-labor ratio, a thousand rubs.; the real volume of capital equipment per unit of labor, thousand rubles; capital-output ratio, rub.; material productivity, rub.; cost recovery coefficient; depreciation coefficient of fixed assets; fixed assets renewal coefficient; fixed assets suitability coefficient; annual labor productivity, thousand rubs.; energy intensity, rub.; hourly labor productivity, rub.; the proportion of arable land in the total area of agricultural land, percent. When preparing a formal model of classes and attributes, classification scales and gradations were used (Trubilin et al. 2020).

In the calculations when carrying out the ASC-analysis, the effect of the following parameters was taken into account: the total cost of livestock production, thousand rub.; annual cow population, heads; average annual pig population, heads; the average annual population of animals in raising and fattening, heads; average annual population of mature hens, thousand heads; the average annual population of young chickens in raising, thousand heads; the main herd of dairy cattle, heads; agricultural land, ha; arable land, ha; costs of the main production, thousand rub.; material costs, thousand rub.; the average annual cost of fixed assets, thousand rub.; the average annual number of employees, people; number of workers employed in agricultural production, people; work effort by workers employed in all industries, thousand staff-hours; energy capacities, h.p.; labor costs, thousand rub.; depreciation, thousand rub.; cost of fixed assets, thousand rub.; commercial and management expenses, thousand rub.; and cost of crop production, thousand rub (Trubilin et al. 2020). Besides, the following indicators were used when preparing descriptive scales and graduations:

- the amount of support agribusiness producers, thousand rubles;
- subsidies from the budget of the entity of the Russian Federation per employee, thousand rubles;
- targeted subsidies for implementing regional programs on agribusiness development, thousand rubles;
- supporting programs and activities in the field of animal husbandry, thousand rubles;
- supporting short-term lending in the agribusiness sector, including lending to small farms, thousand rubles;
- supporting small businesses (grants), thousand rubles;
- supporting farmers, thousand rubles;
- supporting agricultural consumer cooperatives, thousand rubles;
- subsidies to increase the productivity in dairy cattle, thousand rubles;
- subsidies for compensation of interest rates on investment loans in the agribusiness sector, thousand rubles;
- subsidies for compensation of part of the direct costs incurred for creating and modernizing agriculture, thousand rubles;
- The Federal Target Program "Sustainable development of rural territories for 2014-2017 and the period up to 2020", thousand RUB;
- programs and activities under other state programs, federal target program, and other subsidies with co-financing from the federal budget (except the Ministry of Agriculture of Russia), thousand rubles.
- supporting programs and activities in the field of crop production, thousand rubles;

- supporting programs and activities in the field of crop production per employee, thousand rubles;
- subsidies for providing unrelated support in the field of crop production and seed potatoes production, as well as seeds and vegetables of outdoor growing, thousand rubles.

The results of the ASC analysis confirm that subsidies for reimbursement of part of the costs of purchasing agricultural machinery and equipment have a significant impact on profits in the production of livestock products (the greatest impact of all factors, equal to 3.053). Subsidies, aimed at increasing productivity are in second place in terms of impact (the impact of all factors, equals 2.256). According to the results of the ASC analysis, it was revealed that the profitability of agricultural products, taking into account subsidies, was 25.4 percent. Note that in the first place by the negative impact on performance indicators is the total revenue from the sale of crop products (the impact of all factors is 4.4635). Thus, Russia has become one of the largest importers of meat products. And it is quite obvious that an increase in the share of crop production in the structure of production does not solve, but, on the contrary, aggravates the food problem. Therefore, it is necessary to develop the production of livestock products, thereby getting rid of the structural imbalance in the agricultural sector, and above all, in regions, such as the Krasnodar Territory (Gaiduk et al. 2020).

The pre-reform development model of the livestock industry formulated as "increase in livestock is the increase in production" is excluded today: the market does not forgive the irrational, inefficient, uncontrolled use of production factors. Only modern innovative technologies based on advanced experience and achievements of science and technology, and providing high productivity can be a turnaround for animal husbandry. Depreciation on the main production is in second place in terms of the negative impact on performance indicators (the impact of all factors is 4.626). Currently, measures to improve the material and technical equipment of agriculture are provided for by both federal and regional target programs and projects. The main stake in the issue of technical and technological modernization of agriculture is made on subsidizing investment loans and borrowings. Thus, the excessively high cost of borrowed funds is compensated (Gaiduk et al. 2020).

However, there is another even more acute problem – the excessively high cost of agricultural machinery, which should be solved similarly – by providing subsidies to reimburse part of the costs of purchasing agricultural machinery and equipment. The cluster analysis was carried out in a cognitive space in which one unit of measurement is used for all axes (descriptive scales) – the amount of information, rather than based on the initial variables or the conjugate matrix depending on the units of measurement along the axes. Clustering results do not depend on the initial units of measurement of objects' features (Lutsenko and Korzhakov 2011; Loiko et al. 2012; Gaiduk et al. 2020).

The dendrogram of cognitive clustering of classes reflects the similarity-difference between different groups of agricultural enterprises in terms of profit. Thus, some of the agricultural enterprises of group I are very similar to group II, which has received the minimum amount of subsidies to the livestock industry, and they form a cluster, which is opposed to the cluster of groups III and IV and a large number of subsidies. In 2020, the amount of financing of the state program of the Krasnodar Territory "Development of agriculture and regulation of agricultural products, raw materials, and food markets" at the expense of the federal and regional budgets amounted to more than 8304.2 mln rubles (Gaiduk et al. 2017). Within the framework of the State Program, funds were allocated for the development of agricultural land reclamation, support for farmers, development of the fisheries complex, agricultural industries, stimulation of investment activity, integrated development of rural areas, etc. However, financing, allocated for the transition of the agribusiness to a new development model is not enough. Studies have shown that integration processes in agricultural production, namely, the addition of industrial processing of milk and meat, contribute to reaching higher efficiency indicators (Trubilin et al. 2020).

It is important to develop a model, whose implementation would give the maximum effect in the regional agribusiness in matters of ensuring food security and self-sufficiency. At the same time, important attention should be paid to the possibility of implementing these measures directly by the region itself. The expediency of using a spiral scheme is explained by the fact that it allows monitoring the food security status more effectively since, in the course of constant circulation of model elements, new problems and threats to the food security of the region will open up. In approximately the same way, new measures of influence should be determined to eliminate these problems in this area and the system of indicators based on which monitoring is carried out should be supplemented (Trubilin et al. 2020). This method should be based on the following areas of activity:

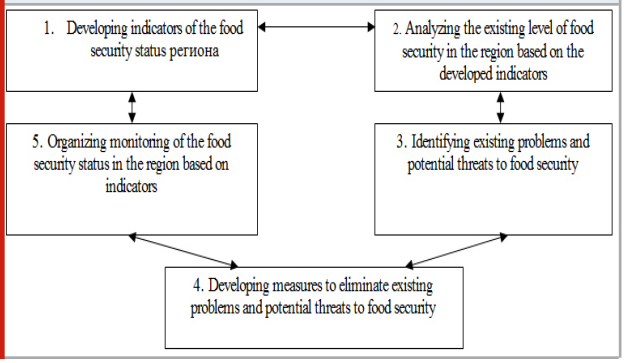
- adjusting the monitoring system of the regional food market as an important component of the state mechanism;
- using operational monitoring services at the local, regional, national, and interstate levels by numerous market participants that will allow free orientation in the price system, and the state will use mechanisms to influence pricing, supply, and demand;
- improving the management system of socio-economic development of agriculture in the region providing control over the impact of the most important economic regulators on the economic results;

The food security model, presented below, should be taken as the basis for the development of measures for active influence in the agribusiness sectors (Fig. 1).

The problem of modernization of agricultural production is associated with the problem of information and consulting services of agribusiness. The lack of unified information space in the field of agriculture makes it difficult for commodity producers to access the necessary information.

Besides, the enterprise executives often do not recognize the important role of the information factor in the development of production, and many of them, due to low qualifications, cannot obtain the necessary information (Sekerin et al. 2021).

Figure 1: Spiral diagram of the food security model of the region



Various consulting centers providing services and agro-consulting agencies have already been established and currently are operating in Russia. At present, it is necessary to unite them into single powerful centers. Functional integration into a single system (service) will require transferring from administration to consulting activities within the framework of the administrative reform of district and regional agriculture administrations. It is necessary to establish their strong cooperation with information and consulting organizations of universities and scientific institutions, as well as private agro-consulting agencies. At the regional level, there are no centers of consolidation of existing economic structures, land users, and owners, necessary for a comprehensive solution to the problem of agricultural development. In our opinion, at this stage of the agrarian reform, it is possible to create a proposed regional service of scientific and consulting services based on agricultural producers (Sekerin et al. 2021).

The development of software for the system of scientific and consulting services for the agribusiness of the region should be determined by the tasks of this system. Its functions can be generically divided into two groups:

1. providing users with information based on which they could make their own decisions (Golubev et al. 2021);
2. consulting and providing to the user decision-making options based on expert assessments and forecasts.

This will allow improving the quality of information and consulting services for agricultural producers and the population of the region will be improved, as well as providing effective training of agricultural specialists and the enhancing effectiveness of scientific research.

Organizational structures of economic management of agricultural sector enterprises are formed independently, depending on the business patterns, organization of production, marketing, and financial activities. The activity of state and public administration bodies in the regions is manifested in the performance of regulatory, consulting, and orienting (advisory), control, and inspection (supervisory) functions. At that, the main regulation object is the markets of food, resources, and production services for the village. The main objects of support are agricultural producers, and the main objects of inspection supervision are the activities of participants in agricultural production and operators of the food, resources, and production services market. The essential features that characterize the development dynamics of the agribusiness, forming the conditions for ensuring food security are its structure-forming factors (Sekerin et al. 2021). The following measures are necessary to overcome the structural deformations of the agribusiness.

1. Development of the Concept of structural transformation of the agribusiness on an innovative basis, focused on ensuring food security. The main components of this concept should become:

- the essence of innovative transformations in the agribusiness to ensure food security;
- their goals (with disaggregation by strategic and tactical criteria);
- priorities (with a clear definition of their ranking: recognition of achieving social benefits from innovative structural transformations as a major task).

2. Regulatory and legal support of structural transformations in agribusiness on an innovative basis as a condition for ensuring food security.

Within the framework of the Program, it is necessary to develop appropriate regional programs for each region of the country. These programs should be interconnected methodically, structurally, and organizationally in achieving goals and implementation mechanisms. The prerequisite for the program implementation at both the federal and regional levels are:

- determination of the dynamics of effective demand of the country and regions, as well as the elasticity of demand for basic foodstuffs at the appropriate levels;
- determination of rational and critical production volumes of basic products, taking into account the state and dynamics of changes in the production and resource potential of the country and regions in the medium term, as well as the place and role of regions in the system of the national differentiation of labor.

The development and implementation of programs should be aimed at optimizing intersectoral relations and developing models of intersectoral balance within regions, food subcomplexes, and a single economic complex as a whole, as well as solving relevant problems in the field of foreign economic activity. It is necessary to define clear basic provisions of administrative reform to establish and consolidate the powers of national, regional, and local authorities to ensure food security of the country and regions.

3. Determining the Program implementation mechanism, choosing indicative planning for this purpose. Its essence is revealed in the following three mutually dependent components:

- determining socio-economic priorities within the agribusiness in the context of achieving food security of the country and regions;
- forecasting the proportions between the agribusiness sectors, their areas, and product subcomplexes embodied in the system of indicators;
- unbundling plan indicators by industry, food, and regional characteristics and their concord at the final stage.

The basis for the development of indicative plans for the development of the agribusiness of the country and regions, which should be considered as the basis for implementing the socio-economic development strategy of the country and regions, should be indicators reflecting rational and critical production of basic food products at appropriate levels. The development and implementation of indicative plans presuppose taking into account both the total economic and technical effects, social interaction of agribusiness sectors and regions, in particular, the effect of interregional cooperation. In the current context, it is necessary to develop a definite social policy in the agricultural sector. Among these policy goals, first of all, it is necessary to highlight:

- a significant increase in the material well-being of the population, living conditions, and the restoration of social infrastructure in rural areas (for the construction of non-industrial facilities, it is necessary to legislate the use of part of public investments that are planned to be invested in the agribusiness);
- increasing the cost, quality, competitiveness, and mobility of the workforce, optimizing its gender, age, and professional qualification structure;
- stabilizing the rural population size to overcome reducing demographic reproduction in rural areas.

CONCLUSION

The findings of the present study confirmed the need to prepare a spiral scheme of the food security model. This method should be based on the adjusting the monitoring system of the regional food market, using operational services, improving the system of socio-economic development of agriculture, strengthening state management of the reform process and control over the action and influence on the economic results of economic regulators. Functional integration into a single system (service) will require transferring from administration to consulting activities within the framework of the administrative reform of district and regional agriculture administrations. It is necessary to establish their strong cooperation with information and consulting organizations of universities and scientific institutions, as well as private agro-consulting agencies.

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