

Foreign Experience of State Regulation of Agricultural Production

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ABSTRACT

Providing the population with food is one of the main tasks of the system of state regulation of production. Food security plays an important role in socio-political and socio-economic processes. The United Nations, in particular the World Food Program, identify the problem of providing food for the global population as critical, especially in the poorest countries of the world. The issue of hunger and malnutrition, including among ideas, is defined as a global issue of humanity, and the fight against hunger has become one of the goals of sustainable development, defined by the UN Sustainable Development Concept. Global issues belong to the sphere of influence of state authorities, that is, state regulation has a decisive role in the system of providing the population with food. The article conducts a literary analysis of the latest research devoted to the issues of food security and the creation of conditions for the effective development of agriculture as the basis of food security of countries, regions, and the planet. The purpose of the article is to find effective approaches to the formation of a state regulation system of agricultural production by analyzing the world's leading experience. By accumulating leading world experience, problematic aspects of the research were determined. The development of effective ways of agricultural development and the solution of problems with providing food to the population can be ensured by analyzing the experience of the leading agricultural countries of the world in establishing a system of state regulation of agricultural production processes using intensive development methods. The article uses methods of statistical analysis, mathematical modeling, and correlation-regression analysis of the interdependence of factors of agricultural development and food supply to the population. The analysis of the existing situation in the world made it possible to prioritize the use of intensive agricultural methods as a key element of the system of state regulation of food markets.

HIGHLIGHTS

- ① Providing the population with food is one of the main tasks of the system of state regulation of production.
- ① Food security plays an important role in socio-political and socio-economic processes.
- ① The analysis of the existing situation in the world made it possible to prioritize the use of intensive agricultural methods as a key element of the system of state regulation of food markets.

Keywords: Agriculture, state regulation, food, world food market

The development of agriculture is an important element in ensuring the food security of the world. Environmental problems and climate change determine the problems of providing the population with food products. The population is constantly increasing. As of July 14, 2022, the population of the planet was 8 billion people. Some scientists

determine that the resource capacity of the planet to ensure the existence of the population according

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to maximum calculations is up to 11 billion people. Therefore, humanity is under the threat of a food disaster, which is also since the population of poor countries of the world, which already have significant food issues, and according to UN statistics, are facing issues of hunger, including among children, is growing exponentially. Statistics show that every three seconds, one person in the world dies of hunger. 821 million people on the planet suffer from hunger. The development of agriculture in these countries is limited due to natural and climatic conditions, as well as the lack of technological innovations in agricultural production the introduction of extensive methods of farming, which significantly limits the opportunities for increasing the amount of food. Importing food from other countries is expensive. The imbalance in the world's food markets causes several sociopolitical and socio-economic problems. It is worth noting that food restrictions are the causes of military conflicts of local nature and global military actions for the redistribution of the market for the sale of grain and other types of agricultural crops. Such an example can be the blockade by the Russian Federation of the ports of the Odesa region of Ukraine after the start of full-scale military aggression of Russia against Ukraine. Cargoes with grain were blocked in the ports of Odesa, and the lack of a "green corridor" for these cargoes led to a rapid increase in the cost of food.

This particularly affected the situation in poor countries in Africa and Asia. It was only through the mediation of the Turkish side that the ports were unblocked, which made it possible to reduce the price of grain and reduce the critical shortage of agricultural products on world markets. According to the evidence of numerous scientists, food crises are directly related to sociopolitical crises. Hunger is the cause of civil wars, acts of civil disobedience, military conflicts, and the development of terrorism. Therefore, analyzing the current state and development trends of society, it is important to note that the processes of forming a balanced food policy in the world are of priority importance for ensuring the sustainable development of humanity. Therefore, the topic that was chosen for analysis is relevant and has global practical significance.

The purpose of the article. Therefore, the purpose of the article is to find effective approaches to

the formation of a system of state regulation of agricultural production by analyzing the world's leading experience. In accordance with the goal of the research set in the article, the following tasks were performed:

- ♦ an analysis of trends in the development of agriculture and food supply of the population was carried out, problematic aspects of the research were identified,
- ♦ the experience of the world's leading agricultural countries in establishing a system of state regulation of agricultural production processes using intensive development methods was analyzed,
- ♦ developed and mathematically substantiated hypotheses of the dependence of the factors of balanced development of agriculture and food supply of the population,
- ♦ proposals were developed for the formation of a system of state regulation of the production of agricultural products by analyzing the world's leading experience.

Literature Review

The relevance of the issue of finding effective mechanisms of state regulation of the processes of providing food to the global population and determining the prospects for the development of agriculture is confirmed by numerous studies conducted in this direction.

The transformations taking place in the modern economy of developed countries determine the development of the service sector, as well as the development of products with high added value. Rich countries are mostly characterized by a focus on non-technological development. Often lacking favorable natural and climatic conditions for agriculture, rich countries ensure their food security using technologies that increase the yield and productivity of agricultural production. The basic principle of structural transformations of the technological economy is the reduction of the share of agriculture in the structure of the country's GDP and the reduction of the share of those employed in agriculture. This is precisely the difference between developing countries and world-leading economies. Numerous authors conducted research on the differences in trends

in the development of agriculture in countries with different levels of economic development. The authors call the high degree of technological development, the dynamics of factors influencing the processes of agricultural development, and the trends of agricultural development in the developed countries of the world. For example, the study examines the processes of agricultural development in the USA and Japan (the country does not have a strong natural and climatic potential for the development of agriculture). In these countries, productivity is high, which is connected to the use of high technologies. At the same time, the amount of agricultural land and the number of people employed in agriculture are constantly decreasing [Liu, S. and Wang, B. (2022)].

The processes of increasing the level of technological development of agriculture are aimed not only at increasing productivity but also at reducing the cost of produced agricultural products, as well as reducing the negative impact on the environment during agriculture. An important item of expenditure in agriculture is energy resources. Considering the energy crisis and the significant increase in the cost of energy sources, energy-saving technologies are the basis of the formation of a competitive system of agriculture and food security in the country. It is relevant to determine the mechanisms of state regulation of the processes of achieving carbon-neutral agriculture, which is one of the priorities of the EU food policy. By the authors [Zafeiriou, E., Azam, M. and Garefalakis, A. (2022)] a study was conducted based on the analysis of statistical data on the use of energy resources in agriculture in 25 countries of the world. As a result of the research, the correlation between environmental and economic indicators of agricultural production in the EU countries was determined. The results of the study made it possible to develop and confirm the relevance of the model of short-term coefficients, which confirms the hypothesis regarding the ratio of indicators of carbon emissions created by energy and agricultural income. Therefore, with the reduction of negative emissions from agriculture and the development of carbon-neutral agriculture, there is a tendency to reduce the cost of agricultural products and increase the income of the industry, because of the development of the country's economy, which is

an important result in the correct interpretation of approaches to the construction of a system of state regulation of the economy. It is important to note that the authors also identified an important political role of an empirically proven hypothesis that determines the priorities of state policy around providing the population with food [Zafeiriou, E., Azam, M. and Garefalakis, A. (2022)].

It is interesting to develop the impact of external factors on the development of agriculture during the pandemic. By the authors [Irawan, A., Saefudin, S., Suryanty, M. and Yuliarso, M.Z., (2022)] an economic model of households based on a system of simultaneous equations was developed. The developed model determines the negative effect of the disruption of demand for agricultural products (reduction of household incomes) is greater than that of the disruption of supply (reduction of the production of agricultural products). However, it is worth noting that limited access to agricultural products was the result of the pandemic. In conditions of shortage, such a model will not be valid, since the reduction of production volumes in conditions of shortage leads to an increase in prices and even more affects the problems of building food security, which especially concerns the system of state regulation of the processes of providing food to the population in the poorest countries of the world.

Numerous authors considered the interdependence of the country's food security and the level of income of the population. It is logical to investigate the hypothesis that in countries with low incomes of the population, the purchasing power is lower, accordingly, the amount of food that can be purchased by the population is also lower. At the same time, the authors propose to solve the issue by increasing the volume of remittances. A dynamic panel assessment of the factors influencing the food market allowed us to determine that the level of food supply is higher in countries with a larger flow of remittances [Subramaniam, Y., Masron, T.A. and Azman, N.H.N. (2022)]. However, it is worth noting that without considering the processes of development of the agricultural system at the level of state regulation of the economy, such dynamics may change due to fluctuations in world food prices, the lack of own reserves in the country,

fluctuations in the national currency exchange rate, sociopolitical factors.

By applying the gray modeling technique and the bibliometric method, the role of scientific and educational institutions in the processes of agricultural development is determined, which is important for the scientific justification of the processes of agricultural development and solving real practical problems. The technologization of agriculture is impossible without the application of modern innovative scientific methods and their results as qualitative transformations of the system of state regulation of the agricultural sector to ensure the country's food security [Li, B., Zhang, S., Li, W. and Zhang, Y. (2022)].

Scientific substantiation of innovative development is the basis of building competitiveness. However, it is appropriate to distinguish the concepts of productivity and competitiveness of innovation and technology transfer. The analysis of these two processes in South Africa (developing countries) made it possible to draw numerous conclusions. Technology transfer has a directly proportional relationship with increasing the productivity and competitiveness of agriculture. However, the processes of technologization should be divided into two subgroups: the processes of obtaining external technologies and their implementation in the national economy; the processes of development, implementation, and sale of innovations developed in the national system. These two approaches have a fundamentally opposite basis [Rambe, P. and Khaola, P. (2022)]. The first is characteristic of developing countries, it gives them opportunities to increase the level of economic development. The second way is progressive and ensures not only the competitiveness of the economy but also its export orientation with high added value, which should cyclically return to ensuring even greater competitiveness of agriculture.

An important element of the technological development of agriculture is also the provision of the industry with technologies related to the establishment of logistics during sowing and harvesting campaigns, the delivery of food to storage places, export and delivery to sweatshops, or the final consumer. In the study [Arora, C., Kamat, A., Shanker, S. and Barve, A. (2022)] it was proposed to identify specific barriers and develop a data

structure of the analytical process of the hierarchy of agricultural production productivity factors. The method involves the search and application of alternative technologies for the involvement of technology in agriculture for the management of supply chains. As a result, the system of state regulation of agricultural development receives alternative scenarios of supply chains of agricultural products, which ensures food security.

Consideration of business models of the operational efficiency of agriculture determines the technological possibilities of each individual task in the agricultural production system. Business models have a unified, standardized nature, so they can be used as elements of state regulation of agriculture through recommendations for the market of agricultural products. It is worth noting that the mechanisms for introducing such business models to the market of agricultural products can be an established and profitable system of lending both at the state level and through private banking institutions [Tetteh, I., Boehlje, M., Giri, A.K. and Sharma, S. (2022)].

In the context of the development of the information society, an important element of ensuring the efficiency of agriculture is the introduction of information technologies. The purpose of the application of information technologies is the development of a system of information and analytical support for operational processes in agriculture for the selection, evaluation, and analysis of large data, in particular, the formation of methods for the analysis of statistics and online reports, the definition, forecasting and projection of trends in the development of agriculture and short-term food market requests and long-term periods. The introduction of e-commerce elements is an important step in ensuring the future competitiveness of national agriculture on world markets [Lu, L., Tian, G. and Hatzenbuehler, P. (2022)].

In the conditions of aggravation of environmental problems due to man-made human influence, an important element of agricultural development is ensuring the environmental friendliness of processes. Agriculture is one of the biggest polluters of the environment in the world due to the use of pesticides that contaminate topsoil, surface water and groundwater, and subsequently pollute the lower layers of the atmosphere through evaporation. The application of a quasi-experimental approach

to the study of environmental issues and natural resources of agricultural production is interesting. The assessment of the external environmental effect of agricultural activities demonstrates the issues associated with the irrational use of resources on farms and the need to find mechanisms for adapting the operational processes of agricultural production to climate change. These issues are a priority at the state level, because of the solution to the processes of ecological development can only be achieved through the joint efforts of agricultural producers and state support for ecological projects and food security programs. Therefore, today it is important to develop the sustainability of agricultural development as an element of ensuring food security, socio-economic development of the country and sociopolitical stability, which can be achieved only by using innovative technologies in operational activities and strategic planning of the development of agricultural production at the level of individual sub-entities of economic activity, as well as at the level of state regulation of the industry as the main priority of social development and ensuring the state's competitiveness on world markets.

Methodology

The article uses methods of literary analysis based on the grouping of numerous studies, the results of which have been published and tested in scientific periodicals. Using a literature review, theoretical and methodological approaches to the formation of a system of state regulation of agricultural production processes were determined [The official website of the United Nations]. The analysis of statistical data conducted by international public organizations allowed us to analyze the trends in the development of agriculture and food supply to the population to determine the problematic aspects of the study. By applying the methods of comparative analysis, deduction and synthesis, the best practices of the leading agricultural countries of the world regarding the establishment of a system of state regulation of agricultural production processes using intensive development methods were determined. Methods of statistical analysis, mathematical modeling and econometrics were used to develop and mathematically justify the hypothesis of the dependence of the factors of

balanced development of agriculture and food supply to the population. Projection of the research results made it possible to develop proposals for the formation of a system of state regulation of agricultural production by analyzing the world's leading experience.

RESULTS

To develop a hypothesis of the interdependence of food security and agricultural development, it is proposed to define numerous factors that may have a dependent correlation. Countries with the highest to lowest food safety were selected for analysis. In particular, the countries where the food situation is the most critical were selected for analysis: North Korea, the Democratic Republic of the Congo, Syria, Afghanistan, and Burundi. Also, five countries were selected, where the food situation is as stable as possible and has positive trends, and agriculture is developing intensively and has an export-oriented character, while maximally providing the internal needs of the food market the following countries were included: the USA, Brazil, Canada, the Netherlands, China. The countries were selected based on the analysis of the map of the countries of the world by percentage of the population suffering from hunger, according to WFP in 2021 (Fig. 1)

For further research, indicators were selected for analysis, which characterizes the degree of development of agriculture and the level of providing the population with food. Among such indicators, the following were selected:

- ♦ the proportion of the population that systematically goes hungry – the indicator indicates the lack of food security in the country, determines the need to review the processes of agricultural management and the creation of conditions for the import of food products (PPSH),
- ♦ the number of deaths from hunger per year – the indicator determines the critical shortcomings of the system of state regulation of food safety and its consequences (NDH),
- ♦ the number of people living below the poverty line – an indicator that characterizes the potential risk part of the population that may suffer from hunger under unfavorable socio-economic conditions (for example, if the price of food products increases), (NLbPI).

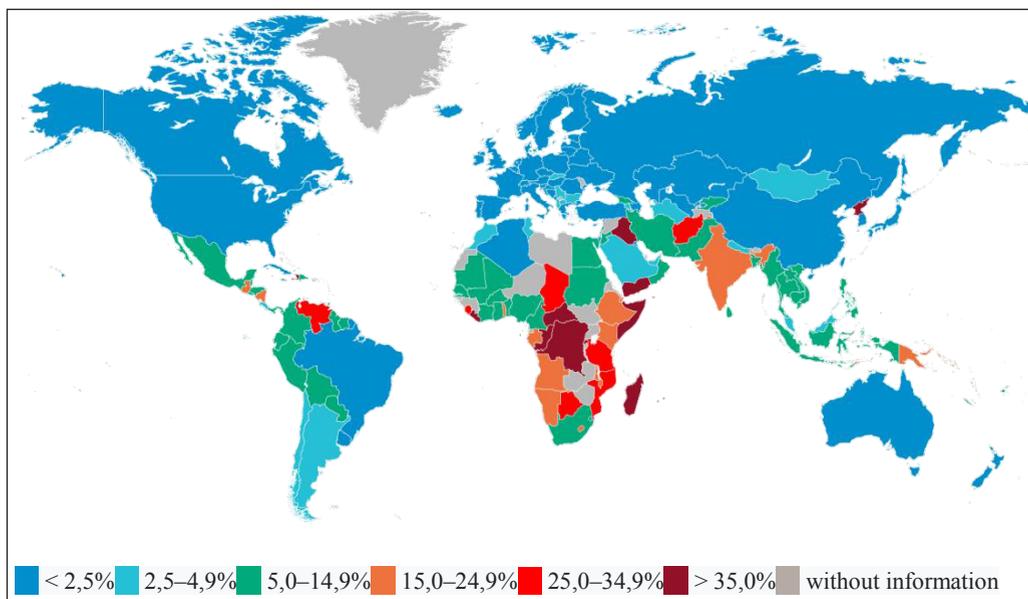


Fig. 1: Map of the countries of the world by percentage of the population suffering from hunger, according to WFP, 2021 [Official web-site WFP]

These three indicators were selected as baseline indicators for analyzing food problems in the world's poorest countries. A theory was put forward regarding the influence of other indicators on these indicators - the efficiency of agricultural management, to which the following indicators were attributed:

- ♦ the number of agricultural products produced in the country per year in relation to the population is an indicator that should characterize the food security of the country itself, its ability to export food and the efficiency of agriculture, (AAPP),
- ♦ an indicator of the number of agricultural lands in the country per capita, hectare - the indicator indicates the development of agriculture in the country, (IAApC)
- ♦ productivity, which is determined by the number of tons of grain per hectare of agricultural land in the country - the indicator determines the efficiency of agriculture (PDNG),
- ♦ provision of agriculture with equipment - the indicator determines the degree of technologicalization of agricultural production processes, and was calculated as the total cost of equipment in US dollars per one hectare of agricultural land, this indicator also allows us to determine the level of modernization and technological development of equipment used in the industry (PAE),

- ♦ an indicator of the using pesticides per one hectare of agricultural land - the indicator determines the quality of farming, ensuring environmental norms and environmental protection standards (IUPAL),
- ♦ an indicator of the volume of production of organic agricultural products per capita - the indicator characterizes the use of ecological technologies aimed at supporting human health and the formation of eco-positive rural production (IVPO),
- ♦ an indicator of the number of cattle per capita - the indicator characterizes the degree of development of animal husbandry and providing the population with meat and dairy products (INC).

These indicators were selected for analysis. Indicators for selected countries were calculated. By applying the method of correlation-regression analysis, the results of the interdependence of the analyzed indicators were determined. The results of the correlation-regression analysis are presented in Table 1.

As a result of the conducted research, it is expedient to determine each element of the correlation-regression analysis as a weighting factor of the parameter in the function of ensuring the food security of the country.

Table 1: The results of the correlation-regression analysis of the interdependence of the analyzed indicators

	AAPP	IAApC	PDNG	PAE	IUPAL	IVPO	INC
PPSH	0,94	0,86	0,96	0,95	0,96	0,87	0,94
NDH	0,92	0,83	0,94	0,93	0,94	0,83	0,92
NLbPI	0,73	0,69	0,96	0,89	0,96	0,93	0,76

DISCUSSION

As a result of the conducted research, trends in the development of agriculture and providing food to the population were determined it was statistically proven that the potential to provide quality food to almost 8 billion people on the planet is currently absent in the world. The role of military conflicts in increasing food security problems, which cause socio-economic and sociopolitical consequences, is determined. Therefore, ensuring the sustainable development of the world is based on the formation of a well-thought-out food policy through the implementation of effective mechanisms of state regulation of agricultural development at the macro- and microeconomic levels. The experience of the world's leading agricultural countries in establishing a system of state regulation of agricultural production processes shows the need to use intensive development methods that allow for practically unlimited expansion of the spectrum and volume of agricultural production. The hypothesis of the dependence of the factors of the balanced development of agriculture and the provision of food to the population confirmed in the discovery indicates that the basis of the solution to the issue of food security should be the system of state regulation of the development of agriculture, which forms the global food security in the world.

The inversely proportional dependence of influencing factors on ensuring food security was determined. According to the conducted research, the influence factors have the following relevance in descending order:

- ♦ productivity, determined by the number of tons of grain per hectare of agricultural land in the country,
- ♦ indicators of pesticide use per one hectare of agricultural land,
- ♦ the number of agricultural products produced in the country per year in relation to the population

- ♦ provision of agriculture with equipment,
- ♦ an indicator of the amount of agricultural land in the country per capita,
- ♦ an indicator of production volumes of organic agricultural products per capita,
- ♦ an indicator of the number of cattle per capita.

The research used both quantitative indicators and their qualitative characteristics. The logical relationship between the number of agricultural products produced per capita and the number of people starving or dying of hunger. However, in correlation dependence, this indicator becomes only the third. The first two indicators (yield and number of pesticides used in agriculture) indicate that countries with the highest level of food security use intensive agricultural methods and innovative technologies. That is why, according to the results of the analysis, indicators of equipping with machinery and organic farming were among the TOP positions of the factors affecting food security, and such quantitative indicators as the indicator of the amount of agricultural land in the country per capita, the indicator of the number of cattle per capita took the last places in weight structure, which was developed based on the results of the correlation-regression analysis.

Proposals for the formation of a system of state regulation of agricultural production, developed during the research, are as follows:

- ♦ formation by the state of conditions for ensuring the intensive development of agriculture,
- ♦ the creation of a transparent land market that would be available to different categories of investors,
- ♦ formation of ecologically oriented agriculture,
- ♦ increasing the level of technological support for agriculture,
- ♦ the development of organic agriculture to ensure the preservation of the potential of

land within the framework of the concept of sustainable development.

CONCLUSION

As a result of the conducted research, the role of agriculture in ensuring food security, which is an urgent issue of the modern global development of mankind, has been determined. The growth of the population and the use of outdated extensive methods of farming already today indicate a shortage of food, which is especially acute in the poor countries of the world. These countries cannot afford to import food and are very sensitive to price fluctuations in the agricultural market. Unscrupulous competitors artificially increase the cost of food by means of military conflicts and influences on world trade processes, trying to blackmail the world with issues of food security. Such a situation can lead to significant socio-economic and sociopolitical upheavals, especially in the countries of Africa, Asia, and Latin America, which have a low level of income, and their food security is directly proportional to public attitudes. Therefore, the search for ways of state regulation of agriculture is the basis of the formation of global collective food security, sustainable development and ensuring the sustainability of social and political processes in the world.

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