

Model of the Post-War Development of the Agro-Industrial Complex of Ukraine: Prognostic and Financial Concept

Oleksandr Novikov^{1*}, Yurii Pasichnyk²

¹Mykolaiv National Agrarian University
54008, 9 Georgyi Gongadze Str., Mykolaiv, Ukraine

²National Scientific Centre "Institute of Agrarian Economics"
03127, 10 Heroiv Oborony Str., Kyiv, Ukraine

Abstract. The article is devoted to the formation of the post-war model of development of the agro-industrial complex of Ukraine. The topicality of the topic consists in determining the means of restoration and further development of the agro-industrial complex with appropriate justification of the proposed model, which will contribute to solving the problems of providing food to Ukrainian and foreign consumers. Considering the specifics of the research, the main method was chosen to be systematic, which ensures the complexity of the research. Along with it, the methods of comparisons, formalization, and economic analysis were used, which make it possible to supplement and expand the scope of the research to obtain a scientifically based result. The purpose of the article is to substantiate the prognostic-financial concept of the restoration model of the agricultural industry of Ukraine in the post-war period. The article analyzes the pre-war state of the agro-industrial complex according to the main criteria and reveals the reasons for inefficient use of its potential. A comparison of the efficiency of agricultural production based on the indicator of added value was made in Ukraine with such countries as Poland, Brazil, Germany, France, where Ukraine was found to be significantly behind. It is also emphasized that a small share of Ukrainian agricultural raw materials is sent to industrial processing, which significantly reduces the amount of added value. Taking into account the importance of the influence of external environmental factors on the functioning of the agro-industrial potential at the present time, an analytical justification of this influence in cost calculation is provided. Using the system method, an algorithm for the development of the specified model was proposed, the hierarchy and structure of the development of this complex were substantiated, six principles were determined, scientific approaches were developed for the formation of a prognostic model of the post-war development of the specified complex in experimental and working versions, and the conditions for its implementation were highlighted. The scientific novelty of the article lies in the development of theoretical provisions, which together made it possible to propose a predictive model of the development of the agro-industrial complex of Ukraine in the post-war period, which will contribute to the restoration and further development of the entire specified complex with sustainable provision of national food security

Keywords: agro-food potential, prognostic model, structure of agro-industrial complex, influencing factors

INTRODUCTION

In the difficult war conditions of 2022, which is characterized by catastrophic levels of destruction of the economic and social component of society, it is necessary to start forming the appropriate restoration schemes, mechanisms, models, etc. already now. In this context, the problem of restoring the agrarian-industrial complex (AIC) is not only to return to the previous state, but also to form a model that would make it possible to use its potential more effectively, in particular, to be

competitive on the Ukrainian and foreign commodity markets, to significantly increase the share of processed agricultural raw materials, increase the level of organic production, increase the volume of products of animal origin, etc. In order to solve this extremely important national task, it is necessary, first of all, to develop a well-founded model of the agricultural industry, using a set of scientific approaches, in particular: methods – systematic, comparisons, comparisons, economic analysis; theories of behavioral economics, poles of growth.

Article's History:

Received: 07.02.2022

Revised: 06.03.2022

Accepted: 07.04.2022

Suggested Citation:

Novikov, O., & Pasichnyk, Yu. (2022). Model of the post-war development of the agro-industrial complex of Ukraine: Prognostic and financial concept. *Ukrainian Black Sea Region Agrarian Science*, 26(2), 67-78.

Taking into account the current social situation, it is expedient to divide the publications on the agricultural industry into two periods – the pre-war period and the period that continues from February 24, 2022, when Russia's military invasion of Ukraine was carried out. Such a division is logically justified, since the conditions for the functioning of the agro-industrial complex in these periods are fundamentally different. The pre-war period is important in this study because it is a certain point of reference that captures its pre-war state. Evaluating the works of Ukrainian scientists in the pre-war period regarding strategies, models, mechanisms, etc., we note that they describe the current and future state of the agricultural industry, taking into account the social situation. Thus, in the research work of A. Bosak and L. Mustafaieva, the peculiarities of the production of agricultural products and their export possibilities were investigated, the factors affecting the competitiveness of agricultural sector products were analyzed, the influence of European integration processes on the development of the Ukrainian agro-industrial sector was identified, and the prospects for the further expansion of the free trade zone between Ukraine were substantiated and the EU [1]. O. Novikov, N. Potryvaieva and others substantiated the feasibility of irrigation development in the conditions of Southern Ukraine, as an important condition for the formation of a favorable innovation and investment environment in the region and proved that the development of irrigation requires a systematic approach with mandatory scientific support with the use of public-private partnership. They also determined the economic efficiency of the implementation of the project of the innovative landfill of rainfed agriculture using Smart technologies [2]. Ya. Hadzalo and Yu. Luzan identified shortcomings and substantiated the expediency of significant modernization of the organization of state management of the agrarian sector and proposed an algorithm for building the system of management of the agrarian sphere of Ukraine [3]. P. Izhevskiy carried out an analysis of the export-import balance of the agro-industrial complex of Ukraine, identified its key problems, found that the growth of agricultural holdings encourages small and medium-sized agricultural producers to find new forms of organization, and proposed solutions to key problems of agriculture and food industry with the help of network interaction of enterprises [4].

In the current conditions of the globalized world, the efficiency of agriculture is gaining importance, and it is the subject of research by foreign scientists. Thus, L. Camanzi and S. Troiano emphasized the impact of climate change and natural resource conservation on agricultural production methods, determined the trends of the transition to green economies in the future and justified that the improvement of the multifunctional role of agriculture will occur due to technological transformations and innovations, including the relationship between management environmental resources and agricultural activities, and also determined that the implementation of models of conscious and responsible

consumption opens up new opportunities for increasing sustainability both on a local and global scale [5]. M. Miranda and J. Glauber found rapid growth in grain and oilseed production in the Southern Hemisphere during 1980-2019, and argued that production growth is important because it increases supplies to meet global food needs. A semiannual stochastic model of spatio-temporal equilibrium of the general agricultural market with two main exporting regions, the North and the South, which plant and harvest at different times of the year is proposed [6]. M. Abraham et al. at the microeconomic level, reviewed the systematics of aggregation models, assessed the impact of qualitative and quantitative factors, analyzed their advantages and disadvantages, and concluded that aggregation models improved access to credit markets and technology [7]. The list of the works of Ukrainian scientists during the war period, in particular until the first half of May 2022, when active military operations continue in the territories of Zaporizhzhia, Mykolaiv, Kherson, Kharkiv, Donetsk, and Luhansk regions, is not so extensive, because now the situation is being understood with an analysis of possible vectors of further social development, including foreign policy, economic, military and demographic aspects. Thus, A. Vyshnevskiy proposed to create a kind of strategic thinking committee for Ukraine, something like the Global Thinking Committee at Columbia University in New York, which was headed at different times by Joseph Stiglitz and Saskia Sassen [8]. V. Novikov expressed a well-founded assumption that from the point of view of the economic structure, we need to change and not preserve the structure of the economy, or in other words, we need a plan for the transition from an agrarian-raw material to a technological economy [9]. I. Burakovskiy emphasizes the important role of the consolidation of the entire society, noting that the post-war recovery of Ukraine will require colossal efforts from both the government and society. In particular, civil society should facilitate the establishment of a regular, honest and responsible dialogue between citizens and the authorities, as well as offer effective solutions to relevant problems [10].

Analyzing these works, we note that they highlight the views of specialists who have certain scientific and pragmatic experience in the relevant field, and therefore there is an effort to find answers to relevant questions from somewhat personal approaches, in particular from an emotional position and not entirely clear scientific justifications, at the same time these and other works form the components of the theoretical-methodological and pragmatic basis for the development of the agro-industrial complex, which in the future should receive a complete form.

Taking into account the imperative need to find optimal forms, mechanisms, schemes, models of the post-war development of the agricultural industry and the almost absence of scientifically based developments regarding its organization, an appropriate model is proposed.

The purpose of the article is to develop a model of the post-war development of the agricultural industry of Ukraine with the corresponding theoretical justification and feasibility of implementation.

MATERIALS AND METHODS

For the theoretical substantiation of the specified model, the system method was used as the main one. The peculiarity of this method is that its application makes it possible to study complex, unbalanced, open systems, which is the agro-industrial complex of Ukraine. Considering the serious problems of the specified complex, the universality of the approaches of this method determines the forms and schemes of the research, which ensures the formation of the stipulated model. The application of the method of comparisons helps to identify differences in the dynamics of the development of the agro-industrial complex of Ukraine and other countries and to shape development directions. The method of formalization was used in the substantiation of the

specified model. A. Konverskyi presents its essence as follows: "Formalization is a type of sign modeling, by means of which the essence of the studied object or phenomenon is fixed, transmitted by a sign or a combination of signs and, most importantly, this combination of signs is treated as the object or phenomenon itself. Thus, it is not about the fact that as a result of formalization we abstract from the content of the studied objects, but about the fact that, with the help of symbols, the essential aspects of the content are expressed through the form, and then the study of the content is carried out on the basis of a symbolic model, according to formal rules [11, p. 54-55]. Economic analysis was used in the study of the state of the agro-industrial complex of Ukraine in the pre-war and post-war periods, which made it possible to identify specific problems, determine characteristics, and form development vectors of the specified model.

For the logical construction of the research order, a corresponding algorithm was formed (Fig. 1).

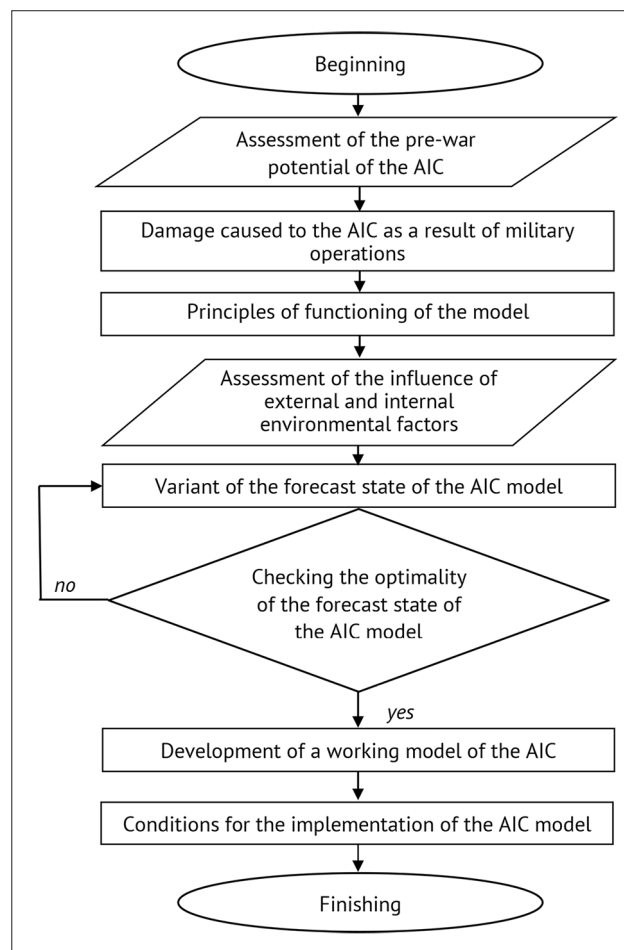


Figure 1. Algorithm for the development of the APC model

Source: developed by the authors

The information base of the research was: works of foreign and domestic scientists, branch specialists; statistical and analytical materials of the Ministry of Agrarian Policy and Food of Ukraine, Ministry of Agriculture

and Rural Development of Poland; specialized public organizations, scientific institutions; regulatory and legal documents that reflect the current and strategic aspects of the functioning of the agro-food complex.

RESULTS AND DISCUSSION

In the process of carrying out the research, the algorithm for developing the APC model was substantiated. A prognostic model of the agricultural industry was built, which includes elements of the external and internal environment, as well as the structure of the agricultural industry and its components. An assessment of the current problems of the specified complex is presented and the main characteristics of its functioning are determined.

The stages of the research are reasonably determined. Separate characteristics of the pre-war potential of the agro-industrial complex by individual components are presented. It is worth noting, according to the UN (Food and Agriculture Organization, FAO), Ukraine is one of the most important producers of agricultural products in the world and plays a leading role in the supply of food products to world markets. According to the results of 2021, Ukraine is the world's largest exporter of sunflower oil (35% of world exports), ranks second in the export of barley (14% of world exports), third in the export of corn (11%) and rapeseed (over 10%), 1st place in terms of wheat exports (about 10% of world exports). Agricultural exports in general are the

largest source of foreign exchange earnings for Ukraine. At the same time, the export structure of Ukrainian agricultural products indicates its mainly raw material nature and the need for development in the direction of deeper processing and production of products with higher added value [12, p. 93].

At the moment, the structure of crop production is dominated by crops of low-margin crops (89% by area of crops), which leads to a lower profit compared to the possible profit obtained from the sale of high-margin crops. For comparison, developed countries mainly grow high-margin crops (80% in the crop production structure in Spain, Italy and the Netherlands). The structure of animal husbandry is weakly diversified with a predominance of poultry farming. Animal husbandry occupies 21% of the agricultural sector. During the last five years, a downward trend has been observed – the number of cattle and pigs is decreasing, and the number of poultry is increasing. “The reasons for the decrease in the number of cattle are unprofitability” [14]. Despite the permanent increase in the export of agri-food products during 2014–2021, growing import volumes, in particular those products that can be manufactured in Ukraine, cause great concern (Fig. 2).

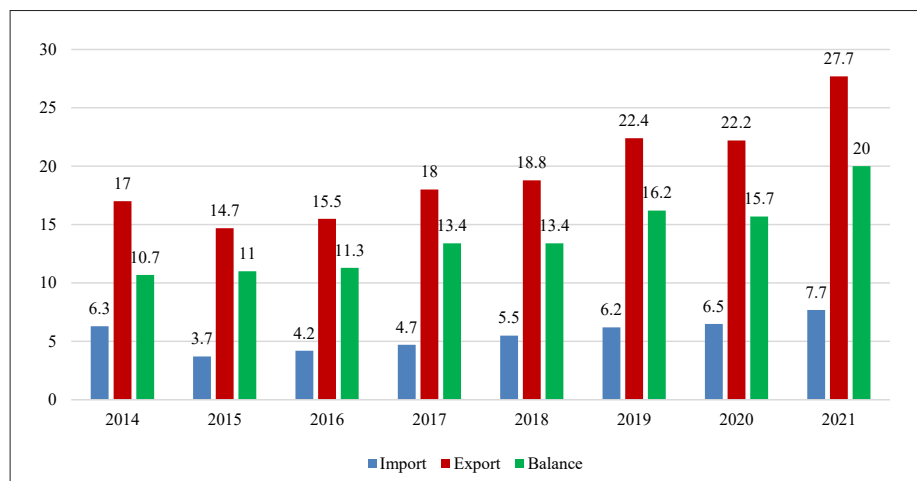


Figure 2. Dynamics of export and import volumes of agro-food products, billion dollars. USA

Source: compiled according to [15-17]

For an objective assessment of the agro-food potential of Ukraine, we will compare the relevant main

criteria of Ukraine and Poland and draw conclusions (Table 1).

Table 1. Criteria for agricultural production in Ukraine and Poland in 2020

Indicators	Poland	Ukraine	
		Total	% to Poland
Territory, thousand square meters km	312.7	603.5	193
Population, million people	37.9	42.2	111.3
Nominal GDP of the country, billion dollars USA	594	156	26.2
GDP of the agricultural sector, billion dollars USA	14.9	14.6	98.0
% of the GDP of the agricultural sector in the GDP of the country	2.5	9.4	3.76 times
Area of agricultural land, million hectares	18.7	42.2	2.26 times
Area plowed, %	36.5	53.9	147
Export of agricultural products, billion euros	34	19	55.9
State support for farmers, billion euros	4.1	0.39	9.5

Source: [18-20]

Evaluating these criteria, we determine that Ukraine is larger: the area of agricultural land is 2.26 times, the plowed area is 1.47 times, but it is smaller: the export of agricultural products is 55.9%, and the state support for farmers is only 9.5%. Therefore, the level of intensity of land use in Ukraine is much higher, but the efficiency of management is much lower, therefore it is expedient to change the pre-war model of agro-industrial complex with an emphasis on eliminating those problems that were previously inherent.

Forming a new model of the post-war development of the agro-industrial complex of Ukraine, it is worth taking into account the damage caused to the agro-industrial complex as a result of military operations. B. Danylyshyn calculated the possible losses of the economy, in particular the agricultural sector: "Similar estimates of losses of the economy based on the "territorial withdrawal" of regions of Ukraine from the normal process of economic reproduction show that the economic losses of Ukraine on an annual basis can reach: GDP production – 46%; export revenues – 48%; capital investment – 45%" [21]. Specialists of the Financial Club performed calculations according to two options by 52%, agriculture by 45%, export – by 52%. According to this scenario, the fall in the GDP of Ukraine may amount to 31% [22]. In this context, it is worth noting that now the war in Ukraine continues and the damages will be specified after its end.

It should be noted that the insignificant efficiency of using the potential of the agro-industrial complex was due to many reasons, in particular: low productivity of agriculture in comparison with Poland, Brazil, and Germany; predominant nature of raw material production;

the growing trend of food imports; negative factors of influence, first of all, of the external environment, which are caused by the permanent increase in the prices of energy carriers, mineral fertilizers, the significant limitation of supplies to EU countries due to insignificant quotas, as well as the imperfect theoretical and methodological justification of its current functioning and development in the direction of European integration processes, which should include the intensification of agricultural production, an increase in the volume of organic production, and an increase in the share of processing of agricultural raw materials [23; 19; 20]. Without defining the entire complex of this rationale, let's focus on only one of the components – the principles of the model's functioning. Justifying the principles, we will determine that the observance of such scientific approaches as systematicity and synergistics presupposes the use of the main method, and in this case the systemic method will be the most receptive, as it allows to study open complex systems, which is the agricultural industry of Ukraine.

Let's argue these principles.

1. Hierarchy of construction. Taking into account the postulates of the system method, the economic system is structured into appropriate hierarchical levels, subsystems and elements. Depending on the purpose and tasks of the research, the methodology is determined and the structure of the research object is substantiated. In the context of this study, the subsystem is defined as the APC, which in turn has a corresponding hierarchy. Regarding the hierarchy, in general, there are no significant differences of opinion among scientists, in particular V. Kopytko, O. Kopytko [24], G. Sytnyk [25], I. Bila, N. Nasikan [26], so we will define it as follows (Fig. 3).

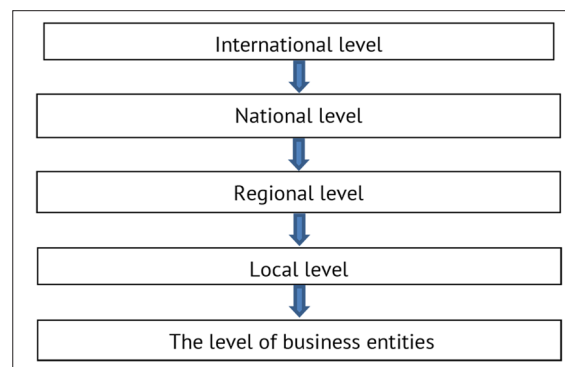


Figure 3. Hierarchy of agro-industrial complex of Ukraine

Source: summarized by the authors

2. Structural integrity. Note that, regarding the structure of the agro-industrial complex, scientists present a different composition of subsystems and elements. Taking into account the purpose of this study, it is expedient to apply the following provisions when justifying the elements of the agro-industrial complex subsystem:

- an element, as a component of a subsystem, must have compatible features with the subsystem, namely, the relevant governing body, organizational certainty, rules of functioning and development (normative and legal framework), resource composition, connections with other elements of the subsystem and the external and internal environment;

- the ability to generate and spend the appropriate type of energy (labour, financial, raw materials, etc.);

- play an inherent role, according to its purpose, in the structure of the subsystem and influence the functioning of other elements;

- to have a certain autonomy, which, however, does not contradict the strategy and tactics of functioning and development of the subsystem.

Taking into account the specified provisions, the composition of the elements of the agricultural industry as a defined subsystem of the economic system is presented as follows (Fig. 4).

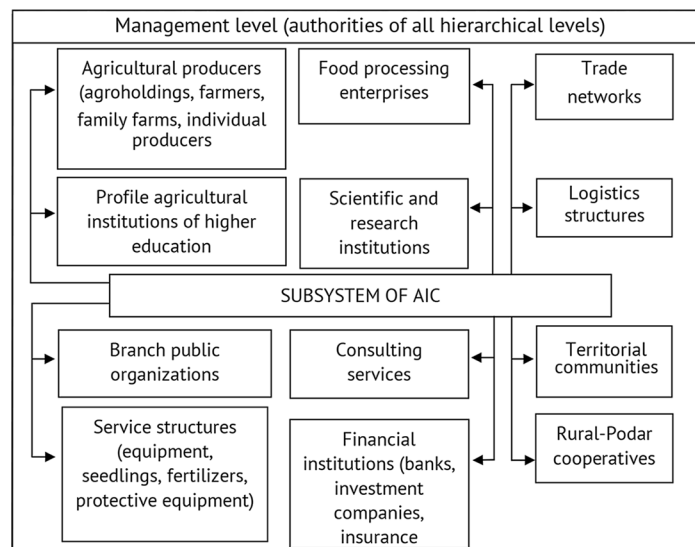


Figure 4. Functional component structures of the agro-industrial complex of Ukraine

Source: developed by the authors

Determination of criteria for current functioning and strategic guidelines for development. The criteria are the defining characteristics of the state of the object under study, and therefore their selection must be approached carefully. A comparison of individual criteria for the state of the agro-industrial complex in Poland and Ukraine makes it possible to assess the comparative efficiency across countries. Such estimates serve as the basis of economic analysis and allow choosing the most optimal vectors of development of the agro-industrial complex of Ukraine in the post-war period. Pragmatics of Ukraine in the pre-war period operated, for the most part, with statistical characteristics, including sown areas, gross harvests, volumes of export deliveries, and, at the same time, characteristics regarding economic efficiency, including comparative content, somewhat receded into the background. The criteria should be formed taking into account: optimizing the interests of the state as a whole, regions, territorial communities and commodity producers. In this context, a well-known proverb is mentioned, the authorship of which is attributed to Cicero (106-43 BC) and which in an approximate version of the Ukrainian language is interpreted as follows: "Heavenly grace is needed to reconcile the benefits of the redeemers and the population, so as not to bring one into sacrifice to others and make sure that the sheep are whole and the wolves are fed" [27, p. 29]. This issue remains relevant at the present time, but in connection with the improvement of the legislation and a clearer definition of the property, land, and financial rights of the participants of the agro-industrial complex, it must be resolved. Also, the production of agricultural products from 1 ha of land area should be a significant criterion. Ukraine has quite significant areas of agricultural land, however, the predominant raw material nature of export supplies significantly reduces the real capabilities of the agro-industrial complex, which does not contribute to obtaining additional income, does not create new jobs

and does not contribute to replenishment budgets of all levels [15-17]. Within the scope of the purpose and defined scope of the study, it is not possible to submit other criteria with the appropriate analytical apparatus, however, such an approach to the specified criteria should be followed.

4. Emergencies. It provides for the formation of progressive qualities in the agro-industrial complex, in particular, the intensification of agricultural production, an increase in the volume of added value, an increase in the area of organic production, which until now were not inherent to its individual elements. Such progressive qualities should be foreseen based on the real efforts of the participants of the agricultural industry.

5. Synergetics. This principle has a rather broad interpretation, but it is one of the basic ones for the development of complex systems. As for the agro-industrial complex, transforming to the current reality, which is characterized by military operations in large areas of Ukraine, logistical problems, insufficient budgetary support for agricultural producers, it conditions the emergence of new qualities, the elimination of obstacles on the way to development, energy accumulation, etc.

6. Consolidation of the efforts of agro-industrial complex participants to restore destroyed agricultural areas, production facilities, warehouses, infrastructure, as well as the creation of new management mechanisms.

The implementation of these criteria is a strong theoretical and methodological basis and should contribute not only to the restoration of the pre-war state of the agricultural industry, but also to determine the vectors of recovery and be the basis of a new model of the agricultural industry.

Like any complex structure, the agro-industrial complex subsystem is affected by factors of the external and internal environment in the process of functioning, which can be positive or negative. According to the system method, a factor is formed by a corresponding element of the environment and its influence is determined

by the energy of this element, taking into account the preventive actions taken against the negative reaction of another element or elements on which this influence is directed. Since the composition of the elements of the social system is much wider than the elements of the agro-industrial complex, they can be influenced by elements of other systems [28]. Thus, a convincing example is when the elements of the military subsystem of Russia have a significant negative impact on all elements of the agro-industrial complex subsystem. Since factors by their nature can be military, political, economic, demographic, etc., we will limit ourselves to economic ones. In the external environment, positive factors are the favorable situation of agri-food Ukrainian products, the removal of quotas for Ukraine by the European Union, and negative factors are logistics networks that are blocked by Russia, delays in payment for delivered products. The positive factors of the internal environment are the quality of Ukrainian chernozems, favorable climatic conditions, and the professionalism of product manufacturers, while the negative ones are insufficient budget funding and a lack of labor. In an analytical form, the power of influence on the components of the potential of the agricultural industry at the national level from the negative factors of the external environment is defined as follows (eq. 1).

$$\sum_{i=1}^n P = -(\Delta F + \Delta M + \Delta S + \Delta L + \Delta N + \Delta T) \times K \quad (1)$$

where: P is the specified impact force; F – loss of financial resources; M – loss of material resources; S – loss of land resources; L – loss of labor resources; N – losses

from damaged infrastructure; T – other losses depending on the specifics of the object; K is a generalizing correction factor that takes into account the level of damage.

Applying this approach, it is possible to calculate the corresponding strength of influence of the selected factors. When developing the specified model, the main provisions of the prognostic-financial concept were substantiated. Forming the methodological toolkit, the determined system method was used as the basis of the research. One of his postulates suggests that in order to study a complex open system, it is necessary to go beyond its boundaries. Regarding this study, it involves the use of the latest theoretical constructions from various fields of science, in particular the theory of behavioral economics and the theory of growth poles, the identification of specific signs of the functioning of the object of resource, financial, and legal content, the relationship with the surrounding environment, and the prediction of its forecast state. Also, the use of: the method of comparisons involves the analysis of the agricultural sector in comparing its previous and future state with other countries; analytical methods – enables assessment with obtaining specific parameters; prognostics – the possibility of forming scientifically based components of the object with the definition of development vectors; sociological methods – to take into account the mental component of the Ukrainian people, which is a defining characteristic of the development of the social system, in particular the agricultural sector.

Using these approaches, we will form a prognostic model of agriculture (Fig. 5).

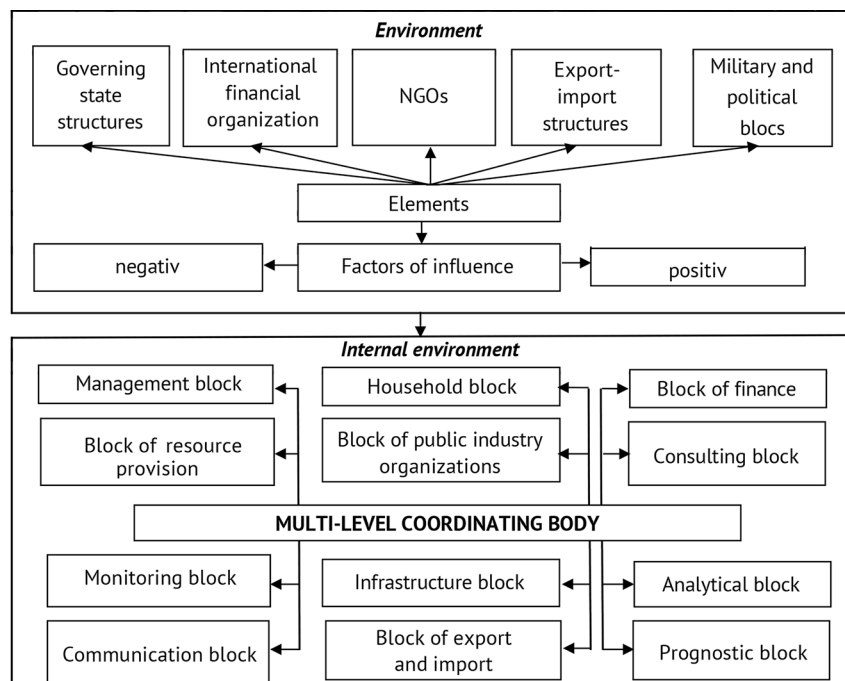


Figure 5. Predictive model of AIC

Source: developed by the authors

When developing the model, the shortcomings of the functioning of the pre-war model were taken into account, in particular:

- lack of state support. Thus, budget expenditures in individual European countries in 2019 amounted to (million euros): Turkey – 7,034, Poland – 2,693, Italy – 2,486, Denmark – 610, Bulgaria – 578, which compared to 540 in Ukraine, are significantly larger. therefore, it is expedient to increase it [29];

- incompleteness of strategic documents regarding development vectors [30–32]. Evaluating the acts that regulate the functioning of the agro-industrial complex, we note that they do not have defined timelines, guidelines for strategic development, permanent monitoring, scientific support, and sufficient budget funding [33; 34]; insufficient pragmatic justification, which does not contribute to the effective management of agribusiness structures [35; 36]. We also note that in these and other legal acts there is a vague demarcation by hierarchy and meaning: strategic – (relevant long-term strategies); basic – national level of agro-industrial complex (Codes); regarding the development of certain industries – Concepts; operational response – Resolutions of the CMU; current functioning – Decisions of ministries, departments, local authorities. As one of the examples, we note that in direction 9. “Agro-industrial sector and food industry” of the National Economic Strategy for the period until 2030 [37] certain problems are highlighted, certain wishes are expressed regarding the development of the agro-industrial complex industries, but without a clear responsibility of officials due to deadlines, adequate budgetary support, etc. This situation regarding the legal support of the domestic agricultural industry in general, and its branches in particular, is due to organizational problems, in particular, the lack of involvement of relevant scientific institutions, specialized public organizations, and analytical agencies, therefore further improvement of this base is proposed;

- the lack of permanent fruitful cooperation between the structures of the agricultural industry, therefore, in accordance with the principle of consolidation, the creation of a multi-level coordination body with appropriate powers, budget funding with the involvement of representatives of all participants of the agricultural industry is foreseen. The functions of this body should not be duplicated with the powers of relevant ministries, but in war and post-war conditions, such a need is relevant for the preparation and further implementation of current and strategic decisions. Note that the presence of coordinating, controlling, consulting independent bodies is inherent in developed agricultural countries. Thus, in Italy, an independent performance evaluation body functions and in monochrome form performs the functions of evaluating the activities of the Ministry of Agriculture, Food and Forest Policy (Organismo indipendente di valutazione della performance in forma monocratica) [38].

To determine the optimality of the forecast state of the agricultural industry model, we will use the following approaches:

- compliance of such a model with the main development vectors of the corresponding models in the leading agricultural countries. In this context, we note that the models in the mentioned countries have their own characteristics, but the problems of proper budget financing, food security, support of the domestic producer, basic resource provision, and organic production are solved much more effectively;

- the creation of powerful clusters at the local level, with basic administrative formations at the level of territorial communities, including agricultural commodity producers, a united agricultural cooperative, processing enterprises, logistics structures, trade networks, consulting services, financial structures, and an effectively functioning coordinating body based on the administration of territorial communities;

- dynamic growth of the GDP of agriculture and the corresponding volumes at hierarchical levels;

- overcoming the identified negative trends.

In the conditions of the current military aggression of Russia, it is difficult to make a predictive assessment of the state of the agricultural industry of Ukraine, however, certain adjustments are made after it ends.

Taking into account the identified shortcomings in the proposed model, if appropriate, appropriate adjustments are made and a working model of the agro-industrial complex is formed. Considering that Ukraine is now in a state of future uncertainty due to significant economic, military, political, demographic, etc. factors, it is necessary to take this into account when forming the working model of the agricultural industry. It should be noted that modern economic and mathematical methods, with a certain degree of probability, make it possible to determine this, in particular, using the theory of decision-making under conditions of uncertainty and applying known approaches, in particular – Chebyshev's inequalities or the criteria of Laplace, Wald, Savage, Hurwitz, Hodges-Lyman, etc. [39; 40].

In order to ensure the effectiveness of the proposed working model of agriculture, the conditions of its implementation play a significant role. In this context, we will present relevant proposals at the level of state management and the views of individual specialists.

One of the areas of implementation of this model is the Decree of the President of Ukraine No. 266/2022, dated April 21, 2022, “Questions of the National Council for the Recovery of Ukraine from the Consequences of the War”, which provides for the creation of such a body [41]. The authors note that the intended functioning of such a body correlates with proposals for a multi-level coordinating body of the agricultural sector.

His own vision of the post-war recovery process, which is also related to the agricultural sector, was presented by the chairman of the board of the Institute of Economic Research and Political Consultations I. Burakovsky during the conference in Warsaw on April 28, 2022 “After the war. Rethinking the future of civil society”, where he noted; “The war took more than 50% of Ukraine's GDP, and in order to compensate for these

losses, the economy must grow by 15% annually for 5 years, by 7% for 10 years. Today, the question of recovery is considered from the point of view of terms (time), funds (financial needs) and sources of financing (aid from the international community, reparations, etc.). The post-war recovery of Ukraine will require enormous efforts from both the authorities and society. In particular, civil society should promote the establishment of regular, honest and responsible dialogue between citizens and the authorities, as well as offer effective solutions to relevant problems. The effectiveness of post-war recovery directly depends on how effectively the state will work as a manager of the recovery project" [10].

Determining the future of the post-war model of Ukraine, in particular its structural component of the agricultural sector, economic consultant V. Novikov expressed the following assumption: "If we look at the Ukrainian situation from the perspective of the Marshall Plan, then the restoration of its economy in its pre-war form will mean the preservation of its agrarian raw materials, which makes Ukraine the poorest country in Europe. Therefore, from the point of view of the economic structure, we do not need the Marshall Plan, we need to change, not preserve, the structure of the economy. In other words, we need an "Anti-Morgenthau Plan", that is, a plan for the transition from an agrarian-raw material to a technological economy" [9].

Regarding the intellectual support of the recovery process, the Chairman of the Board of Transparency International Ukraine, A. Vyshnevsky, expressed his opinion in a reasoned way: "Today is a unique historical moment, when the President of Ukraine has the moral right and objective reasons to turn to such people as Gregory Mankiw for intellectual help. Saskia Sassen, Edward Glaser and many other outstanding thinkers of the world scale" [8].

The role of economic scientists in individual countries had a positive effect, which consisted in the rapid recovery of the country from military destruction, the transition to an innovative path of development, it is enough to mention their role in the formation of new economic models. This is L. Erhard – the author of the "German miracle" in post-war Germany [42], V. Leontiev in the 70-80s ("Asian tigers" – Hong Kong, South Korea, Singapore, Taiwan) [43], who advised the governments of these countries, L. Baltserovych – who in the late 1990s formed a market model of the economy in Poland [44].

Evaluating these views, it is determined that it is worth listening to the advice of foreign consultants, taking into account their experience, but Ukrainian scientists should develop their own model, since they are the bearers of the national mentality, feel the importance of the problem and are able to develop appropriate projects. In this context, we will present the opinion of the well-known Ukrainian scientist I. Lukinov, expressed at the beginning of the present century: "To bring the country's national economy out of a state of crisis, the formation of a scientifically based Ukrainian doctrine and the concept of its economic development,

which belongs to our scientists together with practical workers, is of great importance to develop as soon as possible by own efforts, without waiting for Western advisers and consultants to do it" [45, p. 10].

CONCLUSIONS

Revival of the agricultural industry destroyed by the war is a complex and long-term process, given the extent of the destruction, the departure of workers outside of Ukraine, financial problems, etc., and that is why it requires the efforts of the entire society. The task of Ukrainian scientists is to propose theoretical constructions and practical mechanisms for such recovery, and in this context, the development of a model of the post-war development of Ukraine's agricultural industry is an important national task.

Using the developed research algorithm with the application of systemic and synergistic approaches and methods of comparisons, formalization, economic analysis, a prognostic model of the agricultural industry of Ukraine was formed. In the process of developing this model, a thorough analysis of the potential of the agro-industrial complex was carried out, with an assessment based on the criteria of the area of agricultural land, the productivity of the specified complex, and export-import operations. For the theoretical and pragmatic formation of the model: the hierarchy of the agricultural industry of Ukraine was clarified; the functional component structures of the agro-industrial complex are substantiated; the expediency of applying six principles is emphasized; the strength of the influence of negative factors on the potential of the agro-industrial complex in the cost calculation is analytically determined. Considerable importance was attached to the comparison of the state of the agricultural industry of Ukraine with other countries. Thus, the comparison of the percentage ratio of the Ukrainian crop and livestock industries, where it is 79% and 21%, respectively, is unproductive, compared to the weighted average in the EU countries, where this ratio is 57% to 43%. Significant differences were revealed in the comparative analysis of the main agro-food indicators of Ukraine and Poland for 2020, where, with the area of agricultural land in Ukraine 2.26 times larger, the plowed land – 1.47 times, we have almost comparable GDP volumes of this complex, and the export of agro-food production is only 55.9%.

The scientific result of the research has theoretical and practical significance. The theoretical part consists in the development of the theoretical and methodological basis of the prognostic model of the agricultural industry of Ukraine, and the practical part – in the possibility of applying the components of this model at the regional and local levels. We should also note that the prognostic and financial concept of this model is a significant contribution to the solution of an important task at the national level and should contribute to the processes of revitalization of the agricultural industry of Ukraine in new social conditions, taking into account the European choice of Ukraine.

Taking into account the relevance of this issue for the near future of the agricultural industry, it is expedient to continue research highlighting the specifics of the development of industries, financial support, and increasing the level of processing of agricultural raw materials.

REFERENCES

- [1] Bosak, A.O., & Mustafaieva, L.A. (2019). The current state and prospects of development of agro-industrial complex of Ukraine: Search for new markets. *International Economic Relations and the World Economy*, 24(1), 48-54.
- [2] Novikov, O., Potryvaieva, N., Karpenko, M., & Sadovy, O. (2021). The role of irrigation in the formation of the innovation and investment environment of the region. *Ukrainian Black Sea Region Agrarian Science*, 111(3), 4-11. doi: 10.31521/2313-092X/2021-3(111).
- [3] Hadzalo, Ya.M., & Luzan, Yu.Ya. (2020). Improvement of state management for development of the agricultural sector of the economy and rural territories of Ukraine. *Ekonomika APK*, 11, 6-18. doi: 10.32317/2221-1055.202011006.
- [4] Izhevskiy, P.H. (2018). Agroindustrial complex of Ukraine: Current state, tendencies and prospects of development. *Intellect XXI*, 3, 59-64.
- [5] Camanzi, L., & Troiano, S. (2021). The evolutionary transformation of modern agri-food systems: Emerging trends in consumption, production, and in the provision of public goods. *Agricultural and Food Economics*, 9, article number 24. doi: 10.1186/s40100-021-00196-2.
- [6] Miranda, M.J., & Glauber, J. (2022). A model of asynchronous bi-hemispheric production in global agricultural commodity markets. *American Journal of Agricultural Economics*, 104(2), 812-830 doi: 10.1111/ajae.12241.
- [7] Abraham, M., Chiu, V.L, Joshi, E., Ilahi, A.M, & Pingali, P. (2022). Aggregation models and small farm commercialization. A scoping review of the global literature. *Food Policy*, 110, article number 102299. doi: 10.1016/j.foodpol.2022.102299.
- [8] Vyshnevskiy, A. (2022). *Ukraine's post-war reconstruction: Majestic times call for majestic action*. Retrieved from <https://zn.ua/internal/poslevoennoe-vosstanovlenie-ukrainyvelichestvennye-vremena-trebujut-velichestvennykh-dejstvij.html>.
- [9] Novikov, V. (2022). *What model does Ukraine need to rebuild its economy after the war?* Retrieved from <https://www.epravda.com.ua/columns/2022/03/16/684116>.
- [10] Burakovskiy, I. (2022). *The Ukrainian economy should grow by 15% annually for 5 years*. Retrieved from <http://www.ier.com.ua/ua/institute/news?pid=6911&fbclid=IwAR3QL83rpXGaP2KpDdkwUsppyLZ9rFRuRm c9qy3DoqUreN4TUx82Otq0DEU>.
- [11] Konverskyi, A.Ye. (2017). *Logic* (2nd ed.). Kyiv: VPTs "Kyivskiy universytet".
- [12] Ukraine 2022. How not to lose the chance to become a strong state. (2022). Retrieved from <https://drive.google.com/file/d/1bVEYJ4Zgj3f8XPHh1C2h99TvfLoh2snh/view>.
- [13] White paper "Strategy for the development of land relations in Ukraine". (2021). Retrieved from https://minagro.gov.ua/storage/app/sites/1/PDF/Land-strategy_220530_092343.pdf.
- [14] Resolution of the Cabinet of Ministers of Ukraine No. 179 "On Approval of the National Economic Strategy for the Period up to 2030". (2021, March). Retrieved from <https://www.kmu.gov.ua/npas/pro-zatverdzhennya-nacionalnoyi-eko-a179>.
- [15] Demchak, Í.M., Mitchenok, O.O., Trofimova, G.V., & Maydanyuk, O.Ye. (2020). *Foreign trade turnover of agricultural products*. Retrieved from http://www.uapp.kiev.ua/files/mon-zto/2019/zed_desember_2019.pdf.
- [16] Ukraine in 2020 increased imports of agricultural products by 13%. (2022). Retrieved from <https://www.ukrinform.ua/rubric-economy/3169535-ukraina-u-2020-roci-zbilsila-import-agroprodukcii-na-13.html>.
- [17] Achro-food products account for about 41% of Ukraine's total exports. (2022). Retrieved from http://profapk.org.ua/news/news_apk/3106.html.
- [18] Informational and analytical portal of the agro-industrial complex of Ukraine. (n.d.). Retrieved from <https://agro.me.gov.ua/ua>.
- [19] Exports of Polish agri-food products in 2020. (2021). Retrieved from <https://www.ogrodinfo.pl/rynki-i-prawo/eksport-polskich-artykulow-rolno-spozywczych-w-2020-r>.
- [20] Ministry of Agriculture and Rural Development. (n.d.). *Information on the integrated agricultural market information system*. Retrieved from <https://www.gov.pl/web/rolnictwo/informacje-dotyczace-zintegrowanego-systemu-rolniczej-informacji-rynkowej>.
- [21] Danylyshyn, B. (2022). *To squeeze the maximum out of Russia and attract funds from partners*. Retrieved from <https://www.epravda.com.ua/columns/2022/04/13/685656/>.
- [22] Economists explained 45% of the potential losses of Ukraine's GDP. (2022). Retrieved from <https://finclub.net/ua/news/ekonomisty-poiasnily-45protsent-potentsiinykh-vtrat-vvp-ukrainy.html>.

- [23] Ministry of Agriculture and Rural Development. (n.d.). *Direct payments in 2020*. Retrieved from <https://www.gov.pl/web/rolnictwo/platnosci-bezposrednie-w-2020-r>.
- [24] Kopytko, V.I., & Kopytko, O.V. (2018). Institutional transformation as an important factor in the agrarian sector of regional agribusiness. *Bulletin of Kharkiv National Agrarian University named after V.V. Dokuchaev. Series: Economic Sciences*, 1, 114-122. doi: 10.31359/2312-3427-2018-1-114.
- [25] Sytnyk, H.P. (Ed.). (2016). *Global and national security*. Kyiv: NADU.
- [26] Bila, I.S., & Nasikan, N.I. (2019). Hierarchy of business environment management subjects: State – business associations – enterprises. *Eastern Europe: Economy, business and management*, 20(3), 53-58.
- [27] Yanzhul, Y.Y. (1899). *Basic principles of financial science. The doctrine of state revenues*. St. Petersburg.
- [28] Varenko, V.M., Bratus, I.V., Doroshenko, V.S., Smolnykov, Yu.B., & Yurchenko, V.O. (2013). *System analysis of information processes*. Kyiv: Universytet "Ukraina".
- [29] Official website of the United Nations Economic Commission for Europe. (n.d.). Retrieved from <https://unece.org/>.
- [30] Law of Ukraine No. 124-IX "On Seeds and Planting Material". (2020, October). Retrieved from <https://zakon.rada.gov.ua/laws/show/411-15#Text>.
- [31] Law of Ukraine No. 124-IX "On Agricultural Cooperation". (2021, July). Retrieved from <https://zakon.rada.gov.ua/laws/show/819-20#Text>.
- [32] Law of Ukraine No. 124-IX "On Grapes and Grape Wine". (2020, October). Retrieved from <https://zakon.rada.gov.ua/laws/show/2662-15#Text>.
- [33] Law of Ukraine No. 1684-IX "On the Animal World". (2021, August). Retrieved from <https://zakon.rada.gov.ua/laws/show/2894-14#Text>.
- [34] Order of Ministry of Agricultural Policy of Ukraine and Ukrainian Academy of Agricultural Sciences No. 443/73 "On the Approval of the Concept of the Sectoral Horticulture Development Program of Ukraine for the Period Until 2025 and the Concept of the Sectoral Program for the Development of Viticulture and Winemaking of Ukraine for the Period Until 2025". (2008, July). Retrieved from <https://ips.ligazakon.net/document/view/FIN39917?an=506>.
- [35] Order of the Cabinet of Ministers of Ukraine No. 588-r "On the Approval of the Strategy for the Development of Exports of Agricultural Products, Food and Processing Industry of Ukraine for the Period Until 2026". (2019, July). Retrieved from <https://zakon.rada.gov.ua/laws/show/588-2019-%D1%80>.
- [36] Land Code of Ukraine. (2001, October). Retrieved from <https://zakon.rada.gov.ua/laws/show/2768-14#Text>.
- [37] Resolution of the Cabinet of Ministers of Ukraine No. 179. "On the Approval of the National Economic Strategy for the Period Until 2030". (2021, March). Retrieved from <https://www.kmu.gov.ua/npas/pro-zatverdzhennya-nacionalnoyi-eko-a179>.
- [38] Ministry of Agricultural, Food and Forestry Policies. (n.d.). *Independent performance appraisal body in monochromatic form*. Retrieved from <https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/623>
- [39] Lohvinova, O.P., & Semenenko, I.M. (2015). *Justification of business decisions and risk assessment*. Kharkiv: Lider.
- [40] Vitlinskyi, V.V., & Velykoivanenko, H.I. (2002). *Riskology in the economy and entrepreneurship*. Kyiv: KNEU.
- [41] Decree of the President of Ukraine No. 266/2022 "The Issue of the National Council for the Recovery of Ukraine from the Consequences of the War". (2022, April). Retrieved from <https://www.president.gov.ua/documents/2662022-42225>.
- [42] Nikolaiev, Ye., Dluhopolskyi, O., Yehorchenko, I., Ivanytska, O., Rynhach, N., & Funk, L. (2015). *Social market economy: Landmarks for European integration transformations of Ukraine*. Kyiv: Office of the Representation of the Konrad Adenauer Foundation in Ukraine.
- [43] Leontiev, V.V. (2012). *Life path and contribution to world science, bibliographic index dedicated to the 40th anniversary of the awarding of the Nobel Prize*. Dnipro: Library of Alfred Nobel University.
- [44] Kozlovskiy, I. (2014). *Leshek Baltserovych: "Shock therapy" is a horror story*. Retrieved from <http://www.golos.com.ua/article/25648>.
- [45] Lukinov, I. (2001). About the national doctrine of economic transformations in Ukraine. *Bulletin of TANEU. Special Issue "Problems of Economic Integration of Ukraine into the European Union. European Comparative Studies"*, 18(1), 6-12.

Модель післявоєнного розвитку агропромислового комплексу України: прогностично-фінансовий концепт

Олександр Євгенович Новіков¹, Юрій Васильович Пасічник²

¹Миколаївський національний аграрний університет
54008, вул. Георгія Гонгадзе, 9, м. Миколаїв, Україна

²Національний науковий центр «Інститут аграрної економіки»
03127, вул. Героїв Оборони, 10, м. Київ, Україна

Анотація. Стаття присвячена формуванню післявоєнної моделі розвитку агропромислового комплексу України. Актуальність теми полягає у визначенні засобів відновлення та подальшого розвитку агропромислового комплексу з відповідним обґрунтуванням пропонованої моделі, що сприятиме вирішенню проблем забезпечення продовольством українських та зарубіжних споживачів. Зважаючи на специфіку дослідження, основним методом вибрано системний, що забезпечує комплексність виконання дослідження. Поряд із ним використано методи порівнянь, формалізації, економічного аналізу, які дають змогу доповнити та розширити обсяги дослідження для отримання науково обґрунтованого результату. Метою статті є обґрунтування прогностично-фінансового концепту відновлювальної моделі АПК України у післявоєнний період. У статті проаналізовано передвоєнний стан агропромислового комплексу за основними критеріями та виявлено причини неефективного використання його потенціалу. Здійснено порівняння ефективності сільськогосподарського виробництва за показником доданої вартості в Україні із такими країнами як Польща, Бразилія, Німеччина, Франція, де було виявлено суттєве відставання України. Також наголошено на незначній частці української сільськогосподарської сировини, яка направляється на промислову переробку, що значно знижує обсяги добавленої вартості. Зважаючи на важливість впливу чинників зовнішнього середовища у теперішній час на функціонування агропромислового потенціалу, подано аналітичне обґрунтування цього впливу у вартісному обчисленні. Використовуючи системний метод, запропоновано алгоритм розробки зазначеної моделі, обґрунтовано ієрархію та структуру розвитку цього комплексу, визначено шість принципів, розроблено наукові підходи щодо формування прогностичної моделі післявоєнного розвитку зазначеного комплексу у експериментальному і робочих варіантах та висвітлено умови її впровадження. Наукова новизна статті полягає у розробці теоретичних положень, які в сукупності дали змогу запропонувати прогностичну модель розвитку агропромислового комплексу України у післявоєнний період, що буде сприяти відновленню та подальшому розвитку всього зазначеного комплексу із стійким забезпеченням національної продовольчої безпеки

Ключові слова: агропродовольчий потенціал, прогностична модель, структура АПК, чинники впливу