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PRIORITIES AND MECHANISMS FOR BALANCING THE FOREIGN TRADE IN AGRICULTURAL PRODUCTS BASED ON COMPLEMENTARITY

ABSTRACT

The research paper aims at carrying out a systematic analysis of the complementarity of foreign trade in agricultural products and to substantiate on this basis the priorities for the expansion and balancing of Ukrainian agricultural exports at the micro, macro, and mezzo-levels. The concept of complementarity of foreign trade is defined as the level at which the economic systems of different countries are balanced on the basis of mutual complementarity of the commodity structure of export and import and effective participation in the international division of labour. The methodological approaches to the study of complementarity of foreign trade are systematized. The article uses a complex approach to the analysis of foreign trade relations in the agrarian sphere and the extent to which it is balanced. The main trends and features of the development of Ukrainian foreign trade in agricultural products are determined. It was found that the imbalance of the foreign economic sphere in the agricultural sector is manifested in the dominance of export activities of large agricultural holdings, the monocultural nature of agricultural production and export, and ineffective institutional support of small farmers and agrarians. An empirical assessment of the complementarity of Ukrainian foreign trade in agricultural products has been carried out using complementarity indices, indices of revealed comparative advantage, and applying the method of cluster analysis. The conducted calculations proved that the Ukrainian agricultural sector has a significant unused potential for the development of exports on the basis of complementarity. A set of priorities of balancing foreign trade in agricultural products based on complementarity are substantiated, in particular, the following: forming a system for monitoring the complementarity of Ukrainian foreign trade in agricultural products; concluding and comprehensively supporting the implementation of interstate agreements on the development of mutually beneficial trade in complementary products, including on a barter basis; providing support for export development of small and medium-sized enterprises, and for small-scale production; enhancing diversification of the assortment of agricultural exports of Ukraine, especially in the niches of craft and organic products; supporting complementary foreign trade relations at the level of individual regions of Ukraine; providing a strong and efficient consulting support for exporters, giving assistance in the process of finding foreign partners and entering foreign markets.

Keywords: complementarity, revealed comparative advantages, agro-industrial complex, foreign trade, competitiveness, institutional support, export balancing

JEL Classification: A22, A23, M10, M14

INTRODUCTION

The distinctive characteristics of the development of the world market of agro-food resources in the conditions of deepening global challenges of modern times are the deterioration of its level of stability and balance. The key reasons for this situation are the increasing threats of the emergence of new local military conflicts and the development of the existing ones, the periodic spread of recessions and financial and economic crises on a global scale, the wide use of non-tariff instruments in international trade, the discriminatory policy of highly developed states in relation to countries with lower economic development in terms of product supplies by the agricultural industry, etc. In

these conditions, the priority task for the agricultural sector of Ukraine is the search for new sales markets and the expansion of presence in already developed foreign market niches due to the formation of an effective model of relations based on the principles of mutual complementarity.

In the pre-war period, Ukrainian foreign trade in agricultural products showed rapid growth rates and changes in the geographical and commodity structure of export and import operations. The reasons for the positive trends include the accession of Ukraine to the Free Trade Area of the European Union, changes in the product structure of foreign trade as a result of the gradual withdrawal from the Russian market, and the attraction of foreign capital in this industry. However, the significant agrarian potential of Ukraine on a global scale (taking into account the qualitative and quantitative characteristics of agricultural land) did not result in the country becoming a global leader in world trade in agro-food products. The concentration on the monocultural character of agricultural production resulted in achieving leadership in the international market only in certain commodity positions (primarily cereal crops, maize, sunflower oil, etc.). Therefore, the necessity and urgency of balancing foreign trade in agricultural products through the use of scientifically based methods of analysis, the search for new effective tools and directions for expanding the geography of sales, and the presence of Ukrainian companies in foreign markets through the application of the principles of mutually beneficial cooperation are increasing.

Numerous strategies and program documents emphasize the importance of revitalizing Ukrainian foreign trade in agricultural products and implementing qualitative changes in this sector of the economy. Thus, the "Ukraine-2030" strategy defines the importance of supporting the export of agro-food products, in particular for small-scale manufacturers, and the urge of reducing the excessive dependence of agricultural production on the state of the global economy [15, p. 4-6]. In the message of the President of Ukraine to the Verkhovna Rada, it is emphasized that the export-oriented agricultural industry is the driving force of the Ukrainian economy [1, p. 19], but structural changes in the agricultural sector are inhibited due to the significant level of monospecialization inherent in large agricultural holdings, the decline of small forms of management (farming), which has a negative impact on the social and economic situation of the village [1, c. 20]. In our opinion, in today's conditions, one of the priority directions of the transformation of the Ukrainian agricultural industry is its export-oriented development based on complementarity.

LITERATURE REVIEW

The term "complementarity" is of Latin origin (deriving from the noun "complementum") and is translated in the Latin-Ukrainian Dictionary as "complement" and "completion" (something that complements or completes) [11]. According to the research by H. V. Karpinska [6, p. 86], the problem of complementarity was analysed in economic theory as early as the beginning of the 20th century. Thus, the Austrian economist Friedrich von Wieser in his book "Theory of Social Economy" (1914) argued that the basis of economic life and the main productive means (land, labour, and capital) have a complementary nature.

A fundamental analysis of the concept of complementarity was carried out by Academician V. M. Heyets [4], who concluded that the use of this category is appropriate not only in the field of molecular biology but also in economic and social life. At the same time, this scientist's research claims that the desire for unity through complementarity and interaction is inherent in both social life and economic interaction.

The phenomenon of complementarity has been considered in recent years not only at the level of national economic systems but also in certain spheres of economic activity and branches of the economy. Thus, Ye. V. Krykavskiy [9] examines the complementarity of marketing and logistics strategies in the process of supplying goods of everyday demand and studies the complementary interaction of such internal components as financial, technological, personnel, marketing, logistics, and other company resources [9, p. 26]. H. V. Karpinska [6, p. 86] uses the principles of complementarity when developing recommendations for balanced development at the enterprise level.

The study of Z. A. Atamanchuk and Z. Ya. Makogin [2] analyses the level of complementarity of foreign trade relations between Ukraine and the EU. However, the authors carry out a macro-level analysis without a more detailed assessment of the complementarity of countries at the level of individual regions or industries.

K. A. Flissak [16] proves that the phenomenon of complementarity manifests itself at the level of countries and individual industries in the case of their participation in international production cooperation. For example, the economies of Germany and Ukraine are complementary in the automotive industry, which is ensured thanks to the Ukrainian export to Germany of certain components (electrical wiring) for the production of cars within the framework of agreements on international

production cooperation. That is, there is a mutual complementation of economic processes in the sectoral dimension, while competition and contradictions are absent.

Thus, in the context of our research, the complementarity of foreign trade will be understood as the level of balancing of the economic systems of different countries based on the complementarity of the commodity structure of export and import and effective participation in the international division of labour. At the same time, the complementarity of several countries can be studied at the level of the entire economic system, as well as at the level of individual regions, industries, individual product groups, or even companies. In this case, complementarity will imply the absence of significant contradictions in trade relations, effective interaction, and complementation.

AIMS AND OBJECTIVES

This study intends to carry out a systematic analysis of the complementarity of foreign trade in agricultural products and to highlight on this basis the priorities for the expansion and balancing of Ukrainian agricultural exports at the micro, macro, and mezzo-levels. The main objectives of the article are: to summarize the theoretical and methodological foundations of the study of the complementarity of the agrarian sphere in the conditions of the global economy; to analyse the trends and problems in the development of Ukrainian foreign trade in agricultural products; to carry out an empirical assessment of the complementarity of Ukrainian foreign trade in agro-food products; to justify the priorities and mechanisms for balancing foreign trade in agricultural products on the basis of complementarity.

METHODS

Modern foreign methods make it possible to quantitatively assess the level of complementarity of foreign trade relations at the country or industry level. The trade complementarity index (TCI_j), proposed in 1969 in the work of Australian University professor Peter Drysdale [18], is widely used for macro-level (country-level) analysis. This index was transformed in the work of J. Perlman [19] and in the Recommendations of the World Bank on the analysis of foreign trade [22]. The index shows to what extent the existing structure of imports of a foreign trade partner corresponds to the structure of exports of a certain country, which allows obtaining information about the country's trade prospects. It is calculated according to the following formula:

$$TCI_j = 100 - \frac{\sum M_{jk \rightarrow X_{ij}}}{2} \quad (1)$$

where M_{jk} is the specific weight of product i in the total import of the country k ; X_{ij} is the specific weight of export of the i^{th} product of the country j .

If the value of the trade complementarity index is zero, then the country does not export any goods, or the trading partner does not import goods. If the value of the TCI approaches 100, this indicates that the respective shares of exports and imports coincide. If a country has a high complementarity index for exports, this may indicate that this country participates in the international division of labour as an exporter of various types of products.

It is worth noting that the World Bank website [22] provides an opportunity to automatically calculate this index for a selected country based on its statistical database. This experience would be worth implementing on the basis of the websites of the State Statistics Service, specialized Internet resources for export support, the Ministry of Economy, or other state ministries and departments.

At the level of individual branches (in the context of our study, the agro-industrial complex) within the limits of the formula (1), it is possible to carry out complementarity analysis using a separate element of this formula, namely the module $[100 - (M_{jk} - X_{ij})/2]$.

A special formula for the Complementarity Index for Products/Goods k was proposed in the research by German Calfat and Renato Flores [17, p. 18-19] and allows for branch analysis of the complementarity of foreign trade. The formula is as follows:

$$TCI_{ij}^k = \frac{X_j^k / X_i}{M_w^k / M_w} \times \frac{M_j^k / M_i}{M_w^k / M_w} \quad (2)$$

where X_j^k is the export of products k by the country j ; X_i is the country i 's total exports; M_j^k is the import of products k by the country j ; M_j is the country j 's total imports; M_w^k is the global volume of imports of products k ; M_w is the total volume of imports in the world.

In our opinion, in the process of assessing the complementarity of foreign trade relations, it is advisable to use a comprehensive approach. In this context, it is worth applying the methodological approach of the Chinese researcher Si Xu [20, p. 112-117], who in the process of analysing the complementarity of China and the countries of South Asia uses the following system of indicators:

- Trade Complementarity Index, CI;
- Revealed Comparative Advantage Index, RCA;
- Trade Integration Index, TII.

We agree with the expediency of using the RCA index in the context of the analysis of the complementarity of foreign trade relations. In fact, in the process of decomposition of the formula (2), it can be seen that its left part is formed on the basis of the RCA index. This index is used in the process of analytical activities of the UNCTAD and WTO and is calculated according to the following formula [8, p. 139]:

$$RCA^t = \frac{1000}{(X_i^t + M_i^t)} \times \left[(X_{ij}^t - M_{ij}^t) - (X_i^t - M_i^t) \times \frac{(X_{ij}^t + M_{ij}^t)}{(X_i^t + M_i^t)} \right] \quad (3)$$

where X_{ij}^t is the export of goods of the sector (j) of the country (i) to the group of other countries taken for the analysis; M_{ij}^t is the import of goods of the sector (j) of the country (i) from the group of other countries taken for the analysis; X_i^t is the total exports of the country (i) to the group of other countries taken for analysis; M_i^t is the total imports of the country (i) from the group of other countries taken for the analysis.

The advantage of using this index is that it makes it possible not only to assess the complementarity of foreign trade in terms of individual products but also to identify product groups or countries for which the analysed country has managed to achieve a certain level of competitive advantage. That is, this index makes it possible to identify not only potential opportunities but also actual achievements of the country in foreign trade of certain goods.

Thus, it is advisable to analyse the complementarity of foreign trade relations at different levels, namely at the micro, mezzo, and macro-levels, as well as in institutional, sectoral, and global dimensions. The methodological diagram of the analysis of complementarity at different levels is presented in Figure 1.

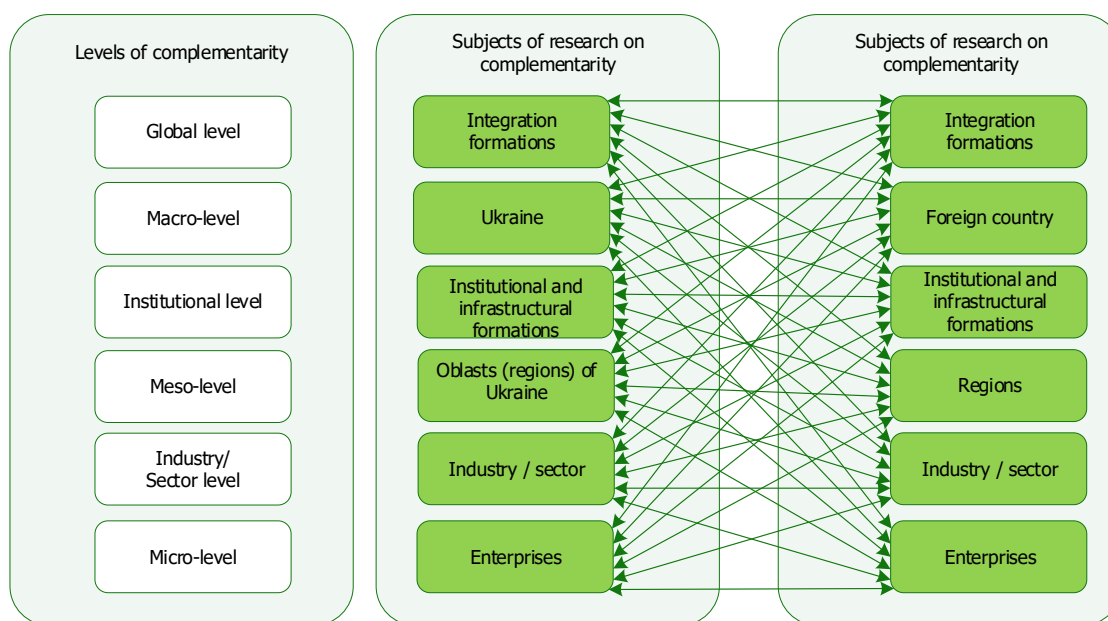


Figure 1. Levels of complementarity analysis in the field of foreign trade relations.

Therefore, the foreign trade complementarity of the domestic agricultural industry can be analysed with such diverse subjects of the world economy as individual foreign countries, integration groups, or international organizations (EU, MERCOSUR, NAFTA, WTO, etc.). For a more detailed analysis, it is worth assessing the complementarity of the agricultural sector for certain regions of Ukraine.

RESULTS

In recent years, the determining factors of the development of Ukraine's foreign trade in agricultural products were: firstly, the high agricultural potential of Ukraine (given the favourable climatic conditions and significant areas of fertile agricultural land) and, secondly, the situation and demand in foreign markets for agro-food products. Among other factors of development in the pre-war period in this area, it is appropriate to note foreign policy (accession to the WTO, membership in the Free Trade Area with the EU and other foreign countries), macroeconomic (exchange rate fluctuations, inflation rate, interest rates), investment (investment processes of leading agricultural holdings, the attraction of foreign investments), institutional (level of state support for the industry, its efficiency and transparency, level of consulting and credit support for farmers), technological factors (implementation of modern technologies in the fields of animal husbandry, horticulture, and food industry), etc. At the same time, Ukraine is a net exporter of agro-food products, that is, its agricultural exports significantly exceed imports.

The following factors had the greatest negative impact on the development of Ukrainian exports of agricultural products (for all four product subgroups) in recent years:

- world financial and economic crisis of 2009 (agricultural exports decreased by 12.1% compared to the previous year);
- economic recession in European countries in 2013 (by 4.8%);
- armed aggression in the East of Ukraine and withdrawal from part of the Russian market in 2014 and 2015 (decrease by 2.1% and 12.6%, respectively);
- a full-scale invasion of Russia in 2022 (by 15.6%).

The rapid rate of growth of agro-food exports starting in 2016 (Figure 2) was caused primarily by the accession of Ukraine to the European Free Trade Area since, from the moment of application of the Agreement by the EU for agricultural products, duties within the tariff quotas were abolished (in 2016, the growth of the total export of agricultural products in relation to the previous year was 4.9%, 16.2% in 2017, 4.8% in 2018, and 19.0% in 2019) [13].

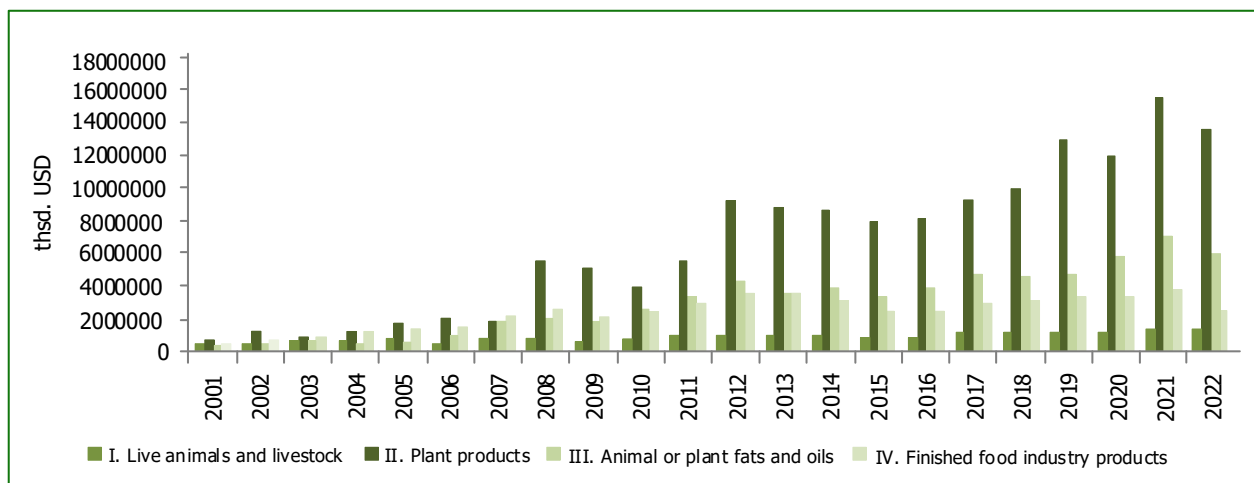


Figure 2. Dynamics of Ukrainian agricultural exports in 2001-2022. (Source: based on [13])

It is worth noting that even in the unfavourable conditions of the global pandemic COVID-19 in 2020, the total agro-food exports of Ukraine did not decrease, but remained at the level of the previous year (increased by 0.2%). At the same time, the export of products of animal and plant origin decreased by 7.0% and 8.0%, respectively, and the export of fats and oils and the commodity group "Finished food products" increased by 21.4% and 4.4%, respectively. This testifies to the high level of stability of the domestic agricultural sector during global crisis processes, the stable level of external demand for these products, and the importance of the domestic agrarian sector of the agro-industrial complex for the formation of foreign currency revenues for the state.

The trend of recent years is the growth of domestic exports of agricultural products not only in absolute terms but also in relative terms. The specific weight of agricultural products in the total volume of domestic export of goods reached 45.1% in 2020, 40.7% in 2021, and 53.0% in 2022 (Figure 3).

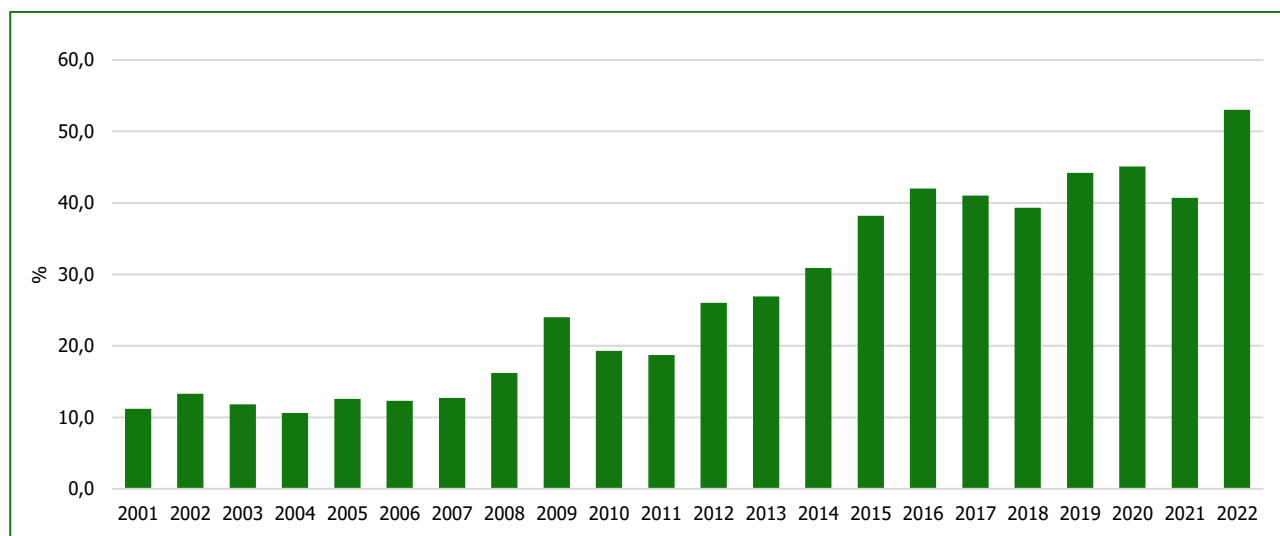


Figure 3. The specific weight of exports of agricultural products (product groups I-IV) in the total volume of Ukrainian exports of goods in 2001-2022. (Source: [13])

Among European countries, Ukraine was surpassed by this indicator in 2020 only by Iceland (51.0%), while Moldova (42.2%), Latvia (33.6%), Greece (23.8%), Lithuania (23.3%), and Denmark (21.2%) remained close [23]. Therefore, the Ukrainian agricultural sector is characterized by the highest level of openness in Europe and a very high level of export orientation. At the same time, this situation is generally not a positive phenomenon for the economy, given the growth in Ukraine's exports of raw materials, but not of technological goods.

According to the data of the State Statistics Service for 2021 [13], the structure of Ukrainian exports in the pre-war period was dominated by agricultural products such as cereals (18.1% of the total volume of Ukrainian exports of goods), fats and oils of vegetable and animal origin (10.3%), finished food products (5.6%), seeds and fruits of oil crops (3.6%), food industry residues and waste (2.5%). Therefore, it can be concluded that domestic agricultural export is based on plant products, it is generally monocultural and its structure is dominated by products with a low level of added value. The structure of Ukrainian agro-food imports is dominated by finished food products (4.9% of the total volume of Ukrainian commodity imports). Other leaders of domestic agricultural imports include such product groups as fish and crustaceans (1.2%), edible fruits and nuts (1.1%), alcoholic and non-alcoholic beverages (1.0%), tobacco and industrial tobacco substitutes (0.8%). In general, Ukraine's foreign trade in agricultural products is characterized by a positive trade balance (+19.961 billion US dollars), although at the same time, a negative balance is observed in certain product groups (livestock products and most commodity items of food industry products).

The predominant volumes of domestic agricultural exports are concentrated within the scope of activities of large enterprises, primarily large agricultural holdings. According to research by the consulting company Bakertilly [14], the 10 largest domestic agricultural holdings (Kernel, UkrLand Farming, Myronivskiy Hlibokombinat Bakery, Agroprosperis, Continental Farmers Group, Astarta-Kyiv, Epicentr Agro, IMC, Harvest, and Ukrprominvest Agro) own a total land bank in the amount of 2.674 million hectares and are leaders in the production and export of such agro-food products as grain, corn, sunflower oil, sunflower seeds, sugar, potatoes, eggs, chicken, etc. On the other hand, the share of small and medium-sized enterprises in Ukraine's agricultural exports is low. According to the State Statistics Service [13], in 2021, only 6.9% of agricultural, forestry, and fishery products were exported by enterprises with a total number of employees up to 9 people, 12% with 10 to 49 employees, and 26.7% with 50 to 249 people. It is a much lower indicator compared to developed European countries, where small and medium-sized enterprises dominate agricultural food exports.

The analysis of the data of the Ministry of Agrarian Policy and Food of Ukraine [12] allows us to conclude that Ukrainian exports of agricultural products are mostly oriented toward Asian countries, and the structure of imports is dominated by European countries. Thus, in 2021, the largest share of domestic exports of agricultural products was accounted for by China (15.5% in the structure of exports of agricultural products), India (7.1%), the Netherlands (6.4%), Egypt (5.8%) and Turkey (5.3%). In 2021, agricultural products were imported to Ukraine primarily from Poland (10.3%), Italy (7.2%),

Germany (6.8%), Turkey (6.5%), and Indonesia (4.2%). Therefore, Ukrainian exports of agricultural products are directed primarily to regions with the largest population and countries with a developed potential for the processing industry. In this context, the Minister of the Ministry of Agrarian Policy of Ukraine, Roman Leshchenko, noted that 20 years ago, Ukraine "fed" 40 million people and today Ukraine contributes to the food supply equivalent to about 400 million people in the world (not including the population of Ukraine). [12].

Therefore, Ukraine's significant contribution to food security on a global scale and its high agricultural potential make it necessary to carry out systematic studies on the complementarity of foreign trade relations of the domestic agricultural sector with other countries of the world with the comprehensive use of various methodological approaches.

Let us dwell in more detail on the empirical analysis of the complementarity of Ukraine's foreign trade in agro-food products. To calculate the Trade Complementarity Index for products/goods k according to the formula (2), we have collected statistical information from the WTO publication "Trade Profile 2022" [23] representing the data of 114 countries of the world regarding foreign trade in agricultural products by 2020. The results of the calculations are presented in Figure 4.

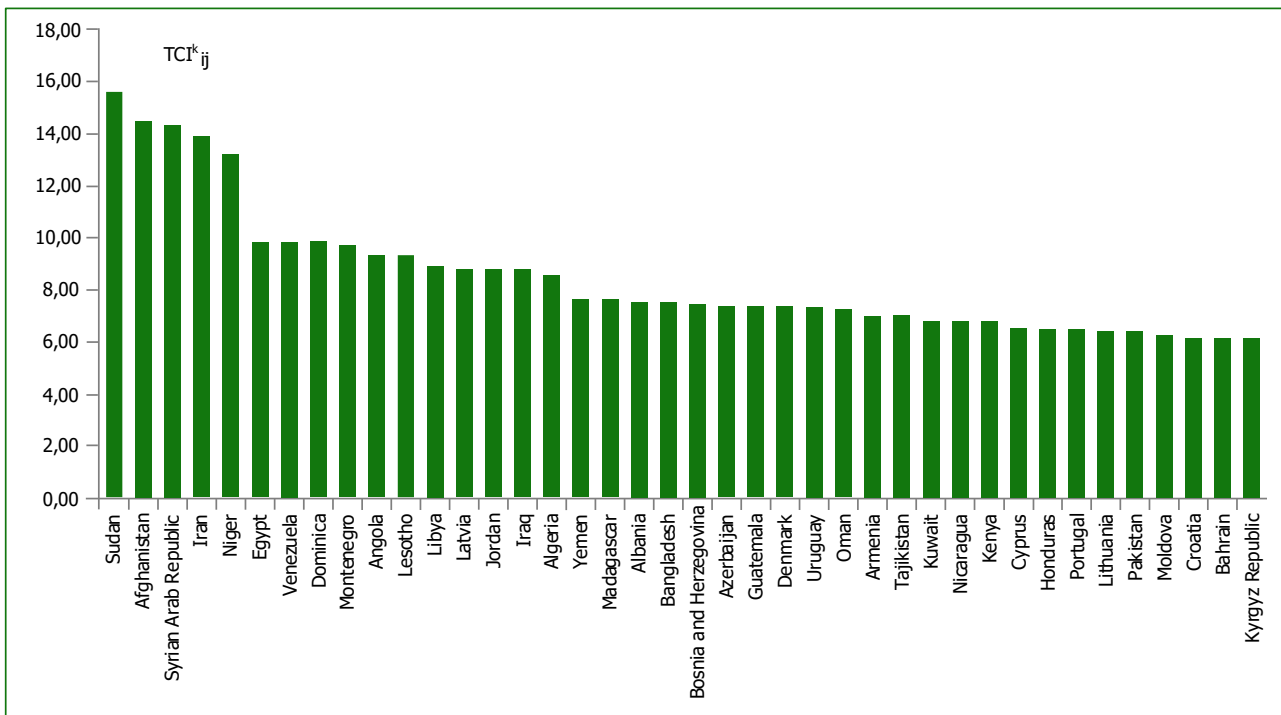


Figure 4. Value of indices of complementarity of foreign trade of Ukraine in agricultural products by countries of the world in 2020.

The results of the calculations show that Ukrainian foreign trade in agricultural products is the most complementary in relation to the countries of the African continent (Sudan, Niger, Egypt, Libya, Lesotho), South Asia (Afghanistan), and the Middle East (Syria, Iran, Iraq). The result of the calculations can be explained by the significant demand for food products in these countries under unfavourable climatic conditions for agriculture. The high level of complementarity in trade with Egypt (TCI equals 9.75) should be emphasized as Ukraine exports significant volumes of agro-food products to this country and therefore realizes the existing potential of complementary interaction at a high level. This country is in sixth place in terms of the complementarity index and in 2021 it took fourth place in Ukrainian exports of agricultural products with a corresponding share of 5.8%.

So, the obtained results of the calculations allow us to distinguish 4 groups of countries according to the value of the index of complementarity of foreign trade of Ukraine in agricultural products (Table 1). On the European continent, only 5 countries can be included in the group of countries with a very high level of complementarity: Montenegro, Latvia, Albania, Bosnia and Herzegovina, and Denmark. In the group with a high level of complementarity, one may find Cyprus, Portugal, Lithuania, Moldova, Croatia, Greece, Luxembourg, Estonia, Belarus, Spain, Sweden, Iceland, Bulgaria, Italy, and the Netherlands. Ukraine makes the most of the potential of foreign trade complementarity with the Netherlands, which ranks third in terms of domestic agricultural exports.

Table 1. Grouping of countries according to the level of complementarity of foreign trade of Ukraine in agro-food products in 2020.
(Source: calculated by the authors based on data [13; 23])

Group Number	Level of complementarity	Countries and values of the TCI
I	Very high (Index value: $TCI_{kij} > 7,0$)	Sudan (15.59), Afghanistan (14.44), Syria (14.22), Iran (13.88), Niger (13.20), Egypt (9.75), Venezuela (9.75), Dominica (9.67), Montenegro (9.67), Angola (9.28), Lesotho (9.24), Libya (8.82), Latvia (8.77), Jordan (8.73), Iraq (8.69), Algeria (8.43), Yemen (7.67), Madagascar (7.62), Albania (7.54), Bangladesh (7.50), Bosnia and Herzegovina (7.41), Azerbaijan (7.37), Guatemala (7.37), Denmark (7.32), Uruguay (7.32), Oman (7.24)
II	High (Index value: TCI_{kij} ranging between 5,0 and 7,0)	Armenia (6.98), Tajikistan (6.98), Kuwait (6.81), Nicaragua (6.81), Kenya (6.77), Cyprus (6.52), Honduras (6.52), Portugal (6.52), Lithuania (6.39), Pakistan (6.35), Moldova (6.30), Croatia (6.18), Bahrain (6.13), Kyrgyzstan (6.13), Greece (5.92), Botswana (5.75), Georgia (5.75), Uganda (5.71), Colombia (5.66), Indonesia (5.66), Luxembourg (5.62), Philippines (5.62), Sri Lanka (5.62), Estonia (5.54), Peru (5.37), Belarus (5.32), Spain (5.32), Sweden (5.32), Iceland (5.28), Morocco (5.28), New Zealand (5.28), Bulgaria (5.20), Saudi Arabia (5.20), Italy (5.15), Tunisia (5.15), Netherlands (5,11)
III	Medium (Index value: TCI_{kij} ranging between 3,0 and 5,0)	Japan (4.90), Ecuador (4.85), Qatar (4.81), Uzbekistan (4.81), Malta (4.73), Romania (4.64), Ireland (4.60), Chile (4.60), Mongolia (4.56), Kazakhstan (4.51), France (4.47), Norway (4.47), North Macedonia (4.39), Great Britain (4.34), Vietnam (4.34), Belgium (4.30), Brunei (4.26), Poland (4.26), Finland (4.17), Austria (4.09), China (4.09), Israel (4.09), Malaysia (4.09), Germany (4.00), Slovenia (4.00), Turkey (4.00), Ethiopia (3.96), Nigeria (3.88), Canada (3.83), Serbia (3.83), Cambodia (3.75), Paraguay (3.71), EU (3.53), Bolivia (3.49), South Africa (3.49), Australia (3.32), Argentina (3.24), Republic of Korea (3.15), Thailand (3.07), UAE (3.02), USA (3.02)
IV	Low (Index value $TCI_{kij} < 3,0$)	Hungary (2.93), Slovakia (2.92), Czech Republic (2.90), Mexico (2.85), Brazil (2.81), Panama (2.81), India (2.43), Hong Kong (2.09), Switzerland (2.04), Singapore (1.70)

It should be noted that foreign trade in agricultural products with China, Turkey, and India is characterized by medium and low levels of complementarity (the value of the TCI is 4.09, 4.0, and 2.43, respectively). However, Ukraine achieves high results in the field of exports to these countries (China ranks first among the countries of Ukrainian agricultural exports, India ranks second, and Turkey is fourth). This can be explained primarily by the significant capacity of these markets and geopolitical factors. China is trying to import Ukrainian agricultural products to save its raw materials. In addition, active trade cooperation with this country is conditioned by China's competition with the EU for raw materials markets, the high business activity of Chinese companies on the Ukrainian market, and significant infrastructural and institutional support (implementation of the "One Belt One Road" initiative, etc.).

The conducted analysis of the complementarity of Ukraine's foreign trade in agricultural products with the EU countries in general (the TCI_{kij} value is 3.53) allows us to conclude that relations with this integration community in the agrarian sphere are characterized by a medium level of complementarity. This can be explained by the fact that the leading countries of Europe (primarily France, Germany, Spain, Italy, and Poland) as well as Ukraine also have a strong agricultural potential and are in many cases competitors to Ukraine in the trade of agro-food products. In particular, France, which is the leading producer of agricultural products in the EU, is a competitor of Ukraine, primarily in the grain markets, and it was this country in the past that made additional demands in the process of joining Ukraine to the EU Free Trade Area and initiated numerous anti-dumping investigations against Ukraine.

In our opinion, in the process of analysing the complementarity of foreign trade in agro-food products, it is necessary to apply along with quantitative and qualitative methods, in particular expert evaluations. For this, we have conducted an expert assessment of the socio-economic and market environment of foreign countries characterized by a high level of complementarity ($TCI_{kij} > 7.0$). In the process of the expert assessment, economic, political-legal, socio-cultural, technological, geographical, institutional, and market factors were analysed. At the same time, each factor was evaluated on a five-point scale depending on how positively it affects the development of Ukrainian agro-food exports to the analysed country. The results of our expert assessment proved that the markets of Latvia, Montenegro, Albania, Egypt, Jordan, and Algeria were the most attractive and complementary for Ukrainian agricultural exports. It is these highly complementary countries that it is advisable for the Ukrainian agricultural industry to focus on the attention of domestic exporters (especially small and medium-sized enterprises) in the process of expanding their activities in foreign markets.

In the process of a comprehensive analysis of the complementarity of foreign trade relations, it is expedient to identify not only complementary markets for the Ukrainian agricultural industry but also to identify countries that are competitors and antagonists for Ukraine in this area. This will make it possible to more effectively form interaction with such countries, and justify new mechanisms and approaches to expanding the presence in their agrarian markets. Such studies are especially important for European countries since deepening the integration of certain sectors of the economy into the European economic space is an important priority task for Ukraine.

To solve this problem, it is advisable to carry out the procedure of grouping European countries according to the level of their agricultural potential using the method of cluster analysis since its use allows grouping objects (countries) according to several diverse characteristics and forming homogeneous groups with a high degree of similarity [5, p. 42-43]. In the process of determining the level of similarity in the development of potentials of agrarian complexes of European countries, the tools of the Statistica application program package were used, while the Euclidean distance was used as a metric. The set of features that determine the competitive potential of the agricultural industry of European countries was formed on the basis of nine main characteristics:

- production of agricultural products, million US dollars (X1);
- production of animal husbandry products, million US dollars (X2);
- production of plant origin products, million US dollars (X3);
- export of agro-food products, million US dollars (X4);
- the specific weight of agricultural products in the total export of the country, % (X5);
- share of agricultural land in the total area of the country, % (X6);
- the area of agricultural land, sq. km (X7);
- number of workers employed in the agricultural sector, thousands of people (X8);
- share of people employed in the agricultural sector, % (X9).

Visualization of the obtained grouping results is presented in Figure 5.

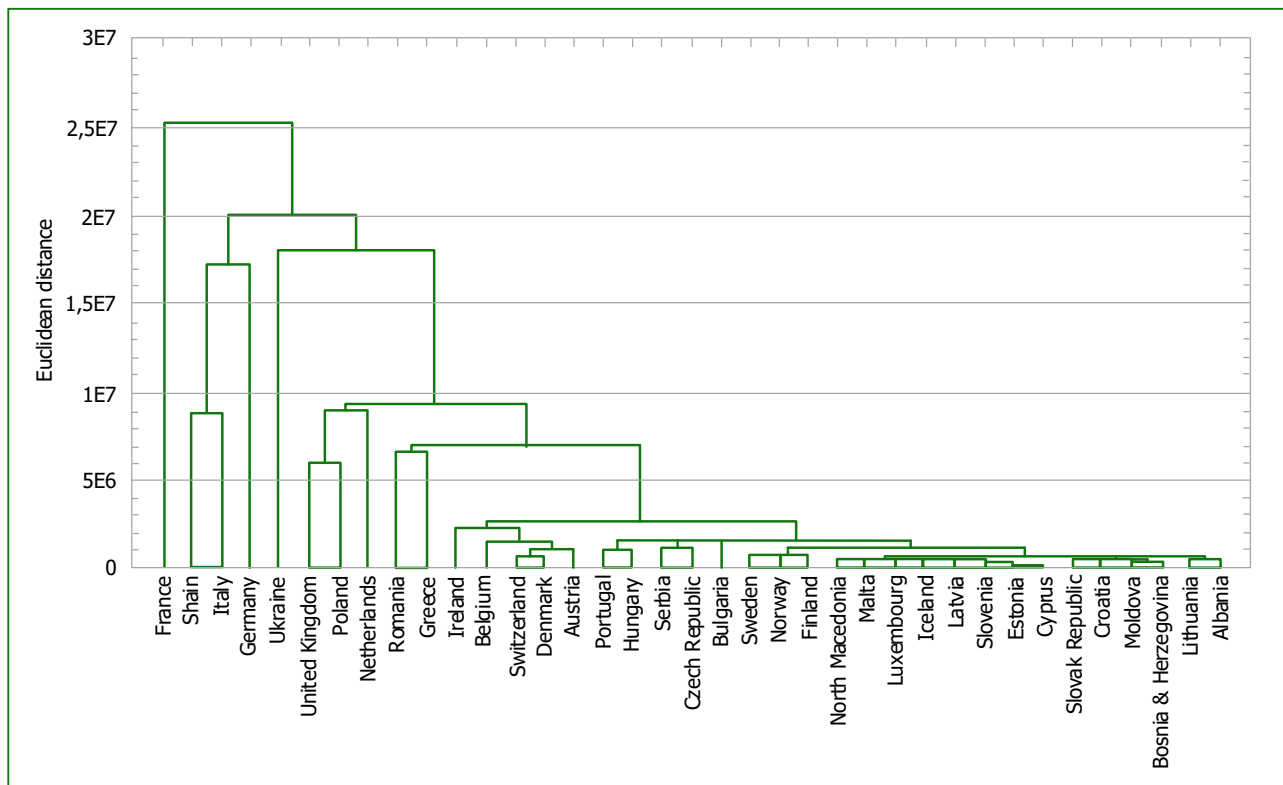


Figure 5. "Tree of combinations" of European countries according to indicators of agricultural potential and foreign economic specialization of the agricultural sector in 2020.

In the process of cluster analysis, it is possible to select individual groups of research objects not only by visual assessment but also by means of software tools. As a result of the analysis, we set the parameters for defining 4 groups of countries, within which it was necessary to form the corresponding clusters. According to the obtained results (Table 2), Ukraine is in a cluster (group) of countries with a high level of agrarian potential and foreign economic development of the agro-industrial complex.

Table 2. Results of the grouping of European countries by indicators of agricultural potential and foreign economic development of the agricultural sector in 2020.

Cluster number	Cluster participants	Euclidean distance to the centre of the cluster	Characteristics of the group
Cluster 1	France	7134420	Countries with the highest level of agricultural potential and foreign economic development of agro-industrial complex (the cluster centre is Italy)
	Germany	5865105	
	Italy	2758924	
	Spain	2829404	
Cluster 2	Netherlands	3147367	Countries with a high level of agricultural potential and foreign economic development of agro-industrial complex (the cluster centre is Poland)
	Poland	1475186	
	Romania	2957733	
	Great Britain	2707131	
	Ukraine	4938230	
Cluster 3	Austria	438998	Countries with a medium level of agricultural potential and foreign economic development of agro-industrial complex (the cluster centre is Belgium)
	Belgium	424855	
	Czech Republic	1089226	
	Denmark	717109	
	Greece	2343151	
	Hungary	608754	
	Ireland	1404389	
	Portugal	597725	
	Serbia	1003637	
Switzerland	585520		
Cluster 4	Albania	278024	Countries with a relatively low level of agricultural potential and foreign economic development of agro-industrial complex (the cluster centre is Croatia)
	Bosnia	196440	
	Bulgaria	1041651	
	Croatia	65050	
	Cyprus	442275	
	Estonia	392422	
	Finland	596387	
	Iceland	577258	
	Latvia	226486	
	Lithuania	211675	
	Luxembourg	566759	
	Malta	645681	
	Moldova	172923	
	Macedonia	272910	
	Norway	788318	
	Slovakia	138482	
Slovenia	325683		
Sweden	837768		

Therefore, the countries that belong to this cluster (Netherlands, Poland, Romania, and Great Britain), as well as countries from the cluster with the highest level of agricultural development (France, Germany, Italy, and Spain) are antagonists to Ukraine and its main competitors on the European market of agro-food products.

Considering the state of the competitive environment in the European market of agro-food products, the priority target markets for Ukraine are primarily countries with medium and low agricultural potential (clusters III and IV). In the process of analysis, we have determined the countries that are in the centre of each cluster and have the smallest Euclidean distance to its centre, and therefore are typical representatives for each of the groups. For countries, which are centres of clusters, it is expedient to substantiate typical recommendations and proposals for the development of foreign economic cooperation with them on the basis of complementarity, which can be extended to other members of the cluster. It is also important to deepen cooperation with those countries that, along with developed agriculture, have high potential in the processing industry and import domestic agricultural products for further processing and export (re-export) to other countries of the world (for example, the Netherlands).

The conducted calculations prove that the Ukrainian agricultural industry has significant unused potential for the development of export activities on the basis of complementarity. At the same time, it is important to identify certain niches in the markets of foreign countries, where there is a potential or actual demand for Ukrainian agricultural products.

Thus, the following are the priority directions and tasks of balancing Ukrainian foreign trade in agricultural products on the basis of complementarity (Figure 6):

- implementation and comprehensive support of interstate agreements in the field of development of mutually beneficial complementary trade, including on a commodity exchange basis;
- comprehensive support of complementary foreign trade relations not only at the level of the agro-industrial complex but also at the level of the regions of Ukraine;
- development of effective consulting support for exporters, assistance in the process of finding foreign partners and entering foreign markets;
- formation of a system for monitoring the complementarity of Ukraine's foreign trade in agricultural products;
- support of export in the sectors of small and medium-sized enterprises, small-scale production, in particular, developed on the basis of cooperation;
- expansion of the range of Ukrainian agricultural exports, in particular, in the niches of organic and craft products.



Figure 6. Priority areas of balancing and development of domestic foreign trade in agricultural products on the basis of complementarity.

Let us dwell in more detail on the practical aspects and tools for the implementation of the above directions and tasks of balancing and activating Ukraine's foreign trade in agricultural products on the basis of complementarity.

1) Implementation and comprehensive support of interstate agreements in the field of development of mutually beneficial complementary trade, including on a commodity exchange basis. To implement this direction, first of all, it is necessary to define a list of countries that require Ukrainian agro-food products and, at the same time, have the potential to supply other products, which are complementary to the Ukrainian economy (primarily energy carriers). It is about the implementation of operations on a commodity exchange basis under the scheme of exchange of Ukrainian food for energy carriers or other products of critical import. A similar practice of concluding and implementing intergovernmental agreements took place in the mid-90s of the XX century in the relations between Ukraine and Turkmenistan in the supply of natural gas (within the agreement, 60% of the cost of imported gas was paid for by Ukrainian products), but this agreement was suspended due to Russian intervention. Today, the implementation of similar schemes is expedient within the framework of Ukraine's cooperation with the countries of the Middle East, as well as with the states of the GUAM association, in particular, Azerbaijan, whose market is characterized by high complementarity for the domestic export of agro-food products (TCI_{kij} = 7,37).

2) Comprehensive support for complementary foreign trade relations not only at the level of the agro-industrial complex but also at the level of the regions of Ukraine. The implementation of this direction will allow taking into account the specifics of the foreign economic specialization of the agricultural sector of individual regions, their export potential, and

the peculiarities of participation in the international division of labour. In this context, it is expedient to conduct systematic studies of the complementarity of foreign trade in agro-food products at the level of the regions of Ukraine, using quantitative and qualitative methods. Based on the obtained results, it is advisable to develop and implement strategies and operational plans for the complementary development of agricultural exports at the level of individual regions of Ukraine.

3) Development of effective consulting support for exporters, and assistance in the process of finding foreign partners and entering foreign markets. Simultaneously, it is necessary to organize at the level of the regions of Ukraine modern and effectively functioning advisory centres, the activities of which should be aimed at providing services to producers of agricultural products (especially small and medium-sized enterprises, farms, agricultural cooperatives). Such institutions should monitor, summarize and provide information on complementary foreign markets at the request of potential exporters, provide professional consulting support at all stages of foreign trade operations, and help with the search for potential foreign partners. At the same time, an important practical task is maximum dissemination among agricultural producers of information about the possibilities of obtaining such advisory support. Such activity should be organized on the basis of specialized departments of regional state administrations and regional chambers of commerce and industry.

4) It is advisable to implement the formation of a system for monitoring the complementarity of Ukraine's foreign trade in agrarian products by launching a specialized internet portal, on which it would be possible to receive information on complementary markets for certain types of domestic agro-food products in real-time. It is commendable to take as a basis the technical solution implemented on the website of the World Bank [22] but with an emphasis on a detailed analysis of complementarity in terms of individual product groups and in-depth detailing of export positions of domestic agro-food products. Such a project would be worth implementing on the basis of the Ministry of Agrarian Policy and Food of Ukraine with the involvement of the potential of the State Enterprise "National Research and Information Centre for Monitoring International Commodity Markets". At the same time, it is prudent to form a statistical base for monitoring, calculations, and analysis of complementarity based on the data of the State Statistics Service of Ukraine [13], a detailed base of statistical information on the development of foreign markets for agro-food products, which is formed by the US Department of Agriculture [24] and other state and non-state analytical institutions. Within the framework of the implementation of this direction, it is advisable to periodically prepare and publish analytical materials and reviews on the development of foreign markets complementary to domestic agricultural products on a specialized website.

5) Support of export in the sectors of small and medium-sized enterprises, small-scale production, in particular, organized and developed on the basis of cooperation. In modern conditions, the high potential of foreign economic complementarity of the Ukrainian agricultural sector needs to be more actively used not only by large corporations and agricultural holdings but also by small-scale, small and medium-sized enterprises, especially in rural areas. In practice, small enterprises and private entrepreneurs face obstacles in the process of entering foreign markets, which are manifested in difficulties with the formation of export batches of goods, problems of product certification, lack of proper practical experience in the implementation of export operations, etc. Therefore, we offer a solution to these problems through the use of cooperative tools for the development of agricultural business and comprehensive state support for the activities of agricultural cooperatives in rural areas. The advantages of the association of residents or enterprises in rural areas in the process of implementing a cooperative model of export-oriented business are confirmed by positive European experience and are obvious, because:

- by combining their efforts, members of cooperatives (citizens, small and medium-sized enterprises) can jointly purchase the necessary equipment (lines for processing and packaging of products, warehouse equipment, freezers, commercial transport, etc.);
- it is easier for cooperatives to receive institutional and consulting support in the process of their export activities, including through grants for international technical assistance;
- citizens can combine their efforts not only to establish sales of their products on the domestic market but also when forming export batches of goods (for example, in the process of carrying out activities related to harvesting walnuts, mushrooms, wild fruits and berries, etc.), as independent access to the foreign market with a small number of products is extremely difficult.

To establish the activities of such cooperatives, it is advisable to use the positive experience of European countries [10], in which it is a common practice to provide cooperative entities with a preferential tax regime, in particular, in the first years of operational activity, to lend systematic state support (provision of grants for the creation of cooperatives, assistance in finding potential cooperative participants, provision of subsidies and grants for the development of certain types of activities).

For example, it is worth supporting the development of cooperatives in the field of harvesting and selling wild fruits and berries, since Ukraine has favourable natural conditions for the development of this activity. In practice, the association of members of cooperatives allows for the formation of export batches, the purchase of freezers and other necessary equipment. As a result, rural residents will not be forced to sell the collected fruits and berries to numerous intermediaries but will be able to enter the foreign market independently. Priority markets for establishing the export of wild fruits and berries with a high level of complementarity can be determined based on the calculation of the index of revealed comparative advantage (RCA) according to formula (3), the results of which are shown in Figure 7.

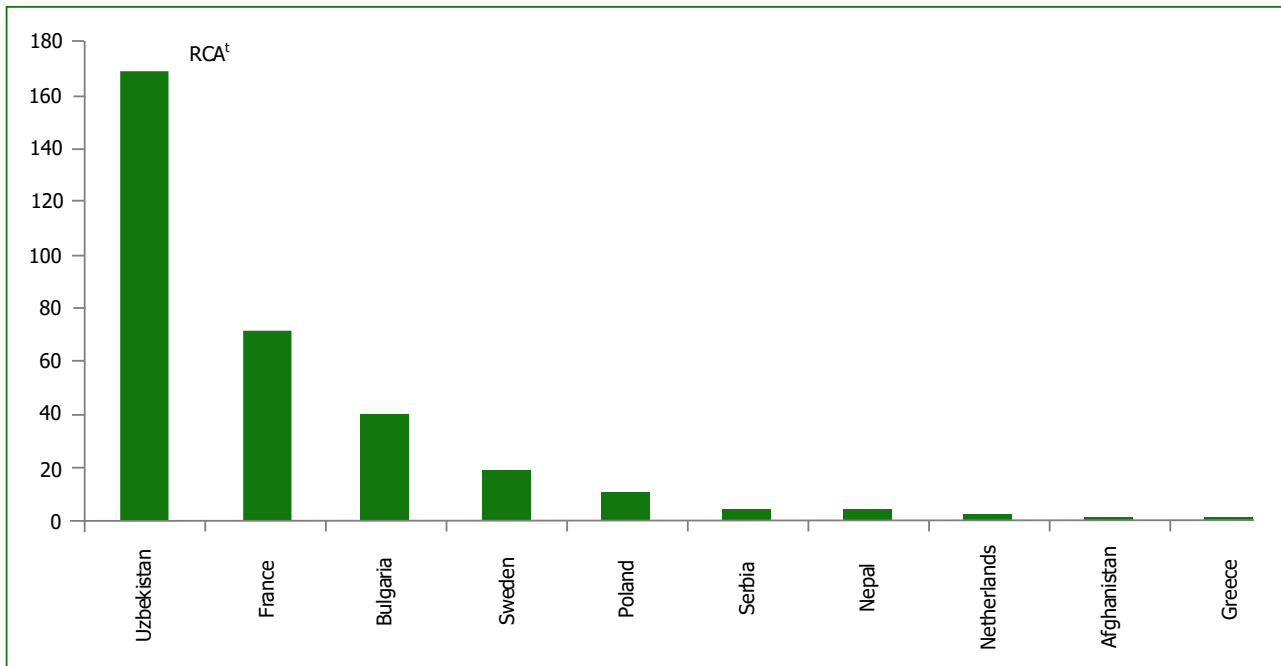


Figure 7. Ranking of countries according to the index of revealed comparative advantage (RCA) for Ukraine on foreign markets of wild fruits and berries (Ukrainian Classification of Goods of Foreign Economic Activity UKTZED group 81040000 – cranberries, blueberries and other fruits).

6) Expanding the assortment of Ukrainian agricultural exports, in particular, in the niches of organic and craft products, should be carried out on the basis of the analysis of the complementarity of foreign markets. The proposed direction is quite promising, since today a significant demand for organic and craft products is being actively formed in foreign markets and remains not satisfied at the expense of national producers. And in Ukraine, as is the case, there is a significant potential for growing organic agro-food products on a global scale. In this context, the expansion of domestic exports of the food industry due to products with a low sugar level, gluten-free products, healthy food products, etc., also has high prospects.

Summing up, we note that the implementation of the model for the development of Ukraine's foreign trade in agricultural products on the basis of complementarity will result in the further increase and diversification of domestic agricultural exports, the reduction of its monocultural and raw material nature, and the involvement of small-scale, medium-sized enterprises and cooperatives in foreign trade. Collectively, this will lead to an increase in the level of employment and welfare of the population in rural areas, development of foreign trade relations at the regional level, strengthening of food security and competitiveness of Ukraine and its agricultural sector in the global economic space.

DISCUSSION

Despite highly appreciating the analytical capabilities of the methodological approaches and indicators of complementarity analysis (formulas 1, 2 and 3) considered in this article, and presented in the works [8; 17; 18; 19; 22], we note that they have certain limitations since they do not take into account the following:

- factors of competition from other foreign countries;
- factors of geographical distance between countries;
- trade barriers, primarily non-tariff barriers, on the market of foreign countries regarding the product being analysed;
- separate social, economic, cultural, innovative, political and other factors influencing foreign trade relations.

Therefore, in our opinion, it is advisable to supplement the analysis of the complementarity of Ukraine's foreign trade in agro-food products with other methodological approaches, in particular, those based on the use of expert assessments and allowing the assessment of factors that cannot be quantified. Systematic studies of the complementarity of foreign trade in agricultural products should be conducted dynamically and combined with a comprehensive analysis of trends, regularities, special features and problems of its development.

CONCLUSIONS

1. The phenomenon of complementarity is inherent in various spheres of science and social life, in particular, it manifests itself in the field of theology, ecology, physics, mathematics, molecular biology, jurisprudence, sociology, psychology, etc. This paradigm is considered in various areas of the economy, namely in institutional, corporate, and marketing spheres, as well as in foreign economic activities. The very nature of the international exchange of goods and services is based on the principles of mutual complementarity when partners from different countries benefit from the implementation of foreign economic operations. The phenomenon of complementarity can be analysed at different levels of the economic system, namely the micro, macro, and mezzo-levels, as well as at the sectoral, institutional, and global levels.
2. The development of Ukrainian foreign trade in agricultural products generally has positive trends and shows steady growth even in the conditions of crisis processes in the economy. Ukrainian agricultural exports are of exceptional importance for ensuring foreign currency inflows to the country in conditions of instability. Despite this, the imbalance in the foreign economic sphere of the agrarian sector is manifested in the monocultural character of agricultural production and export, the dominance of large agricultural holdings in foreign trade activities, and ineffective institutional support of small agrarians and farmers.
3. The conducted comprehensive analysis of the complementarity of Ukrainian foreign trade in agro-food products testified that the markets of African, South Asian, and Middle Eastern countries are the most complementary for the domestic agricultural industry. To the greatest extent, the agricultural sector of Ukraine uses its complementarity potential in trade relations with Egypt. Instead, the complementarity of Ukrainian foreign trade in agricultural products with the EU is generally characterized by a medium level. This is explained by the fact that European countries (primarily France, Germany, Spain, Italy, and Poland) have a powerful agricultural potential and are essentially competitors for Ukraine in this field.
4. The conducted research made it possible to form priority measures for balancing Ukraine's foreign trade in agricultural products. The export-oriented development of the Ukrainian agricultural sector on the basis of complementarity is a particularly important task today since the effective integration of the agricultural sector into the international economic space will increase the competitiveness of the entire economy of Ukraine, an increase in revenues to the state budget, strengthening the economic security of the state, guaranteeing food security not only for Ukraine but also for many other foreign countries, primarily in Africa and Asia. The implementation of the measures proposed in the article will allow not only improve the socio-economic situation in the agricultural sector and the economy of Ukraine in general but also put into practice the principles of complementarity, harmony, parity, partnership, sustainable development, and mutually beneficial cooperation in the field of foreign trade relations.

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ПРІОРИТЕТИ ТА МЕХАНІЗМИ ЗБАЛАНСУВАННЯ ЗОВНІШНЬОЇ ТОРГІВЛІ АГРАРНОЮ ПРОДУКЦІЄЮ НА ЗАСАДАХ КОМПЛЕМЕНТАРНОСТІ

Метою дослідження є проведення системного аналізу комплементарності зовнішньої торгівлі продукцією АПК й обґрунтування на цій основі пріоритетів розширення та збалансування українського аграрного експорту на мікро-, макро- й мезорівнях. Визначено поняття комплементарності зовнішньої торгівлі як рівень збалансування економічних систем різних країн на засадах взаємодоповнення товарної структури експорту та імпорту й ефективної участі в міжнародному поділі праці. Систематизовано методичні підходи до дослідження комплементарності зовнішньоторговельної діяльності. Використано комплексний підхід до аналізу зовнішньоторговельних відносин аграрної сфери та рівня її збалансованості. Визначено головні тенденції та особливості розвитку української зовнішньої торгівлі аграрною продукцією. З'ясовано, що незбалансованість зовнішньоекономічної сфери в АПК проявляється в доміну-

ванні в експортній діяльності великих агрохолдингів, монокультурному характері аграрного виробництва й експорту, неефективній інституційній підтримці дрібних фермерів та аграріїв. Здійснено емпіричну оцінку комплементарності української зовнішньої торгівлі продукцією АПК з використанням індексів комплементарності, виявлених порівняльних переваг та методу кластерного аналізу. Проведені розрахунки засвідчили, що український аграрний сектор має значний невикористаний потенціал щодо розвитку експорту на засадах комплементарності. Обґрунтовано пріоритети збалансування зовнішньої торгівлі аграрною продукцією на засадах комплементарності, зокрема: формування системи моніторингу комплементарності української зовнішньої торгівлі продукцією АПК; укладання та всебічна підтримка реалізації міждержавних угод щодо розвитку взаємовигідної торгівлі комплементарною продукцією, у тому числі на товарообмінних засадах; підтримка розвитку експорту підприємств малого й середнього бізнесу, дрібнотоварного виробництва; диверсифікація асортименту аграрного експорту України, особливо в нішах крафтової та органічної продукції; підтримка комплементарних зовнішньоторговельних відносин на рівні окремих областей України; посилення ефективної консультаційної підтримки експортерів, допомога в процесі пошуку зарубіжних партнерів та виходу на зовнішні ринки.

Ключові слова: комплементарність, виявлені порівняльні переваги, АПК, зовнішня торгівля, конкурентоспроможність, інституційна підтримка, збалансування експорту

JEL Класифікація: A22, A23, M10, M14