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EXPORT POTENTIAL OF UKRAINIAN AGRO-INDUSTRIAL COMPLEX: FACTORS OF FORMATION AND EVALUATION

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Abstract. With the intensification of international integration processes, export potential is the most important factor in the economic growth of states and a condition for equal accession to the world economy. *The purpose of the study* is to identify the factors of formation and implementation of the export potential of the agro-industrial complex of Ukraine, its evaluation, the definition of the place of Ukrainian products on world food markets. *Methodology*. To achieve the designated objectives, a comprehensive approach was used, which included the calculation of indicators of export potential of Ukrainian agro-industrial complex in international trade with the countries of the world and in comparison with major trading partners through the dynamics and structure of foreign trade, export value per capita, export quota, export share of goods in their production, net export potential coefficient; the ratio of the export quota to the population; the country's export efficiency ratio; the country's participation in the international division of labour; the indicator of comparative (relative) advantages. *Research results.* It was established that the export potential of Ukrainian agro-industrial complex is formed under the influence of stimulating and restraining factors. During the period under review (2010–2020) high rates of development of foreign trade in agri-food products of Ukraine were revealed, especially with the countries of Asia, Europe and Africa. However, there are also negative trends: strengthening the export potential of the complex at the expense of raw materials and semi-finished products and at the expense of losing positions in the world market of Ukrainian products with high added value; unjustified priority to stimulate export of agricultural products, which confirms the low level of export efficiency, despite the significant activity of Ukraine in the world market compared to partner countries; low level of export potential of Ukrainian agro-industrial complex in comparison with EU countries as a result of technological backwardness of the producer; small list of export agro-industrial commodity groups with sustainable comparative advantages and their low technology in relation to countries of all world regions indicates the low level of development of agriculture and the economy as a whole. In this regard, there is a need for structural reforms in the agro-industrial complex of Ukraine, strengthening institutional support for the production and export of food products, which contain a high level of added value. *Practical implications*. The main theoretical provisions and conclusions formulated by the authors can serve as a methodological basis for improving the export strategies of various sectors of the economy. *Value/originality*. The proposed results can be used to justify the mechanism of formation of the export potential of the agro-industrial complex of Ukraine on the basis of increasing the production of goods with high added value.

Key words: export potential, foreign trade, agro-industrial complex, globalization, integration.

JEL Classifications: F14, F15, F18, F55

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1. Introduction

In a globalized world economy, the efficiency of the economic complex of the state and the success of its participation in international integration processes is directly proportional to the level of export development, which indicates the importance of the issues of this article. Historically, the key to achieving the leading position of Ukraine in the international arena is a powerful agro-industrial complex (the share of agricultural exports in the country's GDP in 2020 was 14%) (State Statistics Service of Ukraine, 2020), which in the context of the changing structure of the world population, aggravation of the global food problem and the intensified search for ways to solve it, provides both domestic and foreign markets with food. Favorable geographical location, natural and climatic conditions, as well as exceptional land and human resources contributed to the formation of the export potential of the agro-industrial complex of Ukraine (hereinafter the AIC) – the ability of the agrarian sector to produce the necessary amount of goods competitive in foreign markets, which will contribute to the economic growth of the country (Polkovnichenko, Rosokhach, 2016). Despite periodic losses due to falling world prices, total exports continue to grow every year, replenishing the budget (45% of Ukraine's total export revenues in 2020) (State Statistics Service of Ukraine, 2020) and investing in the modernization of the agricultural sector.

The structure of Ukrainian food exports consists mainly of agricultural raw materials without a significant increase in the volume of processed products, which is a consequence of imperfect mechanisms of state regulation of the development of agriculture and foreign economic relations. The situation is aggravated by crises related to the loss of the main market due to the military-political confrontation and the introduction of quarantine measures due to the COVID-19 pandemic. Ukrainian exporters, working in harsh competitive conditions, are forced to adapt to the global challenges and bring food production in line with modern global quality standards, mostly with limited financial resources and insufficient state support compared to developed countries.

Consequently, in the current realities of volatile external environment, the reorientation of commodity and geographic structure of food exports on the basis of a comprehensive approach to monitoring the export potential of the Ukrainian agro-industrial complex by assessing its trends, identifying national conditions and factors of formation, determining the comparative advantages of Ukrainian products on world markets, which indicates the relevance of the chosen topic of research.

2. Literature review

Ukrainian scientists mainly study the general trends and prospects of development of exports of the main types of agricultural products of Ukraine. Thus, based on a thorough analysis of the export-import balance of Ukraine's agro-industrial complex, it was proposed to solve the key problems of agriculture and food industry by supporting the network interaction of enterprises (Izhevskyi, 2018). A list of regions and specific countries where Ukrainian agricultural products are in greatest demand was determined, as well as the ranking positions of Ukraine on world markets of certain products (Dukhnytskyi, 2019). The main risks of foreign economic activity of domestic subjects of agribusiness were investigated (Voronych, 2019).

Researchers are constantly in the field of view of topical problems of development of export potential of agro-industrial complex of Ukraine in the context of globalization and integration processes, the main positive and negative features of the historical trajectory of Ukraine's development in the context of globalization (Lazarieva, Vakar, 2019). The main trends in the expansion of exports of domestic agricultural products to the EU have been revealed and it is proved that the conditions of access of Ukrainian exporters to European agricultural markets are influenced by the systemic actions of EU regulatory policy (Golovachova, Iksarova, Kudyrko, 2018). The prospects of increasing the market presence of Ukrainian agricultural products in Asia were investigated, and the heterogeneity of the influence of various factors on the creation of international competitiveness for different types of agricultural products in different sales markets was proved; the threats of further expansion of the free trade zone (FTZ) between Ukraine and the EU were identified (Bosak, 2019). The institutional preconditions of functioning of agro-industrial complex of Ukraine were investigated, in particular, it was proved that the evolution of agrarian policy of EU is a forming factor of export potential of agro-industrial complex, the specifics of agricultural logistics and its influence on agro-industrial complex were defined (Okhrimenko, 2018).

Numerous works are aimed at assessing the export potential of individual subcomplexes of Ukrainian agro-industrial complex, especially grain products. The content of its export potential is determined and its components are singled out (Zrailo, 2019). The emphasis is made on the competitive advantages of the production of finished food products from grain and the ways of intensification of its processing using domestic demand and increasing exports of finished products are proposed (Lyakhovska, 2019). On the basis of assessment of the cost and expenditure components of the balance of grain crops the directions

of improvement of their exports and imports are justified (Budziak, Budziak, 2020). The main trends and problems of Ukrainian exports of livestock products are investigated, and the directions of its growth on the EU market are proposed (Heraimovych, Humeniuk, Kubai, 2019). Priority directions of development of export potential of Ukrainian dairy industry in the conditions of activation of integration processes were determined (Popko, 2018). The prospects of commodity diversification of food exports to the EU and measures to strengthen the export potential of milk processing enterprises and dairy products production are substantiated (Melnyk, Samosudov, 2020). The activity of the main exporters of Ukrainian dairy products in 2014-2018 and the level of tariff and non-tariff protection of the EU market are assessed (Chesnik, Rozhko, Strus, 2019).

The system is proposed for the formation of the export potential of the agrarian sphere of the region (Nadvynychnyi, 2018). Noted the strategic importance of the agricultural sector in ensuring the foreign economic security of Ukraine (Urba, 2019).

Assessing the scientific papers on this issue, we believe that current trends in the development and implementation of the export potential of agricultural and food products of Ukraine are covered insufficiently and fragmentarily. There are no comprehensive studies combining its assessment by commodity and geographical structures (by regions and countries of the world), the system of export potential indicators in dynamics over a long period (the last 10 years), characterized by crisis changes due to escalation of military-political and economic confrontation with the Russian Federation and the introduction of quarantine measures related to COVID-19, find out the place of Ukrainian products on world food markets and compare with the largest partner countries in foreign agricultural trade, to study the factors and prospects of its formation and implementation, which determined the purpose of this research.

3. Methodology

To study the export potential of the agro-industrial complex of Ukraine, it was proposed to apply a comprehensive approach, which includes:

– analysis of the dynamics of commodity and geographical structure of foreign trade, in particular, export of agri-food products as a form of realization of export potential of Ukrainian agro-industrial complex in combination with identification of key factors influencing its formation;

– methods and inherent quantitative indicators to assess the success of the export potential of the country's agro-industrial complex, including comparison with the main partner countries of the world and the EU (to obtain a more realistic assessment of export potential), as well as with the regions of the world by commodity groups, in particular: the value of exports per capita of the country employed in the production of agricultural products; the ratio of exports of agricultural commodity groups to GDP (export quota); the ratio of exports of agricultural products to their production volume; the coefficient of net export potential; the coefficient of export efficiency of the country; the country's participation in the international division of labour; the indicator of comparative (relative) advantages of foreign trade (Formulas 1-5).

$$Exq = \frac{Ex_i}{GP} \quad (1),$$

where is the ratio of exports of agricultural products to the volume of their production; Ex_i is the export of agricultural products to the *i*-th country; *GP* is the production of agricultural products in the country.

$$C_{exp} = (E - I) / FTT \rightarrow \boldsymbol{max} \quad (2),$$

where C_{exp} is the coefficient of net export potential; *E* is the export of agricultural products of Ukraine; *I* – import of agricultural products of Ukraine; *FTT* – Ukraine's foreign trade turnover in agricultural products.

$$\mathrm{EEx}_i\mathrm{w}(\mathrm{EU}) = \frac{\mathrm{Ex}_i / \mathrm{PP}_\mathrm{i} \cdot \mathrm{Ex}_i / \mathrm{GP}_{\mathrm{w(EU)}} \cdot 100}{\mathrm{Ex}_{\mathrm{w(EU)}} / \mathrm{PP}_{\mathrm{w(EU)}} \cdot \mathrm{Ex}_\mathrm{i} / \mathrm{GP}_\mathrm{i}} \quad (3),$$

where $\mathrm{EEx}_i\mathrm{w}(\mathrm{EU})$ is the export efficiency of the *i*-th country in the world (within the EU); Ex_i/PP_i is the export of the *i*-th c country per capita engaged in agricultural production; $Ex_i/GP_{w(EU)}$ is the share of exports of the *i*-th country in the production of agricultural products of the world (EU); $E_{xw(EU)}/PP_{w(EU)}$ – exports per capita in the world (EU), engaged in the production of agricultural products; Ex_i/GP_i is the share of exports of the *i*-th country in its production of agricultural products.

$$\mathrm{CPIDL}_\mathrm{i}\mathrm{w}(\mathrm{EU}) = \frac{\mathrm{Ex}_\mathrm{i} / \mathrm{Ex}_{\mathrm{w(EU)}}}{\mathrm{GP}_\mathrm{i} / \mathrm{GP}_{\mathrm{w(EU)}}} \quad (4)$$

where $\mathrm{CPIDL}_i\mathrm{w(EU)}$ is the coefficient of participation of the country in the international division of labor in the world (within the EU); GP_i – production of agricultural products of the *i*-th country; Ex_i is the export of the *i*-th country; Ex_w – world exports (EU); GP_w – production of agricultural products in the world (EU).

$$RA_{ij} = \ln\left[\frac{EX_{ij} / IM_{ij}}{EX_i / IM_i}\right] \quad (5)$$

where RA_{ij} is an indicator of the relative (comparative) advantage of the *i*-th country for the *j*-th product; EX_i, IM_i – export and import of the I-th country; EX_{ij}, IM_{ij} – export and import of the *j*-th commodity of the *i*-th country. If $RA_{ij} > 0$, the country has an

advantage in foreign trade in certain goods. If $RA_{ij} < 0$, then the country has no comparative advantage for that good/product group.

The arguments in favor of the proposed comprehensive approach are as follows: *first*, the resultsof a thorough analysis of the commodity and geographical structure of foreign trade in agricultural products of Ukraine in general and exports, in particular, as a form of realization of the export potential of agriculture are the basis for its assessment and are accompanied by the definition of the main factors of its formation; *secondly*, the use of quantitative indicators to assess the export potential makes it possible to determine the effectiveness of the export potential of the country's agro-industrial complex in comparison with other exporting countries and by commodity groups in trade with major regions of the world.

4. Findings

Ukraine has favourable natural and climatic conditions for the development of agriculture, temperature variations that do not pose a threat to crops, a favourable geographical location, the availability of water and land resources. Ukraine has 60.3 million hectares of land, which is 6% of Europe's territory. The area of agricultural land is 42.7 million hectares (70% of Ukraine) and arable land is 32.5 million hectares (78.4% of all agricultural land), including chernozems 17.4 million hectares (8% of the world's reserves) (StateGeoCadastre, 2020).

However, violation of the rules of crop rotation, the insufficient use of organic fertilizers and uncontrolled decline in groundwater level leads to erosion, pollution and degradation of soils (from 2000 to 2020, the fertility level of soils of Ukraine decreased by 3.14%) (Lazarieva, 2019).

Ukraine's accession to the WTO, transition to international quality standards, liberalization of customs regimes within the framework of the Trade Facilitation Agreement (TFA), as noted in the paper of (Ladychenko, Tunitska, 2019), which contributed to the geographical diversification of foreign trade, were the stimulating factors for the export potential of the agricultural sector. Acquisition by Ukraine of the status of associated member of the EU and the signing of the Memorandum of Understanding "Dialogue on Agrarian Issues" between the Ministry of Agricultural Policy and Food of Ukraine and the Directorate-General for Agriculture and Rural Development of the European Commission. With the entry into force of the Deep and Comprehensive Free Trade Area between Ukraine and the EU (DCFTA) on January 1, 2016, highly profitable EU markets were opened, which helped improve the quality of Ukrainian food and strengthen the food security of Ukraine, cooperation with international organizations and financial support for the development of Ukrainian agribusiness, including SMEs, is proved in the work (Melnyk, Tunitska, 2020).

The export potential of the country during the period under review has increased with the adoption and implementation of important regulations for the development of the agro-industrial complex of Ukraine, in particular, the State Target Programme for Rural Development in Ukraine for the period up to 2015, Agricultural Sector Development Strategy up to 2020, the Concept of the Ukrainian Public-Private Partnership Development Program for 2013–2018, justification of the Export Strategy for the Food and Processing Industry of Ukraine for 2019–2023.

However, the following factors have a negative impact on the export potential of Ukrainian agro-industrial complex: the volatility of the political situation, military intervention by the Russian Federation, the lack of satisfactory scientific validity of economic reforms; the low level of state support, the lack of effective mechanisms of investment risk insurance; significant state support by the U.S. and the EU of their national producers, which reduces the level of international competitiveness of Ukrainian food, forming a negative investment image of Ukraine; development of large agricultural holdings, which creates the risk of unemployment for farmworkers (today there are 14 million people living in rural areas, of which 3.6 million work in agriculture) (State Statistics Service of Ukraine, 2020); lack of legal regulation of genetic engineering in the country; technological backwardness of the vast majority of producers; high level of depreciation of fixed assets; use of extensive type of farming.

Throughout 2010–2020 foreign trade in agri-food products of Ukraine was characterized by the excess of annually growing volumes of exports over imports. Thus, in 2020 agricultural products worth 22,199.1 million USD were exported outside of Ukraine, which is 123% more than in 2010 (Table 1).

The dynamics of foreign trade growth was negatively affected by the military and political confrontation with the Russian Federation, as evidenced by the negative growth rates in 2013–2015. However, while during the next five years the growth rate of imports of agricultural products to Ukraine steadily increased by 10-13%, the rate of exports was abrupt. In addition, due to quarantine restrictions related to the pandemic coronavirus COVID-19, the volume of exports in 2020 as a whole exceeded the figure for 2019 by only 0.2%.

Since the beginning of the period under review, the share of agri-food exports in total Ukrainian exports has doubled to 45.1% in 2020, even despite the COVID-19 global crisis.

Table 1
Main indicators of foreign trade in agricultural products of Ukraine in 2010–2020

Year	Exports, million USD	Imports, million USD	Export surplus, million USD	External turnover, million USD	Exports increase rate, %	Import increase rate, %	Foreign trade increase rate, %
2010	9936,1	5761,9	4174,2	15698	-	-	-
2011	12804,1	6346,7	6457,4	19150,8	28,9	10,1	22
2012	17880,6	7519,7	10360,9	25400,3	39,6	18,5	32,6
2013	17024,3	8184	8840,3	25208,3	-4,8	8,8	-0,8
2014	16669	6059,3	10609,7	22728,3	-2,1	-26	-9,8
2015	14563,1	3484,4	11078,7	18047,5	-12,6	-42,5	-20,6
2016	15281,8	3891,1	11390,7	19172,9	4,9	11,7	6,2
2017	17756,9	4301,2	13455,7	22058,1	16,2	10,5	15
2018	18611,8	5055,5	13556,3	23667,3	4,8	17,5	7,3
2019	22144,2	5736	16408,2	27880,2	19	13,5	17,8
2020	22199,1	6495,5	15703,7	28694,6	0,2	13,2	2,9

Source: calculated by the author according to the State Statistics Service of Ukraine

Table 2
Dynamics of the geographical structure of agricultural foreign trade of Ukraine in 2010–2020, %

Region	Indicator	2010	2014	2015	2016	2017	2018	2019	2020
CIS	Export	33,5	14,8	10,0	7,5	7,6	8,0	6,5	5,9
	Import	14,0	12,0	9,0	3,8	3,2	3,4	4,0	3,9
Europe	Export	20,4	28,6	27,9	27,1	32,1	33,1	33,2	29,6
	Import	43,0	46,6	48,5	50,1	53,8	54,9	56,3	57,0
Asia	Export	31,4	40,7	47,1	48,2	44,7	44,8	43,7	50,2
	Import	19,4	21,2	22,3	24,5	22,6	22,1	20,6	20,7
Africa	Export	13,8	15,3	13,8	15,9	14,3	12,5	15,0	13,0
	Import	5,8	4,7	5,7	5,1	5,1	5,1	4,4	4,6
America	Export	0,4	0,4	0,8	0,8	0,7	1,0	1,0	0,8
	Import	17,5	14,2	13,7	15,6	14,2	13,4	13,6	13,4
Australia and Oceania	Export	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1
	Import	0,2	0,8	0,3	0,3	0,3	0,3	0,3	0,4
Other unspecified countries	Export	0,5	0,1	0,4	0,5	0,5	0,5	0,4	0,3
	Import	0,0	0,5	0,5	0,5	0,8	0,8	0,8	-

Source: calculated by the author according to the State Statistics Service of Ukraine

Table 3
Geographical structure of Ukrainian agro-industrial products exports in 2020, % (TOP-10)

Europe		CIS		Asia		Africa		America		Australia and Oceania	
Netherlands	21,6	Belarus	38,9	China	32,0	Egypt	47,4	USA	57,5	Australia	72,9
Spain	15,0	Republic of Moldova	17,8	India	13,5	Tunisia	12,4	Mexico	7,9	New Zealand	13,6
Poland	11,6	Azerbaijan	13,0	Turkey	9,6	Morocco	11,7	Canada	6,8	Tuvalu	3,3
Germany	8,8	Kazakhstan	11,1	Indonesia	5,1	Libya	10,3	Brazil	5,8	New Caledonia	1,9
Italy	8,6	Armenia	5,6	Saudi Arabia	3,9	Algeria	5,9	Costa Rica	4,8	Fiji	0,6
UK	5,8	Russian Federation	5,3	Iraq	3,6	Ethiopia	1,5	Ecuador	3,3	Marshall Islands	0,5
Belgium	5,7	Republic of Uzbekistan	4,2	Israel	3,4	Mauritania	1,2	Suriname	2,8	Papua New Guinea	0,4
France	5,5	Kyrgyz Republic	1,8	Bangladesh	3,1	Republic of Kenya	1,2	Venezuela	2,1	French Polynesia	0,1
Portugal	2,4	Turkmenistan	1,3	Republic of Korea	2,7	Mozambique	0,9	Peru	1,9	Palau	0,0
Romania	2,3	Republic of Tajikistan	0,8	Lebanon	2,6	South Africa	0,8	Guyana	1,5	Cook Islands	0,0
Others	12,7	Others	0,2	Others	20,5	Others	6,7	Others	5,6	Others	6,7

Source: calculated by the author according to the State Statistics Service of Ukraine

The key markets for domestic agricultural products remain three regions: Asia (China, India, Turkey, Indonesia, etc.), Africa (Egypt, Tunisia, Morocco, Libya, etc.), Europe (including the Netherlands, Spain, Poland, Germany, etc.) (Tables 2, 3). In 2020, their total share was more than 98% of the value of Ukrainian agricultural exports. The status of the main importers of Ukrainian agricultural products has passed to Asian countries, whose share in 2010–2020 increased from 31 to 50.2%, while the same indicator of former strategic partners – the CIS countries decreased in 5 times and amounted to 6% in 2020.

Only countries in the Asian region increased the volume of Ukrainian food imports during quarantine measures due to COVID-19. Although European countries accounted for one-third of Ukraine's agricultural exports over the past three years, their share in the region dropped from 33.2% in 2019 to 29.6% in 2020. Analysis of the global market for agricultural and grocery products revealed an almost threefold increase in demand for agro-industrial products over the past 10 years due to the aggravation of the global problem of hunger. In 2019, 820 million people suffered from it, including 8% of the population of developed countries in North America and Europe (FAO, 2020).

In 2020, finished food products (37.7%) held the largest share in the structure of world exports, ahead of plant products (33.1%), live animals; animal products (22.9%); fats and oils held the smallest share (6.3%). The list of commodity groups has been identified for which demand will grow over 2010–2020, as evidenced by their dynamics and share in world exports (see Table 4). These are meat and edible offal; fish and crustaceans; milk and dairy products, poultry eggs; natural honey; vegetables; edible fruits and nuts; grains; seeds and fruits of oilseeds; fats and oils of animal or vegetable origin; prepared grain products; processed vegetable products; various food products; alcoholic and soft drinks and vinegar; food industry residues and wastes. In 2020, their share of total world exports is 4-9%, and their combined share is 80%.

The development of Ukraine's exports does not correspond to global trends. The basis of Ukrainian exports over the past 10 years are only 4 commodity groups: cereals (6th place among world exporters in 2020); seeds and oilseeds (8th place); fats and oils of animal or vegetable origin (5th place) and residues and wastes of food industry (16th place), the total share of which in the structure of Ukrainian agricultural exports in 2020 was 84%.

This trend is quite positive in terms of maintaining a highly competitive niche in export supplies and their expansion. However, it is necessary to accelerate the search for ways to diversify commodity exports through the supply of products that require deep technological processing of vegetable and livestock raw materials. Contrary to the global trend in the structure of demand, the share of finished food products decreased from 26 to 15% in the total structure of exports of Ukrainian agro-industrial complex due to the reduction by half on average of the already small export share of all product groups, except for food industry waste. The share of milk and dairy products, poultry eggs; natural honey; vegetables, edible nuts and fruits; meat and fish products; cocoa and cocoa products; finished grain products; processed vegetable products; alcoholic and soft drinks and vinegar decreased by 1.5-3 times. The decline in the share of the above mentioned Ukrainian goods in their world exports indicates that Ukraine is gradually losing its competitive position on the international market of these goods (Table 4).

Economically developed countries of the world, having an established system of crop rotation management and realizing the significant effect of soil depletion from growing such traditional export-oriented crops as sunflower, corn and rapeseed for Ukraine, import them and products of primary processing. Instead, Ukraine exports raw materials that, after processing in developed countries, return in the form of finished food products with high added value. Thus, compared with 2010, their share in total imports of agricultural products has increased from 44 to 52%, in particular, the share of imports of meat and fish products, finished grain products, alcohol, various foods, tobacco products and dairy products has increased by half or two times.

The orientation of Ukrainian exporters to a limited number of agri-food commodity groups is also erroneous, given the dependence of the efficiency of export operations on seasonal fluctuations in world prices for these products, mainly grain, whose main competitive advantage is a relatively low cost.

Table 5 shows that despite the increase in exports, there is a growing negative balance due to excess imports in such commodity groups of agriculture as fish and crustaceans; other products of animal origin; vegetables; edible fruits and nuts; coffee, tea. Rapid deterioration of the foreign trade balance against the background of decreased export and increased import occurred in milk and dairy products, poultry eggs, natural honey, meat products, fish, alcoholic and non-alcoholic beverages, and vinegar. Negative balance and a decrease in exports are characteristic of cocoa and cocoa products; finished grain products and processed vegetable products.

In the long term, to ensure a highly competitive position on the international food market, Ukraine should not rely solely on the development of agricultural exports, given the average global level of its export potential. In 2019, for example, the vast

Table 4
Comparison of the dynamics and structure of agricultural exports of the world and Ukraine in 2010–2020

Section, UKTZED group and product name	Increase in exports of agricultural products in 2020 to 2010, %		Share of world exports of goods in total world exports of agricultural products, %		Share of commodity exports in the total exports of agricultural products of Ukraine, %		Share of Ukrainian exports in total world exports of agricultural products, %		The place of Ukraine in the world rankings	
	World	Ukraine	2010	2020	2010	2020	2010	2020	2010	2020
TOTAL AIC	33,8	123,4	100	100	19,3	45,1	0,9	1,4	-	-
I. Live animals; products of animal origin	29,5	54,1	23,4	22,9	7,8	5,4	0,3	0,3	-	-
01 live animals	23,5	1316,8	1,7	1,4	0	0,2	0,1	0,2	84	46
02 meat and edible offal	36,8	623,3	8,6	8,6	0,9	2,9	0,1	0,5	44	27
03 fish and crustaceans	24,5	100,9	6,8	6,5	0,2	0,2	0,01	0,0	88	84
04 milk and dairy products, poultry eggs; natural honey	25,7	-34,2	5,7	5,7	6,5	1,9	0,9	0,5	20	31
05 other products of animal origin	39,5	103,2	0,6	0,6	0,1	0,1	0,1	0,2	50	52
II. Vegetable products	42,3	199,0	30,9	33,1	40	53,6	1,11	2,3	-	-
06 live trees and other plants	23,4	222,4	1,7	1,4	0	0	0,0	0,0	81	70
07 vegetables	26,9	41,0	4,6	4,6	1,2	0,8	0,2	0,2	46	37
08 edible fruits and nuts	56,1	14,2	6,5	7,7	2,1	1,1	0,3	0,2	47	50
09 coffee, tea	32,2	52,1	2,9	3,1	0,1	0,1	0,0	0,0	92	83
10 cereals (grain crops)	39,3	281,7	7,6	7,6	24,8	42,4	2,9	8,0	11	6
11 products of flour and cereals industry	32,8	91,0	1,4	1,2	0,8	0,7	0,3	0,8	58	25
12 seeds and oleaginous fruits	56,4	69,7	5,7	6,9	10,9	8,3	1,6	1,7	10	8
13 natural shellac	34,7	-25,1	0,5	0,5	0	0	0,0	0,0	65	78
14 vegetable materials for the manufacture	35,3	2710,9	0,1	0,1	0	0,2	0,2	4,0	52	9
III 15 fats and oils of animal or vegetable origin	21,3	120,1	6,4	6,3	26,3	25,9	3,3	5,9	7	3
IV. Finished food products	31,9	30,7	39,3	37,7	25,9	15,1	0,6	0,6	-	-
16 meat and fish products	36,9	-53,6	3,4	3,3	0,5	0,1	0,1	0,0	60	78
17 sugar and sugar confectionery	-6,7	21,2	3,4	2,7	2,1	1,1	0,5	0,6	38	24
18 cocoa and cocoa products	3,6	-66,0	3,3	2,6	6	0,9	1,6	0,5	19	32
19 finished grain products	61,8	23,1	4,4	5,0	2,6	1,4	0,5	0,4	33	40
20 vegetable processing products	29,0	-17,9	4,4	4,0	2,1	0,8	0,4	0,3	33	44
21 different food products	72,2	29,9	4,3	5,3	1,2	0,7	0,3	0,2	51	56
22 alcoholic and non-alcoholic beverages and vinegar	32,5	-49,6	7,8	7,5	4,5	1	0,5	0,2	31	47
23 food industry residues and wastes	41,1	229,1	5,0	5,1	4,8	7,1	0,3	2,0	31	16
24 tobacco and industrial tobacco substitutes	-1,3	106,3	3,4	2,3	2,2	2	0,6	1,3	37	26

Source: calculated by the author according to the State Statistics Service of Ukraine, the World Bank, FAO, TrendEconomy, and UN Comtrade

majority of Ukraine's largest trading partners were at a much higher level in terms of agricultural production per capita engaged in the farming sector; in terms of exports of agricultural products per capita, which amounted to 5864.8 U.S. dollars per capita, Ukraine was ahead of some CIS and Asian countries, giving way to economically developed countries and world leaders in the production and export of food – the Netherlands (445684.9 USD per capita), Canada (142361.3 USD per capita), Germany (110221.0 USD per capita), etc. (Table 6). Although Ukraine participates quite actively in the international division of labour in agriculture, as evidenced by the size of the export quota (35.9%) and its level is higher than that of the selected partner countries, the net export ratio is the highest in the sample – 0.5 (except for Brazil and New Zealand), and the international division of labour in agriculture is above 1 (2.0), such active participation is not accompanied by a corresponding level of export efficiency.

In general, agricultural export efficiency, which shows the per capita income of each percent of

Table 5

Ukraine's foreign trade in agro-industrial products in 2010–2020

Section, product group UKTZED	Exports, million USD		Share of goods in total exports, %		Imports, million USD		Share of goods in total imports, %		Foreign trade balance, million USD	
	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020
I.	771,4	1188,4	7,8	5,4	1241,7	1257,8	21,6	21,9	-470,3	-69,4
01	3,6	51,5	0	0,2	67,5	80,9	1,2	1,4	-63,9	-29,4
02	90,2	652,2	0,9	2,9	458,0	165,0	7,9	2,9	-367,8	487,2
03	21,0	42,2	0,2	0,2	568,6	680,3	9,9	11,9	-547,6	-638,1
04	648,8	426,6	6,5	1,9	135,4	308,4	2,4	5,4	513,3	118,2
05	7,8	15,8	0,1	0,1	12,2	23,2	0,2	0,4	-4,4	-7,4
II.	3976,3	11890,1	40	53,7	1563,7	1988,3	27,1	34,7	2412,6	9901,7
06	1,8	5,7	0	0	73,9	48,8	1,3	0,9	-72,1	-43,0
07	119,2	168,1	1,2	0,8	129,9	262,5	2,3	4,6	-10,7	-94,4
08	208,8	238,4	2,1	1,1	733,3	794,9	12,7	13,9	-524,5	-556,5
09	9,9	15,0	0,1	0,1	234,1	251,3	4,1	4,4	-224,2	-236,3
10	2467,1	9417,3	24,8	42,5	145,6	178,9	2,5	3,1	2321,5	9238,4
11	80,9	154,6	0,8	0,7	27,5	35,2	0,5	0,6	53,5	119,5
12	1085,7	1842,4	10,9	8,3	178,9	388,0	3,1	6,8	906,7	1454,4
13	1,3	0,9	0	0	39,6	28,0	0,7	0,5	-38,4	-27,1
14	1,7	47,4	0	0,2	0,9	0,7	0,0	0,0	0,8	46,7
III 15	2617,3	5759,6	26,3	26	451,5	280,4	7,8	4,9	2165,8	5479,2
IV.	2571,1	3361,1	25,9	15,2	2504,9	2969,0	43,5	51,8	66,1	392,2
16	48,7	22,6	0,5	0,1	100,3	160,6	1,7	2,8	-51,6	-138,0
17	206,5	250,2	2,1	1,1	231,4	74,1	4,0	1,3	-24,9	176,1
18	591,6	201,4	6	0,9	407,3	375,9	7,1	6,6	184,3	-174,5
19	254,3	313,1	2,6	1,4	125,8	241,5	2,2	4,2	128,5	71,6
20	210,4	172,6	2,1	0,8	223,3	209,0	3,9	3,6	-12,9	-36,4
21	122,9	159,6	1,2	0,7	466,5	484,9	8,1	8,5	-343,5	-325,3
22	443,7	223,7	4,5	1	270,6	587,4	4,7	10,2	173,1	-363,8
23	479,1	1576,5	4,8	7,1	208,4	278,0	3,6	4,8	270,6	1298,5
24	213,9	441,4	2,2	2	471,4	557,5	8,2	9,7	-257,5	-116,1

Source: calculated by the author according to the State Statistics Service of Ukraine

GDP (agricultural) exported compared to the world average, taken as 100%. The more a country exports per capita and the lower the share of exports in GDP (agriculture), the higher the economic efficiency of exports. According to our calculations, Ukraine is characterized by an export efficiency slightly above the world average of 3.2 or 320%, ahead of the CIS countries (not including the Russian Federation).

While the level of export efficiency of developed partner countries (Netherlands, Germany, France, USA, Canada) is 20-200 times higher than the world average. Such a striking lag of Ukraine according to this indicator is connected, first of all, with the distorted commodity structure of agricultural export, drawbacks of state regulation, degradation of science and lack of advanced technologies in the industry.

A comparative analysis of the export potential of Ukraine and the EU also showed a low level of export efficiency of Ukraine, despite the significant level of participation in the international division of labour, the share of exports in agricultural products and export quotas. The increase in production is achieved primarily due to the number of employees, much higher than in the EU, which indicates the technological lag of Ukrainian producers from economically developed countries (Table 7).

Ukraine is one of the leaders in the world export market of food products with a limited number of agricultural products – raw materials and semi-finished products. However, it is obvious that there are significant reserves to increase food supplies to traditional and other countries through the introduction of deeper technological processing.

The results of calculation of the indices of relative advantages, which characterize the realized export potential of the agro-industrial complex as a whole in trade of Ukraine with other regions of the world in 2010–2020 and determination of the priority of export of commodity groups are presented in Tables 8 and 9. For those commodity items, which in the initial data showed no exports or imports, the index of comparative advantage could not be calculated, which indicates the implementation of only

Table 6
Comparison of the export potential of the farming sector of Ukraine and major trading partners, 2019*

State	Production of agricultural products per person employed in agriculture, USD	Exports of agricultural products per person employed in the agricultural sector, USD	Export quota, %	Ratio of agricultural exports to production volume, %	Net exports ratio	Coefficient of participation in the int. division of labour	Export efficiency coefficient
Ukraine	16341,7	5864,8	11,48	35,9	0,5	2,0	3,2
Netherlands	106937,4	445684,9	8,25	416,8	0,2	23,5	88,0
Spain	65527,1	56083,8	3,21	85,6	0,2	4,8	32,2
Poland	20889,4	14817,3	3,73	70,9	0,1	4,0	5,1
Germany	97821,4	110221,0	1,46	112,7	-0,2	6,4	60,5
Italy	42195,2	39122,7	1,77	92,7	-0,1	5,2	16,5
United Kingdom	84590,3	45107,0	0,54	53,3	-0,5	3,0	14,3
France	86843,3	75740,8	1,89	87,2	0,1	4,9	49,1
Belarus	20919,9	6944,7	5,98	33,2	0,0	1,9	0,9
Republic of Moldova	16329,6	6909,0	10,55	42,3	0,4	2,4	0,2
Azerbaijan	3070,4	444,4	1,64	14,5	-0,4	0,8	0,0
Armenia	6553,7	1510,4	2,58	23,0	-0,3	1,3	0,0
Russian Federation	23357,9	4187,2	1,03	17,9	-0,1	1,0	4,5
Kazakhstan	13612,9	2685,9	1,77	19,7	0,0	1,1	0,5
India	2828,9	146,3	0,00	5,2	0,0	0,3	0,7
Turkey	13585,9	4013,9	0,77	29,5	0,0	1,7	3,0
Israel	110641,1	37967,7	2,68	34,3	-0,5	1,9	1,7
Republic of Korea	11050,9	2573,9	0,36	23,3	-0,7	1,3	0,4
Egypt	6414,3	1080,0	0,35	16,8	-0,4	1,0	0,4
USA	170469,4	54880,4	0,22	32,2	0,1	1,8	219,8
Canada	176343,6	142361,3	1,96	80,7	0,1	4,6	79,5
Brazil	29351,0	11187,1	0,55	38,1	0,8	2,2	30,3
Australia	112985,2	64085,4	2,36	56,7	0,3	3,2	26,3
New Zealand	110636,4	124850,1	5,11	112,8	0,7	6,4	23,9

* Data on global agricultural exports in 2020 is not fully available

Source: calculated by the author according to the State Statistics Service of Ukraine, FAO, and ILO

Table 7
Comparison of indicators of export potential of agro-industrial complex of Ukraine and EU countries, 2020

State	Agricultural production per capita employed in agribusiness, USD	Exports of AIC per capita employed in AIC, USD	Export quota, %	Ratio of agricultural exports to production volume, %	Net exports ratio	Coefficient of participation in the int. division of labour	Export efficiency coefficient
Ukraine	14361,3	6559,0	14,23	45,7	0,6	1,2	0,5
Austria	147640,3	61753,0	3,66	41,8	0,0	1,1	3,5
Belgium	411886,0	259771,5	7,61	63,1	0,1	1,7	24,6
Bulgaria	36696,1	17887,0	8,47	48,7	0,1	1,3	0,3
Greece	60018,1	15191,6	4,43	25,3	0,0	0,7	0,8
Denmark	338491,5	213003,5	6,56	62,9	0,2	1,6	11,9
Estonia	121460,1	56114,1	6,51	46,2	-0,1	1,2	0,4
Ireland	268344,5	111704,0	3,86	41,6	0,2	1,1	6,6
Cyprus	100807,2	21114,0	2,17	20,9	-0,4	0,5	0,1
Latvia	64448,2	37743,1	10,61	58,6	0,0	1,5	0,3
Lithuania	81427,8	60808,6	13,26	74,7	0,2	2,0	0,9
Luxembourg	236985,0	674413,8	2,00	284,6	-0,4	7,5	0,5
Malta	122244,0	44888,2	2,06	36,7	-0,4	1,0	0,1
Portugal	108921,4	31874,7	4,01	29,3	-0,2	0,8	1,5
Romania	23576,2	4547,9	3,48	19,3	-0,1	0,5	0,3

(End of Table 7)

State	Agricultural production per capita employed in agribusiness, USD	Exports of AIC per capita employed in AIC, USD	Export quota, %	Ratio of agricultural exports to production volume, %	Net exports ratio	Coefficient of participation in the int. division of labour	Export efficiency coefficient
Slovakia	79588,7	32387,0	3,73	40,7	-0,2	1,1	0,5
Slovenia	80046,3	33778,9	3,61	42,2	-0,2	1,1	0,2
Hungary	69230,8	33196,0	7,64	47,9	0,2	1,3	1,2
Finland	192685,3	16992,7	0,80	8,8	-0,5	0,2	0,6
Netherlands	385559,6	361792,7	12,47	93,8	0,2	2,5	66,0
Spain	171344,4	52209,0	5,15	30,5	0,2	0,8	17,0
Poland	51347,7	18471,6	6,85	36,0	0,2	0,9	3,2
Germany	191322,7	61569,9	2,44	32,2	-0,1	0,8	26,9
Italy	159537,9	39972,2	3,04	25,1	0,0	0,7	13,8
Croatia	52071,9	14088,0	4,28	27,1	-0,2	0,7	0,2
Czech Republic	103686,9	36005,2	4,09	34,7	0,0	0,9	1,6
Sweden	315696,1	91437,4	2,16	29,0	-0,2	0,8	5,6
France	210692,9	55312,7	2,86	26,3	0,1	0,7	23,8

Source: calculated by the author according to the State Statistics Service of Ukraine, Eurostat, and preliminary data by market experts

Table 8

Indicators of relative advantages in mutual trade between Ukraine and the countries of the world by commodity groups of agro-industrial complex in 2010–2020

Section, product group UKTZED	Europe		CIS		Asia		America		Africa		Australia and Oceania		Other unspecified countries	
	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020
01	-6,3	-3,6	3,5	6,5	-0,5	4,8	-0,7	-0,8		3,7				
02	-6,6	0,1	5,3	5,0	1,1	6,6	-6,5	-1,9		4,5	0,3	-3,3		-3,3
03	-4,9	-2,5	-0,2	1,0	-3,9	-1,7	-2,3	-4,3	-8,8	-8,3	-4,6	-5,9		-5,9
04	-1,9	-0,4	2,6	2,2		6,3	-1,0	7,6			-0,8	-5,2		-5,2
05	0,5	0,6	1,5	4,0	1,6	-0,4		-2,8					-5,9	
06	-6,4	-2,7	1,9	3,2	-3,9	0,0		-5,3				0,2		0,2
07	-0,5	0,1	3,0	-1,2	-0,9	-0,6	-2,0	-0,2	-0,9	-0,8	3,3	3,2		3,2
08	-0,6	0,7	1,6	-0,3	-1,2	-2,4	-7,5	-4,2	-5,5	-6,4	-0,6	-4,4		-4,4
09	-2,4	-3,1	-2,2	1,3	-4,0	-2,8	-3,5	-3,4	-3,8	-6,8	-1,7	-0,7		-0,7
10	1,1	3,1	3,0	0,5	4,0	4,8	-8,0	2,3		15,1	-3,0	-0,3		-0,3
11	-0,5	0,7	1,6	0,3	3,9	4,4	0,9	4,1	1,7	3,6		-1,9		-1,9
12	2,5	2,5	3,8	3,5	2,2	1,4	-1,0	-3,0	2,0	1,1	-5,3	-4,0		-4,0
13	-4,8	-3,6	2,1	0,1	-6,4	-4,2	-4,8	-3,5						
14		7,0	2,8	2,7		1,5		3,2			2,2			
15	2,2	3,5	3,3	3,8	1,3	2,9	0,6	4,3	8,3	4,8		8,6		8,6
16	-3,3	-2,4	0,5	-0,2	-2,7	-1,6	-2,5	-2,4	3,2	-1,6	1,6	-0,5		-0,5
17	0,4	0,9	1,1	3,9	1,4	1,1	-4,6	2,0	0,7	2,3		-1,4		-1,4
18	-1,1	-0,8	2,3	2,9	1,0	-0,1	3,4	1,8	-14,3	-6,1	4,1			
19	-1,3	-0,3	1,8	3,4	2,8	1,1	2,2	4,2	2,9	1,8	0,8	-1,3		-1,3
20	-0,9	0,2	2,6	1,4	-2,7	-1,0	-2,5	0,7	-2,0	-4,8	6,7	0,2		0,2
21	-2,6	-1,5	0,5	2,3	-0,7	-0,7	-4,0	-2,3	2,1	0,8		-0,7		-0,7
22	-1,0	-1,5	2,0	1,2	-0,8	-0,5	-0,7	-0,9	-0,8	-0,7	0,4	-3,3		-3,3
23	0,5	1,0	1,7	5,5	3,3	3,6		-3,8		1,8		-1,4		-1,4
24	-5,3	-3,5	0,3	2,4	0,0	1,5	-4,4	-1,5		-1,7				

Source: calculated by the author according to the State Statistics Service of Ukraine

Table 9

Priority commodity groups of Ukraine's exports for sale in the world markets by the criterion of relative advantages in 2020

Europe		CIS		Asia		America		Africa		Australia and Oceania		Other unspecified countries	
Group UKTZED	Relative advantages index	Group UKTZED	Relative advantages index	Group UKTZED	Relative advantages index	Group UKTZED	Relative advantages index	Group UKTZED	Relative advantages index	Group UKTZED	Relative advantages index	Group UKTZED	Relative advantages index
Currently sold in the region and have high advantages													
10	3,1	01	6,5	01	4,8	04	7,6	02	4,5	15	8,6		
12	2,5	02	5,0	02	6,6	10	2,3	10	15,1				
14	7,0	04	2,2	10	4,8	11	4,1	15	4,8				
15	3,5	05	4,0	11	4,4	15	4,3	23	1,8				
23	1,0	06	3,2	12	1,4	15	4,3						
		09	1,3	15	2,9	18	1,8						
		12	3,5	23	3,6	19	4,2						
		15	3,8										
		17	3,9										
		18	2,9										
		19	3,4										
		20	1,4										
		21	2,3										
		22	1,2										
		23	5,5										
		24	2,4										
Currently poorly represented in the market of the region, but have advantages and prospects for development													
02	0,1	03	1,0	14	1,5	14	3,2	01	3,7	06	0,2	02	4,3
05	0,6	10	0,5	17	1,1	17	2,0	11	3,6	07	3,2	04	1,6
07	0,1	11	0,3	19	1,1	20	0,7	12	1,1	20	0,2	10	1,2
08	0,7	13	0,1	24	1,5			17	2,3			12	2,0
11	0,7	14	2,7					19	1,8			13	0,5
17	0,9							21	0,8			14	0,3
20	0,2											15	0,4
												16	0,5
												17	0,8
												18	0,3
Currently sold on the market, but has no advantages													
01	-3,6	16	-0,2	03	-1,7	01	-0,8	03	-8,3	01		06	-1,1
03	-2,5	07	-1,2	05	-0,4	02	-1,9	04		02	-3,3	07	-0,1
04	-0,4	08	-0,3	06	0,0	03	-4,3	05		03	-5,9	08	
06	-2,7			07	-0,6	05	-2,8	06		04	-5,2	09	
09	-3,1			08	-2,4	06	-5,3	07	-0,8	05		11	
13	-3,6			09	-2,8	07	-0,2	08	-6,4	08	-4,4	19	-0,2
16	-2,4			13	-4,2	08	-4,2	09	-6,8	09	-0,7	20	-0,2
18	-0,8			16	-1,6	09	-3,4	13		10	-0,3	21	
19	-0,3			18	-0,1	12	-3,0	14		11	-1,9	22	
21	-1,5			20	-1,0	13	-3,5	16	-1,6	12	-4,0	23	
22	-1,5			21	-0,7	16	-2,4	18	-6,1	13		24	
24	-3,5			22	-0,5	21	-2,3	20	-4,8	14			
						22	-0,9	22	-0,7	16	-0,5		
						23	-3,8	24	-1,7	17	-1,4		
						24	-1,5			18			
										19	-1,3		
										21	-0,7		
										22	-3,3		
										23	-1,4		
										24			

Source: calculated by the author according to the State Statistics Service of Ukraine

unilateral foreign trade operations or the absence of foreign trade in these goods.

In general (with the exception of the CIS market), in recent years, the list of domestic export groups that had sustainable relative advantages in mutual trade with the world (the indices of relative advantages are greater than one and positive) is small, and all of these groups are low-tech exports. Ukrainian agricultural exports to Australia and Oceania are extremely underdeveloped.

However, there is a potential opportunity to increase exports of Ukrainian products with a greater degree of technological processing, in particular, to the markets of European countries – products of the flour-and-cereal industry, sugar and confectionery products from it; to the markets of Asia – finished grain products; tobacco and its industrial substitutes; America – sugar and confectionery products; vegetable processing products; Africa – products of the flour-and-cereal industry; sugar and confectionery products from it; finished grain products.

5. Conclusions

The formation of export potential of Ukrainian agro-industrial complex is influenced by both positive and negative restraining factors. The results of the analysis for 2010–2020 indicate the following trends: high dynamism of foreign trade in agri-food products in Ukraine and annual increase in the total trade surplus; the main markets for domestic agricultural products are Asia, Europe and Africa, while imports from the CIS, a major partner in the past, are declining; under conditions of aggravation of the world food problem, despite the crisis related to COVID-19, there is a significant increase in global demand for agricultural products, especially finished food, and the structure of Ukrainian exports is dominated by commodity groups of low-tech raw materials, which steadily occupy the leading position in the world market; halving the share of finished food products in the overall structure of Ukraine's agricultural exports and the rapid deterioration of the foreign trade balance due to a decrease in their exports and an increase in imports; weakness of Ukrainian agro-industrial complex is due to the priority of strengthening the export potential of agricultural products (commodity groups and semi-finished products), as evidenced by the low level of export efficiency, despite the significant activity of Ukraine in the world agricultural market compared to major foreign trade partners; low technological formation of the export potential of the agroindustrial complex of Ukraine compared to the EU countries, which is manifested in low export efficiency; a limited list of commodity groups of Ukrainian exports with stable relative advantages and their low-tech in relation to countries of all regions of the world, except the CIS market, where high comparative advantages in finished food products are observed. Undeveloped export of Ukrainian products to the markets of Australia and Oceania. Thus, the lack of structural reforms in the agro-industrial complex of Ukraine can lead to irreversible lagging behind the main direction in the globalized world – the production and export of food products with high added value.

The approach proposed by the authors to the assessment of the export potential of the agro-industrial complex can become a methodological basis for expert assessment when justifying and improving national strategies for the development of countries' export activities.

The prospects for further research in this area are the analysis and evaluation of the factors of transition of Ukrainian agro-industrial complex from a raw material model of development to a model focused on the creation of added value within the country, in particular, the study of the degree and characteristics of the involvement of Ukrainian agricultural producers in global value chains and the justification of directions and mechanisms to solve geo-economic problems of export potential of the agricultural sector in the context of increasing its international competitiveness.

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