

Export potential of the agricultural sector of Ukraine under the global regulation of international trade

Potencial de exportação do setor agrícola da Ucrânia sob a regulamentação global do comércio internacional

Maryna A. Melnik ¹(ORCID 0000-0002-8324-7505), **Natalia V. Kukina** ²(ORCID 0000-0003-3204-0624), **Olesia Yu. Havryk** ^{*3}(ORCID 0000-0001-9816-0253), **Oleksandr P. Vdovichenko** ³(ORCID 0009-0009-0306-8215), **Roman S. Stepaniuk** ²(ORCID 0009-0003-9795-4387)

¹Volodymyr Dahl East Ukrainian National University, Kyiv, Ukraine. *Corresponding author: olesia_havryk@edu-knu.com

²Dmytro Motornyi Tavria State Agrotechnological University, Zaporizhzhia, Ukraine.

³Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine

Submission: 04/26/2024 | Acceptance: 16/07/2024

ABSTRACT

The relevance of the study lies in its emphasis on identifying the key factors that enhance the export potential of Ukraine's agricultural sector, with a focus on the regulatory frameworks governing international grain trade. The purpose is to develop a mechanism ensuring the global competitive positioning of Ukraine's agricultural sector by utilizing specialized export-logistics services. The main findings include the creation of a comprehensive methodological toolkit for evaluating export potential, its key determinants, and Ukraine's grain production share in EU trade. The study also forecasts foreign exchange earnings and predicts a decline in wheat and corn exports due to the ongoing war. The study emphasizes that maximizing export potential is a strategically planned and tactically verified process, requiring the development of robust personnel, resource, infrastructure, and logistics systems to strengthen Ukraine's position in the international market. The study concludes on the necessity for a carefully strategized export policy to mitigate negative globalization impacts and foster international cooperation, ultimately transitioning Ukraine from a raw material exporter to a supplier of high-quality, value-added products.

KEYWORDS: export potential; agrarian sector of the economy; branch of agriculture; export quota; subjects of grain production.

RESUMO

A relevância do estudo reside no seu foco em estimular determinantes que aumentem o potencial de exportação do setor agrícola da Ucrânia, considerando os mecanismos regulatórios do comércio internacional na produção de grãos. O objectivo é desenvolver um mecanismo que garanta o posicionamento competitivo global do sector agrícola da Ucrânia, através da utilização de serviços especializados de exportação. As principais conclusões incluem a criação de um conjunto de ferramentas metodológicas abrangente para avaliar o potencial de exportação, os seus principais determinantes e a participação da produção de cereais da Ucrânia no comércio da UE. O estudo também prevê ganhos em divisas e prevê um declínio nas exportações de trigo e milho devido à guerra em curso. O estudo sublinha que a maximização do potencial de exportação é um processo estrategicamente planeado e taticamente verificado, que exige o desenvolvimento de pessoal, recursos, infra-estruturas e sistemas logísticos robustos para fortalecer a posição da Ucrânia no mercado internacional. O estudo conclui sobre a necessidade de uma política de exportação cuidadosamente planeada para mitigar os impactos negativos da globalização e promover a cooperação internacional, fazendo, em última análise, a transição da Ucrânia de um exportador de matérias-primas para um fornecedor de produtos de alta qualidade e valor acrescentado.

PALAVRAS-CHAVE: potencial de exportação; setor agrário da economia; ramo da agricultura; cota de exportação; assuntos de produção de grãos.

INTRODUCTION

According to MAZARAKI & MELNYK (2022), Russia dealt a blow to the Ukrainian economy through war, which can be compared to the destruction in World War II. Western experts predict disappointing indicators of the future development of Ukraine's agricultural sector. According to World Bank forecasts (2022), the volume of Ukraine's GDP may decrease by 45.1% due to reduced opportunities in the agricultural sector. ECONOMIST INTELLIGENCE UNIT (2022) estimates this decrease to be more than 46%. The long-term consequences are currently difficult to assess as hostilities continue in the country. According to UN experts, the situation has been the worst in the last 50 years of human development and requires an immediate response from governments to avoid a catastrophe.

Before the Russian invasion, the MINISTRY OF ECONOMY OF UKRAINE (2022) expected the domestic economy to develop in 2022-2024 due to the acceleration of economic growth in the agricultural sector through the export of agricultural products. Exports are one of the main means of promoting economic growth and a tool to enhance Ukrainian producers' existing and potential competitive advantages in world markets. According to the baseline scenario, indicators of the dynamics of national agricultural export volumes are expected to increase by 6.5% in 2022, 7.7% in 2023, and 7.9% in 2024 (MINISTRY OF ECONOMY OF UKRAINE 2022).

The basis for increasing the export potential of the agricultural sector is to ensure national food security and satisfy the population's demand for agricultural products. The food crisis is most often associated with the rapid growth of the planet's population and the irrational use of natural resources, resulting in a decrease in the level of greening of economic development. Most countries focused on investments in profitable and fast-paying sectors of the economy, while the agricultural sector was financed mainly on a residual basis (KOVAL & ZOS-KIOR 2023). This problem is especially important for agricultural producers because the current globalization processes of the world economy have increased competition in both foreign and domestic markets.

The main way to realize the export potential of the agricultural sector is through European exports. This means Ukrainian exporters of agricultural products focus on EU quality standards because the EU market is the main market for Ukrainian agricultural products. The agreement between Ukraine and the EU institutionalized preferential conditions for international trade, but European quality standards are mandatory for companies exporting products to EU countries. Compliance with European product quality standards significantly increases Ukrainian agricultural companies' export potential (OECD 2020).

The escalation of the export potential of the agricultural sector is of crucial importance in terms of the possibility of increasing foreign exchange earnings, as well as the need to finance the import of strategic resources, resolving the issues of ensuring a positive balance of payments in the country, solving the problem of reducing the pressure of external debt, and creating new jobs. The implementation of the principles of effective global regulation of international trade is possible in the presence of foreign economic activity appropriated by the subjects of the agrarian sector (TOPOLNYTSKA, 2013). Among the factors that influence the strategy of the agricultural sector, KONOVALOV (2013) observes the guarantee of the necessary level of product competitiveness for existing and promising global marketing niches. The search for and elimination of "bottlenecks" is an important task of global regulation of the agrarian sector of the economy (RYABENKO & LYUBICH 2013).

This article provides a comprehensive analysis of the factors driving the export potential of Ukraine's agricultural sector and proposes a mechanism to ensure its competitive position in the global market. This study is particularly relevant for policymakers, agricultural economists, and international trade experts interested in understanding and improving the export dynamics of Ukraine's agricultural sector during global challenges.

MATERIALS AND METHODS

International trade in the agricultural sector positively influences the national economy at three levels. First, it adds value to raw products by producing export-oriented agricultural products and meeting national needs. Second, foreign currency savings from export increase because of the surplus of agricultural products, thus meeting investment needs. Finally, it increases the foreign currency income of productive employment of economically active human capital within the system of international division of labor (KHAN et al. 2020, KOROBOVA & MARGASOVA 2023).

Thus, international trade forms the country's internal national income, which is divided in part from the needs of the consumer (CS_{Idl}), part of the needs invested (I_{Idl}) and part of export requirements (Ex_{Idl}) of the agricultural sector. The adapted commodity structure of export-oriented agricultural products in the formation of domestic national income is transformed at the expense of the country's global foreign exchange savings regulators in the short run. These savings are distributed to material consumption needs and investment support for agricultural production through the international division of labor (formula (1)) (KOPPENBERG et al. 2021):

$$Y = CS_{Idl} + I_{Idl} + Ex_{Idl} - Im_{Idl}, \quad (1)$$

where, Y – domestic national income (foreign exchange earnings), USD;

CS_{Idl} – consumption, USD;

I_{Idl} – investment, USD;

Ex_{Idl} – export, USD;

Im_{Idl} – imports, USD.

The global regulation of international trade makes it possible to transform the structure of manufacturing agricultural products aimed at exports and divide it into surpluses in relation to domestic demand (exports) or scarcity in relation to domestic demand (imports). In the process of import and export operations, the commodity structure of export-oriented agricultural products undergoes profound changes (KOBZEVA 2013, AL-ABABNEH et al. 2021, VDOVENKO et al. 2022).

Therefore, the importation of certain types of agricultural raw materials is a prerequisite for the economic development of these countries. In extreme situations, international trade is the only way to solve the scarcity of certain types of agricultural products caused by natural disasters or military conflicts (HUMENYUK 2019, BUGAS et al. 2015).

A country's national income is the basis for interpreting the investment cost assessment of agricultural sector capacity growth in the sphere of international trade. The demand for exports (imports) of raw and processed agricultural products has the effect of income, multiplied by a multiplier. Imports influence the construction of the multiplier in an open economy, whereas exports initiate the operation of the multiplier mechanism. The multiplier size in an open economy is calculated using equation (2) (MITSENKO et al. 2019):

$$Y = IC_{Idl} + ES_{Idl} + Im_{Idl}, \quad (2)$$

where, Y – domestic national income (foreign exchange earnings), USD;

IC_{Idl} – costs, USD;

ES_{Idl} – saving, USD;

Im_{Idl} – imports, USD.

The main reason for countries to participate in international trade in agricultural products is to achieve a large-scale effect in the global space and to build a new theory of resource exchange to stop economic imbalance and imperfect competition. In addition, countries strive to form adaptive criteria and regularities in the development of the size and structure of exchange between raw materials and products between countries (MITSENKO et al. 2019).

The authors identified several groups of methods to calculate indicators of export potential in the agricultural sector according to directing product distribution. The first group includes a method for calculating one or more indicators of the production potential (PP) of the agricultural sector in terms of the volume of sales of products for export, taking into account constraints.

$$PP = In \sqrt[n]{C_f \times C_g \times C_a \times C_n} \quad (3)$$

where In is agricultural products revenues, USD;

C_f is a composite coefficient of the competitiveness of agricultural exports;

C_g is a national and international market potential coefficient;

C_a is a coefficient of national agricultural product adaptability to international standards;

C_n is a favorable trade and economic policy coefficient for countries participating in international trade.

The use of several indicators of the real and possible competitiveness of the industry's exports in the international market is suggested to determine the limit for the generation of potential monetary resources for export in the agricultural sector. Indicators of the real competitiveness of agricultural sector exports include the following indices: growth in the number of importing countries, export volume of agricultural products, share of export grain products in the domestic and international markets, share of export food products in the domestic and international markets, and export quota. The potential export competitiveness of the agricultural sector considers the following indicators: the level of international certification of production, the ratio of export prices of products between competitors (exporting countries), the share of imported raw materials in the final products, and the level of innovative renewal of the assortment.

The unique indicators of the ceiling to generate potential export monetary resources from the agricultural sector can be foreign exchange savings reserves to improve foreign economic activity in the agricultural sector. This study identifies these reserves in the internal and external contexts according to the organizational, technological, social, and economic components of the external economic activity of the agricultural sector. The unachieved export potential of the agricultural sector is determined according to the range of the deviation of the exchange economy from the ceiling.

The second set of methods for calculating the export potential of the country's agricultural sector according to product distribution is based on a taxometric approach. This approach makes it possible to find "benchmark" export criteria (opportunities) for exporters of agricultural products in terms of the totality of certain indicators of the state of the agricultural and food industries. To calculate export potential, three groups of indicators are distinguished: resources (adequacy of fixed assets, provision of working capital, financial independence, participation of intangible assets in non-current assets, participation of imported resources); production of products (participation of the active part of fixed capital in the sale of export products, capital productivity, efficiency of use of material resources in the sale of export products, labor productivity, duration of the export cycle); and sales of export products (reversibility of receivables, length of cash cycle, profitability of exports, share of exports, sustainable growth coefficient of export activities). A taxonomic approach ensures the reliability of the results obtained (PODOLSKAYA & NIZHELSKAYA 2022).

The third group of methods for calculating the export potential of the agricultural sector according to the distribution of the product implies the economic and mathematical modeling of the maximum limit of generation of foreign exchange resources in relation to the different scenarios of agro-export activities. The maximum limit (functional dependence) is determined by the following equation:

$$Ex = f(PDCS, PICR, MEC), \text{ provided } PDCS = PICR; MEC \rightarrow \max \quad (4)$$

where PIR is a potential forex economy;

PFM is a potential for international monetary resources;

MEC is market entry conditions.

Potential indicators of foreign exchange savings include the expenditure of resources on modernizing and rebuilding the technical base, staff qualifications, management methods, and financial support of the export cycle. The indicators for assessing market entry conditions imply the quality of agricultural exporters' trade policies, state support for export production and the trade policy of the exporting country. The economic and mathematical model of the export potential of the agricultural sector in the distribution of grain products (Ex_t) is determined on the basis of the availability of agricultural land.

$$Ex_t = A_{l_0} \times \frac{I_{A_l}}{t} \times E_{f_0} \times IE_{f_t} \times S_{ap}^{dp} \times I_{lat} \times \frac{1+R}{d} \times Q_{dol}^{nc} \times C_o \times IC_{scigf}^{ex} \quad (5)$$

where A_{l_0} is an area of agricultural land in the reference period, ha;

$\frac{I_{A_l}}{t}$ is an area deformation coefficient;

E_{f_0} is the efficiency of the agricultural land use in the reference period, $\frac{USD}{ha}$;

IE_{f_t} is a coefficient of agricultural land-use efficiency;

S_{ap}^{dp} is a share of agricultural products sent for processing during the reporting period;

I_{lat} is a coefficient of variation in the share of products intended for processing;

R is an index of product profitability;

Q_{dol}^{nc} is an exchange rate from the national currency to USD;

C_o is an export guidance coefficient for the agricultural sector during the reference period;

IC_{scigf}^{ex} is a coefficient of the change in direction for agricultural exports over the reference period.

The fourth group of methods for calculating the export potential of the agricultural sector according to the distribution of the product involves export quotas in the structure of the international market between exporting entities. Coefficients can be calculated by determining the limit of integration of the country's agricultural sectors into the global economy. The types of foreign exchange earnings from exports by branch in the country's GDP should be grouped according to the following indicators:

1. Ratio of the export quota for agricultural products ($\frac{\varepsilon_x}{GDP}$) domestic consumer demand (P);

2. coefficient of participation of the agricultural sector in the international division of labor;

$$CPIDL_i = \frac{Ex_i/Ex_c}{GDP_i/GDP_c}$$

(6)

where GDP_i is the GDP of the i -th country, and is the foreign exchange revenue from the export of agricultural products, USD;

GDP_c is the WGP (world gross product) of a country, USD;

Ex_i is the export of agricultural products of the i -th country I (in USD);

Ex_c is the worldwide export, USD.

When $CPIDL_i \geq 1$ indicates a high level of export potential of a country-specific agricultural sector.

3. the efficiency coefficient of exporting agricultural products from a specific industry branch in the i -th country;

$$Ex_i = \frac{Ex_i/CD_i \times Ex_i/GDP_c \times 100}{Ex_c/CD_c \times Ex_i/GDP_i}$$

(7)

where OA_{ij} is a comparative coefficient of the export advantage of the i -th country in international trade for the j -the agricultural product;

Ex_i and Im_i export and import of agricultural products from i -th country;

Ex_{ij} and Im_{ij} are export and import of the j -the agricultural product of the i -th country.

Thus, when $OA_{ij} \geq 0$, indicates that the i -th country has strong preferences for exporting j -products in its agricultural sector structure and maximizes its export potential in the international market.

The methodology presented allows us to consider, first, the export opportunities of the agricultural and (or) food industry in the structure of the agricultural sector of the state economy. Second, it helps examine areas of effective cooperation between agricultural exporting entities, including grain production entities (export of raw materials), and external partners. Third, it provides for calculating the state of service of the export chain. At the same time, the procedure for assessing the state of service of the export chain in the agricultural sector makes it possible to diagnose differentiated numerical risks according to indicative (forecasting) and resource-directed (comprehensive) criteria.

RESULTS

Before the full-scale war, Ukraine was among the top five grain exporters in the world, exporting $\frac{3}{4}$ of the goods produced in the country, while domestic grain consumption was only 20-25%. Ukraine supplied 10% of the world's wheat exports, more than 14% of corn, and more than 47% of sunflower oil (UNITED STATES DEPARTMENT OF AGRICULTURE 2022). Today, thanks to partners, Ukraine remains an important supplier in the world markets for sunflower grains and oil, with a share of more than 10% of international trade. In 2023, 16.1 million tons of wheat were exported to 65 countries, 26.2 million tons of

corn to 80 countries, and 5.7 million tons of sunflower oil to 130 countries (PRESS SERVICE OF THE VERKHOVNA RADA OF UKRAINE 2024).

At the same time, Russia's large-scale aggression has led to the deterioration of Ukrainian food security, caused by the disruption of logistics chains, the destruction of the infrastructure of production farms, and the decrease in the amount of food produced. In the second quarter of 2023, the value of direct losses caused to the agricultural sector of the Ukrainian economy was USD 8.7 billion. For instance, losses related to the destruction and damage of agricultural machinery amounted to more than USD 4.7 billion, while losses due to the destruction and theft of manufactured goods were estimated at USD 1.9 billion. Indirect losses from the agricultural sector were estimated at USD 40.3 billion (USAID & PUBLIC ORGANIZATION "INSTITUTE OF THE KYIV SCHOOL OF ECONOMICS" 2023).

According to FAO estimates (2022), rural households in Ukraine suffered losses of USD 2.25 billion due to the war, where approximately USD 1.26 billion and USD 0.98 billion of losses were caused in the field of agricultural and livestock production, respectively. In Ukraine, 25% of farming households have stopped or reduced production volume because of the war, in frontline regions, of 38%.

The Ukrainian agricultural sector has demonstrated high resilience and adaptability to the risks of war. The collection of agricultural crops for all groups was 1.5–3 times higher than the domestic consumption needs. In 2023, farmers threshed 79.2 million tons (58.4 million tons of grains and pulses, 20.8 million tons of oilseeds). 11.9 million tons of sugar beets were unearthed (PRESS SERVICE OF THE VERKHOVNA RADA OF UKRAINE 2024). This trend occurred because of the high yield of grain crops (up to 55 tons/ha). In 2023, grain production in Ukraine was 10% higher than in 2022, and the oilseed production was 18%. Sugar beet production in the UK increased by 29% from 2022 (UKAB 2023). In early 2024, corn was threshed to 90% of the forecast.

In addition, vegetable production is also increasing. In 2023, onions and carrots were sown 8.1% and 6.1% more than in 2022. The total area planted with cabbage increased by 1.7%. The area under potato cultivation increased by 2% and table beets increased by 7%. In 2023, Ukrainian farmers harvested almost 29 million tons of vegetables, most potatoes at 21.2 million tons, as well as: tomatoes – 1.4 million tons, cabbage at 1.3 million tons, onions at 877 million tons, carrots at 810 million tons, beets at 766 million tons, cucumber at 681 million tons, and other vegetables at 1.3 million tons (MINISTRY OF AGRARIAN POLICY AND FOOD OF UKRAINE 2023).

The supply of vegetables increased sharply in the third quarter of 2023 due to extremely favorable weather and increased production in some regions of the country. This made it possible to fully offset the consequences of vegetable cultivation, the unfavorable security conditions in the southern regions, and the destruction of the Kakhovskaya Hydroelectric Power Plant. In particular, the price of borsch set (potatoes, onions, carrots, cabbage and sugar beets) decreased by 11% in 2023. The biggest price decreases occurred for onions and carrots (48% and 33%, respectively). Potato prices have increased significantly but remain among the lowest in Europe (AGROPOLIT 2024).

Despite the loss of 25% and 20% of berry orchards (occupied territories of Ukraine), the demand for fruit and berry crops has been fully satisfied (NEW AGRARIAN POLICY 2022). These regions are the largest producers of fruits and berries: Vinnytsia, Chernivtsi, Khmelnytskyi, Dnipropetrovsk, Lviv, and Poltava. They can supply the country's needs for these products.

Export volumes of agricultural products are gradually recovering. In 2023, 67.5 million tons of products from various groups in the agricultural sector were exported, 15% more than in 2022. At the same time, export revenue totaled USD 21.9 billion in 2023, 8% less than in 2022 (UKRINFORM 2023). There was a drop in export prices for almost all types of agricultural products, despite rising cross-border costs for export logistics.

The main challenges limiting the development of the export potential of Ukraine's agricultural sector under the conditions of a full-scale war are as follows:

1. The scarcity of financial resources for the stable economic activities of agricultural producers is caused by the increase in production costs. In 2022, 21% of individuals in agriculture, forestry, and fisheries suffered losses, and this share was 11% in 2021. The level of economic activity profitability was 14.1% in 2022 (in 2021 – 37.8%). The volume of capital investments in agriculture, forestry, and the fishing industry was USD 1302.25 million in 2022, 26.1% lower than in 2021 (MINISTRY OF AGRARIAN POLICY AND FOOD OF UKRAINE 2024);

2. Labor shortages in the agricultural sector. The war affected more than 150 thousand employees in the agricultural workers, forcing them to migrate. Forced population movements and the recruitment of men into the Ukrainian Armed Forces have led to a shortage of skilled workforce and increased workload

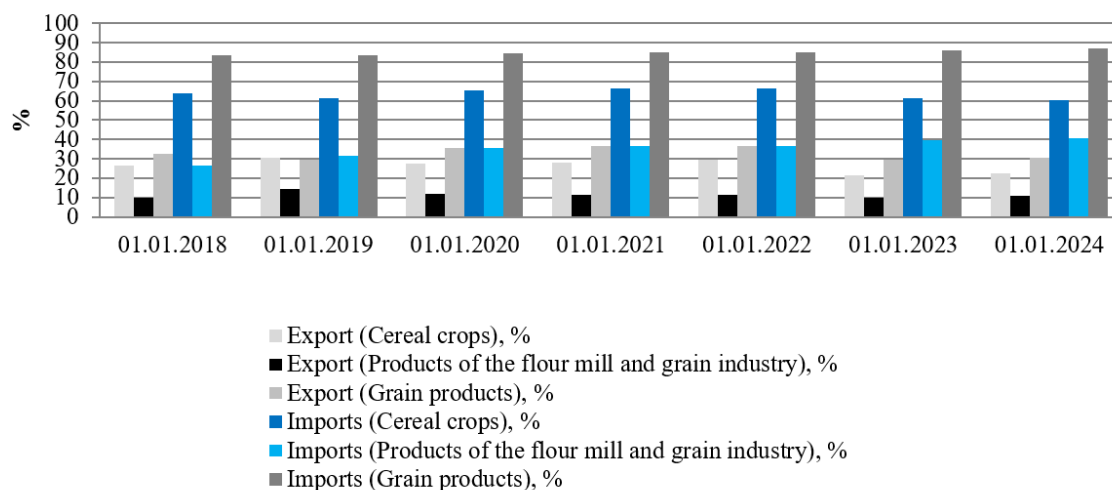
for women. At present, 26% of pig farms lack basic industrial personnel (technologists, veterinarians, operators, managers of production sites); There is also a shortage of auxiliary personnel, such as mechanics and electricians. There is a 48% shortage of personnel in the related agricultural sectors (drivers, tractor drivers, mechanics, agronomists, etc.) (AGROPORTAL 2023);

3. The destruction of the infrastructure of the agricultural sector, including its manufacturing, processing, and storage facilities. The enemy is deliberately destroying granaries, food warehouses, and logistical infrastructure for exporting Ukrainian products. Many agricultural products were damaged or lost due to difficulties in storing crops and electricity shortages in the autumn-winter period of 2022-2023. The total capacity of the destroyed barns was 8.2 million tons, and the capacity of the damaged barns was 3.25 million tons in simultaneous storage capacity (KRAVCHENKO 2022);

4. Environmental challenges. Due to the hostilities and mining of the area in 2022, agricultural producers could not use up to 30% of agricultural land (more than five million hectares) for sowing. In 2023, 25% of the agricultural land area was unfit for industrial use (NEBRAT 2023). The agrarian sector has suffered significant losses of land resources due to the destruction of the Kakhovka Hydroelectric Power Plant.

Overall, the agricultural sector under the conditions of a full-scale war in 2023 demonstrated an adequate capacity to produce agricultural raw materials and supply them to the international market. The field of grain production has significant unused reserves of the export potential of Ukraine's agricultural sector and the development of international trade. In 2021, wheat is expected to account for the largest volume of exports among grain products. Its largest share is in the markets of Lebanon in 2020 (more than 90%), Tunisia (more than 50%), Pakistan (more than 50%), and Libya (40%). The highest sales of Ukrainian wheat in recent years have been observed in the Egyptian market (about 3 million tons per year), but imports from Ukraine account for only 30% of the total wheat supply to the country (SHPYGOTSKA 2022).

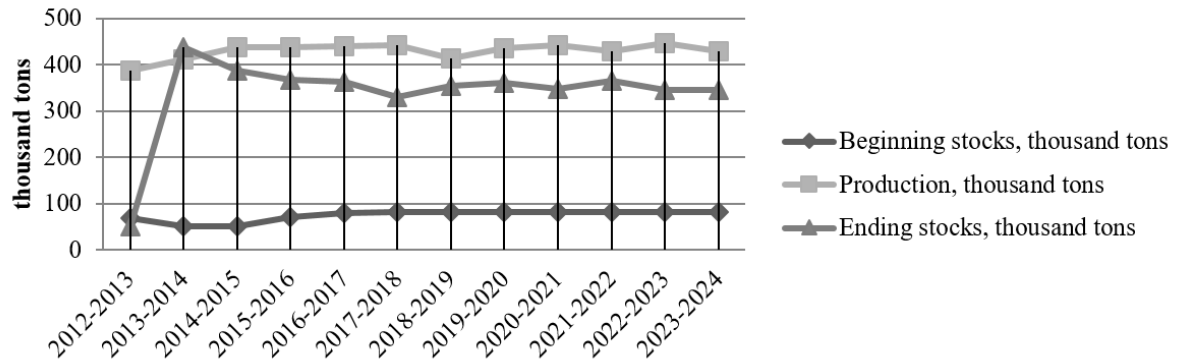
In 2019-2021, Ukraine ranked third among the top exporters to EU countries, second only to the 12.3 billion USD) and Brazil 11.7 billion USD). The volume of Ukrainian agricultural exports to EU countries in 2019 was 7.3 billion USD. A positive trend in the development of Ukraine's international trade and economic relations is the strengthening of the role of EU countries in bilateral trade in cereal products, whose share is increasing not only in exports but also in imports. (Figure 1).



Source: Authors' work based on the STATE STATISTICS SERVICE OF UKRAINE (2024).

Figure 1. The share of exports of grain products from Ukraine in the structure of export and import operations of EU countries for 2018-2023, %.

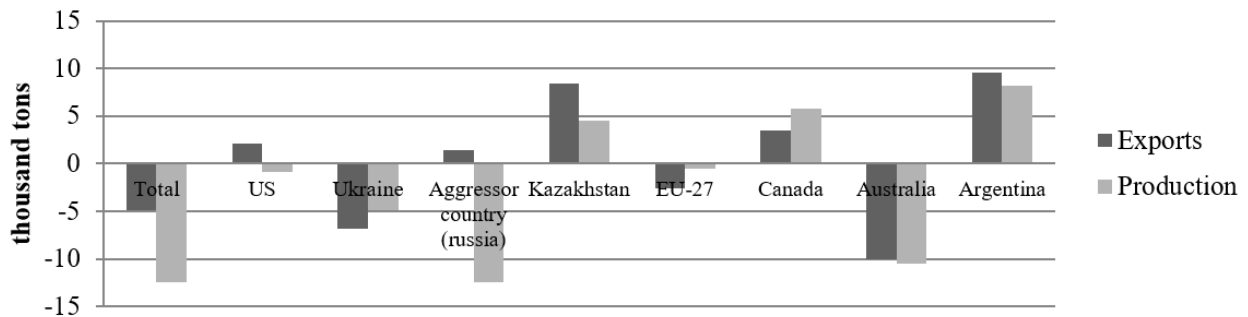
According to the USDA's updated forecasts, in 2022-2023 Ukraine's wheat production indicators will remain unchanged at 19.5 million tons, and wheat exports will increase by 1 million tons to 11 million tons. Regarding corn, Ukraine's indicators are growing significantly both in terms of production (+5 million tons to 30 million tons) and exports (+3.5 million tons to 12.5 million tons). The updated global wheat forecast for 2022-2023 predicted an increase in production volumes, an increase in consumption and trade volumes, and a slight reduction in ending stocks (Figures 2 and 3).



Source: Created by the authors according to the UNITED STATES DEPARTMENT OF AGRICULTURE (2022).

Figure 2. Globalization of wheat supply balance in eight main exporting countries for 2012-2024, thousand tons.

World wheat production increased by 8 million tons to a record 779.6 million tons, mainly due to grain stolen by Russia from Ukraine (+6.5 million tons to 88 million tons), Australia (+3 million tons to 33 million tons), and China (+3 million tons to 138 million tons). At the same time, there was a reduction in wheat production in India (-3 million tons to 103 million tons) and EU countries (-2 million tons to 132.1 million tons). The reduction in the EU has occurred mainly at the expense of Hungary, Spain and Romania.



Source: Created by the authors according to the UNITED STATES DEPARTMENT OF AGRICULTURE (2022).

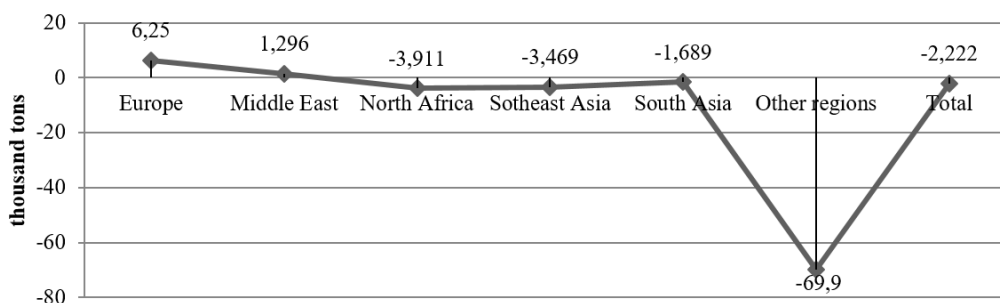
Figure 3. Projected changes in wheat production and exports (2023-2024 to 2022-2023), thousand tons.

Ukraine can supply more than 6 million tons of wheat to Europe each season. However, we must understand that, first, Europe itself can collect more wheat; second, for Ukraine, there is a ban on the import of wheat from neighboring countries. Furthermore, most likely, this ban will be extended because European countries will enter the new season with numerous stocks of the old crop. Therefore, for example, Constanta's port, which is a hub for transporting Ukrainian grain, is full of grain from old crops. Romania does not have time to sell wheat in one season because there is currently no demand for grain from world exporters. Romanian farmers already face a problem: where to go with the new harvest, which is immediately delivered from the field to the port. Therefore Ukrainian producers of the grain subcomplex only need to supply wheat in transit to Ukraine. However, export volumes of the products are limited. The countries that really need Ukrainian wheat are Asian and North African countries. However, they reduced purchases of Ukrainian grain in 2022-2023 (Figure 4).

Most Asian and North African countries have increased their purchases of wheat from alternative suppliers. For example, Egypt, Pakistan, and Morocco have increased their purchases of French wheat, and Russia is an aggressor country (Russia). Indonesia, which has bought significant volumes from Ukraine, has increased its purchases of Australian crops. These countries are ready to buy Ukrainian wheat. However, there are two important factors for them: the price and reliability of seaborne exports. Note that Egypt did not consider Ukrainian offers in the tenders due to the lack of guarantees that wheat would be delivered, despite the price of this product being attractive.

Summary for 2022-2023 and outlook for 2023-2024: Egypt (-2 million tons), changed to Russia,

France, Romania, Bulgaria; Morocco (-1.1 million tons), switched to France; Germany, Baltic: possible increase in purchases from South America in 2023-2024; North Africa (-3.9 million tons) higher demand projected for 2023-2024, but currency issues may affect. Imports: possibilities for Ukraine's wheat, but stable seaborne exports are crucial; Indonesia (-2.2 million tons), moved to Australia; Argentina is back in 2023-2024; Pakistan (-1.4 million tons), switched to Russia; Romania (+2.3 million tons) and Poland (+0.9 million tons), higher expected local production may limit the volumes of Ukrainian wheat supplied there, including those for transit; Turkey (+2.3 million tons), good prospects for Ukrainian wheat exports amid stable demand, especially if seaborne exports remain limited; Spain (+1.8 million tons), good prospects for Ukrainian wheat exports amid a further drop in projected production, lower quality; but strong competition from the EU.



Source: Created by the authors according to the UNITED STATES DEPARTMENT OF AGRICULTURE (2022).

Figure 4. Difference between Ukraine's wheat exports in 2022-2023 and 2020-2021, thousand tons.

In 2022-2023, trade in maize increased due to increased exports of this product from Ukraine (+3.5 million tons to 12.5 million tons), Serbia, and Zambia (+1.2 million tons to 4 million tons). At the same time, maize exports from the EU (-2 million tons to 2.7 million tons) and the US (-3.7 million tons to 364.7 million tons) decreased. The remaining corn export stocks in 2022-2023 decreased by 6.2 million tons to 306.7 million tons. The volume of corn production in Ukraine is expected to decrease due to the reduction in the number of sown areas. However, if there are no problems with the yield of this crop, producers in the country's grain production can expect a harvest at the level of 22-23 million tons.

Thus, Ukraine continues to lose its share of the global barley market. The projected barley export potential for 2023-2024 is too limited to allow Ukraine to regain its position in the international market. In addition, lower demand from major importers is expected. Thus, China began to diversify its barley imports, focusing on France, Canada, and Argentina. Australia will return to China's market, whereas Turkey is expected to further reduce barley imports as a result of increased domestic supply and high import duty. Romania expects higher local production. Saudi Arabia has switched to Australia, the EU, and Russia as aggressor countries. There should be demand from the Middle East, North Africa, and Spain. This export potential will be easier to realize, especially considering that the main importers of Ukrainian barley (China and Saudi Arabia) have diversified their purchases in 2022-2023 and will be able to do so without Ukrainian barley.

DISCUSSION

European markets are the most attractive for Ukrainian enterprises exporting grain products due to geographical proximity and the same industry orientation in terms of export product types. However, access to them is complicated by high levels of competition. As practice shows, the inability of Ukrainian grain production to overcome the barriers of the European market is related to the inadequate adaptation of grain-producing entities to their requirements and standards (UNITED STATES DEPARTMENT OF AGRICULTURE 2022).

A predictive model of the development of the export potential of Ukraine's agricultural sector by grain production branch was developed. To estimate the forecast error, a comparison of the actual export volume of grain products from Ukraine was made with the predicted value of the increase (decrease) in the volume of GDP of the international trade of exporters in the agricultural sector (Figure 5). The upper and lower limits of the predicted values were determined using the following formula (SHPYGOTSKA 2022):

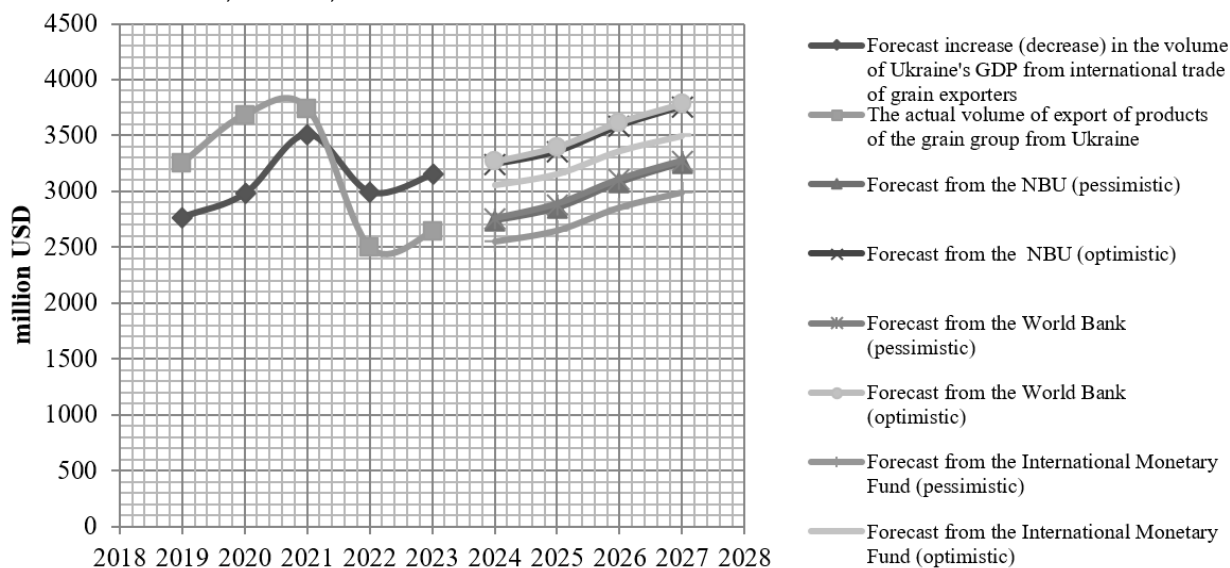
$$UL_i = Ex_{ic} + D; \quad LL_i = Ex_{ic} - D, \quad (3)$$

where, UL_i , LL_i – upper and lower forecast limits.

According to the pessimistic-optimistic forecast of the National Bank of Ukraine, the expected marginal limits of the GDP growth of the foreign economic trade of the grain subcomplex subjects are USD 2739.4 million to USD 3244.9 million in 2024, USD 2853.04 million to USD 3358.47 million in 2025, USD 3081.42 million to USD 3586.85 million in 2026, from USD 3253.59 million to USD 3759.02 million in 2027.

The World Bank's pessimistic-optimistic forecast indicates that the GDP growth of the foreign economic trade of the subjects of the grain subcomplex is expected to range from USD 2758.39 million to USD 3263.82 million in 2024. For the next few years, the distribution is as follows:

In 2025, from USD 2888.94 million to USD 3394.37 million; In 2026 – from USD 3109.58 million to USD 3615.01 million; In 2027, from USD 3273.13 million to USD 3778.56 million.



Source: Created by the authors based on the STATE STATISTICAL OFFICE OF UKRAINE (2024), THE WORLD BANK (2024).

Figure 5. The expected value of the increase (decrease) in the volume of Ukraine's GDP from the international trade of grain production exporting entities for 2024-2027 is USD million.

The pessimistic-optimistic forecast of the IMF indicates that the GDP growth of the foreign trade of the subjects of the grain subcomplex should range from USD 2553.42 million to USD 3058.85 million in 2024. In 2025, it is expected to range from USD 2651.29 million USD to 3156.72 million, while the range in 2026 is expected to be 2856.49 million to USD 3361.92 million. In 2027, the foreign trade GDP growth of the subjects of the grain subcomplex is expected to range from USD 2990.96 million to USD 3496.39 million.

To get Ukraine out of the economic recession caused by the Russian invasion, it is advisable to consider an export policy strategy, including the use of financial and credit instruments to ensure the functioning of the agrarian sector. In postwar recovery conditions, it is necessary to ensure the diversification of agricultural production. This can be achieved by increasing agricultural enterprises' capitalization and investment attractiveness and by establishing market institutions to increase resource efficiency. In addition, strengthening the state's food security, increasing the export of high-value products, and ensuring comfortable living conditions in rural areas.

The main task of the state's export policy in 2024 was to restore grain production in unoccupied territories, dictated by the people's need for food opportunities and self-employment. Thus, achieving this goal involves demining farmland, infrastructure facilities, and private farm territories; determining the damage caused; and initiating the reclamation of land affected by hostilities.

CONCLUSION

Thus, the complete measurement of the export potential of the agricultural sector of the Ukrainian economy in the global regulation of international trade is not limited to the situational increase in the volume of exports of products during the war and postwar periods. This is a strategically planned and tactically

verified process focused on developing and ensuring high efficiency in various activities. This involves the formation of a system of personnel, resources, infrastructure, and logistics to activate export and import operations for product sales. This process strengthens the position of agricultural production entities in the export chain of the international market while deepening the practice of international cooperation.

However, globalization's changes in the development of the export potential of Ukraine's agricultural sector have a much broader list of negative factors because some aspects of the state's export policy with regard to strengthening the internationalization of the domestic food market show signs of risk. Ukrainian commodity producers' interests are leveled during the dynamic increase in financial assistance from the International Monetary Fund and other international partners interested in the restoration of agricultural production, as the latter are trying to displace Ukrainian commodity producers from international trade and interstate associations. Due attention, planning, and implementation of a system of measures based on the aforementioned aspects require a more careful and strategically oriented export policy of the state in order to realize its own foreign economic opportunities. This requires proof of effective agrarian policy tools that can activate relevant processes.

To activate foreign economic cooperation programs between Ukrainian agricultural exporters and foreign partners, a realistic concept of international economic cooperation is needed. This concept should include the following priority guidelines: diversification of exports and the geographical structure of external trade in agricultural products; preparation and implementation of projects to attract foreign direct investment; and promotion of programs to increase the level of competitiveness of Ukraine's exports in the international arena. The range of agricultural product exports should be expanded. First, it is about the increase in the share of ready-to-eat and semi-finished food products in Ukrainian exports. To this end, it is appropriate to support exporters trying to sell nontraditional types of plant products to Ukraine (niche and ready-to-eat organic products). Ukraine's repositioning in the global food system signifies its transition from a former exporter of raw materials to a supplier of high-quality, safe products with higher value-added content.

REFERENCES

- AGROPOLIT. 2024. Despite the destruction of the agricultural sector of the Kherson region in Ukraine, vegetable growing has reached its pre-war level. Available at: <https://agropolit.com/news/27382-ne-zvajayuchi-na-znischennya-agrosektoru-hersonschini-v-ukrayini-ovochivnitstvo-dosyaglo-dovoyennogo-rivnya>. Access on: Oct. 15, 2023.
- AGROPORTAL. 2023. Half of pig farms experience staff shortages. Available at: <https://agroportal.ua/news/zhivotnovodstvo/polovina-svinogospodarstv-vidchuvaye-deficit-kadriv>. Access on: Jun. 20, 2024.
- AL-ABABNEH HA et al. 2021. Analysis of export of agricultural products in the context of the global food crisis. *Agricultural and Resource Economics* 7: 5-26.
- BUGAS NV et al. 2015. Export potential in the system of foreign economic activity of an industrial enterprise. *Bulletin of the Kyiv National University of Technology and Design. Series: Economic Sciences* 6: 14-21.
- ECONOMIST INTELLIGENCE UNIT. 2022. Assessing the impact of war on G7 economies, Russia and Ukraine. Available at: <https://onesite.eiu.com/campaigns/impact-of-war-ong7-economies-russia-and-ukraine>. Access on: Feb. 5, 2024.
- FAO. 2022. Ukraine: Impact of the war on agriculture and rural livelihoods in Ukraine. Findings of a nation-wide rural household survey. Available at: <https://doi.org/10.4060/cc3311en>. Access on: Oct. 15, 2023.
- HUMENYUK YV. 2019. Strategies for the development of the grain product sub-complex of the agro-industrial complex to ensure the country's food security and comprehensive development of agriculture. *Bulletin of the Khmelnytskyi National University* 2: 147-152.
- KHAN ZA et al. 2020. Revisiting the effects of relevant factors on Pakistan's agricultural products export. *Agricultural Economics–Czech* 66: 527-541.
- KOBZEVA KV. 2013. Export potential of the enterprise: the essence and peculiarities of formation. *Problems of the Economy* 4: 281-285.
- KONOVALOV YO. 2013. Peculiarities of foreign economic activity of agrarian enterprises in modern management conditions. *Customs Security* 2: 25-33.
- KOPPENBERG M et al. 2021. Mapping potential implications of temporary COVID-19 export bans for the food supply in importing countries using precrisis trade flows. *Agribusiness* 37: 25-43.
- KOROBOVA NM & MARGASOVA VG. 2023. Optimization of market mechanisms in the sphere of economics of snail farming in Ukraine and the world. *Academic Visions* 22. Available at: <https://academy-vision.org/index.php/av/article/view/603>. Access on: Feb. 5, 2024.
- KOVAL V & ZOS-KIOR M. 2023. Regulation of rural development for the export of organic agricultural products in the new conditions of the development of international trade and decentralization. *Scientific Notes of the Lviv University of Business and Law* 38: 331-337.

- KRAVCHENKO V. 2022. Dark times for agricultural holdings: How will the war change agriculture in Ukraine? Available at: <https://mind.ua/publications/20245288-sutinki-agroholdingiv-yak-vijina-zminit-siliske-gospodarstvo-ukrayini>. Access on Jun 15, 2024.
- MAZARAKI A & MELNYK T. 2022. World economy: challenges of the Russian-Ukrainian war. *Scientia Fructuosa* 143: 4-35.
- MINISTRY OF AGRARIAN POLICY AND FOOD OF UKRAINE. 2023. This year, farmers collected 29 million tons of vegetables. Available at: <https://minagro.gov.ua/news/u-comu-roci-fermeri-zibrali-29-mln-tonn-ovo>. Access on: Apr. 17, 2024.
- MINISTRY OF AGRARIAN POLICY AND FOOD OF UKRAINE. 2024. The impact of the war on the profitability of agricultural production. Available at: <https://minagro.gov.ua/en/news/in-2024-crop-production-will-break-even-and-the-profitability-of-livestock-production-will-decrease-ministry-of-agrarian-policy-and-food-of-ukraine>. Access on: Apr. 17, 2024.
- MINISTRY OF ECONOMY OF UKRAINE. 2022. The government approved the forecast of economic and social development of Ukraine for 2022-2024. Available at: <https://www.kmu.gov.ua/news/uryadshvaliv-prognoz-ekonomichnogo-i-socialnogo-rozvitku-ukrayini-na-2022-2024-roki>. Access on: Apr. 8, 2024.
- MITSENKO NG et al. 2019. Formation of sales potential of domestic enterprises on the European market. *Bulletin of the Lviv University of Trade and Economics* 58: 55-62.
- NEBRAT VV. 2023. Reconstruction for development: foreign experience and Ukrainian perspectives. Kyiv: State University "Institute of Economics and Forecasting.
- NEW AGRARIAN POLICY. 2022. Available at: <http://www.vin.gov.ua/images/doc/vin/Dep-APK-2022/Prezentatsia.pdf>. Access on: Nov. 8, 2023.
- OECD. 2020. Agriculture and fisheries. Available at: <http://www.oecd.org/agriculture>. Access on: Nov. 8, 2024.
- PODOLSKAYA T & NIZHELSKAYA D. 2022. Directions of reorienting exports and improving export's state support due to an unfriendly nature actions by a number of foreign states. *Euraseans: Journal on Global Socio-Economic Dynamics* 5: 7-13.
- PRESS SERVICE OF THE VERKHOVNA RADA OF UKRAINE. 2024. It is already possible to grow 1 million tons of grain on demined lands of Ukraine. Available at: https://www.rada.gov.ua/news/news_kom/245689.html. Access on: Nov. 8, 2023.
- RYABENKO LI & LYUBICH BB. 2013. Object-oriented management of the enterprise's foreign economic activity. *Bulletin of the Lviv Polytechnic National University* 769: 190-195.
- SHPYGOTSKA N. 2022. Food chains. Will the war in Ukraine cause world hunger? Available at: <https://biz.nv.ua/ukr/economics/analitik-dragon-capital-pro-vpliv-viyini-na-rinki-prodovolstva-50227393.html>. Access on: Nov. 8, 2023.
- STATE STATISTICS SERVICE OF UKRAINE. 2024. Available at: <http://www.ukrstat.gov.ua>. Access on: Nov. 21, 2023.
- TOPOLNYTSKA TB. 2013. Theoretical principles of organizational and economic support of the enterprise's foreign economic activity. *Innovative Economy* 2: 84-88.
- UKAB. 2023. Agriculture in wartime conditions: the second year of the struggle for survival. Available at: https://www.ucab.ua/ua/pres_sluzhba/novosti/siliske_gospodarstvo_v_umova. Access on: Nov. 21, 2023.
- UKRINFORM. 2023. Ukraine increased export of agricultural products. Available at: <https://www.ukrinform.ua/rubric-economy/3806895-ukraina-cogoric-zbilsil>. Access on: Nov. 21, 2023.
- UNITED STATES DEPARTMENT OF AGRICULTURE. 2022. Available at: <https://dzi.gov.ua/press-centre/news/usda-znachno-zbilshyv-prognoz-vyrobnystva-ta-eksportu-kukurudzy-ukrayinoyu-v-2022-2023-mr/>. Access on: Apr. 21, 2024.
- USAID, & PUBLIC ORGANIZATION "INSTITUTE OF THE KYIV SCHOOL OF ECONOMICS". 2023. Report on direct damage to infrastructure and indirect losses to the economy from the destruction caused by Russia's military aggression against Ukraine. Available at: https://kse.ua/wp-content/uploads/2023/09/June_Damages_UKR_-_Report.pdf. Access on: Oct. 9, 2023.
- VDOVENKO NM et al. 2022. Innovative strategy for the formation of a security management system for the innovative development of the agro-food sector in conditions of digitalization. *Formation of Market Relations in Ukraine* 5: 26-33.
- WORLD BANK. 2022. War in the Region. Europe and Central Asia Economic Update. Available at: <https://www.worldbank.org/en/region/eca/publication/europe-and-central-asia-economic-update>. Access on: Oct. 9, 2023.
- WORLD BANK. 2024. Available at: <https://data.worldbank.org/>. Access on: Oct. 9, 2023.