Foreign Economic Priorities for the Development of Agro-Food Enterprises in European Integration Business Partnership

Oleksandr Shpychak[1*], Olga Varchenko[2], Nadiia Svynous[2], Anna Semysal[2], Serhii Ostapenko[3], Oleksandr Prystemskyi[4]

[1]National Scientific Centre "Institute of Agrarian Economics" of the NAAS of Ukraine
03127, 10 Heroiv Oborony Str., Kyiv, Ukraine

[2]Bila Tserkva National Agrarian University
09117, 8/1 Soborna Sq., Bila Tserkva, Ukraine

[3]National University of Life and Environmental Sciences of Ukraine
03041, 15 Heroiv Oborony Str., Kyiv, Ukraine

[4]Kherson State Agrarian and Economic University
73006, 23 Sritenska Str., Kherson, Ukraine

Abstract. Agro-food production is a source of the national food security, the basis for increasing its export potential, meeting domestic demand for agricultural products and food. The relevance of the subject under study is that Ukraine is currently developing the European vector of foreign economic activity. The purpose of this study is to substantiate a set of indicators used to assess the export potential of agro-food enterprises in the European integration business partnership both qualitatively and quantitatively. The authors used general scientific methods (analysis, synthesis), integrated approach, model of the hierarchy of factors influencing the integration business environment on the export potential of enterprises. Permissible tariff quotas for the volume of duty-free exports of crop products, livestock, and processed goods for Ukraine have been allocated. The volume of concentration of production of export-oriented agricultural crops in the enterprises of agro-food production of Ukraine was analysed. It was established that the bulk of agro-food exports are agricultural raw materials, including cereals and oilseeds, vegetable (sunflower) oil. The study estimated the efficiency of corn exports on average per agro-food enterprise in Ukraine under the conditions of currency risks. It was determined that in 2020 the total export costs for 1 tonne amounted to 186.18 USD. Furthermore, it was found that the profit received as a result of export activity for 1 tonne was 76.90 USD. The authors identified the parameters of the regression equation and their estimation in the dependence model of Ukrainian internal prices on export prices for agro-food products on the world market. The gravitational model of the integrated level of the export potential of Ukrainian agro-food enterprises was proposed to stimulate foreign trade on the world market and ensure a stable business partnership with European Union member states

Keywords: export potential, agricultural products, market, trade, price

*Corresponding author

INTRODUCTION

Agro-food production demonstrates the stability of development. Strengthening the position of any country in the world market of agricultural products and food, in terms of exports of its key types, is ensured by the factors of agricultural development in the conclusion of the Association Agreement between European Union (EU) countries and the creation of a Free Trade Area (European Commission, 2021). Prospects for the gradual development of the EU market allow building an effective policy on the implementation of foreign economic priorities for its expansion. Creating preconditions for mechanisms of interaction between the state and business allows focusing on measures of national agricultural policy to improve the efficiency of agricultural market instruments. This contributes to the free and transparent movement of agricultural products, the smoothing of price fluctuations, the functioning of agricultural logistics as a factor of increasing the profitability of enterprises by reducing total production costs.

The multilevel hierarchical system of national support for the basic and promising sectors of agriculture is aimed at harmonising agro-food production in the European integration business partnership. Based on market control instruments over agricultural quality in the internal market it strengthens international competition, reduces restrictions and barriers to exchange, and increases competitiveness and effective interaction between producers and consumers. Aspects of ensuring the foreign economic activity (FEA) of agro-food production are considered by many scientists who investigated these issues through the interaction of functioning institutional entities and structural components of the institutional system that regulate their international economic interactions and relationships. N. Cuckovic, *et al.* (2013) investigated the factors affecting regional competitiveness and ways for its measurement on example of Croatia. In Latvia, this aspect was investigated by I. Judrupa (2021). A study on regional competitiveness in Latin America was conducted by S. Catalán (2021). In Ukraine, this issue was studied by Yu.H. Kozak *et al.* (2016), and A.V. Zavhorodnii (2019). V. Januškaite & L. Užiene (2018) paid attention to intellectual capital and its importance for regional competitiveness. O. Romanko *et al.* (2019) studied the importance of innovation and investment activities. Brás *et al.* (2021) considered the Entrepreneurial University construct. A. Bilbao-Terol *et al.* (2019) and V. Charles & T. Sei (2019) created their original approaches to measuring regional competitiveness.

Priority areas for the development of foreign economic relations in the agricultural sector of the economy, with an emphasis on the transformation of the market model of the country and the modernisation of the criteria of foreign economic activity of economic entities were studied (Bakhchyvandzhy *et al.*, 2013). A.V. Kliuchnyk (2015) characterised state and non-state regulation of foreign economic activity including agricultural sector. The connection between export orientation of the country and its competitiveness were investigated

by M.O. Lepekha & H.M. Svyrydenko (2017). N.V. Trusova *et al.* (2021) developed an approach to assessing the investment infrastructure of agri-food entities, which allowed forecasting the volume of agri-food exports. N.H. Varshavska (2016) studied the European standards of agro-food production with a focus on basic socially oriented market relations. I.M. Demchak *et al.* (2019) investigated the state of the agricultural products and food market in Ukraine, having summarised information on the volume and dynamics of its exports and imports. V.S. Ivanchenkov (2014) explained the concept of innovation in the canning industry and highlighted areas of further research on this issue. M. Moraliyska, (2018) considered the EU cohesion policy, the changes it had caused, its impact on the economy, as well as the European standards of agro-food production. Yu.M. Umantsiv & O.I. Miniailo (2018) described the specific features of the national economy development in the context of globalisation.

The purpose of this study was to substantiate a set of indicators used to assess the export potential of agro-food enterprises and increase their competitiveness in foreign markets to harmonise European integration business partnership in international trade and consumption of agricultural products and promote export-oriented internal market.

MATERIALS AND METHODS

Foreign economic priorities for agro-food enterprises, with the heterogeneous nature of the main structural elements of export potential require a special approach to its quantification. The synergy of levels of harmonisation of business partnership in the European integration space, interpreted by qualitative and quantitative criteria of the mathematical apparatus, is built on the universal principles of economic analysis, with methodological positions of an integrated approach. From the standpoint of creating an environment for the effective functioning of foreign economic activity subjects, it is advisable to investigated them through the lens of international integration relations and their development level, as well as factors of national regulation, stimulation, and control of foreign economic relations, investment attractiveness (Nelep, 2011).

Analysis of the interaction of formal and informal contradictions in business partnerships and relationships to harmonise the transformation of the integrated business environment at the stage of investigating important causal links between structural elements of the export potential of agro-food enterprises is provided for socio-economic variables at various levels: international, national, sectoral, regional, and micro-level. The system of ensuring foreign economic activity of agro-food enterprises in the expansion of the European integration process forms the basic business relations of business partnership based on norms and rules establishing certain restrictions and opportunities (exchange, processing, distribution, storage, transportation, and

consumption). In general, the national system of foreign economic activity support in the European vector is unformed and has several destructive elements (Rodrik, 2001). Therefore, it is proposed to assess the cumulative impact of factors of export-oriented internal market on the coefficient of impact of factors of European integration business environment on the export potential of agro-food enterprises, which is calculated according to formula (1) (Ryneyska, 2018):

$$C_{MAC} = \frac{\pm A_1 B_1 \pm A_2 B_2 \pm \ldots \pm A_n B_n}{[max\ A_i B_i] \cdot n} = \frac{\sum_{i=1}^{n}(\pm A_i B_i)}{[max\ A_i B_i] \cdot n} \quad (1)$$

where C_{MAC} is the coefficient of influence; A is the expert assessment of the importance of factors of export-oriented internal market; B is the expert assessment of the impact of factors of the European integration business environment; n is the number of influencing factors.

Using the method of correlation analysis to assess the impact of factors of the European business environment on the export potential of agro-food enterprises

allows establishing the most significant of them (Zhuk & Bilianskyi, 2020; Ryneyska, 2018). A prominent issue in this case is the choice of the analytical form for the function f, which connects the available factors with the effective feature-function. This feature must reflect the factual correlation between the indicators and factors under study. Empirical substantiation of the type of function by graphical analysis of relationships for multifactor models is not suitable. Considering that any function of many variables can be reduced to a linear form by logarithmising or substituting variables, then in practice the multiple regression equation (2) is given in a linear form (Kosach, 2017):

$$\hat{Y} = a_0 + a_1 X_1 + a_2 X_2 + \ldots + a_n X_n \quad (2)$$

where: $a_0, a_1, \ldots,$ an are the parameters of the equation to be determined.

If for each factor, including the resultant attribute n values $y_i, X_{1i}, X_{2i}, \ldots, X_{ni}, i = 1, 2, \ldots, m$, are known, then the regression equation (3) is obtained as follows:

$$\begin{cases} a_0 m + a_1 \sum_{j=1}^{m} x_{1j} + a_2 \sum_{j=1}^{m} x_{2j} + \ldots + a_n \sum_{j=1}^{m} x_{nj} = \sum_{j=1}^{m} y_j, \\ a_0 \sum_{j=1}^{m} x_{1j} + a_1 \sum_{j=1}^{m} x_{1j}^2 + a_2 \sum_{j=1}^{m} x_{1j} x_{2j} + \ldots + a_n \sum_{j=1}^{m} x_{1j} x_{nj} = \sum_{j=1}^{m} x_1 y_j, \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ a_0 \sum_{j=1}^{m} x_{nj} + a_1 \sum_{j=1}^{m} x_{nj} x_{1j} + a_2 \sum x_{1j} x_{2j} + \ldots + a_n \sum_{j=1}^{m} x_{nj}^2 = \sum_{j=1}^{m} x_{nj} y_j \end{cases} \quad (3)$$

Dynamic changes in foreign economic relations lead to the need for permanent coordination of European integration interests of all business partners with various levels of stimulating levers of export-oriented support in the internal market of agro-food production (Kosach, 2017). This process is influenced by such factors as the specific features of economic activity of entities, the volume and complexity of tasks, the level of socio-economic development of society (territory), which depends on the ability of socio-political system to ensure its stability in

European integration (Karasova, 2015). Several unresolved methodological issues on harmonisation of foreign economic priorities of cooperation between agro-food enterprises as an innovative process of balancing the goals and interests of all subjects of foreign economic relations in time and space, allows building models of key factors of European integration business environment. Accordingly, based on the method of hierarchies, an alternative multi-level structure of incentives for export-oriented internal market is built as follows (Fig. 1).
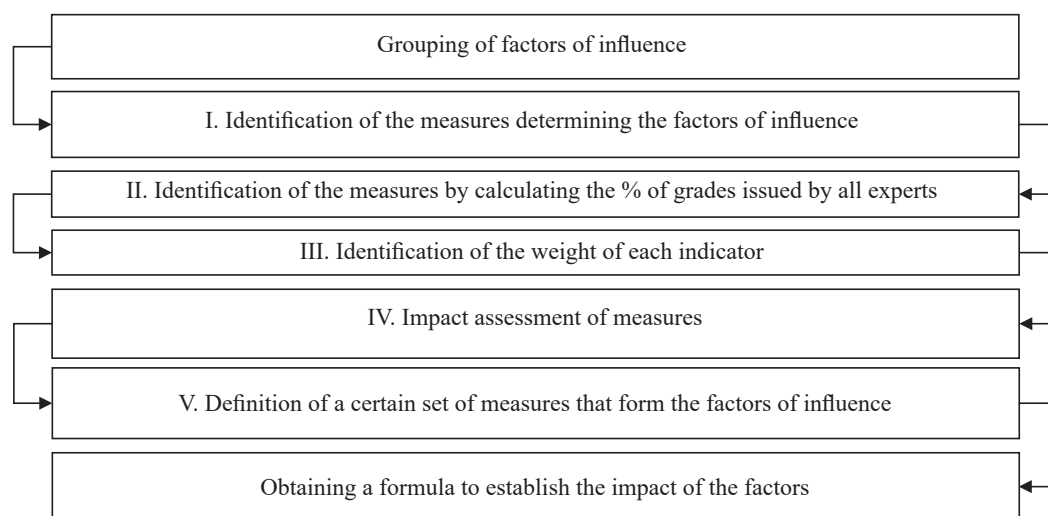
Figure 1. *Algorithm for stimulating export-oriented internal market*
Source: *developed by the authors*

The next step is to identify the key measures of the factors of the European integration business environment on the export potential of agro-food enterprises with subsequent calculation of the percentage of points (4) (Kosach, 2017):

$$B_{gi} = \frac{\sum_{k=1}^{n} a_k}{\sum_{k=1}^{n} max\, a_k} = \frac{\sum_{k=1}^{n} a_k}{50} \qquad (4)$$

where: B_{gi} is the percentage of experts' estimates of the indicator g_i; a_k is the assessment by the kth expert of the ith indicator; k is the total number of experts; max a_k is the maximum possible value of the indicator a_k in this scale.

The weight of each indicator is determined as the ratio of the value of each indicator to the sum of all estimates (5) (Kosach, 2017):

$$g_i = \frac{B_{gi}}{\sum_{i=1}^{m} B_{gi}} \qquad (5)$$

where: m is the total number of factors assessed by experts.

Further assessment of the export potential of agro-food enterprises requires the development of a model of the hierarchy of factors of influence. For the convenience of further modelling, the notation for each of the elements will be supplemented with a mnemonic name (Table 1).

The binary matrix A is formed in the form of a table with information rows and columns (Table 2).

Table 1. *Mathematical interpretation of the model of the hierarchy of factors influencing the European integration business environment on the export potential of agro-food enterprises*

Mathematical notation	The name of the factor influencing the European business environment on agro-food enterprises	Mnemonic name
Z_1	Factors influencing monetary interests	F
Z_2	Factors influencing the foreign economic interests of agro-food enterprises	FEIE
Z_3	Factors influencing foreign economic relations	FER
Z_4	Relations with international institutions	RII
Z_5	Factors influencing the correlation between internal and external European integration business environment of FEA agro-food enterprises	IEI
Z_6	Factors influencing the economic interests of staff in the development and promotion of innovative products for export	EISdpIPE
Z_7	Factors influencing environmental interests	EI
Z_8	Factors influencing production interests	PI

Source: developed by the authors

Table 2. *Binary matrix (A) of elements that determine the factors of influence*

	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8
F_1	x	x	x	x	x	x	x	x
F_2	x	x	x					x
F_3								x
F_4	x	x	x	x	x	x	x	x
F_5	x	x	x	x	x	x	x	x
F_6			x	x	x	x	x	x
F_7	x	x	x	x			x	x
F_8	x	x	x	x	x	x	x	x

Source: developed by the authors

Based on the matrix A, a binary matrix of reachability (I+A) is constructed, where I is a unit matrix that satisfies the following condition (6) (Kosach, 2017):

$$(I + A)^{k-1} \leq (I + A)^k = (I + A)^{k+1} \qquad (6)$$

The combined results of the reachability matrix (I + A) are summarised in Table 3. The vertex is reached if z_j has a vector of motion from vertex z_i, if on the graph there is a vector of motion from vertex Z_i to vertex Z_j.

Table 3. Matrix of reachability (I+A) of elements

	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_n
F_1	x	x	x	x	x	x	x	x
F_2	x		x		x			x
F_3		x	x	x	x	x	x	
F_4	x	x	x	x	x	x	x	x
F_5	x	x	x		x	x	x	
F_6	x		x	x				x
F_7		x	x	x	x	x	x	x
F_n	x	x	x	x	x	x	x	

Source: developed by the authors

For further modelling, a subset of similar vertices S(Zj) and analogous vertices (Zi) is formed, which are formed before vertex Zj, provided that it reaches its vertex. The set of previous vertices forms a subset P(Zi), that is satisfied by the condition (7) (Bilianskyi, 2020):

$$R(z_i) = S(z_i) \cap P(z_i) \qquad (7)$$

The set of actions performed will determine the first level of the hierarchy of elements. Based on the previous matrix, the consolidated results of the levels of the model of the hierarchy of elements are built (Table 4).

Table 4. The combined results of the levels of importance of the elements

i	S(zi)	P(zi)	S(zi) P(Zi)
1	1, 2, 3, 4, 5, 6, 7, n	1, 2, 3, 4, 5, 6, n	1, 2, 3, 4, 5, 6, n
2	1, 2, 4, 5, 6, 7, n	1, 2, 4, 5, 6, 7, n	1, 2, 4, 5, 6, 7, n
3	1, 3, 4, 5, 6, 7, n	1, 3, 4, 5, 6, n	1, 3, 4, 5, 6, n
4	1, 2, 3, 4, 5, 6, n	1, 2, 3, 4, 5, 6, n	1, 2, 3, 4, 5, 6, n
5	1, 2, 3, 4, 5, 6, 7, n	1, 2, 3, 4, 5, 6, 7, n	1, 2, 3, 4, 5, 6, 7, n
6	1, 2, 3, 4, 5, 6, n	1, 2, 3, 4, 5, 6, 7, n	1, 2, 3, 4, 5, 6, n
7	1, 2, 5, 7, n	2, 3, 5, 6, 7, n	2, 6, 7, n
n	1, 2, 3, 4, 5, 6, 7, n	1, 2, 3, 4, 5, 6, n	1, 2, 3, 4, 5, 6, n

Source: developed by the authors

The emergence of a particular element at a certain level significantly depends on the correlations established between them, given in the original graphic image, the change of which in number and nature will lead to a modification of the resulting model (8) (Yemelianenko *et al.*, 2019):

$$F = \begin{cases} f_1(x_1, x_2, ..., x_n; y_1, y_2, ..., y_n) \\ f_2(x_1, x_2, ..., x_n; y_1, y_2, ..., y_n) \\ f_n(x_1, x_2, ..., x_n; y_1, y_2, ..., y_n) \end{cases} \qquad (8)$$

where: F is the total functional dependence; f_i is the conversion function between effective parameters ith their fixed number ($i = 1, z$); x_j, y_j are the groups of parameters that can be functionally independent if the elements of one group x_j or y_j are always functionally interdependent ($j = 1, n$).

Economic substantiation of priority directions of the development of foreign economic relations on the world market and maintenance of European integration business partnership of agro-food enterprises is carried out based on the analysis of group of efficiency indicators (Verbytska, 2013): absolute indicators; relative indicators; structure indicators; efficiency indicators. When analysing the priority areas of foreign economic relations in the world market and ensuring European integration business partnership of agro-food enterprises, the chosen criterion of efficiency should be considered, it should meet the methodological principles of generalising indicators (Didukh, 2020), be proportional, and meet its economic content. The presented data allows calculating intermediate and integrated economic indicators; build factor models to identify the impact of individual factors on the generalised indicator, etc. They are used to identify deviations in foreign economic activity of agro-food enterprises, reserves of increasing production, namely export-oriented ones and other parameters requiring management decisions.

RESULTS AND DISCUSSION

The procedure for the creation of a Deep and Comprehensive Free Trade Area (DCFTA) with the EU is part of the Association Agreement between the European Union

and its Member States, on the one part, and Ukraine, on the other part (2014) and lasts from 2016 to 2026. Mutual access to markets, including agricultural products, which are based on mandatory trade rules, expand; there are processes of convergence of the European integration business environment with various levels of stimulation of the national export-oriented internal market for agro-food products according to international rules and regulations. This is manifested in substantial adaptation of Ukrainian legislation, in the reduction of import and export duties on imports of Ukrainian products to EU countries (providing access to markets without customs restrictions under tariff quotas).

The tariff quota for trade with the EU countries is abolished in export to their territory 83.1% of tariff

lines and 35.2% of tariff lines when importing European products into the territory of Ukraine. Therewith, transitional periods from 1 to 7 years and duty-free tariff quotas have been introduced for agro-food products (Kvasha, 2013). That is, agricultural enterprises are given the opportunity to adapt to highly competitive European markets. Trade in these products is insignificant compared to other products of the national economy, as agricultural production in the EU is supported from the national budget. Thus, according to the agreement with the EU, Ukrainian exporters can import agricultural products of Ukrainian origin into the EU countries without paying import duties within the established tariff quotas. The dynamics of allowable volumes of duty-free exports and their increase is presented in Figure 2; 3.
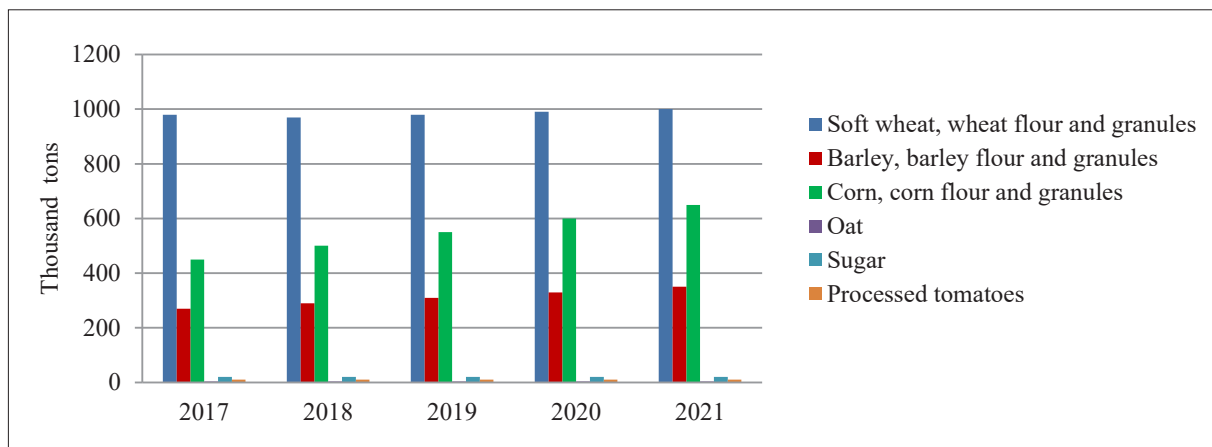
Figure 2. *Dynamics of allocated tariff quotas for the volume of duty-free exports of crop products and products of their processing for Ukraine for 2017-2021, thousand tonnes*
Source: *compiled by the authors according to data State Statistics Service of Ukraine (2021)*
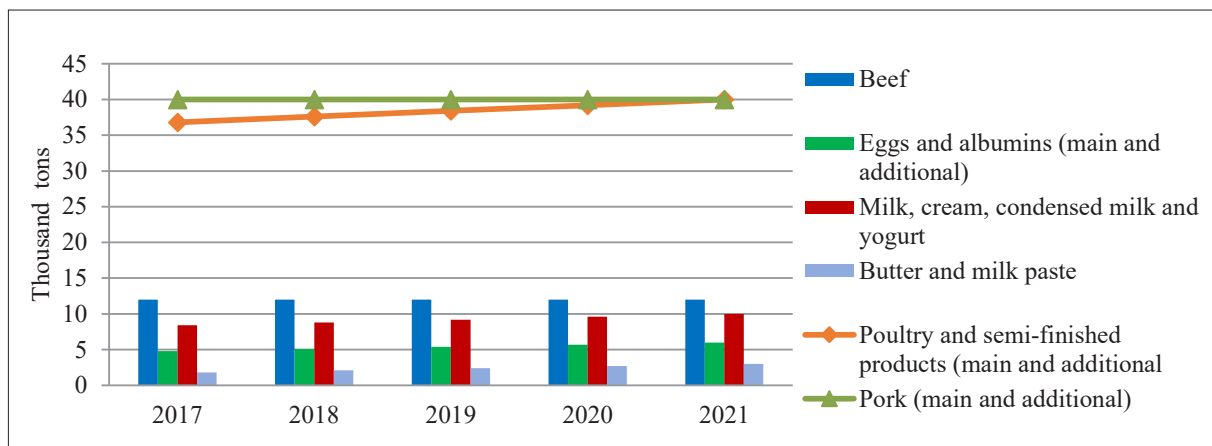
Figure 3. *Dynamics of allocated tariff quotas for the volume of duty-free exports of livestock products and goods for Ukraine for 2017-2021, thousand tonnes*
Source: *compiled by the authors according to data State Statistics Service of Ukraine (2021)*

It is established that the list of products comprises 36 items including beef, pork, lamb, poultry, milk, cream, butter, yogurt, cereals, and processed products, honey, sugar, eggs, and other foods. For some types of agricultural products, added quotas are allocated, which are introduced when the basic tariff quota is exhausted,

namely for wheat, corn, barley groats, honey, grape juice, barley flour.

The distribution of quotas is based on two principles "first come – first served" or through a system of import licenses. The order of distribution and the list of goods subject to such distribution are presented in Figure 4.

Tariffing of quotas for import of agro-food products into the customs territory of EU countries

The principle "First come – first served" The right to duty-free import of goods is granted in the order of submission of the import customs declaration by importers, depending on the availability of unused balance of the quota	Annex II to Regulation (EU) No. 374/2014: barley groats and flour; malt and wheat gluten; malt and starch processing products; processed dairy products; processed milk products; grape and apple juices; processed tomatoes; mutton; sweetcorn; mushrooms; sugar; oat; garlic; honey. and others
Issuance of import licenses The right to import goods (licenses) is granted as a result of submitting an application to the Directorate General of the European Commission "Agrarian Issues and Rural Development". There is a separate regulation for each type of product, which provides quantitative and temporal distribution of quotas (meat and meat products – quarterly distribution of 25% of the total quota, grain production – weekly, milk and dairy products – semi-annual distribution), the size of the insurance premium and the amount of quotas are determined	Annex III to Regulation (EU) No. 374/2014: poultry meat and poultry semi-finished products; milk, cream; corn, corn flour and granules; pork; barley, barley flour and granules; beef; wheat; milk powder and others

Figure 4. *Tariffing of quotas on imports of agro-food products to EU countries*
Source: *compiled by the authors according to data from Diia Business (2021); Regulation (EU) No. 374/2014 of the European Parliament and of the Council "On the Reduction or Elimination of Customs Duties on Goods Originating in Ukraine" (2014)*

To reduce barriers to trade in agro-food products by Ukrainian exporters, which may arise due to differences in technical regulations and standards for conformity assessment and other quality requirements, harmonisation of national norms with EU standards and metrology, accreditation, conformity assessment and market surveillance is envisaged. Thus, trade business partnership with EU countries creates a positive image in international markets for Ukrainian agro-food enterprises. According to the analysis of foreign trade of agro-food products (for the period of January–August 2021 compared to January–August 2020) in Ukraine exports and imports of goods of all kinds increased as follows: imports +20.5%, exports +9.5%, balance +5.0% (Table 5).

Table 5. *Ukraine's Foreign Trade in Agricultural Goods with EU, January-September 2021*

	Exports		Imports		Balance
	Billion USD	**In % to January– September 2020**	**Billion USD**	**In % to January– September 2020**	
Austria	0.709	181.3	0.592	148.8	0.117
Belgium	0.498	130.4	0.478	129.1	0.020
Bulgaria	0.615	177.8	0.394	195.2	0.221
Greece	0.136	101.6	0.323	143.0	-0.187
Denmark	0.212	134.5	0.226	150.5	-0.014
Estonia	0.121	156.1	0.127	93.5	-0.007
Ireland	0.053	70.6	0.165	106.2	-0.112
Spain	1.013	113.9	0.657	126.7	0.356
Italy	2.495	187.0	1.783	126.8	0.713
Cyprus	0.032	140.1	0.020	212.8	0.012
Latvia	0.216	129.4	0.146	137.8	0.070
Lithuania	0.426	138.8	0.917	148.3	-0.490
Luxembourg	0.011	86.0	0.015	121.0	-0.004
Malta	0.027	397.7	0.113	1308.6	-0.085
Netherlands	1.583	126.3	0.723	133.7	0.860
Germany	2.034	137.4	4.521	116.5	-2.486
Poland	3.989	171.3	3.542	121.2	0.447

	Exports		Imports		Balance
	Billion USD	**In % to January–September 2020**	**Billion USD**	**In % to January–September 2020**	
Portugal	0.234	156.9	0.066	146.9	0.169
Romania	1.129	148.5	0.588	132.3	0.541
Slovakia	0.788	235.6	0.631	81.1	0.158
Slovenia	0.057	197.9	0.205	118.6	-0.147
Hungary	0.117	129.9	1.224	126.7	-0.049
Finland	0.063	142.2	0.220	122.6	-0.157
France	0.581	151.6	1.277	122.8	-0.696
Croatia	0.027	126.7	0.047	119.4	-0.021
Czech Republic	1.125	201.4	1.007	156.2	0.118
Sweden	0.075	147.2	0.468	163.8	-0.393

Note: *USD – United States dollar*
Source: *compiled by the authors according to data V. Kruglyak (2021)*

In 2020, agro-food enterprises concentrated 85% of the gross harvest of corn, 80% of wheat, 58% of barley, 99% of rapeseed, 92% soybeans and 86% of sunflower seeds. Therewith, a considerable concentration of production was formed by such crops as wheat (40.5% of production volumes are concentrated in 4.3% of agro-food enterprises with sown area over 1000 ha), corn (52.8% of production volumes – in 5.2% of enterprises), sunflower (40.4% of production volumes – in 4.7% of enterprises), soybean (36.4% – in 2.5% of enterprises) (Table 6).

Table 6. *Concentration of production of the main export-oriented crops in the enterprises of agro-food production of Ukraine, 2020*

Products	Groups of enterprises by sown area, ha	Share in total production, %	Share of enterprises in total, %	Yield, c/ha
Wheat	under 1,000 ha	59.5	95.7	37.4
	over 1,000 ha	40.5	4.3	40.1
Corn	under 1,000 ha	47.2	94.8	79.6
	over 1,000 ha	52.8	5.2	94.9
Barley	under 1,000 ha	88.7	99.5	31.7
	over 1,000 ha	11.3	0.5	38.0
Sunflower seeds	under 1,000 ha	59.6	95.3	23.6
	over 1,000 ha	40.4	4.7	24.8
Rapeseed	under 1,000 ha	79.2	97.2	26.7
	over 1,000 ha	20.8	2.8	25.9
Soybeans	under 1,000 ha	63.8	97.5	25.3
	over 1,000 ha	36.4	2.5	28.6

Source: *compiled by the authors according to data V. Kruglyak (2021)*

The main factor in the formation of a considerable export potential of agro-food products constitutes a significant concentration of export-oriented products in large enterprises with sown grain and oilseeds over 1,000 hectares, which allows forming large consignments (2.5-8 thousand tonnes). In the commodity structure in agricultural products in January–July 2021, the most exported from Ukraine were soybean oil – 25.2%, corn – 23.8%, and wheat – 13.9%. Asian countries occupy the largest niche in the export of Ukrainian agro-food products – over 50%. During the period of January–August 2021, Ukraine exported the most to Asian countries – by 7.57 billion USD, EU – by 4.09 billion USD, Africa – by 1.91 billion USD, Russia, Belarus, Moldova – by 0.84 billion USD, America – by 0.16 billion USD. The top five countries in terms of exports of Ukrainian agro-food products include China (2.7 billion USD), India (1.06 billion USD), the Netherlands (1.02 billion USD, Egypt (0.8 billion USD) and Turkey (0.6 billion USD). The largest share of imports to Ukraine from the EU is 48.8% (2.34 billion USD), from Asia – 20% (0.96 billion USD) and from America – 13.3% (0.64 billion USD). The United States imports the most frozen fish to Ukraine – 4.9%, soybean seeds – 4.2 and other food products – 4.4% (Kruglyak, 2021).

Given the openness of markets and significant exports of certain types of agro-food products, the price

situation in the internal market depends on the world market. In turn, this determines the specific features of price formation and cash inflows for agro-food producers, which are directly or indirectly (through traders) sent for export. The competitiveness of export-oriented agro-food products of Ukraine (wheat, barley, corn, sunflower oil, rapeseed, soybeans) on the world market is determined using relative indicators of competitiveness, including the index of relative export competitiveness (RXC), index of relative dependence on imports (RDI), index of relative trade advantages (RTA) (Novikova & Tkachuk, 2011; Bukhtiiarov, 2014). Figure 5 shows the indices of identified benefits for certain types of Ukrainian agro-food products and products of their processing for 2013-2020.
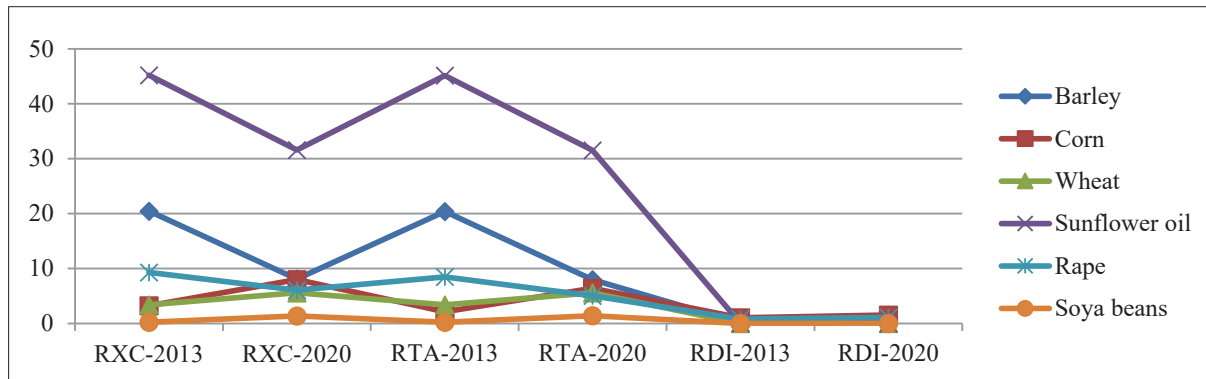
Figure 5*. Indices of identified advantages for certain types of agro-food products and goods of their processing in Ukraine on the world market*
Source*: M.V. Novikova and N.Yu. Tkachuk (2011); O.S. Bukhtiiarov (2014)*

Thus, for the period under study, the RTA index shows that the most competitive products are sunflower oil, which in 2020 had a relative trade advantage in size 31.6, barley – 8.0, and corn – 6.4. However, for 2013-2020, there is a declining trend of RTA index, namely for barley – a decrease of 2.5 times, for rapeseed – by 40.6%, for sunflower oil – by 1.5 times. There is a clear tendency to increase the share of products that are raw materials or have a low degree of processing products, in the production of which there is an elevated level of mechanisation and automation involving significant land resources. In particular, the share of foreign exchange earnings from grain exports during 2013-2020 increased by 15 percentage points, oilseeds – by 6 percentage points. While the share of exports of finished food, milk, and dairy products decreased by 17% and 10%, respectively. There is a positive trend in the export of sunflower oil, the share of vegetable oils in the structure of exports increased by 8% points. Thus, today agro-food exports are still focused on raw materials.

The foreign economic activity of agro-food enterprises faces a considerable impact on the efficiency of export and import operations of currency risks, which affect the pricing policy and increase the cost of production (State Service of…, 2021). Y. Zhang & Y. Zong (2018) studied the specific features of agricultural products export in Jiangsu Province. A. Nagurney *et al.* (2019) have developed their original model of the agricultural supply chain, which considers tariff quotas. J.Ch. Bureau *et al.* (2019) reviewed the tariffs applied by different countries for agricultural products and found that more opportunities should be used to protect imports in the agricultural sector. In this study, the average financial losses and benefits of the agro-food enterprise in the export of corn, given the appreciation and change of the national currency against the USD (Table 7) were determined.

Table 7*. Estimation of efficiency of corn exports on average per one agro-food enterprise in Ukraine under the conditions of currency risks*

Indicators	2013	2020	Subject to currency risks	
			With a devaluation of 1.2 times	With a devaluation of 1.2 times
The cost of mineral fertilisers per 1 tonne, USD	20.03	282.87	339.44	282.87
Costs for fuels and lubricants per 1 tonne, USD	12.02	269.82	323.78	269.82
Total cost of 1 tonne, USD	148.44	375.84	430.96	375.84
Price subject to delivery FOB, USD for 1 ton without VAT	229	638.92	743.71	638.92
Export costs				
Transportation of products to the elevator	8.14	12.73	12.73	12.73
Reception, finishing of products on the elevator	6.01	7.35	7.35	7.35
Loading into railway transport	5.63	11.27	11.27	11.27
Transportation by rail	23.03	50.07	50.07	50.07

Table 7, Continued

Indicators	2013	2020	Subject to currency risks	
			With a devaluation of 1.2 times	With a devaluation of 1.2 times
Certificate of quality and quantity of an independent surveyor	1.00	27.58	28.7	27.58
Freight forwarding services in the port, customs clearance	2.25	28.75	34.07	28.75
Transhipment of products	17.02	45.93	55.07	45.93
Fumigation	0.75	2.50	3.00	2.50
Total export costs	63.83	186.18	202.26	186.18
The profit received as a result of export activity for 1 tonne, USD	16.7	76.90	110.49	76.90

Note: *FOB – Free on board; VAT – value added tax*
Source: *calculated by the authors*

G. Sacchi (2018) explored the importance of prices and food policies for the development of enterprises and the economy. An increase in the prevalence of ethical consumption behaviour was found as well. An analysis of the dairy sector was conducted, identifying rising prices for dairy products over the past 10 years and explaining the reasons for this trend (Reviron & Python, 2018). This study allowed stating that the effectiveness of changes in the European business environment in the fluctuations of price policy in the export-oriented internal market of agro-food products is proposed to assess by several indicators presented in Table 8.

Table 8. *Indicators of efficiency of foreign economic activity of agro-food production enterprises of Ukraine at change of the European integration business environment and stimulation of export-oriented business partnership in the internal market*

Indicators	2010	2015	2020
The cost of agricultural exports per employee in agriculture, USD	3262.3	6392.87	8335.7
Including cereals	1119.9	3111.6	5874.4
Oilseeds	429.3	645.9	865.2
Fats and oils	585.7	2365.7	3874.4
The cost of agricultural imports per capita, USD	139.8	242.7	277.1
Foreign direct investment in agriculture per 1 employee, USD	142.6	355.7	297.8
The cost of agricultural exports per 1 ha of agricultural land, USD	596.5	1514.6	2023.2
Costs to produce cereals per 1 ha of harvested area, USD	323.3	613.7	805.4
Costs to produce oilseeds per 1 ha of harvested area, USD	336.7	648.6	868.3

Source: *compiled by the authors according to data State Statistics Service of Ukraine (2021)*

As a result of the research, a correlation-regression model of dependence of internal prices in Ukraine (Y) and prices of agro-food products on the world market (X) was built (Kvasha *et al.*, 2014). The value of the Student's distribution (t) and Fisher's (F) was used, considering the corresponding degrees of freedom, probability for t (0.95) and significance level for F (0.01 – for crop products and 0.05 – for livestock products. A significant influence of factors on all constructed models of regression coefficients was established (Fig. 6).
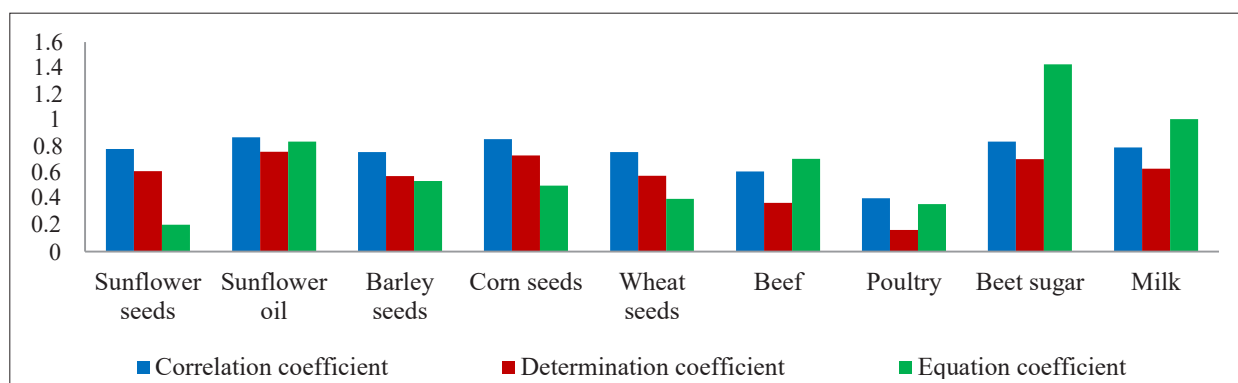
Figure 6. *Parameters of the regression equation and their estimation in the model dependence of domestic prices in Ukraine (Y) of export prices for agro-food products on the world market (X)*
Source: *calculated by the authors*

Correlation-regression models of the impact of world price on the internal prices of agro-food products.

Sunflower seeds – Y=415.2+0.204X1.
Sunflower oil – Y=753.1+0.841X1.
Barley seeds – Y=502.7+0.540X1.
Corn seeds – Y=644.7+0.504X1.
Wheat seeds – Y=599.3+0.403X1.
Beef – Y= -2.346+0.708X1.
Poultry – Y=1.783+0.363X1.
Beet sugar – Y=2.544+1.429X1.
Milk – Y= -3.82+1.411X1.

Thus, the greatest influence of the world market is observed on such types of products as sunflower oil (76.3%), corn seeds (73.5%), beet sugar (70.5%), and milk (63.4%). The coefficient of elasticity obtained as a result of model construction shows by what percentage (from the average) the average prices of the internal market for the studied types of agro-food products will change when the price situation of the respective market changes by 1%. The greatest elasticity was observed in milk prices. Thus, the increase in prices in the EU countries on 1% led to the corresponding price trends in the internal market on 1.17%. Changes in world sugar prices by 1% were reflected in the internal market for 0.92%.

S.-H. Huang & S.-T. Ji (2018), upon investigating the possibilities of expanding the export of agri-food products developed their original programme to strengthen the export infrastructure, which has demonstrated its effectiveness. There are studies, the results of which allow determining and comparing the profitability of enterprises according to different business models (Lutsiak *et al.*, 2021). According to the findings of the study on the export activity of agro-food enterprises in the European market, based on the standard gravitational model of foreign trade, the gravitational model of trade with the European Union was built, considering conditions of formation of stable export potential. Using indicators characterising the state of these subsystems and multilevel stimulation of export-oriented internal market, an integrated index was calculated, which allows assessing the internal and external European business environment to ensure business partnership with EU member states and defining the foreign economic priorities of harmonisation of interests of the enterprises of agro-food production (Fig. 7). Modified classical gravitational model is as follows (9):

$$E^p{}_{ij} = a_0(GPAP_i) \times a_1(GPAP_j) \times a_2(N_{ij}) \times a_3(d_{ij}) \times a_4(I_{sv}) \times a_5(I_{sz}) \times a_6(B_j) \times a_7(SP_{ij}) \times a_8 + q + T_j \quad (9)$$

where $E^p{}_{ii}$ is the export of products; $GRAP_i$ is the gross production of agricultural products in Ukraine (weighted average for 5 years); $GRAP_j$ is the gross production of agricultural products in EU countries; N_{ij} is the population; d_{ij} is the distance between Ukraine and EU countries; I_{sv} is the internal institutional system; I_{sz} is the institutional system of the external environment; B_j is the restrictions on the export of agricultural products (quotas, licenses, certificates, etc.); SP_{ij} is the system of support and preferences for agricultural exports in countries; q is the accidental error; T_j is the expiration date of agricultural products, including the validity of licenses; a_0 is the free member of the equation; $a_1 \dots a_8$ are the coefficients of elasticity.
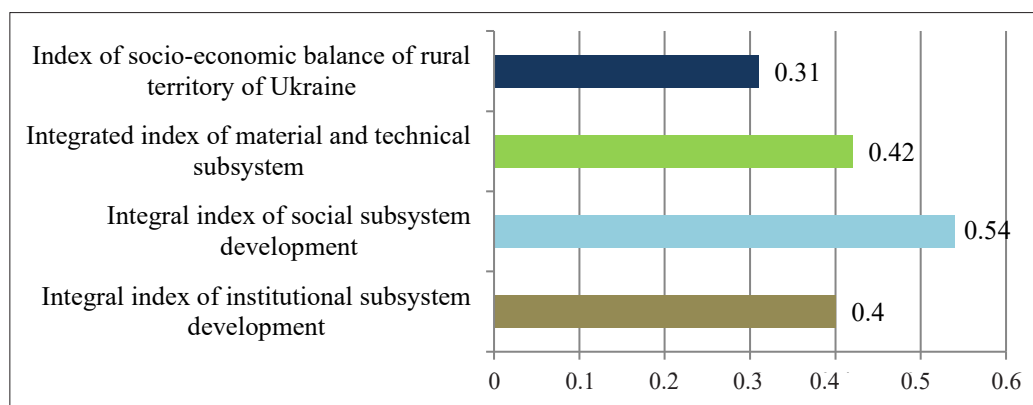
Figure 7. Gravitational model of the integrated level of export potential of agro-food enterprises of Ukraine to stimulate foreign trade in the world market and ensure stable business partnerships with EU member states
Source: calculated by the authors

Export potential as a system of interaction of its elements allows harmonising the economic interests of enterprises-exporters of agro-food production and stimulating export-oriented internal market to high added value products, as well as creating conditions for production efficiency.

CONCLUSIONS

Thus, to determine identify the promising areas for the increase in exports of agro-food products, especially to the EU market, it is required to improve the foreign economic function of agricultural sector. The vectors in expanding the European integration process include the development of farming; the improvement of the financial infrastructure of the agro-food sector and development of effective financial institutions; the improvement of the investment climate and stimulation of vertical and horizontal integration processes, including international ones. The progress of export potential of agro-food enterprises should be considered as a holistic system of creating competitive advantages and focusing

products on foreign consumers, given that the results of export potential are appropriated not by agricultural enterprises, but by entities, exporters, and intermediaries.

The progress of export potential should be based on a strategy of increasing export opportunities. The systematic interaction of the components of the export potential allows harmonising the economic interests of agro-food enterprises and subjects of circulation in the export of products. The European integration necessitates the formation of high purchasing power in this market segment with a prominent level of control over export-import operations, establishing appropriate requirements, norms and rules for raw materials and finished products for exporters. Along with the opportunities for foreign economic activity of agro-food enterprises in the EU market, there is a need to ensure the liberalisation of foreign trade between European countries. This increases competition due to the entry of European agro-food producers into the internal market of any country.

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Зовнішньоекономічні пріоритети розвитку агропродовольчих підприємств в умовах євроінтеграційного ділового партнерства

Олександр Михайлович Шпичак[1*], Ольга Миронівна Варченко[2], Надія Іванівна Свиноус[2], Ганна Вікторівна Семисал[2], Сергій Олександрович Остапенко[3], Олександр Станіславович Пристемський[4]

[1]Національний науковий центр «Інститут аграрної економіки» НААН України
03127, вул. Героїв Оборони, 10, м. Київ, Україна

[2]Білоцерківський національний аграрний університет
09117, пл. Соборна, 8/1, м. Біла Церква, Україна

[3]Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 15, м. Київ, Україна

[4]Херсонський державний аграрно-економічний університет
73006, вул. Стрітенська, 23, м. Херсон, Україна

Анотація. Агропродовольче виробництво є джерелом продовольчої безпеки країни, основою нарощування її експортного потенціалу, задоволення внутрішнього попиту на сільськогосподарську продукцію та продовольство. Актуальність теми дослідження полягає в тому, що на даний момент Україна розвиває європейський вектор зовнішньоекономічної діяльності. Метою даного дослідження є обґрунтування комплексу показників, які використовуються для якісної та кількісної оцінки експортного потенціалу агропродовольчих підприємств євроінтеграційного ділового партнерства. Авторами використано загальнонаукові методи (аналіз, синтез), комплексний підхід, модель ієрархії факторів впливу інтеграційного бізнес-середовища на експортний потенціал підприємств. Визначено допустимі тарифні квоти на обсяги безмитного експорту продукції рослинництва, тваринництва та продуктів переробки для України. Проаналізовано обсяги концентрації виробництва експортоорієнтованих сільськогосподарських культур на підприємствах агрохарчового виробництва України. Встановлено, що основну частину агропродовольчого експорту становить сільськогосподарська сировина, зокрема зернові та олійні культури, рослинна (соняшникова) олія. У дослідженні оцінено ефективність експорту кукурудзи в середньому на одне агропродовольче підприємство України в умовах валютних ризиків. Визначено, що у 2020 році загальні витрати на експорт за 1 т склали 186,18 дол. Крім того, встановлено, що прибуток, отриманий в результаті експортної діяльності за 1 т склав 76,90 дол. Визначено параметри рівняння регресії та їх оцінку в моделі залежності внутрішніх цін України від експортних цін на агропродовольчу продукцію на світовому ринку. Для стимулювання зовнішньої торгівлі на світовому ринку та забезпечення стабільного ділового партнерства з країнами Європейського Союзу запропоновано гравітаційну модель інтегрованого рівня експортного потенціалу українських агропродовольчих підприємств

Ключові слова: експортний потенціал, сільськогосподарська продукція, ринок, торгівля, ціна