CLUSTERING OF THE INTERNATIONAL AGRICULTURAL TRADE BETWEEN UKRAINE AND THE EU

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The relevance of this study is determined by the necessity to refocus the foreign trade policy of Ukraine and to adjust the agricultural sector of economy to the conjunctural changes on the world agricultural markets. At present, the structure of the foreign trade of Ukraine is changing drastically taking into account economic, social and political circumstances. How can one identify potential partners and single out those that are the most economically feasible for a long-term co-operation? This is one of the most topical issues of the development of the foreign economic activity. The purpose of the article is to identify the main trade partners of agricultural products between Ukraine and the EU. Using the k-means method and the Ward-method, clustering of the trade partners of the EU member countries and Ukraine is carried out. Three cluster groups are singled out and the main factors that have impact on these groups are described.

Key words: foreign trade, export, import, agricultural products, cluster analysis, gravity model, efficiency.

JEL Codes: F10, F13, F17.

1. Introduction

Involving the domestic economy in global processes contributes to the expansion of Ukraine's ability to carry out trade activities on international markets. Although the external conditions for the development of foreign trade are favorable, there are obstacles of internal nature such as the military-political conflict in the east, the deterioration of economic relations with Russia, the state economic downfall. Consequently, conditions and possibilities of domestic enterprises to cooperate with foreign partners change. Taking this into account, the expansion of foreign economic relations with the EU member states should be noted. Further expansion of the mentioned cooperation will contribute to increasing the efficiency of the national economy, growth of the material well-being of the population, and improving the quality and level of their life.

Therefore, the relevance of this study is determined by the need for a systematic analysis of the development of international trade between Ukraine and the EU and necessity to establish the regularities for such cooperation, based on the application of modern methods of investigating international economic processes.

The purpose of the article is to identify the main trading partners of agricultural products between Ukraine and the EU and to define the main factors that influence the development of this trade.

Among the latest overseas research in the field of cluster analysis of the foreign agricultural trade we should highlight the studies of J. Anderson and E. van Wincoop (2003) (the peculiarities of trade between the countries are investigated taking into account current global challenges). Milot and Yotov (2014) studied the particular characterisitcs of service trade between the trading partner countries. In Cafiero's works (2005) the gravity models for analyzing the foreign trade and a possibility to diversify the agricultural business are studied. Chen and Zhan (2008) made a study of the factors that influence the international trade and suggested the methodology for evaluating the efficiency of the trading activity. Ding and Tay (2016) analysed the peculiarities of the economic growth and reaching the stability of foreign economic activity using the example of the trade policy of China. Duliba and Ilkiv (2017) investigated the peculiarities of arranging agricultural trade on international markets. Zinchuk (2017) analysed the institutional transformations of agricultural economy under the conditions of current global challenges and the extension of foreing trade with agricultural products. Qu and Han (2010) carried out a review of the factors that affect the efficiency of the trade in commodities in the context of foreign trade relation between China and countries of the world. Rasoulinezhad and Kang (2016) conducted cluster analysis based on the trade between South Korea and member countries of OPEC with the further use of the gravity modeling. Wang (2008) researched current trends in the development of agricultural trade relations between countries. Xuegang, Zhaoping and Xuling (2008) developed sectoral gravity models for studying trade relations between countries.

The identification of encouraging and discouraging factors of developing foreign agricultural trade between Ukraine and the EU countries will allow to enhance balance of trade, diversify commodity structure of exports and imports, develop strategic directions of the state policy in the field of agricultural production, improve the efficiency and profitability of agricultural business. The relevance of this study is also determined by the necessity to solve current global problems, especially those that are related to the world food security.

2. Methodology

The research methodology is based on the following economic methods: monographic (studying the experience of the EU member states in terms of forming and ensuring the effective functioning of the foreign agricultural commodities mar-

ket), system analysis (comparing the approaches of EU member states to the state formation of foreign trade policy), statistical (analysing the main indicators of export and import), graphical-table (schematic and table presentation of research results), cluster analysis (grouping trading partners of agricultural products).

The sequence of carrying out a cluster analysis of foreign agricultural trade between Ukraine and the EU using a gravity model includes six stages. At the first stage ("Selection of indicators"), a selection of indicators characterizing the level of development of trade relations is conducted: export and import of agricultural products, their share in total exports and imports, and the existence of a common border with a trading partner. At the second stage ("Selection of clustering method and distance metrics"), the most rational clustering method for studying foreign trade between Ukraine and the EU is determined: 1) the Ward-Method, which uses methods of dispersion analysis to estimate distances between clusters; 2) the method of k-means, which refers to non-hierarchical ones. The third stage ("Determining the number of trading partners") involves the formation of a research base on the basis of the statistics of international information resources (Trade Map - Trade statistics for international business development. Import & export values, volumes, growth rates, market shares, etc.) At the fourth stage ("The number of clusters"), the elbow method looks at the percentage of variance explained as a function of the number of clusters: one should choose a number of clusters so that adding another cluster does not give much better modeling of the data (Ketchen, 1996). At the fifth stage ("Determining the number of homogeneous groups of trading partners and visualizing the results"), cluster groups of trading partners are formed, graphical interpretation of cluster analysis is carried out. At the sixth stage ("Interpretation of the obtained results using a gravity model"), the parameters of the gravity model are estimated on the basis of retrospective data with the help of econometric methods using software packages STATA, R (programming languages and free software environment for statistical computing and graphics).

The gravity model is a theoretical hypothesis introduced by Tingderben and Poyhonen, who applied Newton's law of universal gravitation to explain the interaction between international trade flow and the related influencing factors (Tingderben and Poyhonen) (Anderson, 2014). The gravity model shows that the trade flow between two countries is affected by the size of their economy and geographic distance. Usually, the GDP will produce positive effects on trade flow, whereas geographic distance will cause negative effects. In international trade, the gravity model is often used to study the effects of influencing factors on international trade, such as the size of economy, geographic distance, and cultural background. The basic equation of the gravity model is presented as follows:

$$Xij = \beta_0 \cdot \beta_1 \, (GDPiGDPj)/\beta_2 Dy \qquad (1)$$

where: *Xij* – represents the trade flow between country *i* and country *j*; *GDPi* and *GDPj* – represent the economic level of country *i* and country *j*; *Dij* – represents the geographical distance between country i and country j; α is a proportionality constant; β_i – vectors of parameters to be estimated.

In the latest theory of international trade, many scholars have added other influencing factors, such as per capita GDP and distance (D), to the gravity model. Thus, the equation can be optimized as follows:

$$\mathrm{Ln}X_{ij} = \beta_{0*}\beta_1\mathrm{Ln}\,\mathrm{GDP}_i + \beta_2\mathrm{LnGDP}_i + \beta_3\mathrm{LnD}_{ij} + \beta_4\mathrm{LnT}_{ij} + \mu_{ij} \qquad (2)$$

where: μ_{ij} – residual standard error; *T* – border between countries or population; β_1 – vectors of parameters to be estimated.

Gravity model is an important tool to analyze international trade. Some special factors, particularly cultural factors, are considered. Therefore, some Chinese scholars have used the gravity model to analyze cultural trade. Xiaoqing and Zhengmao (2008) conducted empirical analysis on the influencing factors of the American cultural trade under the theory of gravity model; Xiaoli and Lili (2010) analyzed the influencing factors of the Chinese cultural trade using the gravity model. The gravity model is one of the best methods to analyze the influences of cultural factors on international trade.

3. Results of research

3.1. Analysis of foreign economic activity
Foreign trade plays an important role in the Ukrainian economy. The tendency of the last 3 years was to reduce revenues from exports of goods by almost 33% (Fig. 1). The information base for the research consisted of databases of the statistical information resources: Trade Map (Trade statistics for international business development), the World Bank, Eurostat, and State Statistics Service of Ukraine. Period of the research is from 2014 to 2016.

The largest decline was observed in the dynamics of exports to CIS countries – 59%, while with the EU countries (28) it was 21%. Similar negative trends are observed in the dynamics of imports. At the same time, agricultural products occupy a significant share in total exports.

The Asian market remains the main market outlet for Ukrainian agricultural products; however, this market somewhat reduced its share in the structure of Ukrainian exports to 45% in 2017, compared to 48% in 2016. The main partner countries in Asia in 2017 were India, Turkey and China. The EU countries, with a share of 32%, take the second place; here the main partners are the Netherlands,

Spain and Italy. The third among the leaders are African countries, which, in their turn, amount to 14%. The main partners from Africa are Egypt, Tunisia and Morocco. At the same time, taking into account the current trends in the growth of trade volumes for individual trade groups, the European market is the most dynamic and promising for Ukraine (Vyshnevska, 2017).

When studying the commodity structure of exports from Ukraine to the EU member states, it should be noted that the share of agricultural products increased from 32% in 2014 to 35% in 2016 (Fig. 2). The largest increase among all product groups is recorded in the "Agricultural Products" group. However, it should be highlighted that the basis of agrarian exports is still the export of raw materials, namely, products of plant origin such as wheat, corn, barley and soybeans. The share of these products in the structure is more than 55%. Since 2016 Ukraine has increased import purchases, both of agricultural products and other products. In 2017, imports of agricultural products increased by 10.5% compared with 2016 and reached USD 4.3 billion. In return, the total imports of all products in the first half of 2017 compared with the previous year increased by +27.6% (State Committee of Statistics of Ukraine, 2016).

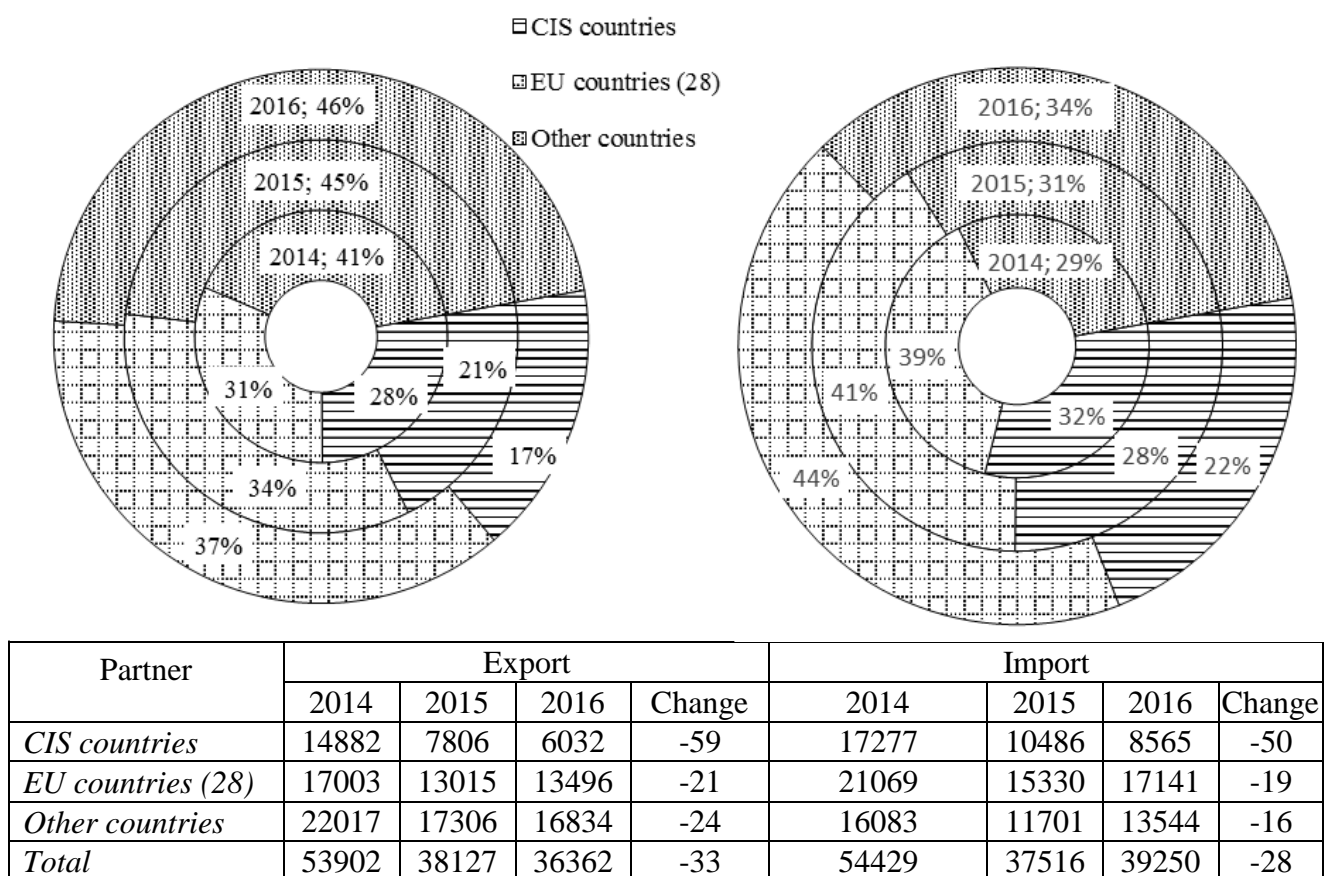| Partner	Export				Import			
	2014	2015	2016	Change	2014	2015	2016	Change
CIS countries	14882	7806	6032	-59	17277	10486	8565	-50
EU countries (28)	17003	13015	13496	-21	21069	15330	17141	-19
Other countries	22017	17306	16834	-24	16083	11701	13544	-16
Total	53902	38127	36362	-33	54429	37516	39250	-28

Fig. 1. Geographical structure of exports (on the left) and imports (on the right) of goods Foreign trade of Ukraine (mln. USD)

The increase in sales of sunflower oil by +16% (USD +597 million) was the driving force for the growth of agrarian exports. Ukraine has been a global leader in the production and export of sunflower oil for several years (Vyshnevska, 2017).

Since the beginning of 2014, Ukrainian authorities have shifted away from the multy-vector principle and are turning to cooperation with Western partners, while relations with the CIS countries, especially Russia, have become more strained. It should be acknowledged that this happened largely due to the Association Agreement with the EU, which did not provide for the preservation of preferential trade within the framework of the Treaty with the CIS countries, which was valid for Ukraine since 2012.

It should be noted that the volume of trade in 2014–2016 in Fig. 1 is already introduced with deduction of the statistics of enterprises located in the occupied Crimea and in the ATO zone, and therefore, indicators show a deterioration of the situation, even without taking into account lost enterprises. It is from this perspective that one should proceed in assessing the possible economic development of Ukraine in the near future.
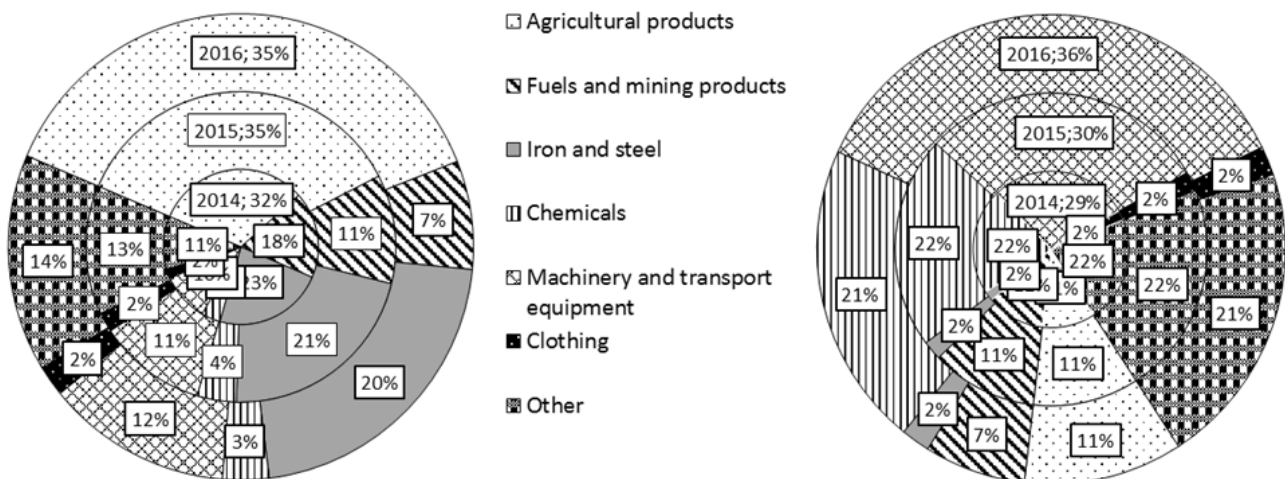

Fig. 2. Commodity structure of exports from Ukaine to the EU (on the left) and import from the EU to Ukraine (on the right)

The abovementioned proves the necessity of the economic and mathematical substantiation of the prospects for the development of foreign agricultural trade between Ukraine and the EU countries. The implementation of this is possible through the use of the clustering method and further implementation of a gravity model for each cluster.

3.2. Cluster analysis

For carrying-out cluster analysis, we selected the main indicators that characterize the level of development of trade relations: export and import of agricultural products, their share in total exports and imports, the existence of a common border with a trading partner, distance to a trading partner, the number of non-tariff re-

strictions applied by Ukraine to each trading partner from EU member states and applied by partner countries. As a result of using the "descending shoulder" method, the optimal number of clusters was determined for further use in k-means and dendrogram methods (Ward-Method). It is established that for the further analysis, the formation of 3 clusters is optimal.

Table 1 represents the distribution of countries by clusters using two methods. Each country is marked with a certain number. Using the Ward-Method, it was possible to divide the trading partners into three cluster groups with the corresponding numbering used in the study. With the application of the k-means method, the results obtained in the previous study using the Ward-method were confirmed.

Table 1. Cluster groups of foreign agricultural trade between Ukraine and the EU

Number of cluster	Member States of the European Union
1st cluster	Germany, Hungary, Poland, Romania, Slovakia
2nd cluster	Belgium, France, Italy, Malta, Netherlands, Portugal, Slovenia, Sweden, United Kingdom
3rd clusters	Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Ireland, Latvia, Lithuania, Luxembourg, Spain

A detailed analysis of each cluster group gave grounds to distinguish the peculiarities of each of them (Table 2). Taking into account the deviation of the indicators of each cluster from the average indicators, it can be stated that the first cluster of trading partners of agricultural products is import-oriented, which is evidenced by the deviation of the indicator of agricultural exports from the average one by more than twofold. The share of Ukrainian agrarian exports in the total export of goods to the trading partners of this cluster is only 20%. At the same time, it should be noted that all countries included in this cluster (except Germany) have a common border with Ukraine.

Analysis of the second cluster allows us to conclude that the countries included in this cluster are export-oriented. The ground for this assertion is a decline in the volume of agricultural exports from the average figures by 46%. In addition, the share of Ukrainian agrarian exports in the total export of goods to trading partners of this cluster is 54%. A characteristic feature of this cluster is the greatest distance from Ukraine.

The analysis of trade relations with countries of the third cluster allows us to state the weak trading relations in agricultural trade with Ukraine. This is determined by the high level of development of agricultural production in these countries (Austria, Bulgaria, Croatia, Denmark, etc.) and self-suffiency regarding food products. The countries mentioned are potential partners for Ukraine. Access to the markets of these countries is possible only with unique agricultural products, for example, products of flax industry, organic products, medicinal herbs, etc.

Table 2. Analysis of cluster groups of foreign agricultural trade between Ukraine and the EU

Cluster group	Number of trading partner countries	Volume of agricultural exports, mln USD	Volume of agricultural imports, mln USD	Share of agricultural exports in total exports of goods, %	Share of agricultural imports in total imports of goods, %	Distance, km
Total indicators						
1	5	1216	898	102	40	5069
2	9	2280	376	483	64	22372
3	14	1363	371	434	233	19684
Total	28	4859	1644	1019	337	47125
Average indicators						
1	5	243	180	20	8	1014
2	9	253	42	54	7	2486
3	14	97	27	31	17	1406
Total	28	174	59	36	12	1683
Deviation of cluster indicators from average ones (%)						
1	5	140	306	56	67	60
2	9	146	71	148	59	148
3	14	56	45	85	138	84

3.3. Gravity model.

For further analysis, we selected 18 indicators that describe the international trade relations between Ukraine and the countries of the European Union: the volume of agricultural exports (*Ag_Ex*), the volume of agricultural imports (*Ag_Im*), the total volume of Ukrainian exports to the EU (*Ukr_Exp*), the total volume of European import of goods to Ukraine (*UKR_Imp*), the share of agricultural products in total imports of goods (*C_AG_Imp_P*), share of agricultural products in total exports of goods (*C_AG_Exp_Ukr*), the existence of the common border (*Border*), GDP of Ukraine (*GNP_UKR*), GDP of the trading partner country (*GNP_P*), population of Ukraine (*Pop_UKR*), population of the trading partner country (*Pop_P*), the rate of the national currency of Ukraine relative to the EU currency (*Kurs*), GDP formed by the agricultural sector of Ukraine (*GNP_AG_UKR*), GDP formed by the agricultural sector of the trading partner country (*GNP_AG_P*), the share of the agrarian sector in Ukraine's GDP (*C_GDP_AG*), the area of agricultural land in Ukraine (*AG_Land_Ukr*), the area of agricultural land in the trading partner country (*AG_Land_P*) the distance between Ukraine and the trading partner country (*Distw*). All indicators were researched in the last 10 years: from 2006 to 2015.

To identify the most influential indicators for the export of agricultural products (*Ag_Ex*), we used a correlation analysis of the influence of the studied indicators. As a result, it was revealed that the most influential indicators are the volume of import of agricultural products to Ukraine from the EU countries (*Ag_Im*), the total vol-

ume of Ukrainian exports to the EU (*UKR_Exp*), the total volume of European imports of goods to Ukraine (*UKR_Imp*), the share of agricultural products in total imports goods from European countries to Ukraine (*C_AG_Imp_P*), the distance between Ukraine and the trading partner country (*Distw*).

A gravity model of foreign agricultural trade between Ukraine and the EU was formed on the basis of indicators obtained from the correlation analysis using the existing theoretical and methodological approaches to economic and mathematical modeling (3). The developed model was tested on the clusters that we formed (Table 3). The first column "Estimate" in the table shows the Estimate coefficients – *βi* for each cluster (Cluster 1, Cluster 2, Cluster 3), the second column "Std. Error" shows Residual Standard Error – μ, all other columns show the statistical significance of the resulting equations.

$$log.Ag\_Ex = \alpha\,\beta_1 log.Ag\_Im + \beta_2 log.UKR\_Exp + \beta_3 log.UKR\_Imp +$$
$$+\beta_4 log.C\_AG\_Imp\_Ukr + \beta_5 log.GDP\_AG\_P + \beta_6 log.distw + \mu \qquad (3)$$

where: μ_{ij} – residual standard error; β_I – vectors of parameters to be estimated, $Pr(>|t|)$ – t value in a T distribution table.

Table. 3. Results of using gravity model

	Cluster 1				Cluster 2				Cluster 3			
	Esti ma-te(β_I)	Std, Error (μ)	t value*	Pr (>|t|)**	Esti ma-te(β_I)	Std, Error (μ)	t value*	Pr (>|t|)**	Esti ma-te(β_I)	Std, Error (μ)	t value*	Pr (>|t|)**
Intercept (α)	1.082	0.017	62.845	2e-16	0.981	0.161	6.081	3.5e-08	0.793	0.079	9.997	2e-16
log_Ag_Im	0.003	0.001	2.642	0.011	0.009	0.003	2.818	0.006	0.003	0.002	2.121	0.036
log_UKR_Exp	0.084	0.002	49.382	2e-16	0.088	0.003	27.051	2e-16	0.106	0.002	51.486	2e-16
log_UKR_Imp	-0.001	0.001	-1.199	0.023	0.002	0.006	0.514	0.061	-0.007	0.002	-2.775	0.006
log_C_AG_Imp _Ukr	0.084	0.001	80.278	2e-16	0.124	0.005	25.983	0.011	0.096	0.002	50.337	2e-16
log_GDP_AG_P	0.001	0.001	3.598	0.001	-0.028	0.017	-1.656	0.051	-0.001	0.008	-0.073	0.014
log_distw	-0.002	0.002	-1.202	0.024	-0.002	0.004	0.561	3.5e-08	-0.003	0.079	1.775	0.038
R-square	$R^2 = 0.785$				$R^2 = 0.962$				$R^2 = 0.735$			

t- value* – is the ratio of the departure of the estimated value of a parameter from its hypothesized value to its standard error.

Pr(> |t|)** – this is the two-tailed p-value evaluating the null against an alternative that the mean is not equal to 50.

The table presents the basic statistical parameters of a gravitational model for each of the clusters: a column Estimate coefficients are the regression coefficient; Std. Error is residual standard error are the weights that minimize the sum of the square of the errors; the coefficient t-value is a measure of how many standard deviations our coefficient estimate is far away from 0; Pr(>|t|) – t value in a T distribution table with the given degrees of freedom is in norm. The R-squared statistic provides a measure of how well the model is fitting the actual data. It takes the form of a pro-

portion of variance. R-square is a measure of the linear relationship between our predictor variable and our response / target variable. In our calculations, high R-squares were obtained, which indicates the high reliability and strainity of the gravitational equations for each cluster.

*3.3.1. Analysis of the gravity model for European countries of **the first cluster** (Germany, Hungary, Poland, Romania, Slovakia).* An increase in agrarian import to Ukraine by 1% from one of the trading partners of the first cluster will increase the agricultural export by USD 3 mln. An increase in the total volume of exports of goods from Ukraine by 1% will lead to the increase the export of agricultural products by USD 84 mln. An increase in the total import of goods to Ukraine by 1% will reduce the export of agricultural products by USD 1 mln. A 1% increase in the share of agricultural products in the general import of Ukraine from a trading partner will result in increasing the export of agricultural products by USD 84 mln. A 1% increase in GDP, which forms the agriculture of a trading partner country, will increase the export of agricultural products by USD 1 mln. An increase in the distance between Ukraine and a trading partner country by 1% leads to a reduction of agricultural exports by USD 2 mln.

*3.3.2. Analysis of the gravity model for European countries of **the second cluster** (Belgium, France, Italy, Malta, the Netherlands, Portugal, Slovenia, Sweden, United Kingdom).* An increase in agricultural import to Ukraine from one of the trading partner countries of the second cluster by 1% will increase the agricultural export by USD 9 mln. An increase in the total volume of exports of goods from Ukraine by 1% will increase the agricultural export by USD 88 mln. An increase in the total import of goods to Ukraine by 1% will lead to the increase the agricultural export by USD 2.8 mln. An increase in the share of agricultural products in the total imports from the trading partner to Ukraine by 1% will result in increasing the agricultural export by USD 124 mln. The increase in GDP, which forms the agriculture of the trading partner country, by 1% will lead to reducing the export of agricultural products by USD 2.7 mln. An increase in the distance between Ukraine and the trading partner country by 1% will reduce the volumes of agricultural exports by USD 2.3 mln.

*3.3.3. Analysis of the gravity model for European countries of **the third cluster** (Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Greece, Ireland, Latvia, Lithuania, Luxembourg, Spain).* An increase in agicultural import to Ukraine from one of the trading partner countries of the third cluster by 1% will lead to the increase of the agricultural export by USD 3 mln. An increase in the total volume of exports of goods from Ukraine by 1% will increase the agricultural export by USD 106 mln. An increase in the total imports of goods to Ukraine by 1% will result in reducing the export of agricultural products by USD 6.5 mln. An increase in the share of agricultural products in the general import from the trading partner to Ukraine by 1% will lead to an increase in agricultural exports by USD 96 mln. The increase in GDP, which forms the agriculture of the trading partner country, by 1%, will reduce the agricultural export by USD 1 mln. An increase in the distance

between Ukraine and a trading partner country by 1% will reduce the volume of exports of agricultural products by USD 2.6 mln.

4. Discussion

The authors researched and demonstrated the main tendencies in foreign agricultural trade between Ukraine and the countries of the European Union. The distribution of European trade partner countries when conducting foreign agricultural trade is of particular value. The result of the research is the distribution of all trading partners into three clusters, each of which has important peculirities and differences. The first cluster brings together European trading partner countries which are oriented towards import of agricultural products. The second cluster groups the countries that are targeted at export of agricultural products from Ukraine and the third cluster are potential partners for the export of agricultural products.

The authors also identified the main stimulating and discouraging factors that affect the volume of agricultural exports to European trade partner countries. The obtained coefficients in the gravity models for each cluster can be further used as indicators of foreign agricultural trade between Ukraine and the EU countries.

5. Conclusions

1. The study of the dynamics of foreign trade in the geographical and commodity dimensions allows us to conclude that in recent years, exports to the EU, Africa and Australia have increased significantly. This can be explained by changes in the positions of individual regions in the international division of labor, geographical reorientation of Ukrainian producers, Russian aggression, etc. The largest exporters to Ukraine are the EU countries, while the CIS, including Russia, occupied the second place, and the countries of Asia the third one. At the same time, imports from the CIS countries (RF) decreased, while supplies from Europe, the EU, Asia and America increased.

2. In the course of the research, an algorithm for carrying out cluster analysis with the further construction of a gravity model for each cluster was developed. As a result of the testing of this algorithm, three clusters ("export-oriented", "import-oriented" and "potential partners") were formed. As a result of the use of the gravity model for each cluster, the following significant stimulating and discouraging factors that influence the development of foreign agricultural trade between Ukraine and the EU were singled out.

3. When the cluster analysis was carried out for each cluster of trading partner countries, the main encouraging and discouraging factors were identified.

For the first cluster (which was defined by the authors as an "import-oriented"one), the encouraging factor is a total volume of exports from Ukraine to a trading partner country, the discouraging one is the distance to this partner.

For the second cluster (which was defined by the authors as an "export-oriented"), the stimulating factor is a share of agricultural goods in the total imports to Ukraine from a trading partner country, the discouraging one is GDP that forms agriculture of a trading partner country.

For the third cluster (which was defined by the authors as a cluster of "potential partners"), the encouraging factor is a total exports volume of goods from Ukraine, the discouraging one is the total volume of imports to Ukraine.

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TARPTAUTINĖS ŽEMĖS ŪKIO PREKYBOS KLASTERIZAVIMAS
TARP UKRAINOS IR ES

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Santrauka

Šio tyrimo aktualumą lemia poreikis perorientuoti Ukrainos užsienio prekybos politiką ir prisitaikyti žemės ūkio sektorių prie konjunktūrinių pokyčių pasaulio žemės ūkio rinkose. Šiandien Ukrainos užsienio prekybos struktūra iš esmės keičiasi atsižvelgiant į ekonominę ir socialinę bei politinę aplinkybės. Problema yra tai, kaip identifikuoti potencialius partnerius ir nustatyti ekonomiškai perspektyviausias ilgalaikio bendradarbiavimo grupes? Tai yra vienas svarbiausių užsienio ekonominės veiklos vystymo klausimų. Straipsnio tikslas – nustatyti pagrindinius žemės ūkio produktų prekybos partnerius tarp Ukrainos ir ES. Naudojant k-vidurkio ir Ward metodus, vykdomas ES valstybių narių ir Ukrainos prekybos partnerių grupavimas. Išskiriamos trys klasterių grupės ir aprašyti pagrindiniai juos veikiantis veiksniai.

Raktažodžiai: užsienio prekyba, eksportas, importas, žemės ūkio produktai, klasterių analizė, gravitacijos modelis, efektyvumas.

JEL kodai: F10, F13, F17.