

СВІТОВЕ ГОСПОДАРСТВО І МІЖНАРОДНІ ЕКОНОМІЧНІ ВІДНОСИНИ

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METHODICAL APPROACHES TO EVALUATION OF THE ROLE OF ORGANIC AGRICULTURE IN THE EUROPEAN UNION MEMBER STATES ECONOMIES

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Introduction. The rural development is for the most countries one of the strategic development priorities. An important component of rural development is a support of the ecological agricultural products production. Organic agriculture is developing more and more through the demand increasing favorable impact on the environment. The EU member states were among the first who began to apply benefits of organic agriculture. Detailed study and evaluation of the role of organic agriculture in these countries will help to determine the potential of its application in economic conditions of Ukraine.

Literature review. The problem of the role of organic agriculture in the rural development was discussed in the works by M. Lesiv [9], V. Krupin [6], M. Lendyel [8]. So M. Lesiv notes the important role of organic agriculture in sustainable rural development. M. Lendyel concludes that the most part of funding through the EU Common Agricultural Policy is aimed at reorientation of agriculture on ecological principles. As the source of data on organic farming served statistical yearbooks [13]. For the most part, scientists have concentrated on the development of agriculture in general, without selection its organic part as an object of analysis. To identify the expediency of organic agriculture in Ukraine, the experience of leading countries, including EU countries, will be learned.

Problem statement. The role of organic agriculture in the EU member states and in Ukraine will be evaluated. The article deals with the EU countries classification on the basis of cluster analysis taking into account the role of organic agriculture in their economies by criteria such as the share of rural population, the share of organic farmland and the share of employed in organic agriculture.

Research results. The leading role in the EU rural development belongs to agriculture [9]. The support of agriculture is considered as a priority within the Rural Development Policy. Rural agriculture plays the main role in the matters of social-economic development, as for the majority of rural residents it remains to be the basic income source. However in recent decades in rural areas is observed the tendency to develop alternative economic activities, which would give an opportunity for rural residents to earn higher incomes than those they can get from agricultural production.

Changes in rural development promotion policy in Europe are related in recent years primarily to revision of human's role in maintaining of ecological integrity and nature wealth in non-urban areas [8]. The environmental component of sustainable rural development is of particular relevance. The reason for that is represented in the necessity of environmental security, of climate changes prevention and of ecological balance preservation. And there is a necessity to diversify agricultural production by the development of ecological production. Prevention the depletion of land and exclusion of suitable land from agricultural production are the main components of ecological rural development policy of the EU. Organic production in Europe is profitable due to the high price of products and the absence of spending for chemical

components. It functions simultaneously economically and environmentally. Today in the European Union in organic agriculture are occupied 5.7% of agricultural land [13].

According to studies, in Ukraine 19% of land is suitable for the development of organic agriculture. Organic products produced by enterprises in small quantities are not sold in the domestic market because of its low cost. Scientists M. Kropyvko and O. Kovaleva notice that such production becomes highly profitable a few years later only, after the rebuilding of enterprise technological base [5]. European farmers are able to adapt during this period to the new conditions of business due to the direct state support. But in Ukraine there are only a few households which risks to develop a sustainable production. The reason of inability to sale organic products in domestic market is the low level of real incomes in the country. The share of food costs in the households expenses is high, so for most Ukrainian people a transition to organic products sold at much higher prices is not possible [8].

Taking this arguments into consideration, it is important to analyze an international experience and to give an objective of the role of organic agriculture in the EU countries and, consequently, in their rural development. In order to obtain such an evaluation we have analyzed a number of indicators that can be divided into primary and secondary. To the primary belong the following indicators:

- the share of the rural population in the EU countries;
- the share of land area involved in organic agriculture, in the general area of each EU countries;
- the share of employed in organic agriculture in each of the EU countries.

Secondary indicators are:

- GDP in US dollars per capita in EU countries;
- value added in agriculture in US dollars per 1 employee of the EU member state.

These figures reflect the resources available to the country, and in terms of organic agriculture the role of these resources in their economies, as well as they show how large is the share of population receiving income from organic agriculture.

The analysis shows that in general more than 25% of the EU population lives in rural areas [11]. The largest share of rural residents accounts for countries of Central and Eastern Europe, especially for Slovenia (50.3% of the population), Slovakia (46.2%), Romania (45.6%), Croatia (41.3%), Poland (39.4%), as well as Portugal and Ireland (37%). As for Ukraine, the share of rural population is significant and almost 30.5%, being about the same level as for Italy and higher than the average for the EU, which is 25%.

During the analysis was detected the irregularity in distribution of shares of organic farmland among the EU countries [13]. For example, the largest share of organic farmland occupies in Austria (19.4%) and for Sweden this figure is 60 times smaller. For six EU member states, the share of organic land in 2014 exceeded 10%, and for 21 countries, the figure was between 1 and 10%. The average value of this indicator for the EU as a whole is 6.4%. Considering the share of organic farmland in Ukraine, it was 1% in 2014, which is almost the smallest level for the EU, which corresponds to Malta.

This distribution of agricultural land among the countries is primarily caused by climate conditions, soil quality, and historical background, which contributed the active using of the available land resources in agriculture.

The most employees in organic farming in 2014 were registered in Austria (0.5%), the least – in Malta (0.01%). The figure for Ukraine in 2014 amounted to 0.001%, which is the lowest among EU indicators [13].

Value added of organic agriculture in the GDP of EU countries remains low – about 0.2% in 2014 [13]. The largest share of GDP among EU member states organic agriculture occupies in Denmark and Austria, where it was about 7% of GDP in 2014. Value added of organic farming for EU member states increased by 460% in 2014, compared to the level of 1997 [12].

Analyzing the data above, we note that the role of organic agriculture in each of the EU member states is different, but country groups with common characteristics and the level organic farming can be selected. Using cluster analysis, we are going to make a grouping of EU member states according to the following features:

- 1) the share of organic agricultural land area in the total land area;
- 2) the share of organic agriculture employment in the total employment;
- 3) the share of the rural population.

For evaluation was applied statistics for 2014. In the first phase were formed two groups of indicators by which member states can be classified.

The first group includes such indicators as the share of organic farmland and the share of employment in organic agriculture. This group of indicators was selected to track how the EU member states decide the question of organic development on existing agricultural lands and their involvement in agricultural production.

The second group of indicators reflects the degree of involvement of the rural population in organic agricultural production in the EU member states and covers such indicators as the share of the rural population and the share of employment in organic agriculture.

In order to build the cluster model, with help of which the clustering of EU member states was made, normalized value of each of the studied indicators was calculated. For this the method of minimum-maximum was applied, using the formula:

$$X_N = \frac{X - \min(X)}{\max(X) - \min(X)}, \tag{1}$$

where X_N is normalized value;

\min and \max are minimum and maximum of set X.

The results of calculation show that the normalized values of indicators are located in intervals from 0 to 1.

As part of the analysis, the 9 major clusters were selected, which provide different combinations of such characteristics as share of organic farmland or share of rural population and share of employment in organic agriculture.

Belonging of countries to the relative cluster will be defined by calculation of the Euclidean distance between the central values of the relative clusters and the normalized values of share of organic farmland or share of rural population and the share of employed in organic agriculture for each of the EU member states.

The distance is calculated using the formula:

$$dist = \sqrt{(X_C - X_i)^2 + (Y_C - Y_i)^2}, \tag{2}$$

where $dist$ – Euclidean distance;

X_C – central value for cluster by X axis (share of farmland or share of rural population);

Y_C – central value for cluster by Y axis (the share of employment in organic agriculture);

X_i – point value by X axis (normalized value of share of organic farmland or share of rural population);

Y_i – point value by Y axis (normalized value of share of employed in organic agriculture).

With regard to each of the identified groups of indicators were calculated Euclidean distances for all countries. The results of calculation determined that the EU member states belong to 8 clusters. Each of the countries was referred to the cluster to which central point the Euclidean distance appeared to be the least.

The results of this assessment show that most EU countries belonging to clusters with low and average shares of organic farmland and average and below average shares of employed in organic agriculture. The importance of organic agriculture for Austria is highly expressed by the significant shares of employment and land.

For the second indicators group results of Euclidean distances calculation show that countries have been divided among 6 clusters. In most cases, EU countries belong to clusters with low and medium shares of employed in organic agriculture and of rural population. Romania and Slovenia have the largest shares of employed in organic agriculture.

Combining all three characteristics in one cluster model shows that EU countries can be divided between the 14 clusters by the share of employed in organic agriculture, the share of rural population and the share of organic agricultural land (Table 1).

Table 1

Distribution of EU countries between clusters by criteria of share of organic farmland, share of rural population and share of employed in organic agriculture [4, 7, 11, 13]

Cluster	Features	Countries
1	2	3
1	Low share of employed in organic agriculture; low share of rural population; low share of organic agricultural land	Belgium, Luxembourg, Malta, Netherlands
2	Low share of employed in organic agriculture; low share of rural population; average share of organic agricultural land	Denmark
3	Low share of employed in organic agriculture; average share of rural population; low share of organic agricultural land	Cyprus, France, Hungary, Ireland, United Kingdom

Continued Table 1

4	Low share of employed in organic agriculture; average share of rural population; average share of organic agricultural land	Czech Republic, Germany, Portugal
5	Low share of employed in organic agriculture; average share of rural population; high share of organic agricultural land	Sweden
6	Average share of employed in organic agriculture; average share of rural population; low share of organic agricultural land	Bulgaria
7	Average share of employed in organic agriculture; average share of rural population; average share of organic agricultural land	Italy, Spain, Latvia, Lithuania, Finland
8	Average share of employed in organic agriculture; average share of rural population; high share of organic agricultural land	Estonia
9	Average share of employed in organic agriculture; high share of rural population; low share of organic agricultural land	Greece
10	Average share of employed in organic agriculture; high share of rural population; high share of organic agricultural land	Austria
11	High share of employed in organic agriculture; low share of rural population; low share of organic agricultural land	Poland, Croatia
12	High share of employed in organic agriculture; low share of rural population; average share of organic agricultural land	Slovak Republic
13	High share of employed in organic agriculture; average share of rural population; low share of organic agricultural land	Romania
14	High share of employed in organic agriculture; average share of rural population; average share of organic agricultural land	Slovenia

If to calculate the Euclidean distance to central values of clusters above for Ukraine, it will belong to the third cluster, which is characterized by low levels of shares of employed in organic agriculture and of organic farmland and the average level of share of rural population. Among the EU Member States this cluster includes Cyprus, France, Hungary, Ireland, United Kingdom.

Comparing the results of cluster analysis to GDP per capita in EU, it can be argued that countries with high GDP, such as Luxembourg, Denmark, Sweden, Ireland, have the low share of employment in organic agriculture, regardless of share of rural population or agricultural land in them (Fig. 1).

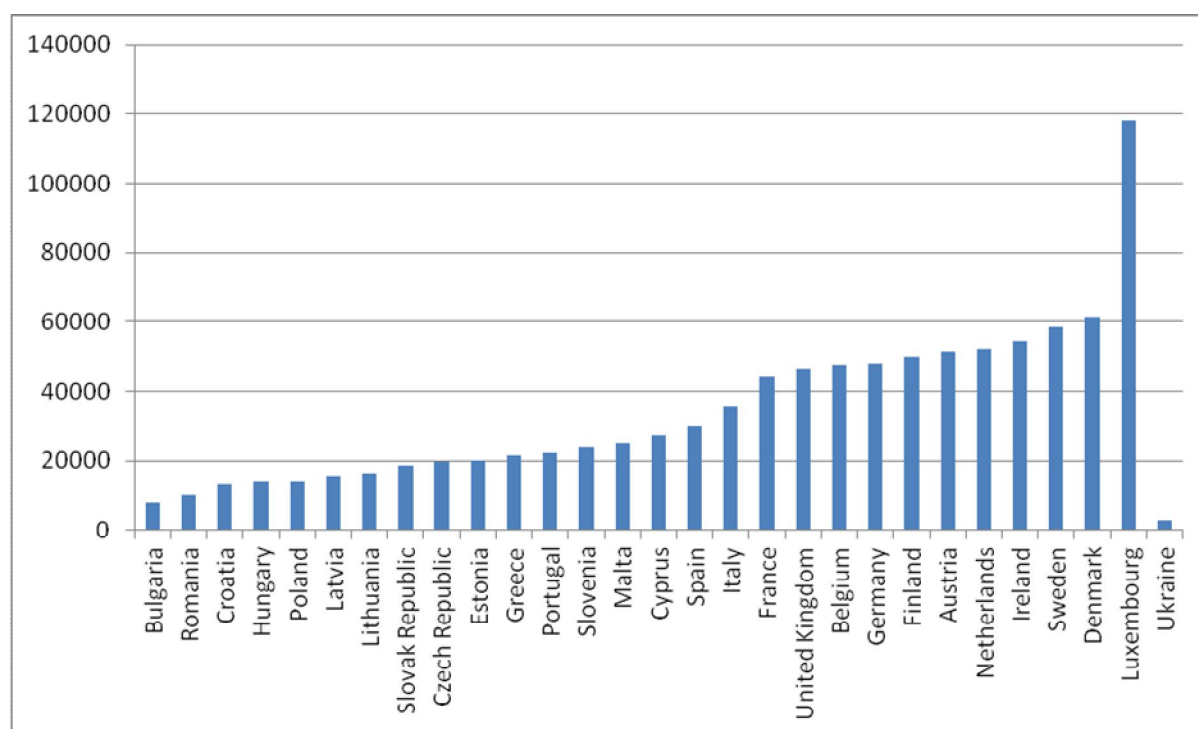


Fig. 1. GDP per capita US dollars in EU countries and in Ukraine in 2014 [3]

This can be explained primarily by the fact that these countries are focused on somewhat more profitable activities such as the service sector (including financial, information), high-tech production [10]. As for organic agriculture, we note that these countries widely use modern technologies in production, which

does not require significant involvement of the workforce. However, often the rural population in these countries prefer non-agricultural activities. For countries with lower GDP, such as Romania, Croatia, Poland, the situation is the opposite, the rural population is more involved in organic agricultural production. But for such countries as Bulgaria and Hungary, where the number of rural residents indicators are average, and agricultural land under organic production is low, a number of employed in organic agriculture is low (Hungary) and average (Bulgaria). As for Bulgaria, one of the key reasons for this is that the rural population is mainly in the retirement age or is not qualified to conduct agricultural activities [1]. In Hungary agriculture has an important long played role, but as a result of restructuring and the collapse of large farms, which were typical in socialist times, capacities in agriculture decreased significantly [2].

As we can see in Fig. 1, GDP per capita for Ukraine is at a rather low level. It is more than two times lower than the lowest EU level, which belongs to Bulgaria. This negative situation is caused by the inefficiency of Ukraine's economy in general. However, organic sales occupy a small share of the market, and do not reach 0.1%.

To examine the efficiency of agriculture in EU according to defined by cluster analysis groups of countries, they were analyzed in combination with value added indicator of organic farming per 1 employee (Fig. 2).

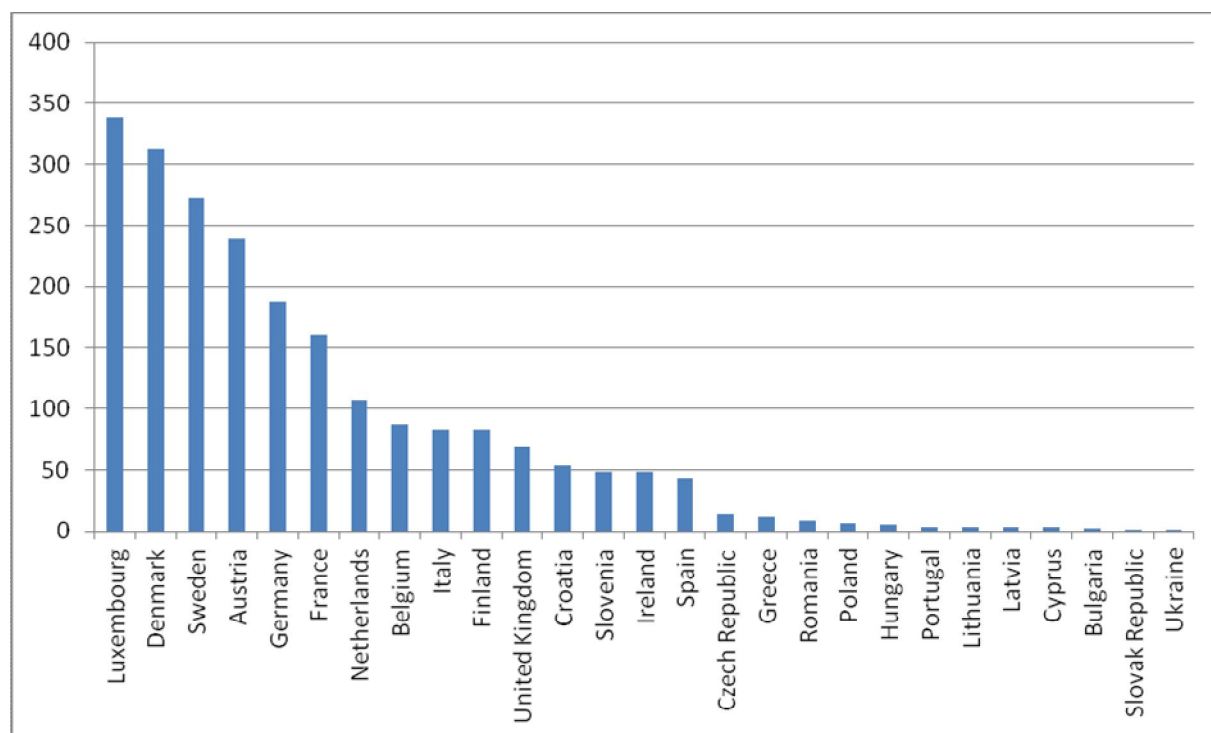


Fig. 2. Value added of organic agriculture per 1 employee in EU countries and in Ukraine in 2014 (euro) [13]

The results of this analysis have showed that the advanced countries of the first cluster show high rates of value added per worker, but for them is characteristic a low level of involvement in organic agricultural production in general. At the same time, by the low level of employment in these countries in organic agriculture the productivity level of employees working in this area is high, which can be explained by the use of modern technologies in agriculture, which involves reducing manual labor and increases productivity in general.

Clusters from 2 to 5 bring together countries with predominantly medium and high agricultural productivity. The exceptions in this case are Cyprus and Hungary, with a lower level of involvement in agriculture in general and lower productivity. Other exceptions are the Czech Republic and Portugal, which are more dependent on agriculture and have the lower productivity level.

Most of the countries in clusters from 6 to 14 illustrate the low productivity and a high level of involvement in organic agricultural production. The explanation for this is inefficient methods used by these countries. They require modernization and the implementation of modern technologies. The exceptions in this group are Austria, Italy, Finland, Croatia, Slovenia, which show high productivity levels of organic farming among all EU countries and closer to the high level of involvement in organic agriculture.

For Ukraine, the rate of labor productivity in organic agriculture was 0.65 euro, which is the lowest in the EU.

Conclusions. Summarizing the results of the analysis and evaluation, we note that for the most EU countries the participation of rural residents in organic agriculture is growing. For high-developed EU countries, such as Luxembourg, Denmark, Sweden, Ireland, organic agriculture does not play a significant role in the national economy. For the less developed countries of the EU and for the Austria, organic farming is important, but for most of them it is inefficient. With this regard, the task of such countries is the modernization and restructuring of organic agriculture in such a way that it can provide the appropriate level of income for the population and encourage the rural development. For Ukraine, the organic agriculture is a perspective direction, but it is ineffective and needs improvement and change. We suppose that the use of the EU experience will serve as a driving force for progress and restructuring of Ukraine's agriculture.

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Ключові слова: органічне сільське господарство, органічна продукція, оцінювання, кластерний аналіз, групування, Європейський Союз.

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Irina Chyckalo-Kondratska, D.Sc. (Economics), Professor, Head of International Economics and Marketing Department. **Olha Fedina**, Student. Poltava National Technical Yuri Kondratyuk University. **Methodical approach to evaluation of the role of organic agriculture in the European Union member states economies.** In the article is reasoned the place of organic farming in the economies of member states. The classification of EU member states is made on the basis of cluster analysis, taking into account the role of organic agriculture in their economies, on the criteria of share of rural population, share of organic farmland and share of employed in organic agriculture. Evaluation has shown that organic agriculture is more important for Austria and some of the relatively less developed EU countries. The aim of such countries, as well as for Ukraine, is the transition to a more efficient organic agriculture, which will provide an adequate level of income for the population and the rural development.

Keywords: organic agriculture, organic product, evaluation, cluster analysis, grouping, European Union.

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Ирина Борисовна Чичкало-Кондрацкая, доктор экономических наук, профессор, зав. кафедрой международной экономики и маркетинга. **Ольга Игоревна Федина**, студентка. Полтавский национальный технический университет имени Юрия Кондратюка. **Методический подход к оцениванию роли органического сельского хозяйства в экономике стран-членов Европейского Союза.** В статье определено место органического сельского хозяйства в экономике стран-членов ЕС. Произведена классификация стран-членов ЕС на основании кластерного анализа с учётом роли органического сельского хозяйства в их экономике по критериям доли сельского населения, доли органических сельскохозяйственных угодий и доли населения, занятого в органическом сельском хозяйстве. Оценивание показало, что органическое сельское хозяйство имеет большее значение для Австрии и некоторых сравнительно менее развитых стран ЕС. Задачей таких стран, как и Украины, является переход к более эффективному органическому сельскому хозяйству, которое обеспечит надлежащий уровень доходов для населения и развитие сельских территорий.

Ключевые слова: органическое сельское хозяйство, органическая продукция, оценивание, кластерный анализ, группирование, Европейский Союз.