

DOI: <https://doi.org/10.32782/2524-0072/2024-61-122>

UDC 338.48 (477)

CLUSTER ANALYSIS OF THE DEVELOPMENT OF RURAL TOURISM IN UKRAINE

КЛАСТЕРНИЙ АНАЛІЗ РОЗВИТКУ СІЛЬСЬКОГО ТУРИЗМУ В УКРАЇНІ

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The article provides a cluster analysis of the development of rural tourism in Ukraine. Attention is focused on the fact that rural tourism is one of the ecologically oriented types of tourism, which is aimed at implementing the concept of sustainable development of rural areas and communities. Attention is paid to the main advantages of the organization of tourism business based on the cluster model. For conducting the cluster analysis, a system of indicators was formed that characterize the level of development of rural areas and the state of development of rural tourism in the regions of Ukraine. On the basis of the conducted analysis, regions of Ukraine are grouped according to similar signs of development. As a result of the conducted research, attractive regions of Ukraine are identified and optimal measures are proposed for the development of rural tourism in each region of Ukraine.

Keywords: rural tourism, sustainable development, rural areas, regions of Ukraine, cluster analysis.

Туристична галузь в Україні законодавчо визнана одним із пріоритетних напрямів розвитку національної економіки та культури. З розвитком галузі туризму одночасно сформувались і нові види туризму, які поступово зайняли свої місця на туристичному ринку. Одним із таких видів є сільський туризм – перспективний напрям розвитку туристичної галузі, який відкриває нові можливості для вирішення ряду проблем розвитку сільських територій. Україна володіє значним туристичним потенціалом. Сільський туризм – перспективний напрям розвитку туристичної галузі в усіх регіонах, що приваблюють туристів своїми природними особливостями та багатою історико-культурною спадщиною. Але водночас в кожному регіоні існує значний невикористаний людський та малоосвоєний рекреаційний потенціал для розвитку сфери сільського туризму, які можна ефективно використовувати в майбутньому у відпочинково-туристичних цілях. Для цього Україна повинна стимулювати розвиток малого підприємництва у сфері організації відпочинку у селі та створити умови для всебічного заохочення населення до участі у розвитку сільського туризму. Перспективний розвиток сільського туризму в Україні потребує певної моделі організації туристичної діяльності, яка сприятиме сталому розвитку сільського туризму. Однією з таких моделей є кластерна модель розвитку сільського туризму. Географічний вимір може варіюватися від окремого міста або області (регіону) до усєї країни або навіть мережі країн, що є сусідніми між собою. У статті проведено кластерний аналіз розвитку сільського туризму в Україні. Акцентовано увагу на тому, що сільський туризм є одним із екологічно орієнтованих видів туризму, який спрямований на реалізацію концепції сталого розвитку сільських територій та громад. Звернено увагу на основні переваги організації туристичного бізнесу на основі кластерної моделі. Для проведення кластерного аналізу сформовано систему показників, які характеризують рівень розвитку сільської місцевості та стан розвитку сільського туризму в регіонах України. На основі проведеного аналізу згруповано області України за схожими ознаками розвитку. У результаті проведеного дослідження ідентифіковано привабливі регіони України і запропоновано оптимальні заходи для розвитку сільського туризму у кожному регіоні України.

Ключові слова: сільський туризм, сталий розвиток, сільська місцевість, регіони України, кластерний аналіз.



Statement of the problem. Rural tourism is one of the ecologically oriented types of tourism, which is aimed at implementing the concept of sustainable development of rural areas and communities. This type of tourism is an effective tool for helping the rural population to improve the socio-ecological and economic development of rural settlements and is a perspective way of development and reconstruction of Ukrainian villages in the war and post-war period.

The development of certain types of tourism depends in each region on geographical, social and economic factors. Today's realities require flexibility and quick adaptation to modern trends. Tourism as a socio-economic phenomenon is not an exception, on the contrary, it intensively implements the latest technologies, forms social guidelines and provides an economic effect. In this connection, new directions and types are emerging in tourism [4].

Today, this type of tourist activity functions exclusively at the expense of the personal initiative of the rural population, acting as one of the means of overcoming poverty in rural area [11].

The development of rural tourism with the involvement of all the possibilities of a modern Ukrainian village, i.e. the use of free living space of a personal peasant farm, rich recreational and tourist resources of the region, recreational services that can be offered by the owner of a rural estate, opens up good opportunities for the peasant to provide not only for his family yes, but also to benefit the rural community. Today, there are many rural areas in Ukraine that can interest tourists and create comfortable conditions for recreation and living [2].

It should be noted, that the cluster approach in the regional development of European countries has become an important mechanism in determining the pace of industrial and economic development. This approach determines the strategy of regional development of territories regardless of their size in the new conditions of competition and globalization. Clusters are the important prerequisite for increasing competitiveness, productivity and growth of mostly small and medium-sized enterprises. Clusters are a universal mechanism for providing better experience for acquiring skills, building a knowledge infrastructure, marketing research, risk distribution due to joining organizations in a network, developing joint strategies for the activities of market entities, building a corporate culture [10, p. 12].

Analysis of recent research and publications. Studying the peculiarities of

cluster formation and functioning dedicated to the work of such domestic scientists as Dutka A., Savitska O., Savitska N., Gavrillko P. P., Kolo-diychuk A. V., Vazhynsky F. A., Pistunov I. M., Antoniuk O. P., Turchaninova I. Yu., Zhybak M. M., Khristenko G. M. etc. [1; 2; 6; 11].

However, further research is needed to analyze the state of rural tourism in Ukraine and search for actual directions of regional development through the formation of clusters of rural tourism.

Formulation of article goals. The purpose of the work is to conduct a cluster analysis for determining the state of development of rural tourism in Ukraine at the current stage. For that, the geographical regions of Ukraine were studied according to various indicators and were grouped into cluster groups based on similar signs of development. This will make it possible to identify attractive regions of Ukraine and design optimal measures for the development of rural tourism in the near future, taking into account regional characteristics. This will contribute to the efficient use of resources and the creation of sustainable tourist clusters.

Presentation of the main research material. The advantages of the development of rural tourism consist in the preservation of the environment and cultural heritage of rural regions. The perspective development of rural tourism in Ukraine requires a specific model of the organization of tourist activities that will contribute to the sustainable development of rural tourism. One of these models is the cluster model of sustainable rural tourism development. The geographic dimension can vary from a single city or oblast (region) to the entire country or even a network of neighboring countries. Associations of cluster subjects can be very diverse, but mainly include businesses that create goods and final services, suppliers of raw materials, components, equipment, services, financial institutions, enterprises in related sectors of the economy, public and volunteer organizations. Government and state institutions that have an influence on the geographical territory of cluster can also be a participant in cluster formation.

The purpose of cluster analysis is the formation of groups of similar objects, which are usually called clusters. Cluster analysis is a set of methods that allow classifying multivariate observations, each of which is described by a set of output variables X_1, X_2, \dots, X_n [6, p. 4].

For the statistical analysis, the information provided in the statistical collection "Regions of Ukraine 2020. Part 1" [9] and the statistical

information “Collective means of accommodation in Ukraine (legal entities, separate divisions of legal entities) in 2020” [8] were used.

One of the methods of grouping regions according to the level of development of tourist activity based on a system of indicators is cluster analysis, which consists in dividing a given sample of objects into subsets (clusters) in such a way that each cluster consists of similar

objects, but the objects of different clusters must differ significantly.

To conduct the cluster analysis, the system of indicators was formed. The indicators characterize the level of development of rural areas (Table 1) and the state of development of rural tourism in the regions of Ukraine (Table 2).

Cluster analysis was performed using the Statistica 10.0 program.

Table 1

Indicators of the development of rural settlements in 2020 by regions of Ukraine

Regions of Ukraine	Conditional designation of the region	Number of rural settlements, units	The number of available rural population, persons	Rural housing fund, thousand m ²	Unemployment of the population aged 15-70, thousand persons	The total number of monuments of cultural heritage, units	Objects of the nature reserve fund of national and local significance, units
		X1	X2	X3	X4	X5	X6
Vinnitsia region	C_1	1456	1529123	27631	75,8	4329	431
Volyn region	C_2	1054	1027397	13642	51,9	1529	393
Dnipropetrovsk region	C_3	1436	3142035	14995	129	11708	180
Donetsk region	C_4	1115	4100280	7334	125,1	2192	178
Zhytomyr region	C_5	1613	1195495	17142	60,1	6948	242
Zakarpattia region	C_6	578	1250129	19856	58,7	1568	478
Zaporizhzhia region	C_7	914	1666515	10929	84,4	8906	347
Ivano-Frankivsk region	C_8	765	1361109	22072	50,5	3944	560
Kyiv region	C_9	1126	1788530	33665	55,9	3606	238
Kirovohrad region	C_10	991	920128	10195	52,7	5021	223
Luhansk region	C_11	780	2121322	5195	52,3	6152	203
Lviv region	C_12	1850	2497750	27580	84,9	8479	399
Mykolaiv region	C_13	885	1108394	8818	57,4	5877	146
Odesa region	C_14	1122	2368107	22531	75,9	4449	125
Poltava region	C_15	1805	1371529	16250	77	4694	393
Rivne region	C_16	999	1148456	15366	48	2365	317
Sumy region	C_17	1455	1053452	10785	47,8	2592	291
Ternopil region	C_18	1023	1030562	16175	52	4172	643
Kharkiv region	C_19	1673	2633834	14228	79,6	9474	246
Kherson region	C_20	656	1016707	9531	55,6	5759	84
Khmelnyskyi region	C_21	1414	1243787	18608	55,6	2896	536
Cherkasy region	C_22	824	1178266	18490	53,1	9103	561
Chernivtsi region	C_23	398	896566	14009	36,8	2371	331
Chernihiv region	C_24	1464	976701	14826	55,4	8897	203

Source: [9]

Table 2

**Performance indicators of collective accommodation facilities (KAF) in 2020
by regions of Ukraine**

Regions of Ukraine	Conditional designation of the region	Number of KAF by region, units	The total number of seats in the KAF by regions, units	The number of persons who were in KAF, persons	Number of tour operators and travel agents, units	The number of tourists served by tour operators and travel agents, persons	Number of overnight stays in KAF, units	Total number of working days of KAF, days
		Z1	Z2	Z3	Z4	Z5	Z6	Z7
Vinnitsia region	C_1	10	1017	23499	79	26470	67934	2660
Volyn region	C_2	36	1987	28323	70	10047	62178	4008
Dnipropetrovsk region	C_3	87	8047	151077	431	78100	365549	22819
Donetsk region	C_4	65	7396	73285	82	18672	404757	11458
Zhytomyr region	C_5	16	1193	17719	59	11203	105056	5222
Zakarpattia region	C_6	48	3905	47266	72	14669	163861	9691
Zaporizhzhia region	C_7	119	16169	92794	147	33169	499999	15027
Ivano-Frankivsk region	C_8	50	5002	123876	104	62479	272382	9415
Kyiv region	C_9	80	9910	189169	220	47950	517560	18682
Kirovohrad region	C_10	20	1223	19266	57	7774	48524	4125
Luhansk region	C_11	7	642	6600	37	3411	36546	1959
Lviv region	C_12	111	12086	229963	265	100824	489903	28963
Mykolaiv region	C_13	83	11327	72898	89	11103	338747	11589
Odesa region	C_14	147	21707	138618	194	28182	524888	24675
Poltava region	C_15	43	3393	87745	124	18993	183895	12195
Rivne region	C_16	13	619	12779	102	19269	28245	4209
Sumy region	C_17	17	1300	27160	85	12004	41143	3874
Ternopil region	C_18	13	1269	15609	65	8199	32334	3063
Kharkiv region	C_19	66	6698	80153	234	43989	209884	14480
Kherson region	C_20	70	12582	66506	54	13767	365013	9788
Khmelnyskyi region	C_21	28	2078	49591	63	11073	119813	8299
Cherkasy region	C_22	43	3076	52433	99	15761	106137	6744
Chernivtsi region	C_23	11	1135	11024	55	7825	48104	2683
Chernihiv region	C_24	22	1391	34354	57	15849	67807	5120

Source: [8]

The difference in the development of rural tourism in the regions of Ukraine leads to the need for a statistical analysis of the regional development of the field of tourism, the separation of regions by the level of development of tourist activity, which can be used as a basis

for making management decisions regarding the strengthening of the tourist attractiveness of one or another region [1].

One of the forms of quantitative relationships between phenomena and processes is the correlation relationship – when the average value

of one characteristic corresponds to several values of another interconnected characteristic (for example, the average growth of a statistical population corresponds to several values of the mass of observation units).

The strength of the correlation is the degree of connection between the investigated variables or the degree of dependence between features.

For our research, we will use the Pearson correlation coefficient (parametric correlation coefficient), which is calculated according to the formula:

$$r_{xy} = \frac{\sum_{i=1}^m (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^m (x_i - \bar{x})^2 \sum_{i=1}^m (y_i - \bar{y})^2}},$$

where \bar{x}, \bar{y} – the average values of the investigated values x_i and y_i respectively, $r_{xy} \in [-1;1]$.

In the Tables 3 and 4, the matrix of Pearson correlation coefficients was calculated for the data from the Tables 1 and 2 respectively.

To calculate the Pearson correlation coefficients, we use the Statistica 10.0 program.

The Pearson correlation coefficient has the following properties:

- Pearson’s correlation coefficient takes values on the interval [-1;1], namely $-1 \leq r \leq 1$;
- if the Pearson correlation coefficient is within $0 \leq |r| \leq 0,5$, then the connection between the investigated values is weak; if $0,5 \leq |r| \leq 0,7$ – connection is average; if $0,7 \leq |r| \leq 1$ – the connection is strong;
- if $r > 0$, then the relationship is positive, i.e. as the values of X increase, the value of Y also increases. If $r < 0$, then the relationship is negative, that is, an increase in X values leads to decrease in Y values [5, p. 41; 7].

It should be noted that in the first case (Table 3), the indicators, selected for analysis, are characterized by a weak correlation (which does not exceed 0,5). Only the coefficient r_{42} indicates a strong relationship between the investigated values X4 and X2. The specified correlations are significant only at the $p < 0,05$ level.

In contrast to the first, in the second case (Table 4) we observe a much stronger correlation between the investigated indicators. This means that there is a high level of dependence

Table 3

Matrix of Pearson correlation coefficients of initial data on the development of rural settlements in 2020

Indicators	X1	X2	X3	X4	X5	X6
X1	1					
X2	0,292607037	1				
X3	0,278670871	-0,005347981	1			
X4	0,409228984	0,871783315	-0,0265895	1		
X5	0,354565748	0,270079057	-0,047023817	0,406801	1	
X6	-0,039926809	-0,327827473	0,362511436	-0,27877	-0,21702	1

Source: Calculated by the authors in Statistica 10.0

Table 4

Matrix of Pearson correlation coefficients of the initial data of the activity of collective means of accommodation in 2020

Indicators	Z1	Z2	Z3	Z4	Z5	Z6	Z7
Z1	1						
Z2	0,96436	1					
Z3	0,79959	0,693730232	1				
Z4	0,62474	0,478452611	0,76704989	1			
Z5	0,56721	0,422035731	0,863441716	0,824844	1		
Z6	0,93397	0,915870084	0,854507037	0,588181	0,603336	1	
Z7	0,89905	0,800912706	0,933327261	0,817666	0,783728	0,873709	1

Source: Calculated by the authors in Statistica 10.0

between indicators of the collective activity of accommodation facilities by region of Ukraine in 2020. The weakest dependence is characterized by two Pearson correlation coefficients r_{42} and r_{52} . Also, from the Table 4 we can see that all the coefficients are positive, so, there is a direct connection between the investigated values – an increase of one parameter causes the increase of other parameter.

The process of grouping data objects can be done using cluster analysis, based on the information contained only in the data that describes the objects and their connections. The goal is to get objects in the group similar (or related) to each other, and these objects must be different from objects in other groups. The greater the similarity (or homogeneity) in the group, the greater the difference between the groups, and the better or clearer the clustering is carried out [3, p. 842].

The research uses an agglomerative hierarchical type of clustering, which is characterized by the sequential merging of smaller clusters into larger ones or the division of large clusters into smaller ones. This method consists in sequential combining the original elements and correspondingly reducing the number of clusters. At the beginning of the executed algorithm, all objects are the separate clusters. The first step of the algorithm combines the most similar objects into a cluster. In the following steps, the unification continues until all objects are formed into one cluster [3, p. 842].

The advantage of hierarchical clustering methods is their visibility. The graphical result of clustering is dendrogram – a tree-shaped diagram (cluster merging tree, tree of hierarchical structure), which consists of n levels, each of which corresponds to one of the steps of the process of sequential merging of clusters [3, p. 842].

To measure the distance between objects, we used the most common measure of similarity – the Euclidean distance. It is the distance in a straight line between two points in a multidimensional space. The Euclidean distance is calculated according to the following formula:

$$d_E(p, q) = \sqrt{(p_1 - q_1)^2 + (p_2 - q_2)^2 + \dots + (p_n - q_n)^2},$$

where n represents the number of dimensions or variables under consideration; p and q are the corresponding measures of two points on each of the dimensions. A kind of this distance is the squared Euclidean distance, which eliminates the square root operation in the formula. The result of Euclidean distance is that features with higher variance tend to dominate other variables.

In the study, the Complete Linkage method was used to determine the distance between clusters, which consists in determining the largest distance between any two objects in different clusters (i.e., “farthest neighbors”).

It is worth noting that if the characteristics of the set X have different units of measurement, then additive aggregation requires bringing them to one basis, i.e. preliminary standardization. At the same time, the vector of primary values of features $x_j = |x_1, x_2, \dots, x_m|$ is replaced by a vector of standardized values $z_j = |z_1, z_2, \dots, z_m|$.

Standardization of indicators is carried out in those cases when their measurement units are different, and it is necessary to bring them to a single dimensionless form, to ensure their comparability and proportionality, in order to exclude the influence of different dimensions of the values on the resulting integral indicator. The different orientation of changes of stimulating indicators and disincentive indicators also requires different formulas for their standardization.

Indicators-stimulators are performance indicators for which exceeding the planned values is desirable and has a positive effect on the effectiveness of the program.

Disincentive indicators are performance indicators for which exceeding the planned values has a negative impact on the effectiveness of the program.

Standardization of indicators (x_i^j) is carried out according to the following formulas:

- for stimulating indicators:

$$x_{i\ st}^j = \frac{x_i^j - \bar{x}_i}{\sigma_i}, \quad (1)$$

where \bar{x}_i is the average value of the indicator; σ_i is the standard deviation of the indicator.

- for disincentive indicators:

$$x_{i\ st}^j = \frac{\bar{x}_i - x_i^j}{\sigma_i}. \quad (2)$$

In our case, formula (1) was used, since all indicators are stimulants.

Economic-mathematical modeling was performed on the basis of the obtained standardized values of the characteristics using the Statistica 10.0 statistical package. In the first step, the agglomerative-hierarchical classification procedure Joining (Tree clustering) was used – a clustering tree according to the algorithm of complete unification, the method of the most distant neighbor (Complete Linkage) using Euclidean distances as a metric. As a result, a dendrogram was constructed, which reflects the sequential unification of the

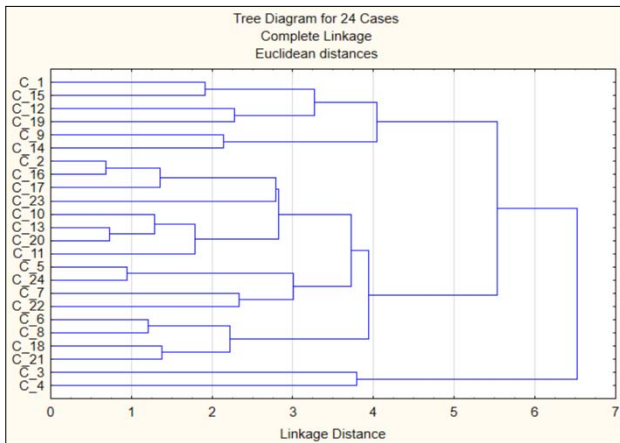


Figure 1. Dendrogram based on the results of a cluster analysis of the development of rural settlements in 2020
 Source: built by the authors

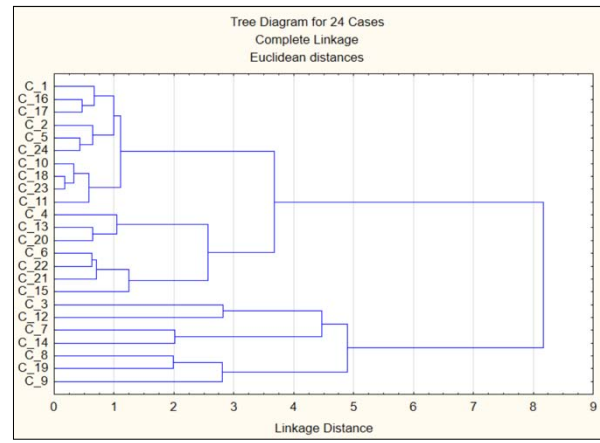


Figure 2. Dendrogram based on the results of a cluster analysis of performance indicators of collective means of accommodation in 2020
 Source: built by the authors

regions of Ukraine into clusters (Figures 1 and 2). The regions of Ukraine are plotted on the vertical axis, and the intercluster Euclidean distances are plotted on the horizontal axis.

To determine the optimal number of clusters, a step-by-step distance merge diagram was constructed (Figures 3 and 4). The Euclidean distance is plotted on the vertical axis, and the merging step is plotted on the horizontal axis.

In Figure 3 we see that the largest jump in the distance of the combined objects occurs at steps 8, 14, 18 and 22. However, the best solution would be the choice of step 22, which allows to select 4 clusters of regions of Ukraine (the distance of combining objects into clusters is conventionally divided by 4).

In Figure 4 it can be seen that at steps 15, 17 and 20, 21 the largest jump in the distance of the merged objects occurs. In this case, the best solution would be the choice of step 20, which allows to select 5 clusters of regions of Ukraine (the distance of combining objects into clusters is conventionally divided into incomplete 3).

As a result of the conducted cluster analysis, it is possible to distinguish four clusters of regions of Ukraine regarding the indicators of the development of rural settlements in 2020 and five clusters regarding the performance indicators of the collective means of accommodation in 2020. The distribution of the regions of Ukraine according to the defined clusters is given in the Tables 5 and 6, respectively.

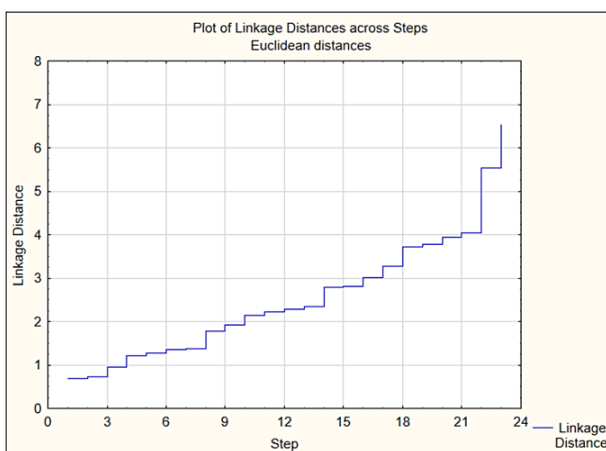


Figure 3. Diagram of the step-by-step merging of distances between clusters of the analysis of the development of rural settlements in 2020
 Source: built by the authors

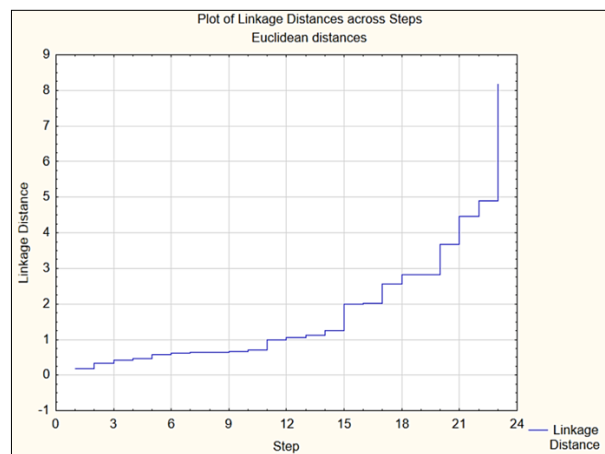


Figure 4. Diagram of the step-by-step merging of the distances between the clusters of the analysis of the performance indicators of the collective means of accommodation in 2020
 Source: built by the authors

Table 5

Distribution of regions of Ukraine into clusters according to indicators of development of rural settlements

Distribution of regions of Ukraine into clusters according to indicators of development of rural settlements			
Cluster 1	Cluster 2	Cluster 3	Cluster 4
Dnipropetrovsk, Donetsk regions	Volyn, Zhytomyr, Zakarpattia, Zaporizhzhia, Ivano-Frankivsk, Kirovohrad, Luhansk, Mykolaiv, Rivne, Sumy, Ternopil, Kherson, Khmelnytskyi, Cherkasy, Chernihiv, Chernivtsi regions	Kyiv, Odesa regions	Vinnytsia, Lviv, Poltava, Kharkiv regions

Source: systematized by the authors based on research results

Table 6

Distribution of regions of Ukraine into clusters according to performance indicators of collective means of accommodation

Distribution of regions of Ukraine into clusters according to the activity of collective means of accommodation				
Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Kyiv, Kharkiv, Ivano-Frankivsk regions	Odesa, Zaporizhzhia regions	Lviv, Dnipropetrovsk regions	Poltava, Khmelnytskyi, Cherkasy, Zakarpattia, Kherson, Mykolaiv, Donetsk regions	Luhansk, Chernivtsi, Ternopil, Kirovohrad, Chernihiv, Zhytomyr, Volyn, Sumy, Rivne, Vinnytsia regions

Source: systematized by the authors based on research results

At the second stage of the study, an iterative procedure is used to refine the classification – the K-means clustering method. The goal of this clustering method is the dividing of n objects into k clusters so that each object belongs to the cluster with the closest average value to it. The method is based on minimizing the sum of squared distances between each object and the center of its cluster. The difference between this method and the previous one is the predefined number of clusters.

Figures 5 and 6 show graphs of the average values of standardized indicators for each cluster based on indicators of the development of rural settlements and the activity of collective means of accommodation in 2020.

A cartogram of the dividing of regions of Ukraine into clusters based on indicators of the development of rural settlements is presented in Figure 7. A cartogram of the dividing of regions of Ukraine into clusters based on performance indicators of collective means of accommodation is presented in Figure 8.

As a result of the conducted cluster analysis based on the statistical indicators of the development of rural settlements in 2020, the following conclusions can be drawn regarding the activities of each cluster.

Cluster 1. Rural tourism in this region is a perspective type of recreation, since in the regions of this cluster there is a high number of existing rural population and a high level of unemployment. The development of rural tourism in this region is restrained by the low rate of the rural housing stock. This cluster includes regions with a high level of industrial development. The development of rural tourism in the regions of this cluster will be slower than in the regions of other clusters in the future. And the restoration of rural tourism in the Donetsk region, which suffered a devastating impact as a result of military operations, will be difficult and long-term.

Cluster 2. Due to the charm and uniqueness of natural landscapes and a large number of objects of the nature reserve fund, the regions of this cluster have very good prospects for the development of rural tourism.

Cluster 3. The riverside location of the Kyiv region and the proximity to the sea of the Odesa region create good conditions for the development of medical and recreational tourism.

Cluster 4. The development of rural tourism in this region is promising and profitable, as the presence of a significant rural housing stock is combined with a large number of cultural

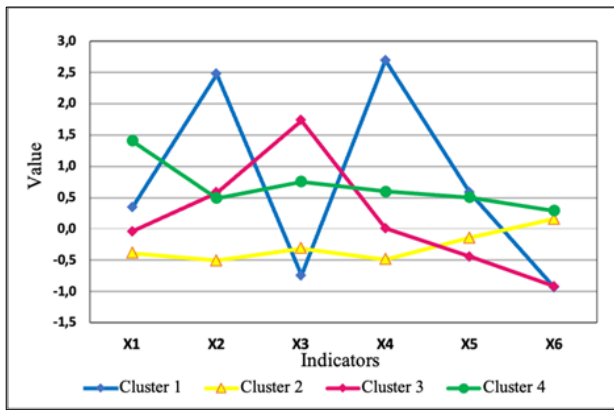


Figure 5. Graph of average values of standardized indicators of development of rural settlements in 2020

Source: built by the authors

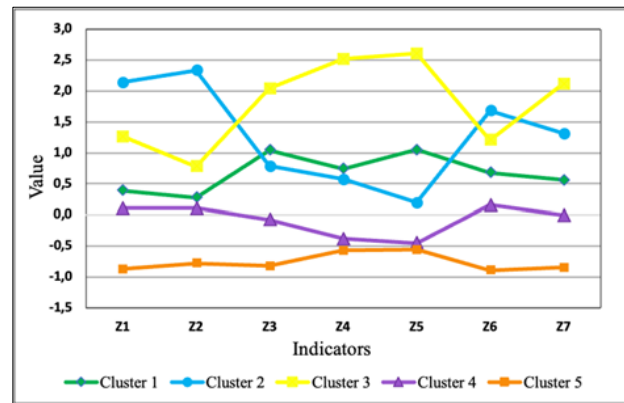


Figure 6. Graph of average values of standardized activity indicators of collective means of accommodation in 2020

Source: built by the authors



Figure 7. Cartogram of the dividing of regions of Ukraine into clusters according to indicators of the development of rural settlements

Source: built by the authors



Figure 8. Cartogram of the dividing of regions of Ukraine into clusters based on performance indicators of collective means of accommodation

Source: built by the authors

heritage sites. In this region, it is expedient to develop almost all subtypes of rural tourism.

As a result of the cluster analysis, all regions of Ukraine are grouped into five clusters in 2020 based on the performance indicators of collective means of accommodation (Figure 6).

The first cluster includes Kyiv, Kharkiv and Ivano-Frankivsk regions. The graph shows that this cluster is characterized by average values of all indicators compared to other clusters. In particular, the Z5 indicator is the highest among them – the number of tourists served by tour operators and travel agents. The areas of this cluster are visited by a large number of people. Developing the field of rural tourism, local authorities should pay attention to the expansion of the housing stock for receiving tourists both at the expense of hospitable estates and at

the expense of hotels, cottages and motels. The second cluster is formed by Odesa and Zaporizhzhia regions. Here we observe the highest values of indicators of the number of collective means of accommodation (Z1), the total number of places in collective means of accommodation (Z2), as well as the number of overnight stays of people in collective means of accommodation (Z6) compared to other clusters. These regions are very attractive for tourists. When developing rural tourism in this cluster, it is worth paying attention to the quality of the provision of tourist services in order to further encourage tourists who wish to undergo rehabilitation and rest on the sea coasts of the Black and Azov seas. Further directions of development of the regions of the second cluster are medical and recreational tourism.

The third cluster includes Lviv and Dnipropetrovsk regions. The difference between this cluster and others is the highest values for the following indicators: Z3 – the number of persons who were in collective means of accommodation; Z4 – number of tour operators and travel agents; Z5 – number of tourists served by tour operators and travel agents; Z7 is the total number of days of operation of collective means of accommodation. Considering the large number of people wishing to visit the cultural sites and historical monuments of these regions, local authorities and entrepreneurs should invest more in expanding the housing stock to accommodate tourists (guest houses, hotels, cottages).

The fourth cluster included Poltava, Khmelnytskyi, Cherkasy, Zakarpattia, Kherson, Mykolaiv and Donetsk regions. This cluster is characterized by low indicators of all studied values, compared to previous clusters. When developing rural tourism in this region, it is necessary to pay attention to the interest of tourists in local cuisine, folklore events, and participation in folk crafts.

The fifth cluster is formed by Luhansk, Chernivtsi, Ternopil, Kirovohrad, Chernihiv, Zhytomyr, Volyn, Sumy, Rivne and Vinnytsia regions. The peculiarity of this cluster is the lowest average standardized indicators for all studied values. Developing rural tourism in these regions, local authorities should pay attention to the possibilities of encouraging tourists to visit these regions and to expanding the number of collective means of accommodation for tourists. Most of the regions of this cluster have picturesque natural landscapes, rich historical heritage and promising recreational areas.

In the future, it is worth noting that the division of regions of Ukraine into clusters requires special attention. Taking into account the experience of European states, this approach will make it possible to make effective management decisions regarding the prospective development of each region and the restoration of the tourism industry in those regions that have been heavily affected by military operations.

Conclusions. The cluster approach in regional development is a powerful tool for stimulating economic growth and increasing the competitiveness of Ukraine's regions. The common association of rural tourism enterprises and stakeholders in similar industries creates favorable conditions for synergy and cooperation. Clusters can become effective mechanisms for joint implementation of innovations, exchange

of knowledge and resources, as well as for solving common challenges and problems. In addition, they contribute to the creation of a favorable environment for the development of small and medium-sized businesses, which is an important element of economic development. This approach also allows regions to adapt more quickly and easily to changes and develop in conditions of competition and globalization. Clusters act not only as economic associations, but also as a union of organizations for the exchange of ideas and experience, which contributes to the sustainable development of regions.

The work carried out a cluster analysis, the purpose of which was to group the regions of Ukraine according to similar signs of development on the basis of the main economic indicators. The analysis provided an opportunity to identify attractive regions of Ukraine and to propose optimal measures for the development of rural tourism in each region.

As a result of the cluster analysis, four clusters of the regions of Ukraine were identified in terms of indicators of the development of rural settlements, and five clusters were identified in terms of indicators of the activity of collective means of accommodation. Cartograms of dividing of the regions of Ukraine into clusters according to these indicators are presented.

The main advantages of organizing a tourism business based on the cluster model include:

- better access to resources, proper quality of raw materials, goods and services, often at a more favorable price;
- long-term partnerships between participants;
- favorable conditions for the joint promotion of goods and services, the possibility of attracting high-level specialists, obtaining a higher-quality information product. Better conditions for implementing a communication strategy;
- more accurate activity planning and stable orders;
- impact on the sphere of state decision-making at the local and national levels: creation of infrastructure, allocation of financial resources, promotion of the cluster at international events;
- participation in international technical assistance projects.

Consideration exactly these advantages and aspects of the development of the cluster model of business organization helps to make rural tourism more sustainable and profitable for the regions of Ukraine.

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