CLUSTER ANALYSIS OF SOCIO-ECONOMIC DEVELOPMENT OF RURAL AREAS AND PEASANT FARMS IN THE SYSTEM OF FORMATION OF RURAL TERRITORIAL COMMUNITIES: A CASE STUDY OF VOLYN REGION, UKRAINE

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Abstract

In the article we proved that the clustering of regions in terms of socio-economic conditions of rural development and farms located on them using a selected range of indicators by scientists was not carried out. The obtained results provide an opportunity to conduct a comprehensive assessment and generalization of the territorial differentiation of socio-economic conditions for the development of rural areas and farms located in the Volyn region of Ukraine. Visualization of the territorial-spatial distribution of selected clusters using a cartogram allows optimizing the visual perception of the information load on the clustering results. The general generalizations of regional differentiation of separate elements of social and economic conditions of development of rural territories and peasant farms located on them for real realities prompt to think about perspective prospects of development of the system of these farms, their place, and role in the organizational structure of agrarian sector of market type.

Key words: *rural areas, clusters, socio-economic development, peasant farms, hierarchical clustering algorithm, cartogram of cluster analysis results*

INTRODUCTION

In the realities of the current economic conditions, peasant farms, due to the influence of a number of systemic factors and trends, act as an alternative, and efficient agricultural producer. However, in the context of permanent reforms in the agro-industrial sector, it is important, in our opinion, to outline the forecast parameters of rural development, and farms located on them, and develop in this aspect a comprehensive system of recommendations aimed at forming a progressive agricultural policy. After all, the range of scholars` opinions on the further functioning of peasant farms is quite ambiguous and even polar: from recognizing them as one of the most flexible, dynamic, and resilient to difficult economic conditions forms of management to claims of absolute futility from the standpoint of agricultural development in terms of European integration. In our opinion, the differentiation of forecast models of functioning of rural areas and peasant farms is largely formed on the basis of a system of socio-economic indicators,

territorial and spatial configurations of development of each region.

Territorial differences in the development of socio-economic conditions for the functioning of various organizational, and legal forms of management, including peasant farms, are inherent in the vast majority of countries, in particular, as evidenced by numerous studies in recent years, significant regional asymmetry is characteristic of Ukraine. In addition, there is virtually no scientific research on the complex ranking of administrative-territorial entities of the country at lower hierarchical levels. At the same time, the need to reduce and settle interregional territorial disparities has become especially important, and therefore – the primary importance now belongs to the identification, and ordering (ranking) of the most problematic (depressive) territorial entities.

We believe that in the context of this scientific research it is advisable to emphasize the so-called "threshold of complexity", according to which adequate analysis of a particular problem situation by the analyst is possible as a result of targeted observation and simultaneous comparative evaluation of a relatively small number of parameters (not more than 7-10), which significantly impoverishes the possibility of multifactor calibration of the studied phenomenon or object. It is in this aspect that it is necessary to emphasize the expediency of using cluster analysis, which is a set of methods for classifying multidimensional observations [15], and its ability to operate with a large number of features to compare objects with each other.

Cluster analysis is widely used in much of modern scientific research. In particular, - for the purpose of classification of consumers of the electric power (Ya. Yeleiko, R. Hryshchuk), an estimation of the economic risk of the enterprises (N. Podolchak) [15], classification of areas of the country on the release of foodstuff (O. Totska), the grouping of regional labour markets of the country (S. Volkova, O. Nosach) [41] and explored other aspects of the research, in particular O. Agres [1], O. Apostolyuk [2], O. Binert

[4], M. Dziamulych [6-9], A. Popescu [16-27], T. Shmatkovska [28-30], R. Sodoma [32-33], O. Stashchuk [34-36], I. Tsymbaliuk [40], Ya. Yanyshyn [42], I. Zhurakovska [43]. However, the clustering of regions in terms of socio-economic conditions of rural development and farms located on them using a selected range of indicators by scientists was not carried out, which confirms the special relevance of the selected issues.

MATERIALS AND METHODS

The purpose of the publication is to carry out a cluster analysis of the districts of the Volyn region on the socio-economic conditions of development of rural areas and farms. Among the targets are: the need to build a matrix of input data on the study, standardization of the array of initial information by the selected method, building a symmetric matrix of distances, combining objects into clusters, forming the optimal number of clusters, building a map of the Volyn region of Ukraine based on clustering and their scientific interpretation.

It should be noted that a necessary condition for cluster analysis is to ensure the proportionality and unidirectionality of the initial indicators [12]. We standardized the indicators selected for analytical research by the method of the so-called z-transformation.

The z-transformation method is one of the most common methods and consists of the normalization of the studied indicators relative to the standard deviation [15]:

$$z_{ij} = \frac{(x_{ij} - \overline{x_j})}{\sigma_j},$$

where: z_{ij} – standardized value of the i-th indicator of the j-th feature;

$x_{ij} (i = \overline{1,n}; j = \overline{1,m})$ – the initial value of the i-th indicator of the j-th feature;

n – the number of indicators that characterize the j-th feature;

m – number of signs;

$$\overline{x}_j = \left(\sum_{i=1}^{n} x_{ij} \right) / n$$ – the arithmetic mean of

the initial indicators of the j-th sign;

$$\sigma_j = \sqrt{\frac{\sum_{i=1}^{n} (x_{ij} - \overline{x}_j)^2}{n}}$$ – the standard

deviation of the values of the j-th feature.

For clustering of districts of the Volyn region of Ukraine one of the most widespread distances – «squared Euclidean distances» is used, which is calculated as the sum of squares of a difference of values of indicators of the same name for each pair of objects. [15]:

$$d_{fq} = \sum_{k=1}^{p} (z_{fk} - z_{qk})^2 ,$$

where: d_{fq} – Euclidean distance between the f-th and q-th objects (in this study - areas of the Volyn region);

z_{fk} – standardized value of the k-th indicator for the f-th object;

z_{qk} – standardized value of the k-th indicator for the q-th object;

p – the number of pairs of indicators of the same name (in this study – 36).

To simplify the calculations and automate part of the computational processes in the study involved the functional resources of the software package StatSoft Statistica 6.0.

RESULTS AND DISCUSSIONS

At the first stage of the study, indicators were selected from the initial data set that, in our opinion, most fully represent the socio-economic conditions of personal farms by building a matrix of their pairwise correlation-regression dependence and analysis of the significance of the interaction between each pair of indicators.

It is pertinent to note that a significant amount of initial data (more than 90 indicators) and the need to ensure maximum objectivity of the final results, led to the feasibility of introducing restrictions on the materiality of

the identified relationships. So, further, only those communications which durability was reflected by the coefficient of pair correlation $r>|0,3|$ were recognized as essential. According to the results of counting the number of significant correlations for each of the indicators, selected those of them that are characterized by the largest number of significant dependencies.

Thus, the final list of indicators selected for clustering areas of the Volyn region in the context of socio-economic conditions of peasant farms included those that correlate with 70-100% of their block and 60-100% of other blocks (Table 1).

It should be noted that in the case of an equal number of significant links, preference was given to those indicators that are more correlated with the representatives of other blocks. Thus, according to the results of the analysis, we selected 36 indicators, among which the Ist block, which allows us to assess the general economic situation, is represented by eight indicators: gross agricultural output per 1 person (in comparable prices in 2005), UAH (X_1); fixed capital investment per 1 person, UAH (X_2); the share of districts in the regional volume of meat sales through all channels, % (X_3); the gross harvest of cereals per 1 person, t (X_4); the gross harvest of sugar beets, factory, per 1 person, t (X_5); cattle per 1 person, at the end of the year, heads (X_6); meat production, in slaughter weight per 1 person, t (X_7); milk production per 1 person, t (X_8).

The block of indicators that characterize the economic base of rural settlements is represented by three indicators: the number of farms located in rural areas, units. (X_9); area of agricultural land per 1 person. for all categories of farms, at the end of the year, ha (X_{10}); the share of personal farms in the value of gross agricultural output in all categories of farms, % (X_{11}). Among the indicators of the demographic situation (III-rd block) there are eight: the birth rate of the rural population, per 1,000 people (X_{12}); share of births in rural areas for mothers who were not in a registered marriage,% of the total number of births (X_{13}); proportion of children born in rural areas to women under 20 years,% of the total

number of births (X14); divorce of the rural population, per 1,000 people (X_{15}); balance of interstate migration of rural population, per 1,000 people (X_{16}); the median age of the rural population, years (X_{17}); demographic burden on the rural population of working age by persons who have not reached working age, pers. (X_{18}); the share of rural settlements, wherein 2016-2019. the number of deaths exceeded the number of births, % (X_{19}).

Table 1. Matrix of initial data for cluster analysis of districts of the Volyn region by socio-economic conditions of rural development*

Indexes	Districts of the Volyn region of Ukraine															
	Volodymyr-Volynskyi	Horokhiv	Ivanychi	Kamin-Kashyrskyi	Kivertsi	Kovel	Lokachi	Lutsk	Lyubeshiv	Liuboml	Manevytshi	Ratno	Rozhysche	Stara Vyzhivka	Turiysk	Shatsk
X_1	9,122	5,595	5,188	3,227	2,231	4,923	5,896	5,108	4,178	2,649	3,296	3,485	4,367	3,053	5,208	2,209
X_2	2,262.7	1,175.0	955.0	305.8	448.6	1,720.1	925.6	2,784	439.3	1,910.4	283.2	529.6	942.0	304.4	431.3	542.9
X_3	30.4	16.3	2.7	0.3	1.2	6.7	9.9	9.5	0.8	0.7	1.0	2.8	4.9	0.8	11.7	0.3
X_4	2.94	1.67	1.67	0.44	0.41	1.08	2.01	1.85	0.46	0.47	0.41	0.45	0.86	0.60	1.56	0.47
X_5	5.41	3.36	2.18	0.11	0.30	0.69	1.57	2.05	0.02	0.17	0.07	0.12	0.90	0.10	1.06	0.07
X_6	0.48	0.59	0.41	0.26	0.20	0.76	0.37	0.47	0.37	0.26	0.32	0.44	0.47	0.29	0.67	0.20
X_7	0.31	0.13	0.09	0.06	0.05	0.08	0.16	0.08	0.07	0.05	0.06	0.06	0.08	0.06	0.15	0.05
X_8	0.91	1.04	1.09	0.65	0.56	0.93	0.70	0.91	0.87	0.63	0.72	0.80	0.93	0.69	1.12	0.56
X_9	88	79	57	22	39	86	84	108	8	12	6	13	11	24	20	2
X_{10}	2.2	1.4	1.2	0.9	0.8	1.9	1.9	1.2	0.9	1.2	0.9	1.0	1.7	1.4	2.5	0.9
X_{11}	45.3	61.3	76.1	98.7	93.2	79.9	70.7	66.6	96.6	97	97.2	89.5	77.6	95.1	63.1	97.7
X_{12}	12.6	11.1	10.6	17.8	12.4	12.1	9.8	13.3	17.4	12.7	16.5	15.9	11.3	11.7	12	12.9
X_{13}	14.3	11.4	11.2	4.2	12.0	10.4	10.7	10	4.9	8.6	4.8	6.9	12.5	6.7	11.8	7.5
X_{14}	12.6	13.3	11.6	8.6	12.0	11.4	11.7	9.8	12.7	11.0	6.1	9.1	12.5	8.3	13.3	10.2
X_{15}	2.8	2.9	2.2	1.4	1.7	1.8	2.1	2.4	1.6	2.0	1.6	1.2	2.0	1.0	2.5	1.6
X_{16}	0.0	0.1	-0.3	-0.4	-0.3	-0.1	-0.1	-0.3	-1.7	-0.4	-0.8	-1.3	0.0	-0.9	-0.2	-1.4
X_{17}	37.8	38.7	38.4	31.4	35.4	38.7	36.8	34.5	32.4	37.2	34.0	33.2	36.9	37.5	39.8	37.6
X_{18}	360	380	341	480	418	401	385	363	459	400	463	449	390	394	415	392
X_{19}	93.5	91.1	94.8	42.2	90.3	94.5	83.0	87.7	45.7	88.2	72.5	70.1	92.4	84.8	90.5	73.3
X_{20}	3.9	8.9	5.2	28.1	13.9	4.4	3.8	16.1	26.1	5.9	14.5	19.4	7.6	17.4	0.0	13.3
X_{21}	7.4	8.0	9.0	3.7	5.1	5.3	7.4	8.5	3.2	4.6	3.0	4.7	7.1	4.1	6.1	3.9
X_{22}	318	451	479	789	560	365	383	628	661	415	609	573	402	596	255	403
X_{23}	2.1	2.0	1.9	2.9	2.5	2.5	2.1	1.9	3.2	2.6	3.2	2.6	2.1	2.8	2.3	2.8
X_{24}	40.2	37.0	32.5	48.0	42.8	45.0	46.2	46.8	46.9	41.0	48.2	44.7	43.1	43.2	35.3	47.8
X_{25}	12.0	27.1	16.0	4.2	10.8	20.0	11.2	17.8	8.1	6.6	6.5	12.5	24.5	6.8	26.0	8.0
X_{26}	6.9	17.9	6.2	2.8	7.0	8.0	6.7	13.2	0.4	2.1	0.4	2.8	4.3	4.6	16.5	0.1
X_{27}	33.7	42.4	26.9	74.9	41.6	44.2	64.4	23.1	63.1	61.1	71.4	66.8	46.6	69.1	36.0	63.6
X_{28}	42.6	17.8	43.3	6.9	33.4	20.8	11.8	47.2	12.8	15.6	7.5	8.2	17.0	9.3	21.3	9.2
X_{29}	22.9	24.4	23.3	19.3	19.0	23.3	22.2	21.5	21.3	21.0	18.5	20.2	22.7	21.3	24.0	21.3
X_{30}	42.07	33.49	46.41	1.09	17.12	12.33	8.78	60.49	0.02	3.30	4.94	8.69	24.53	5.13	34.0	2.26
X_{31}	45.5	32.2	29.3	20.3	25.0	35.2	37.7	55.6	15.2	35.3	18.8	44.8	36.4	15.2	48.6	43.3
X_{32}	68.8	57.8	56.9	28.1	37.5	60.4	50.9	56.8	34.8	55.9	47.8	53.7	53.0	54.3	63.5	60.0
X_{33}	70.1	63.3	62.1	46.9	66.7	64.8	58.5	56.8	47.8	66.2	53.6	61.2	56.1	43.5	66.2	70.0
X_{34}	49.4	48.9	50.0	28.1	37.5	37.4	41.5	54.3	34.8	38.2	23.2	44.8	27.3	47.8	47.3	23.3
X_{35}	39	116	102	411	205	182	200	83	278	231	169	201	113	370	105	34
X_{36}	24	40	1	544	72	188	183	5	614	174	211	335	6	330	55	263

Source: *some of the indicators are calculated independently on the basis of processing these sources: [3, 11, 13, 31, 37, 38, 39].

The IVth block, which characterizes the peculiarities of the settlement of the rural population – is represented by four indicators: the share of rural settlements with a population of more than 1,000 people, % of the total number of rural settlements (X_{20}); density of rural settlements, units/100 km^2 (X_{21}); average population of rural settlements, people (X_{22}); average distance between villages, km (X_{23}).

Among the indicators of the block (Vth), representing employment, there are five: the share of employees in the total number of the available rural population, % (X_{24}); the share of those employed in agriculture from the total working rural population, % (X_{25}); the share of employees employed on farms from their total number in the region as a whole, % (X_{26}); the share of employees in personal farms in the total working rural population, % (X_{27}); the share of the rural population employed outside their locality in the total number of employed, % (X_{28}).

The VIth block, which represents the development of social infrastructure and assessment of living conditions of the rural population, is characterized by eight indicators: rural housing, m2 of the total area on average per 1 person (X_{29}); share of apartments in rural settlements with central heating, % (X_{30}); share of rural settlements where there are school-age children, but no schools, % (X_{31}); share of rural settlements where there are no libraries, % (X_{32}); the specific weight of rural settlements where there are no communication departments, % (X_{33}); share of rural settlements where there are no clubs, houses of culture,% (X_{34}); the average number of the rural population living in apartments where there is no sewerage, per 1 village, pers. (X_{35}); the average number of the rural population living in apartments where there is no central heating, per 1 village, pers. (X_{36}).

Note that cluster – is a method of multidimensional statistical analysis, allowing organize the studied objects into homogeneous groups [15].

When carrying out clustering, it is necessary to take into account that the semantic load of the term "cluster analysis" implies the presence of a set of different classification algorithms. Since the results of clustering obtained using different classification algorithms can differ significantly [5], to ensure maximum reliability of the final results, as well as to substantiate the stability of the cluster structure, we consider it appropriate to carry out cluster analysis of the Volyn region by synthesizing several methods, namely, at the first stage to apply agglomerative hierarchical algorithms. next - iterative (non-hierarchical) k - medium method (k -means clustering), which is quite common [12] among iterative procedures. We believe that the use of cluster analysis in two stages will provide sufficient quality grouping results.

To simplify calculations and automate some computational processes, the resources of the software package StatSoft Statistica 6.0, which enjoys a high rating among other software products.

The peculiarity of most iterative procedures is that clusters are formed in a predetermined number [12]. Therefore, we believe that before establishing the optimal number of clusters, it is advisable to classify the studied objects, using one of the agglomerative hierarchical procedures, and based on its results (relative to the probable number of clusters) to apply iterative procedures.

It should be noted that a necessary condition for cluster analysis is to ensure the proportionality and unidirectionality of the initial indicators [12]. Since the indicators selected at the previous stage of the study are presented in different dimensions and units, it is advisable to standardize them (so-called z-transformation).

As a result of z-transformation, a matrix of standardized indicators for each of the features was obtained, which was selected for clustering. Since it is quite cumbersome, we consider it appropriate not to submit it within the publication, but to visualize the normalized indicators using a three-dimensional image, which allows assessing the degree of their differentiation by regions of the Volyn region of Ukraine (Fig. 1).

Note that in the implementation of hierarchical clustering, the choice of the distance between objects is a key point of the study, it largely depends on the final version of the division of objects into clusters [10].

Therefore, for the clustering of districts of the Volyn region used one of the most common distances – "squared Euclidean distances", which is calculated as the sum of squares of the difference of values of the same indicators for each pair of objects [15].
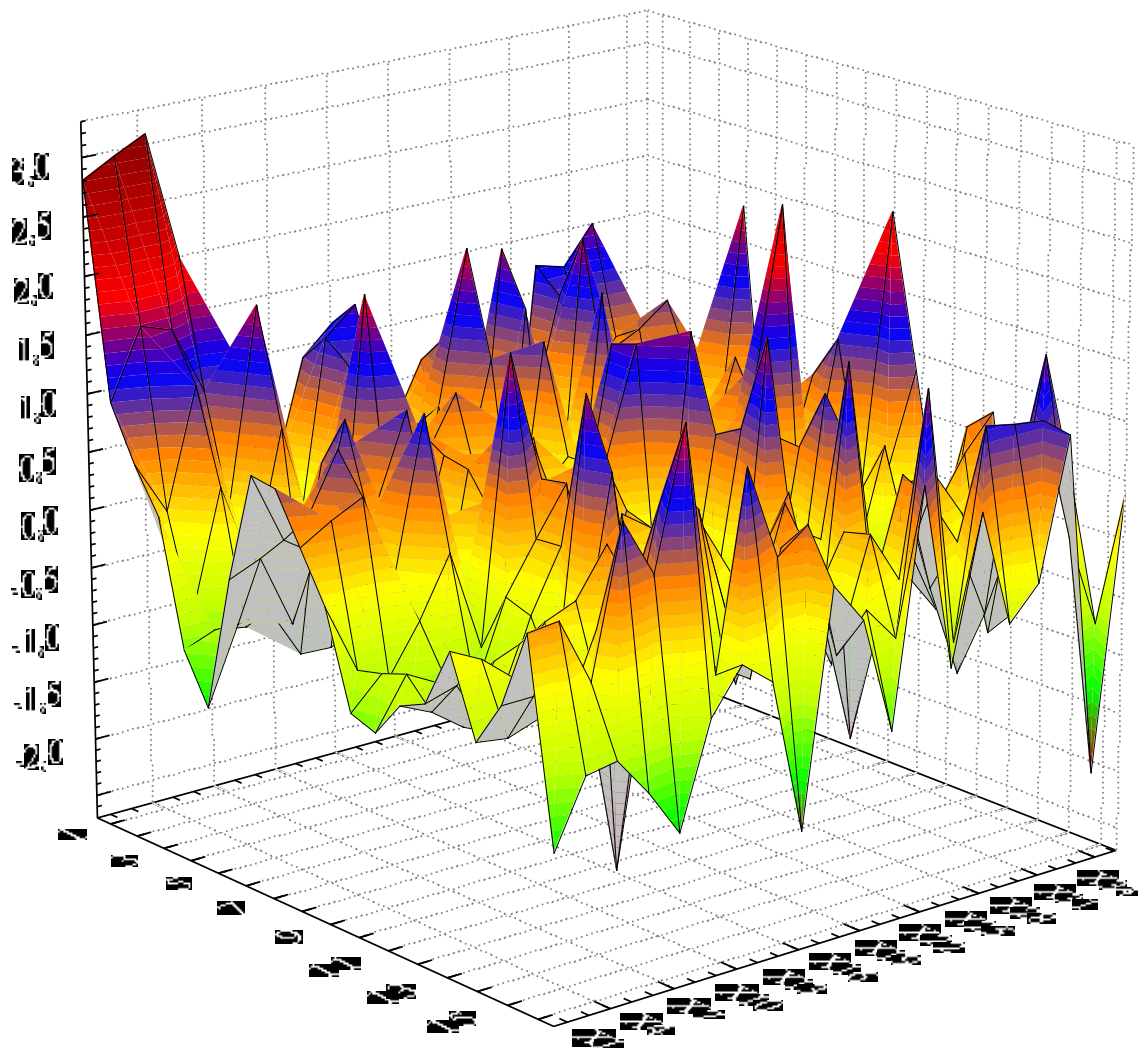

Fig. 1. Three-dimensional image of differentiation of values of standardized indicators on the basis of which clustering of districts of Volyn region of Ukraine is carried out.
Source: own development.

Having chosen the measure of distances, as a result of calculations a symmetrical matrix of distances between objects (districts of the Volyn region of Ukraine) with dimension $16x16$ is formed, however, in our opinion, it is inexpedient to present it within the limits of publication due to excessive cumbersomeness. When performing hierarchical clustering from a set of different algorithms for combining objects into clusters, the Ward method is chosen. Note that the use of Ward`s method

(Ward`s method) minimizes intra-cluster scattering of objects (intra-group variance within the cluster) and the dendrogram is formed by the results of its work with deeply divided, compact clusters of small size [10].
In addition, according to Ward`s method, objects are joined to clusters in the case of a minimal increase in the intragroup sum of squares of deviations, and therefore its application leads to a more accurate clustering.
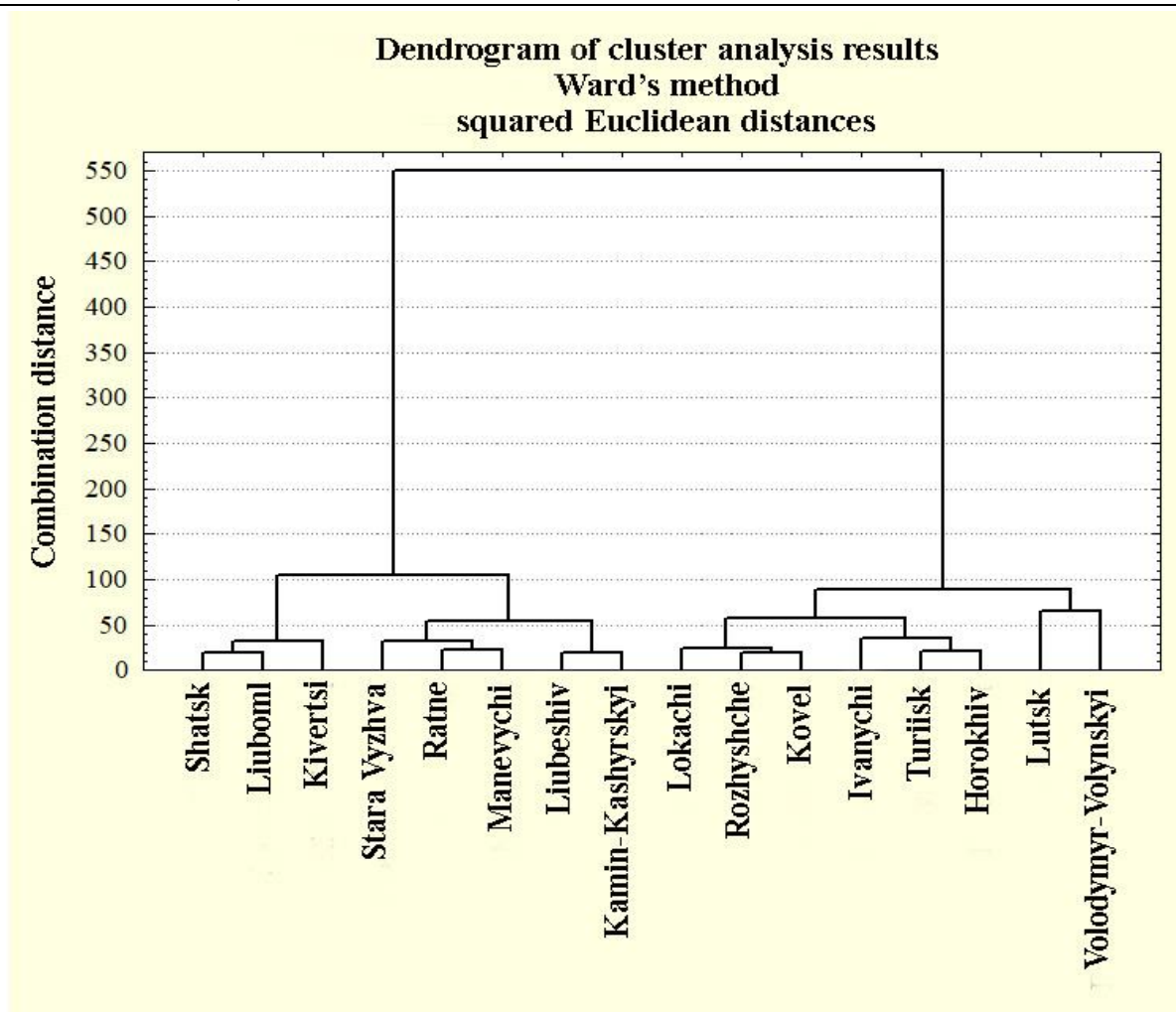
Fig. 2. The dendrogram of the cluster analysis results of the districts of the Volyn region of Ukraine in terms of socio-economic conditions of development of rural areas and peasant farms
Source: own development.

At this step of hierarchical clustering there is a process of sequential integration of the studied objects, which is subject to geometric interpretation and can be represented as a tree diagram - dendrogram (Fig. 2) on the vertical axis of which is the distance of the areas into clusters, and along the horizontal axis - the names of areas.

Therefore, based on the data of the dendrogram, at this step, the hypothesis of the presence of four clusters is preliminarily accepted. At the next stage of the study in order to confirm or refute the hypothesis used the method k -medium.

Summarizing the features of the clustering method k -medium, we note that its application predetermines the number of clusters that you want to get, in addition, the affiliation of objects to a particular cluster changes so as to minimize the differentiation of the studied indicators within clusters and maximize their intercluster [5]. However, the implementation of cluster analysis by the method k - averages allows determining the average values of standardized indicators for each of the formed clusters (Fig. 3).

It should be noted that the results of clustering by selected methods completely coincide, which confirms the correctness of the previous hypothesis of the presence of four clusters of the Volyn region of Ukraine, formed in terms of socio-economic conditions of rural development and farms located on them.
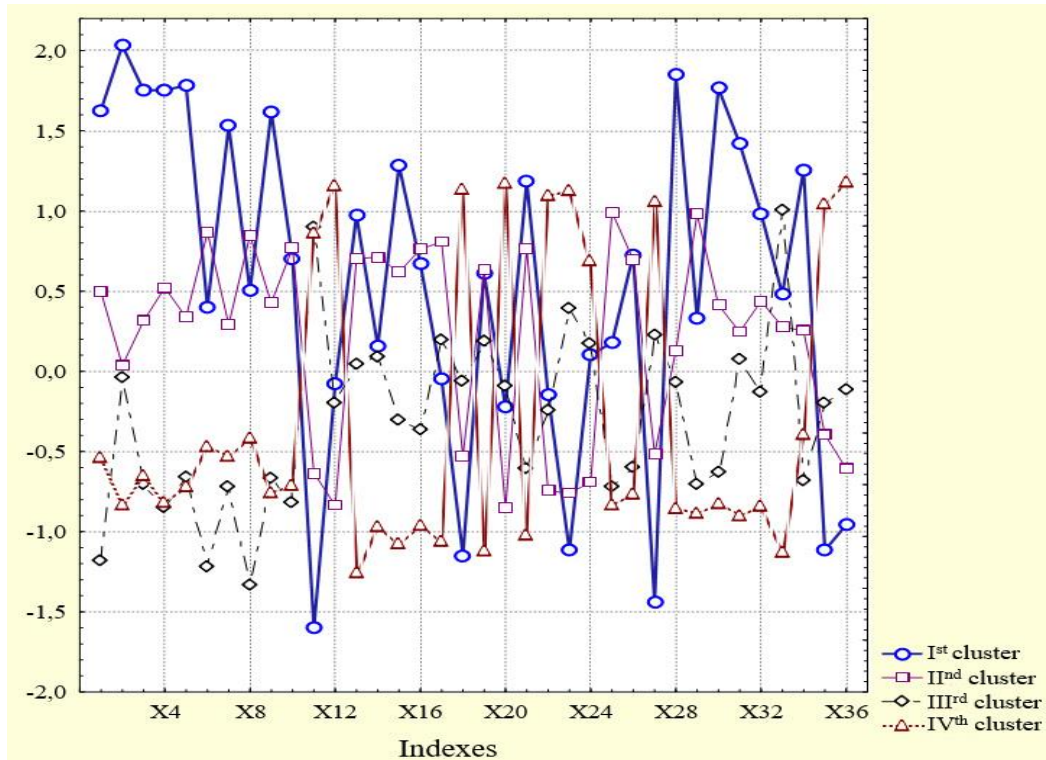
Fig. 3. Average values of the standardized indicators for each cluster of districts of the Volyn region of Ukraine, formed by the results of the study of socio-economic conditions of development of rural areas and peasant farms
Source: own development.

Visualization of the territorial-spatial distribution of selected clusters using a cartogram (Fig. 4) allows optimizing the visual perception of the information load on the clustering results.
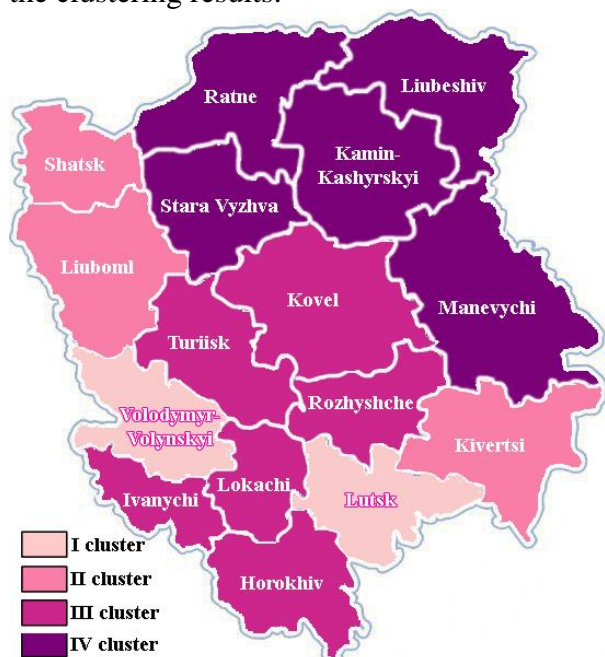

Fig. 4. The cartogram of the clustering results of districts of the Volyn region of Ukraine according to the research results of socio-economic conditions of the rural territories and peasant farms development
Source: own development.

CONCLUSIONS

The obtained results provide an opportunity to conduct a comprehensive assessment and generalization of the territorial differentiation of socio-economic conditions for the development of rural areas and farms located in the Volyn region of Ukraine.

In particular, the first cluster, which is not territorially integral and covers Lutsk and Volodymyr-Volynskyi districts, is characterized by relatively high average values of indicators of gross agricultural output per capita (UAH 7,115.0), the number of farms in rural areas (98 units), investments in fixed capital per capita (UAH 2,523.4), the density of rural settlements (7.95 units/100 km2), the share of apartments in rural settlements with central heating (51.3%) and the lowest average the value of the share of personal farms in the value of gross agricultural output (56.0%), the average distance between villages (2 km), the average number of the rural population living in apartments without central heating (14.8 people/village).

The general generalizations of regional differentiation of separate elements of social and economic conditions of development of rural territories and peasant farms located on them for real realities prompt to think about perspective prospects of development of the system of these farms, their place, and role in the organizational structure of agrarian sector of market type.

Agreeing with the opinion of O. Onyschenko and many other scientists that peasant farms, while remaining small producers, cannot be considered as a promising form of management in a developed market structure of the agricultural sector [14] one of the dominant factors that objectively determine the need and feasibility of their further development, in our opinion, is the insufficient level of production in agricultural enterprises.

Thus, based on a comparative analysis of selected socio-economic indicators between the formed clusters, we believe that for farms of the first cluster it is possible to further develop by transforming them into farms and (or) integration into the functioning of formal or informal agricultural associations in agricultural producers including large enterprises). In our opinion, due to the benefits of wholesale production and mutually beneficial symbiosis with other agricultural formations, it becomes obvious the possibility of establishing a qualitatively new system of production, storage, processing, and marketing, which will move from uncompetitive methods of economic activity. Peasant farms were positioned as a fundamental basis for social stability of the population, to a progressive form of management of the European model.

In our opinion, the second cluster of districts of the Volyn region of Ukraine is characterized by the presence of personal farms mainly of the commodity-consumer type. In general, this cluster is characterized by relatively positive conditions for their further development on the basis that was formulated for the first cluster. In addition, in our opinion, it is advisable to pay considerable attention to the recreational direction of the development of farms in the Shatsk district, especially those located in the settlements of the coastal zone of the Shatsk lakes.

However, since the socio-economic conditions for the development of peasant farms in the second cluster are slightly lower than in the first, we believe that some of these farms, mostly consumer type, will cease to function in the future, and their owners will be employed in large agricultural enterprises or in the non-agricultural sector.

According to the results of the study, it was found that the third cluster, which covers the central and southern part of the region and includes the largest number of districts (37.5% of their total number), is characterized by the presence of farms mainly consumer type, operating to the self-sufficiency of the rural population, with separate elements of personal households of consumer and commodity type. In our opinion, in the long run, as the growth of production in agricultural enterprises stabilizes, the bulk of such farms will not function.

Note that according to the results of the study, the IV cluster, which territorially covers a continuous area in the north-eastern part of the region, includes five districts of the Volyn region of Ukraine (or 31.3% of their total number) and is characterized by the worst socio-economic conditions rural areas and peasant farms located on them, the functional purpose of which is mainly aimed at self-sufficiency of the rural population with food products. Characterizing the features of this cluster, we note that the average value of fixed capital investment per person for him is 6.8 times less than for the first cluster; gross agricultural output per 1 person – 2.1 times; the share of apartments in rural settlements with central heating – 12.9 times; density of rural settlements – 2.1 times. At the same time, the average value of the share of personal farms in the value of gross agricultural output in all categories of farms for the IV cluster is 1.7 times higher than for the I; the share of those employed in peasant farms out of the total working rural population is 2.4 times; the number of the rural population living in apartments without central heating – 27.4 times.

It is important to note that in the areas of the IV cluster on average 69.1% (or more than two thirds) of the working rural population is employed in farms, which given the range of shortcomings and limitations in the possibilities of further development of personal forms of management in this cluster should not be, in our opinion, to consider positive and to allow further prolongation of the current situation. Under such conditions, we believe that in order to ensure the priority of development and implementation of measures and mechanisms to optimize the number and prospects of rural areas and farms located on them and a sufficient level of employment of the rural population in the Volyn region of Ukraine, forming the IV cluster, it should be attributed to depressed (underdeveloped) rural areas in order to further develop and implement a set of specialized measures aimed directly at the development of such rural areas.

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