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ANALYSIS OF DIFFICULTIES OF REGIONAL DEVELOPMENT IN SOCIAL CRISIS IN UKRAINE

Abstract. The article proposes an approach to assessing the level of the social crisis in Ukraine, based on the use of expert assessment, factor analysis and cluster analysis. The authors identify the factors that most influence the crisis processes in Ukrainian society, namely: living standards, unemployment, the ecological situation in Ukraine, political instability, corrupt authorities, social security and economic situation. For the analysis of the social crisis in the regions expert data and statistical data were used which allowed to identify a more adequate and realistic state of affairs. On the basis of the factors that form the social crisis in the regions, the classification of regions of Ukraine of the group with high, medium and low level of social crisis has been carried out. This analysis will allow to affect the state of development of social processes in the regions with the implementation of programs of socio–economic development.

Keywords: regional development, assessment of the level of the social crisis, methods of expert evaluation, factor analysis, cluster analysis, programs of socio–economic development of the regions

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АНАЛІЗ ВІДМІННОСТЕЙ РЕГІОНАЛЬНОГО РОЗВИТКУ В УМОВАХ СОЦІАЛЬНОЇ КРИЗИ В УКРАЇНІ

Анотація. У статті запропоновано підхід до оцінки рівня соціальної кризи в Україні, що базується на використанні методів експертного оцінювання, факторного та кластерного аналізу. Авторами виявлено фактори, що найбільше впливають на кризові процеси в українському суспільстві, а саме: рівень життя, рівень безробіття, екологічна ситуація в Україні, політична нестабільність, корумпованість влади, соціальна безпека та матеріальне становище. Для аналізу соціальної кризи в регіонах було використано дані, отримані експертним шляхом, та статистичні дані, що дозволило визначити більш адекватну і реальну оцінку стану речей. На основі факторів, які формують соціальну кризу в регіонах, здійснено класифікацію регіонів України на групи з високим, середнім та низьким рівнем соціальної кризи. Здійснений аналіз дозволить враховувати стан розвитку соціальних процесів у регіонах при впровадженні програм соціально–економічного розвитку.

Ключові слова: регіональний розвиток, оцінка рівня соціальної кризи, методи експертного оцінювання, факторний аналіз, кластерний аналіз, програми соціально–економічного розвитку регіонів.

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АНАЛИЗ ОТЛИЧИЙ РЕГИОНАЛЬНОГО РАЗВИТИЯ В УСЛОВИЯХ СОЦИАЛЬНОГО КРИЗИСА В УКРАИНЕ

Аннотация. В статье предложен подход к оценке уровня социального кризиса в Украине, основанный на использовании методов экспертной оценки, факторного и кластерного анализа. Авторами выявлены факторы, наиболее влияющие на кризисные процессы в украинском обществе, а именно: уровень жизни, уровень безработицы, экологическая ситуация в Украине, политическая нестабильность, коррумпированность власти, социальная безопасность и материальное положение. Для анализа социального кризиса в регионах были использованы данные, полученные экспертным путем, и статистические данные, что позволило определить более адекватную и реальную оценку состояния вещей. На основе факторов, формирующих социальный кризис в регионах, осуществлена классификация регионов Украины на группы с высоким, средним и низким уровнем социального кризиса. Проведенный анализ позволит учитывать состояние развития социальных процессов в регионах при внедрении программ социально–экономического развития.

Ключевые слова: региональное развитие, оценка уровня социального кризиса, методы экспертной оценки, факторный анализ, кластерный анализ, программы социально–экономического развития регионов.

Формул: 0; рис.: 7; табл.: 2; библ.: 21

The problem statement. Today in Ukraine, due to the social risk that the Ukrainian society has encountered in recent years, there is a social crisis. The factors that led to this situation include the need to protect the country from an external aggressor, the implementation of European integration processes, the reduction of the level of social protection of the population, distrust of the authorities, etc. As a result of the influence of such negative factors, there are numerous rallies, protests, and the level of dissatisfaction of citizens with social, political and economic spheres of life. In connection with this, there is a need for a detailed analysis of the social crisis, the causes of its occurrence and possible consequences, to develop the necessary conditions and means to overcome it at all levels – state (or society as a whole), regional or local.

Analysis of research and problem statement. An analysis of literary sources shows that the study of the social crisis in Ukraine is quite relevant, as it is being considered in the context of the study of the transformational processes of the past decades in post–Soviet countries. Part of the research deals with the causes and consequences of the social crisis at the community level as a whole, while others analyze the regional differences in the manifestations of the social crisis in Ukraine, and, accordingly, suggest different ways of solving the problem. In both cases, special attention is paid to the methods of identifying (diagnose) of the social crisis at one level or another level of governance, to the justification of the system of indicators and assessment methods. We will consider the main results obtained by domestic authors in the study of indicators and methods for assessing the level of social crisis in Ukraine (Table 1).

The main research results. To study the social crisis in the regions of Ukraine using of the following economic and mathematical methods and models, such as expert evaluation, factor and cluster analysis, classification trees, general statistical methods is proposed. The relationship of these methods and models is presented in the form of the following conceptual scheme of research (fig. 1).

An overview of literary sources has shown that the assessment of the social crisis, as well as social tension as the main threats to the social security of the region, the identification of their causes and consequences, patterns of development and forecasting methods, is today a topical task of research.

Table 1

A review of literary sources on the study of the social crisis in Ukraine

No	Authors	Content of research	Result
1	Yatsenko L.D. Kolomiets O. O. [21]	The method of measurement of social tension in the regions of Ukraine and determination of priority directions of providing of social security in separate territories are proposed.	The method of measuring social tensions in certain territories is proposed and described, and the results of the complex evaluation of its formation parameters are presented. The grouping of the regions of Ukraine according to the level of social tension is carried out, perspective ways of ensuring social stability are presented.
2	Sirii Y.V. [15]	The approach to constructing a conceptual model of social tension on the basis of system analysis is proposed.	Interpretative, operationalizing and explicative actions on the phenomenon of social tension are determined. The classification and grouping of factors of social tension is carried out.
3	Golovakha E. Panina N. [5]	The estimation of a level of readiness of a society for a social protest is proposed.	Dynamics, regional features and factors of formation of a social crisis are considered.
4	Mishchenko M., Balakireva O.[13]	The method of research of social tension as a precondition of social crisis is offered.	The problems of detection and analysis of social tension in society are investigated.

5	Nebozhenko V. [14]	The topic "Ukraine on the way to an open society" was expanded.	Social tensions and conflicts in Ukrainian society are considered.
6	Klyuenko E. [11]	Improvement of the methodology for assessing the social crisis.	The methodological principles of the study of social tension in a transformed society are considered.
7	Slyusarevsky M.M. [16]	The theoretical model of social tension is proposed.	The set of necessary and sufficient indicators of estimation is considered.
8	Holovenko V.A. [6]	The reasons of the social crisis in Ukraine are investigated.	The social crisis arises due to a combination of economic, political, social and other processes, the course and direction of which leads to the emergence of unstable (political, economic, military) or conflict situation in the society.
9	Akinina P.V., Ryazantseva S.V. [8]	The factors of formation of social tension in society are suggested.	The psychological and personality traits of each person are believed to be the basis of internal factors of social stress. As external factors, the authors distinguish the following: economic; political socio–psychological; ecological.
10	Tolstova Yu.N. Voronina N.D. [18]	The methods of determining the level of social tension are proposed, the preconditions and consequences of the social crisis are determined.	To study the social crisis it's recommended to use of methods of multidimensional analysis; models that include two types of information, with the use of expert judgment or the use of statistical methods of information processing.
11	Uzunov V. [19]	It is proved that the social tensions in the country and its regions are influenced by many groups of factors, among which one of the most important is the quality of life of the population.	The following factors are suggested for the group of factors of quality of life of the population: low financial level; increase in crime; unemployment; unfair distribution of income; low level of social security; demographic factors; mortality of all kinds; increase in the number of mental illnesses; aggravation of the housing problem; increasing the number of divorces; reduction of volumes and quality of medical services; ecological situation.
12	Borodkin F. [4]	Improvement of the system of indicators of social tension.	Six indicators that characterize social tension are proposed, these are: the unemployment rate; the load of the unemployed at one vacant place; the share of long–term unemployed; average wage arrears with respect to the subsistence minimum; poverty line; coefficient of migration growth.
13	Korobeinikov A.M. [12]	Improvement of the system of indicators of the social crisis in society.	It is proposed to use the following statistical indicators: the number of persons of the disabled for one thousand able–bodied age; the level of registered unemployment; average length of unemployment; the number of registered crimes per 10 thousand inhabitants.
14	Baranova G.V. [3]	A comprehensive objective assessment of the social crisis in the region is proposed.	A system of 29 priority factors has been developed that significantly affect the social crisis in the region.
15	Gryzlov I.M. [7]	Improvement of the system of indicators of social tension of the population.	It is proposed to form a set of indices of social tension of the population of the region using the method of the main components.
16	Andrenko O.A., Mordovtsev O.S. [1, 2]	The methodology for assessing the social tension of the region has been improved.	An that allows us to form grounded sets of partial indicators and to define a comprehensive rating assessment of the level of social tension in the regions of Ukraine is proposed.

Despite the wide range of work on the methodology for assessing the social crisis in Ukraine, the number of quantitative and qualitative indicators of its assessment, as well as the coverage of the territorial aspects of the social crisis, needs to be clarified. This will allow us to investigate the strengths and weaknesses of the functioning of regional socio–economic systems.

Thus, the object of research in the article is the social crisis in the regions of Ukraine and factors that affect it. The purpose of the study is to analyze the social crisis in the regions of Ukraine and the methods and models of its analysis.

To study the social crisis in the regions of Ukraine it is proposed to use the following economic and mathematical methods and models, such as expert evaluation, factor and cluster analysis, classification trees, general statistical methods. The relationship of these methods and models is presented in the form of the following conceptual scheme of research (Fig. 1).
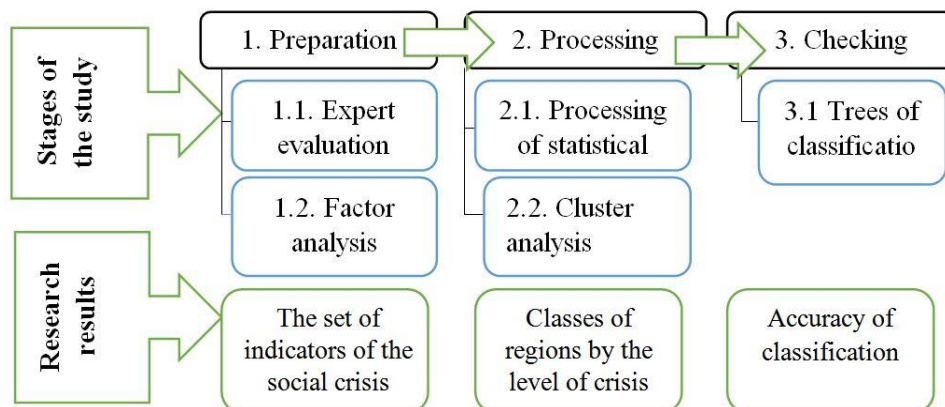

Fig. 1. Conceptual Scheme of Research of the Social Crisis in the Regions of Ukraine

Based on the conceptual schema, we consider the algorithms underlying this study. The complexity of this objective reality, which is the social crisis, implies for its assessment and analysis of the use of combined methods.

At the stage of identifying factors that determine the social crisis, it is proposed to apply methods of expert and sociological surveys. It is important to find out the degree of influence (significance) of each factor on the final result of management of social security in various regions of Ukraine. In order to determine the most important factors of the social crisis in the regions of Ukraine, 25 different indicators were taken, concerning which a sociological survey of 20 respondents was carried out regarding the degree of their importance in managing the social crisis. To implement the proposed algorithm, it is necessary to find out the internal relationships between the factors that form the level of the social crisis, the construction of multidimensional functions of communication factors, the allocation of their minimum number, which describe the social crisis with a sufficient degree of accuracy. Therefore, we apply the methods of factor analysis to reduce the number of variables [9].

The social crisis is a multifactorial phenomenon, so the essential difference is its ambiguity. At the data preparation stage, a study was conducted that allowed us to identify 25 factors that have a direct impact on the formation of the social crisis in Ukraine. Using the factor analysis method, we reduce the input number of factors to reduce the dimension of the information space of the signs [9]. The result of finding own numbers is shown in Fig. 2.

According to the results obtained, we can see that the eigenvalues of the selected factors exceed the value of 1, which means that each of them will characterize at least one indicator. The generated factors represent 96% of the total variance of variables, which is an indicator of the high quality of the obtained model.

We shall note that the number of main components the researcher sets independently. To facilitate this task, you can use the Kaiser's method or "Scree test". These methods allow to determine the optimal number of main components. We use the "Scree test" criterion for the preliminary interpretation of the number of factor variables from the original data array. The result is shown in Fig. 3.

The results of the application of the criterion of " Scree test " prove that seven factors should be used for the study. To determine the factor loads of the indicators, we should use the Varimax normalized rotation procedure, the results of which are shown in Fig. 4.

Value	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	7,265475	29,06190	7,26548	29,06190
2	5,189234	20,75693	12,45471	49,81884
3	3,357932	13,43173	15,81264	63,25056
4	2,945977	11,78391	18,75862	75,03447
5	2,340149	9,36060	21,09877	84,39507
6	1,617574	6,47030	22,71634	90,86536
7	1,248377	4,99351	23,96472	95,85887

Eigenvalues (Spreadsheet1)
Extraction: Principal components

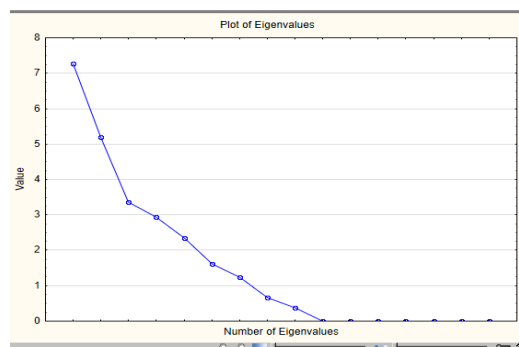Fig. 2. Evaluation of the informative components of the main components

Fig. 3. Scree test for determining factor variables

At the second stage, clustering was carried out. The main task of cluster analysis is to split a given set of objects (situations) into a subset called clusters, so that each cluster consists of similar objects, and objects of different clusters differ significantly [10].
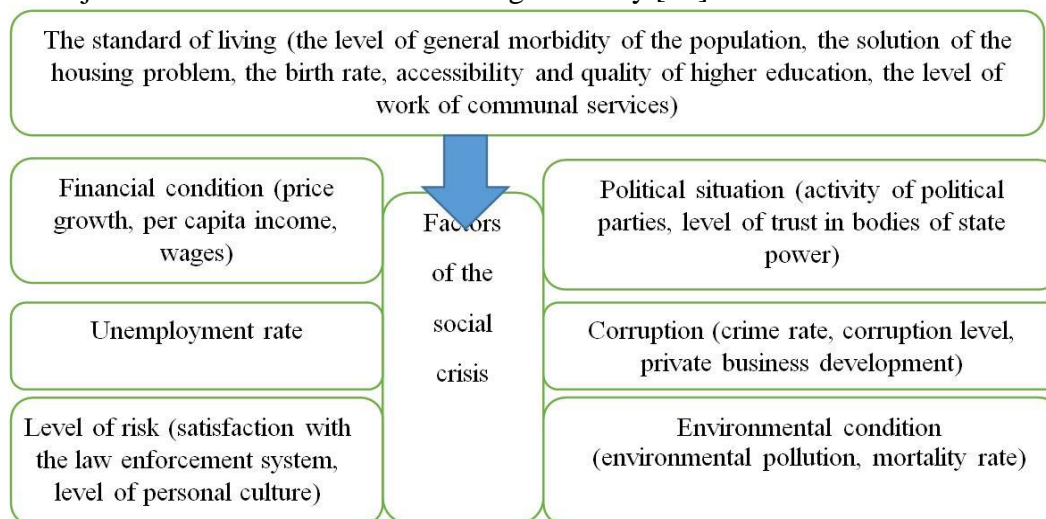

Fig. 4. Results of factor analysis of indicators of the social crisis in Ukraine

Modern computer packages for the processing of statistical information make it easy to build such models. Before the analysis, all data is standardized.

Cluster analysis performs the following main tasks: development of a typology or classification; research of useful conceptual schemes of grouping objects; generation of hypotheses based on data research; hypothesis testing or research to determine if the types (groups) that are identified in one way or another are present in the existing. Stages of cluster analysis are shown in Fig. 5.
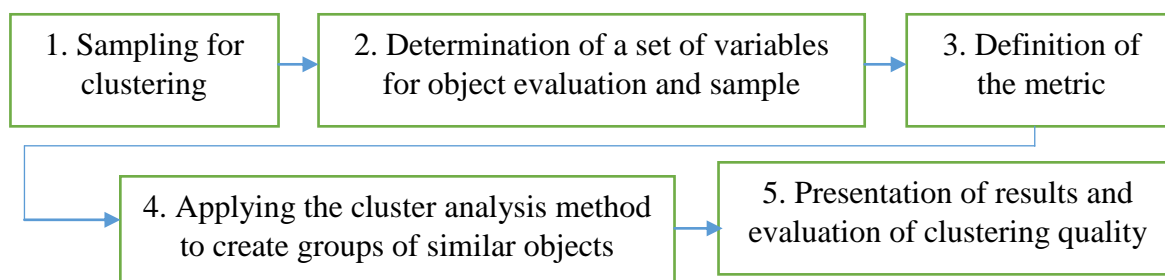

Fig. 5. Algorithm of application of cluster analysis

To implement clustering, we define the indicators characterizing the factors of the social crisis in the regions that were obtained at the previous stage, but only those that can be measured statistically for each region (Table 2, [17]).

Table 2

Indicators for assessing the level of social crisis in the regions of Ukraine

No.	Indicator	No.	Indicator
1	The unemployment rate of the population	5	Length of worn and emergency plumbing networks
2	The level of economic activity of the population	6	Length of worn and emergency thermal and steam networks
3	Average monthly salary	7	Acceptance of housing
4	Capital investment	8	The level of environmental pollution

To conduct the research, we use the single–link procedure and the usual Euclidean metric. For a more visual presentation of the results, construct the dendrogram (Fig. 6).
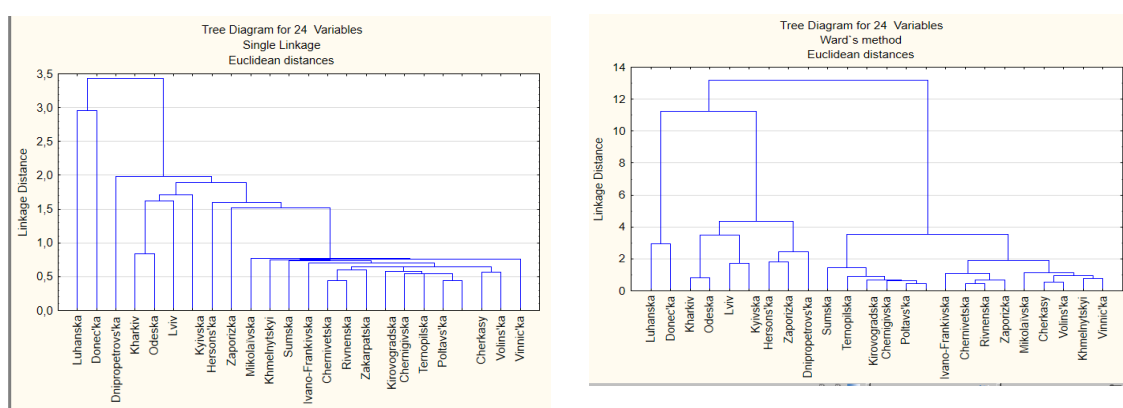

Fig. 6. Grouping the regions by single–link method (left) and Ward method (right)

The resulting breakdown of a set of regions into clusters shows that it is worthwhile to allocate two groups of homogeneous regions in the state of the social crisis. At the same time, the cluster with a high level of social tension included such regions as Luhansk, Donetsk, Dnipropetrovsk, Kharkiv, Odessa, Kiev, Kherson and Zaporozhye regions. The rest of the regions have formed a cluster with a low social tension. However, given the special political and socio–economic situation in the eastern regions that became the center of the military conflict in our country, it is expedient to allocate Donetsk and Luhansk regions to a separate cluster. Therefore, we divide the set of regions into three clusters by the Ward method (Fig. 6). Dendrogram analysis confirms the presence of three clusters, that is, it allows to recognize three groups of homogeneous states in the observed set of data. There are clearly three clusters, which include regions with a high social crisis, medium and low. The first cluster (regions with a high level of social crisis) includes Donetsk and Luhansk regions. To the second cluster (regions with an average level of social crisis): Kharkiv, Dnipropetrovsk, Odessa, Lviv, Kherson, and Transcarpathian. To the third cluster (regions with low social crisis): Mykolayiv, Sumy, Kirovograd, Ivano–Frankivsk, Chernihiv, Rivne, Zaporozhye, Chernivtsi, Ternopil, Poltava, Cherkasy, Volyn, Vinnitsa.

At the last stage, the quality of clustering with the use of classification trees was confirmed. The methods of this group allow, for example, to find out, in which combination of independent variables, the dependent variable most often takes one value, and in which another. For the application of this method, all regions of Ukraine are divided into two clusters. The first one – with a low level of social crisis, the second with a high level. The results of constructing a classification tree using the one–dimensional branching method are shown in fig. 7.

From pic. 7–a, we see that we have 1 terminal vertex and 2 branches. To analyze the importance of variables for classification, we will calculate their ranks (pic. 7–b, 7–c). After analysis, it can be argued that the most important variable for constructing a classification model, followed by a further branching of observations, is "Length of worn and emergency thermal and

steam networks." Thus, the most important rank is the factor that is most important for constructing the classification. In general, according to the results of the analysis, we can conclude that for the considered set of observations, the classification procedure has been successfully carried out, which is confirmed by the confidence level of 0.0527 (pic. 7–d).
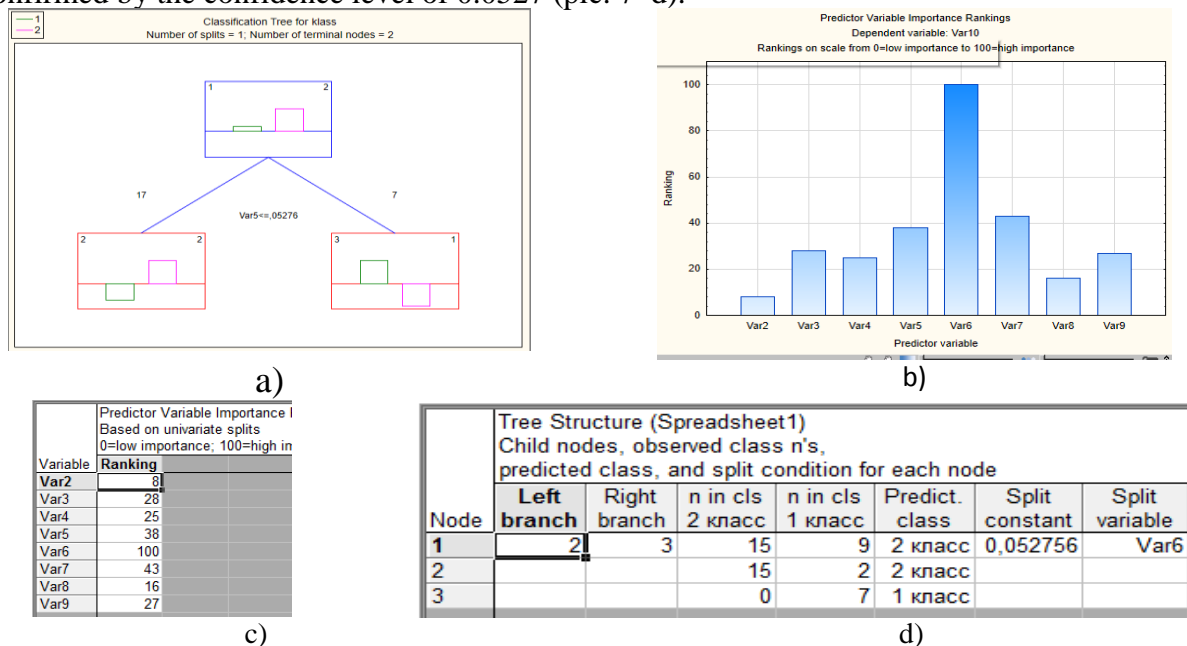

a)

b)

c)

d)

Fig.7. Results of checking the clustering of regions using the classification tree

The conclusions. The proposed approach to assessing the level of the social crisis in Ukraine allowed us to identify the factors that have the greatest impact on the crisis in Ukrainian society, namely: living standards, unemployment, the ecological situation in Ukraine, political instability, corruption in power, social security and economic situation. For the analysis of the social crisis in the regions expert data and statistical data were used which allowed to identify a more adequate and realistic state of affairs. Among the factors that form the social crisis in the regions, there are "major" ones that have the greatest impact on the growth of social tension in the region. All regions of Ukraine were divided into groups with high, medium and low social crisis using cluster analysis methods. The clustering results were confirmed by constructing a classification tree. This analysis will allow taking into account the state of development of social processes in the regions when implementing programs of socio–economic development.

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