

## FORMATION OF REGIONAL STRATEGIES OF COMPETITIVENESS ENHANCEMENT ON BASE OF CLUSTER ANALYSIS INTERPRETATION RESULTS

<sup>a</sup>BEZKHLIBNA ANASTASIIA, <sup>b</sup>ZAYTSEVA VALENTYNA

National University "Zaporizhzhia Polytechnic", 64 Zhukovskiy Street, Zaporizhzhia, Ukraine  
email: <sup>a</sup>bezkhlibna22@gmail.com, <sup>b</sup>zayceva\_valentina@ukr.net

The article is published as part of a study of the Department of Tourism, Hotel and Restaurant Business on the topic "Tourism industry of Ukraine in the period of European integration: a theoretical aspect"

**Abstract:** Determining the competitiveness of regions is necessary to understand the effectiveness of regional socio-economic policies. The aim of the research is to interpret the results gained applying cluster method in the framework of formation of Ukrainian regions competitiveness enhancement strategies. The methodology of the research is to use cluster analysis, to build a multidimensional statistical model for grouping regions according to the principle of similarity of socio-economic development parameters, methods of analysis and synthesis, induction and deduction, graphical method. Result is based on implementing the method of cluster analysis and broadening the sphere of its application in the framework of regional competitiveness estimation and advancement of strategies of regional development.

**Keywords:** cluster analysis, competitiveness, effectiveness, region, regional policy, strategic management, socio-economic development, Ukrainian regions.

### 1 Introduction

The modern development of the regions requires the development of a development strategy that addresses their advantages and efficiency. In addition the strategy should shape competitive regions in order to enhance Ukraine's competitiveness as a country in the world community. Regions should not compete with each other in the economic struggle for resources, but should use their advantages to strengthen each other. The use of cluster analysis reveals groups of regions with similar socio-economic development and problems.

Regional development strategies are based on an understanding of the weaknesses and efficiency of the regions. As competitiveness is a multidimensional set of characteristics of the socio-economic environment of the region, proposed is the use of cluster analysis.

The research of methods and mechanisms of regional development strategy formation is devoted to the work of foreign and domestic scientists. Ketels's work [1] is devoted to explaining the strategy of territorial competitiveness formation. N.Adams and N. Harris [2] wrote about guidelines and instruments for regional development, using the example of spatial planning in the European Union. A. Rugman and A. Verbeke [3] investigated the impact of transnational corporations on regional development. A.Rugman [4] explored the impact of globalization on regional economies and regional strategies. It is suggested to use cluster analysis to analyze the strategic development of the regions based on improvement their competitiveness.

Cluster analysis is a multidimensional statistical procedure that "... involves the collection of data that stores information about the sampling of objects and the ordering of objects into relatively homogeneous groups" [5, p. 518].

Studying the cluster method of differentiation of regions requires the following tasks: research of the method of cluster analysis, its essence, algorithm of carrying out. Development of algorithm of cluster grouping of regions of Ukraine by indicators of socio-economic development of regions for 2018, its implementation on the basis of actual materials of the State Statistics Service of Ukraine using modern software products, interpretation of cluster decisions and generalization of the obtained results.

In economic studies, multidimensional statistical methods are quite useful, which among the many probabilistic statistical models allow us to reasonably select the one that best fits the original statistics that characterize the actual behavior of the studied set of objects, evaluate the reliability and accuracy of

conclusions, and the conclusions gained as per statistical material. [6, P. 38]

Cluster analysis methods can be applied in a variety of cases, even when it comes to simple grouping, but the use of cluster analysis in the process of assessing the competitiveness of Ukrainian regions is a difficult grouping because it covers indicators from different industries.

A cluster analysis method is a multidimensional statistical procedure that involves collecting data containing information about a selected objects and ordering objects into relatively homogeneous groups [7, p. 141]. The primary purpose of the analysis is to distinguish in the original multidimensional data such homogeneous subsets so that the objects within the groups are alike in a certain value and the objects in the different groups are not alike. "Similarity" means the closeness of objects in the multidimensional space of features [8, p. 10]. The cluster analysis technique is useful in situations where information about the possible structure of object classes is completely or partially missing. [6, C. 39]

Since the State territorial structure of Ukraine provides for the division of the territory into regions, the use of regional policy of economic development and the use of budgetary financing and financing of the State Development Fund.

### 2 Theory

The competitiveness of the region in today's globalization world is not only a "struggle", but on the contrary – an "active creative environment". Creating a competitive advantage for regions provides benefits for investment development, capacity building and intellectual capacity (leading to improved demographics and growth in GRP through the use of business and service potential). Creating an favourable environment for other resources to grow. The use of new tools for improvement competitiveness is becoming increasingly relevant.

Kitson in e-mail (2004) [9] argued that regional competitiveness focuses more on drivers and the prosperity of a region (or city) in the long run than for more restrictive understanding of competition for markets and resources.

At the end of the twentieth century the concept of competitiveness of regions has become increasingly important in the scientific and political circles. "Regions and cities have no other choice but only to become competitive in order to survive in the new globalized market of new competition," notes Best American [10, 11].

The founder of the "rhombus" of competition, M. Porter and co-author Ketels [12], state that "competitiveness remains a concept that is not completely understood, despite its broad definition of its importance. In order to understand competitiveness, the sources of prosperity of a nation must be the starting point. The standard of living of a nation is determined by the productivity of its economy which is measured by the value of its goods and services produced per unit of human capital and natural resources of the country. Productivity depends both on the value of the nation's products and services, measured by the prices they can operate in the open markets, and the efficiency which they can be produced. Real competitiveness is thus measured by productivity. Productivity allows the nation to maintain high wages, a stable currency and an attractive return on capital, and with it a high standard of living."

R. Cellini and A. Soky [13] argue that "the concept of regional competitiveness is neither macroeconomic (national) nor microeconomic (based on the performance result): regions are neither a simple integration of firms nor reduced versions of nations." R. Camagni [14] supported a similar view. It assumes that regions are really competing, but based on absolute competitive advantages, not comparative ones. A region may be

considered to have absolute competitive advantages if it possesses distinct technological, social, infrastructure or institutional assets that benefit individual firms in such a way that no alternative price factors will cause a geographical redistribution of economic activity. These assets typically give the region's firms overall better performance than otherwise. According to the European Commission: "The idea of regional competitiveness should reflect the idea that despite the presence of strong competitive and non-competitive firms in each region, there are common features in the region that affect the competitiveness of all firms located there.

Although competitiveness is not straightforwardly defined, it has become one of the most popular concepts among scientists [15].

Using the results of the cluster analysis of the competitiveness of the regions will create mutually beneficial economic ties between state authorities, business, science and education, social sphere, which will lead to multiplicative development of the territory and will allow to form state development programs.

Today as practice shows when implementing regional policy programs, the calculation takes place on the "middle" region and consists in mining on the basis of statistical data, which ultimately leads to a lack of methodological support and weak argumentation in the development of regional policy directions [16]

Cluster analysis alone does not provide the necessary information for making informed management decisions. In regional management an integrated approach is important which includes a system of methods for: researching the current situation; identify problem areas in the socio-economic condition of the region; development of a regional development strategy [16] in order to identify specific areas for further development in a similar socio-economic situation.

There is no generally accepted definition of the term "cluster", but it is obvious that a cluster can be characterized by a number of features, "... the most important of which are density, dispersion, size, shape and separability" [16]. The result of cluster analysis is the partition of the objects in the original sample into a number of clusters. Moreover, each cluster includes one or more objects that are characterized by similar changes in the initial indicators in other words the regions of a particular cluster are less differentiated when compared with regions of other clusters [16]. B.G. Mirkin in the book "Groupings in socio-economic research" [17, p. 42-43], notes that "the most natural thing is to give a strict definition of a compact group, and then construct the group as a collection of compact groups in the sense of this definition." So B.G. Mirkin suggests calling a group of objects a cluster if the maximum distance between its points does not exceed the minimum distance "outside". R.R. Sokal in the book "Cluster Analysis and Classification: Prerequisites and Key Directions" [18, p. 7-19] describes that: the cluster analysis algorithm is essentially a regional classification algorithm. "It is often claimed that classification is one of the fundamental processes in science. Facts and phenomena must be streamlined before we can understand them and develop general principles that explain their appearance and apparent order. From this point of view, classification is a high-level intellectual activity necessary for us to understand nature"

Despite the differences in goals, data types, and methods used, all studies using cluster analysis are characterized by five major steps [7, p. 145-146]: sampling selection for clustering; determining the number of features by which the sample objects will be evaluated; calculating values of varying degrees of similarity between objects; applying cluster analysis to create groups of similar objects; validation of cluster solution results.

Most often, cluster analysis is used to segment territorial entities by a set of socio-economic indicators [16].

### 3 Data and Methods

In the framework of this study, the stages of cluster analysis were supplemented and detailed on the basis of which a cluster grouping methodology was developed, adapted to the analysis of regional competitiveness. This technique involves the consistent realisation of the basic procedures shown in Fig. 1. The following groups of regional indicators were selected for analysis: social, economic, demographic, infrastructure (transport, energy, construction), industry and agriculture.

Each of these stages plays a significant role in the use of the cluster method in the analysis of data of socio-economic development of Ukrainian regions.

According to the described algorithm of grouping of regions of Ukraine on the basis of cluster analysis of competitiveness the main purpose of cluster grouping (stage 1) has been determined. The purpose of the cluster analysis of the competitiveness of Ukrainian regions is to continue investigate individual groups of regions and improve their development strategy, as well as to identify the link between their socio-economic development, competitiveness, attractiveness for the population and business.

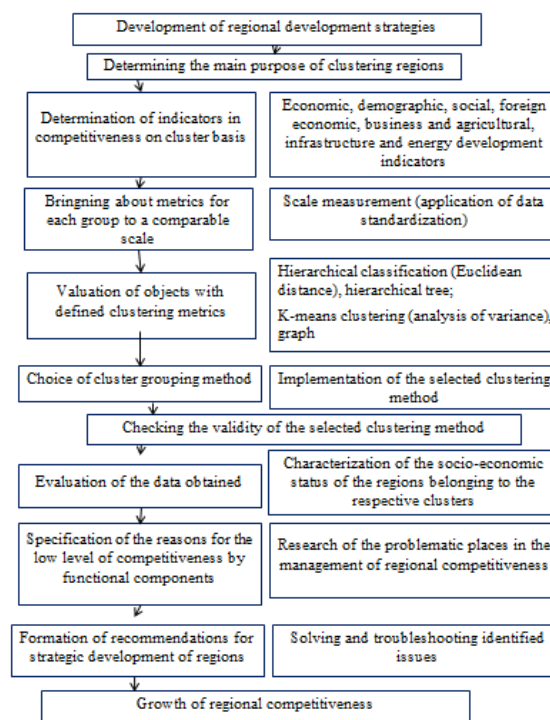


Figure 1 - An algorithm for analyzing the competitiveness of regions

In the second stage of the study, competitiveness indicators were determined, on the basis of which clustering will be carried out.

The choice of variables in cluster analysis is one of the most important steps in the research process [6, p. 40].

To carry out the analysis used were official statistical reports published on the website of the State Statistics Service as the source data .

Table 1: Factors selected for cluster analysis

Group of factors	Variable	Units of measurement
Economic	Number of registered unemployed people	thous.
	Average monthly earnings per	UAH

	employer, nominal wages,	
	Consumer price index before December of previous year	-
Demographic	Number of new-born children	persons
	Residential population	number of people
	Number of decedent	persons
Business and agriculture development	Amount of industrial products sold	mil. UAH
	Number of legal entities	number of units
	Retail turnover,	mil. UAH
	Index of agricultural products	-
Infrastructure	Amount of building and construction works	thous. UAH
	Freight	ton-kilometrs
	Passenger transportation	million passenger/km
Social	Number of criminal offenses recorded	cases
Foreign Economic	Export of goods	millions of US dollars
	Import of goods	millions of US dollars
Energy	Fuel reserves	thousands of tons pit coal
	Supply of electricity, gas, steam and conditioned air,	thous. UAH

The criterion for the selection of indicators (factors) was group selection, the essence of which consists in the choice of a set of factors, for their subsequent grouping as per 7 socio-economic and infrastructure subsystems (Table 1). This group of subsystems gives a multidimensional picture of the socio-economic situation of the regions. The factors were selected according to an earlier study [19]. The analysis of indicators by functional components will allow to investigate in more detail the problematic places in its management (organization) in order to solve and eliminate the identified problems.

#### 4 Methods or Model

Cluster analysis uses the polyethical principle of group formation - all attributes are simultaneously involved in grouping, that is, they are taken into account at the same time when a particular group was assigning as object. At the same time, as a rule, no clear boundaries for each group are specified and it is also unknown in advance how many groups it is expedient to distinguish in the population studied [20].

Since all algorithms used in cluster analysis require estimating distances between clusters or objects the scale of the measurements must be set. The indicators selected use different types of scales and units of measurements that need to be standardized.

In the first stage, the "natural" clusters are formed can be used for further analysis. Euclidean distance is defined as a measure of proximity.

The measure of proximity determined by the Euclidean distance is the geometric distance in the n-dimensional space and is calculated as follows:

$$d(x, y) = \sqrt{\sum_{i=1}^n (x_i - y_i)^2} \quad (1)$$

The description of the vertical tree diagram starts from the top of each area in its own cluster. As soon as the top-down feature expressed, the areas that are closer to one another merge and form clusters. Each node of the diagram is a union of two or more clusters. Linkage distance defines the distance at which the respective clusters have been merged.

All calculations were realized using the Stat Soft Statistica software.

Based on the results shown in Fig. 2, it is recommended to use 4 natural clusters for further analysis. That is according to the results of hierarchical classification, it is found that for further investigation with the k-means method it is advisable to use the assertion that the given array of data forms 4 clusters (identified 4 areas that "touch" each other more closely).

The most important result of tree clustering is hierarchical tree (Fig. 2).

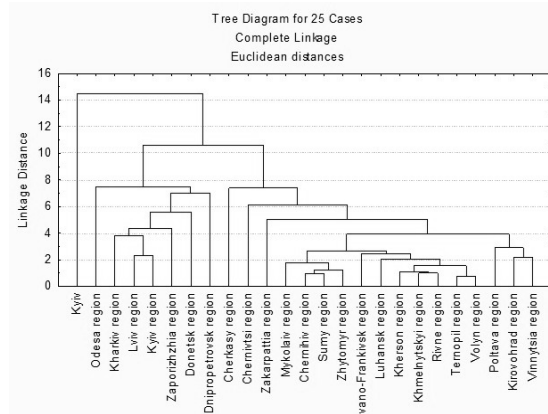


Figure 2 - The result of the hierarchical classification of the competitiveness of regions in the Euclidean distance

It is possible to test this hypothesis using the k-means method which consists of dividing the output data into 4 clusters (according to their competitiveness indicators) and checking the significance of differences between the groups. The k-means method is as follows: the calculations start with the 4 observations we have chosen which are the centers of the clusters when the object composition of the clusters is modified to minimize intra-cluster variability and maximize inter-cluster variability. Each subsequent observation belongs to the group whose degree of similarity with the center of gravity is minimal. After changing the composition of the cluster a new center of gravity is calculated, most often as the vector of averages for each parameter. The algorithm continues until the composition of the clusters stops changing. Once the classification results have been obtained, it is possible to calculate the average of the values for each cluster to evaluate their differences.

To determine the significance of differences between the clusters obtained, the analysis of variance was used the results are given in Table. 2.

Table 2: Results of analysis of variance

Variable	Between SS	Within SS	F	Signif. p
Number of registered unemployed people, thous.	10,81823	13,18177	5,7449	0,004944
Average monthly earnings per employer, nominal wages, UAH	20,33172	3,66828	38,7980	0,000000
Amount of industrial products sold,	12,75850	11,24150	7,9446	0,000996

mil. UAH				
Amount of building and construction works, thous. UAH	19,20375	4,79625	28,0274	0,000000
Export of goods, millions of US dollars	17,78067	6,21933	20,0126	0,000002
Import of goods, millions of US dollars	22,98329	1,01671	158,2385	0,000000
Freight ton-kilometers	10,44718	13,55282	5,3959	0,006521
Retail turnover, mil. UAH	20,88885	3,11116	46,9992	0,000000
Residential population, number of people	16,90737	7,09263	16,6865	0,000009
Number of newborn children, persons	18,11236	5,88764	21,5344	0,000001
Number of decedent, persons	18,92119	5,07881	26,0786	0,000000
Number of criminal offenses recorded, cases	20,68826	3,31174	43,7286	0,000000
Index of agricultural products	9,99710	14,00290	4,9975	0,009025
Fuel reserves, thousands of tons pit coal	3,95129	20,04871	1,3796	0,276469
Supply of electricity, gas, steam and conditioned air, thous. UAH	14,69623	9,30377	11,0572	0,000145
Passenger transportation, million passenger/km	20,90280	3,09720	47,2425	0,000000
Number of legal entities	22,94121	1,05879	151,6722	0,000000
Consumer price index before December of previous year	3,49182	20,50818	1,1919	0,336948

The disadvantage, as well as a feature of clustering methods, is the fact that there are no uniquely defined and strict criteria for identifying the number of possible homogeneous segments. Each time the researcher independently decides on the number of clusters, focusing on theoretical and practical considerations. That is why determining the number of clusters is always a difficult question for the researcher. Sometimes it is possible a priori (before conducting cluster analysis) to determine this number, having an idea of the essence of the phenomenon under study. However, in most cases, the number of clusters is determined only in the analysis process. It should also be noted here as the number of clusters is set by the researcher independently, this allows to use subjective criteria during the analysis [21].

**5 Results**

In the course of the research, an analysis was carried of and it was found that the separation of the 4 groups was the most reasonable. The first cluster includes the regions: Dnipropetrovsk region, Donetsk region, Zaporizhzhia region, Lviv region, Odessa region, Kharkiv region. They are industrialized regions. The major centers of these regions are large cities with a population of 800 thousand inhabitants.

The second cluster includes regions of Ukraine Vinnytsia region, Kyiv region, Kirovograd region, Poltava region, Cherkasy region.

Table 3: Members of cluster and Distance from Respective Cluster Center, 2018

Cluster 1		Cluster 2		Cluster 3		Cluster 4	
Region	Distance	Region	Distance	Region	Distance	Region	Distance
Dnipropetrovsk region	1,07	Vinnytsia region	0,404	Kyiv	0	Volyn region	0,199
Donetsk region	0,906	Kyiv region	0,61			Zhytomyr region	0,355
Zaporizhzhia region	0,723	Kirovograd region	0,50			Zakarpattia region	0,757
Lviv region	0,562	Poltava region	0,40			Ivano-Frankivsk region	0,404
Odesa region	1,005	Cherkasy region	0,978			Luhansk region	0,366
Kharkiv region	0,519					Mykolayiv region	0,388
						Rivne region	0,206
						Sumy region	0,305
						Ternopil region	0,175
						Kherson region	0,152
						Khmelnytskyi region	0,191
						Chernihiv region	0,243
						Chernivtsi region	0,807

The third cluster includes the city of Kyiv, the capital of Ukraine and it has its own economic features related to the administrative and territorial situation. The city of Kyiv is the capital of Ukraine, the largest city in the country and is distinguished by state statistics as a separate region because of its special status, which is enshrined at the legislative level. It should be noted that among the sample of indicators the agricultural index for Kiev is not determined.

The fourth cluster includes the following regions: Volyn region, Zhytomyr region, Zakarpattia region, Ivano-Frankivsk region, Luhansk region, Mykolayiv region, Rivne region, Sumy region, Ternopil region, Kherson region, Khmelnytskyi region, Chernihiv region, Chernivtsi region.

Thus, 4 clusters were identified, where there are differences between degrees of socio-economic development. For a more detailed study, we show the results of cluster grouping in Fig. 3.

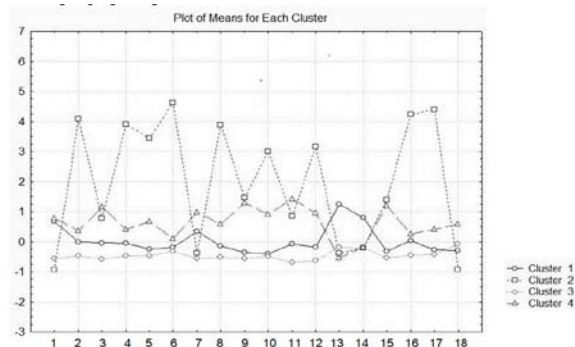


Figure 3 - Graphical representation of cluster grouping, 2018

Each set of indicators was allocated according to clustering parameters to compare with the results of multidimensional grouping of regions with selected competitiveness indicators. Summarizing the results made it possible to state that economic, demographic, social, foreign economic, indicators of business and agriculture, infrastructure and energy sector significantly affect the effectiveness of the region (meeting the needs of residents, improving their well-being).

Comparison of indicators of each group allows to determine in advance the reasons for the unsatisfactory level of competitiveness of the region, among which may be: unacceptable organization of cooperation between government and business (sector of production and agriculture), irrational management of local government infrastructure development, imbalance of foreign economic sector, social problems.

Due to the relevance and specificity for every region specific there exist of low competitiveness. Further integrated assessment of the factors of the above indicators by functional components will allow to explore in more detail the problematic places in its management (organization) in order to solve and eliminate the problems identified.

Let us analyze the characteristics of socio-economic development indicators of each cluster, which revealed similarities between regions (table 4).

Table 4: Group indicators for competitiveness

Cluster 1		Cluster 2		Cluster 3		Cluster 4	
Most competitive		Competitive		Less competitive		Least competitive	
High rates (>1)	Low rates (<1)	High rates (>1)	Low rates (<1)	High rates (>1)	Low rates (<1)	High rates (>1)	Low rates (<1)
13	-	2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 17	1, 7, 18	All dates are close to low ones		3, 7, 9, 10, 11, 12, 13, 15	-

Thus, it is necessary to conclude that the regions belonging to the first cluster are characterized by above average agricultural production index. These regions (except for the Lviv region are concentrated in the south and east of Ukraine) are the most competitive regions of the country. Indicators of our interest are the number of unemployed registered (signaling a difficult socio-economic situation), the turnover (population and number of industrial enterprises in the regions require) and fuel reserves (pit coal). Other indicators have averages of distances.

The regions that are united in the second cluster are characterized by a high trend in terms of: nominal average monthly wage of an employee, volume of industrial production, volume of construction work completed, export of goods and imports of goods (indicates active foreign economic activity), retail trade turnover, number of permanent population, number of live births, number of reported criminal offenses, passenger traffic, number of legal entities

The below average indicators include the number of registered unemployed and the Consumer Price Index (which is a positive trend) and the turnover in these regions.

It can be noted with certainty that the regions that are the result of the analysis of the first and the second cluster (Dnipropetrovsk, Donetsk, Zaporizhzhia, Lviv, Odesa, Kharkiv, Vinnytsia, Kyiv, Kirovograd, Poltava, Cherkasy regions) are the most competitive among the regions of Ukraine and interesting for living for residents have the highest rates of socio-economic development.

The third cluster is a city with a special charter the capital Kyiv. However, the calculated competitiveness indicators are below average Consumer price index and fuel reserves. The death rate is below average.

Regarding the characteristics of the fourth cluster (they are all the other areas which are not included in the first three clusters), it should be noted that they do not have below average values. The volume of industrial production, freight turnover, number of permanent population, number of live births, number of deaths, number of reported criminal offenses, index of agricultural production, supply of electricity, gas, steam and air conditioning

are slightly above average. Regions, which inhere into the fourth cluster grouping, are the least competitive ones.

## 6 Conclusions or Discussion and Implication

As a result of applying the system of methods, groups of Ukrainian regions with similar socio-economic development and weaknesses were identified. They are associated with weaknesses in the region's overall competitiveness. In this regard, regional and national programs and the development of development strategies should take into account the identified strengths and features in order to improve the situation in the subsystems with high rates and the concentration of resources in problem areas.

It was also established by the diagnostic results that, even at first glance, prosperous regions (which are included in the first cluster) also need support from the state for individual subsystems.

The practical results of our study showed that the cluster analysis method based on the results of multidimensional ranking of socio-economic and infrastructural subsystems allows you to expand the scope of existing ideas about the state of the areas studied. In addition, the application of the cluster approach provides a proper informational and analytical substantiation for the selection of priorities and guidelines for regional policy which should form the basis for planning the actions of state authorities and local self-government [16]

The development of a strategy for the development of a regional socio-economic system is relevant for a number of reasons [22, p. 159-162]: the strategy forms the basis for further development of other programmatic and project development documents; it contains the basis for concluding an agreement between the entities and strategic management entities for a common financing over several years of those tasks that reflect the area of interest and are of the highest priority. Strategy development contributes to the formation of new relationships between participants in questions.

According to the authors in [2, p. 340] "The greatest failures of strategic management occur when executives take any viewpoint excessively seriously." Therefore, it is important in strategic management not to be passionate about planning, but to consider this activity from a geometric standpoint and be based on careful calculations.

Table 5: Priority strategic directions of cluster development

Cluster	Competitive field	Priority strategic directions of development	Performance benchmark of competitiveness enhancement
Cluster 1	Active enlightened population, foreign investments, state funding of infrastructure, industrial market (domestic and overseas)	Growth in employment by creating new jobs, increasing state support for industrial enterprises, building up infrastructure in the region (especially transport and energy), attracting foreign direct investment	The number of active population per territory unit of the region, the rate of growth of foreign investments in the region, percentage ratio of international investments and gross regional product, percentage of funding of regional infrastructure items in local budgets; taxes paid by production enterprises to the local budgets, structure of regional production enterprises' export, indicators of ecological conditions of natural resources
Cluster 2	Scientific-and-technological community, state funding of regional infrastructure, foreign investments	Application of existing socio-economic potential in the field of commercialization of innovations and creation of enterprises of the new smart-format, development of	The number of scientific-and-technological institutions in business infrastructure of the region, the percentage of population with higher education, the rate of growth of foreign investments in

		transport infrastructure in the regions	the region, the percentage of financing of regional infrastructure in the local budget, indicators of commercialization of scientific and technical activities, indicators of ecological conditions of natural resources
Cluster 3	Foreign investments, scientific and industrial potential (physical resources, academic personnel), overseas market	The city of special status requires the development of a separate strategy for development and enhancement of competitiveness in the main areas: economy, social environment, infrastructure, business development, foreign economic activity.	Rate of foreign investments growth, indicators of business activity in the region, financing of infrastructure items, indicators of ecological condition; taxes paid to the state and local budgets by production enterprises of the region; dynamics and structure of goods and services exports
Cluster 4	Physical resources, fuel and power resources, financial support of regions by the state, domestic and international investors, active population, amenity infrastructure.	Support for foreign economic activity in the regions, development of energy infrastructure	Energy balance, number of active population per territory unit of the region, rate of growth of foreign investments in the region, percentage ratio of international investments and gross regional product, gross income of industrial and service enterprises, dynamics and structure of regional exports, state and regional funding of social infrastructure, indicators of ecological condition of natural resources

Strategic planning for regional development is a complex dynamic process that determines not only data collection, grouping, analysis, setting goals and operational plans, but also forecasting territorial development taking into account national socio-economic development, country's perspective on the international arena.

Further studies concern to study the socio-economic potential of the regions (human, information, resource (material), infrastructure, financial).

Planning for the strategic development of the regions should begin with the development of a strategic framework (platform). According to the methodology of regional development planning in Ukraine proposed by the European Union the appropriate strategic basis should be based on socio-economic analysis and SWOT analysis. The cluster analysis proposed in the study in particular allows to evaluate the degree of socio-economic development and complements the SWOT analysis of territories according to the criterion of inter-regional comparison.

Defining the benefits, vision and goals of harmonious socio-economic development must balance the priorities of both regional and national, both long-term and short-term in the context of scarce resources for development.

Meanwhile the main subjects of the regional strategy are the following groups: state and local self-government bodies, public organizations, enterprises of different forms of ownership, including municipal, regional state institutions, local educational institutions of different levels, representatives of local political parties, religious and ethical groups, trade unions, active locals, representing the interests of the public, the media.

Among the socio-economic resources of the region, an important role is played by regional infrastructure, which forms a kind of framework for the development of all sectors of the region's economy. For example, in the field of tourism infrastructure has a decisive role in forming the "framework" of the industry. Assessment of the state of regional infrastructure is not

sufficiently covered in the writings of economists, as approaches to the methodology of assessment differ.

Sotnichenko L.L. decided [23, p. 249] that the method of the region infrastructure potential estimation is based on the calculation of the integral indicator of the infrastructure potential growth (provided the use of statistics on the growth rate of the share of the transport industry in GRP, the growth rate of the infrastructure basic assets value, the growth rate of freight transport). This method of estimation is based in its calculated positions of the transport industry growth rate, without considering the development of other components of the region's infrastructure.

At the same time evaluation the development of infrastructure will help determine the prospects for the development of region's industries and areas.

Based on previous research [24, 25] future studies will assess the development of regional infrastructure by clusters.

Conclusions. The rating indicators are not sufficiently informative to develop a regional development strategy based on competitiveness. The use of cluster analysis methodology based on the proposed algorithm helps to understand the efficiency and weakness of regions, to find regions similar in socio-economic development. Developing a strategy for enhancing regional competitiveness should be based on the use of modern smart specialization concepts.

The obtained results allow us to formulate a multi-vector strategy for the development of the region, the formation of which will involve the interaction of business environment, government and innovative institutions.

The directions of future research are to substantiate the indicator of evaluation of the effectiveness of implementation of regional development programs and increase of competitiveness.

#### Literature:

1. Ketels, C.H. (2015) What is regional strategy? Lessons from Business Strategy Strategies for Shaping Territorial Competitiveness, Chapter: 3, Publisher: Routledge, Editors: Jesus Valdaliso, James Wilson, 37-54 (In Eng.)
2. Adams, N., Harris, N (2005) Best practice guidelines for instruments of regional development and spatial planning in Cardiff University, 65 (In Eng.)
3. Rugman, A.M, Verbeke, A. (2004) A perspective on regional and global multinational enterprise strategies Journal of International Business Studies January 2004, 35, 3-18 (In Eng.)
4. Rugman, A.M. (2003) Regional Strategy and the Demise of Globalization Journal of International Management 9, 409-417 (In Eng.)
5. Harkavenko, S. S. (2002). Marketynh: pidruchnyk dlya vuziv [Marketing: college for high schools]. Kyiv : Libra, 712. (In Ukr.)
6. Tkachova, A. V. (2012). Klasternyy analiz metalurhiynykh pidpryyemstv na osnovi vyrobnychykh, finansovo-ekonomichnykh ta lohistychnykh pokaznykiv diyal'nosti [Cluster analysis of metallurgical enterprises based on production, financial-economic and logistic indicators of activity]. Visnyk Zaporiz'koho natsional'noho universytetu. Ekonomichni nauky [Bulletin of Zaporizhzhia national university. Economic sciences], 1(13), 37-44. (In Ukr.)
7. Kim, Dzh.-O., M'yuller, CH. U., Klekka, U. R. (Eds.). (1989). Faktornyy, diskriminantnyy i klasternyy analiz [Factor, discriminant and cluster analysis]. Moscow : Finansy i statistika, 215. (In Russ.)
8. Mandel', I.D. (1988). Klasternyy analiz [Cluster analysis]. Moscow : Finansy i statistika, 176. (In Russ.)
9. Kitson, M., Martin, R., Tyler, P. (2004). Regional Competitiveness: An Elusive yet Key Concept? Regional Studies, 38, 991-999. (In Eng.)
10. Best, M. (1990). The New Competition. Cambridge, Mass: Harvard University Press, 296. (In Eng.)

11. Best, M. (2001). *The New Competitive Advantage: The Renewal of American Industry*. Oxford: Oxford University Press, 286 (In Eng.)
12. Porter, M., Ketel, C. (2003). *UK Competitiveness: Moving to the Next Stage*. DTI Economics Paper 3, London: Department of Trade and Industry, 55 (In Eng.)
13. Cellini, R., Soci, A. (2002). Pop Competitiveness, Banca Nazionale del Lavoro, Quarterly Review. LV, 220, 71-101. (In Eng.)
14. Camagni, R. (2002). On the Concept of Territorial Competitiveness: Sound or Misleading? *Urban Studies*, 39, 2395-2411. (In Eng.)
15. Borozan, O. (2008). Regional Competitiveness: Some Conceptual Issues And Policy Implications. *Interdisciplinary Management Research*, 4, 50-63. (In Eng.)
16. Chalik, A.V., Mudrevskiy, A.YU. (2017). Klasternyy podkhod k metodike regional'nogo upravleniya i razvitiya [Cluster approach to the methodology of regional management and development]. *Mezhdunarodnyy nauchno-issledovatel'skiy zhurnal. Ekonomicheskiye nauki* [International Research Journal. Economic sciences], 10 (64), 121-128. (In Russ.) DOI: <https://doi.org/10.23670/IRJ.2017.64.048>
17. Mirkin, B.G. (1985). Gruppyrovki v sotsial'no-ekonomicheskikh issledovaniyakh [Groupings in socio-economic research]. Moscow : *Finansy i statistika*, 224. (In Russ.)
18. Sokal, R.R. (1980). *Klaster-analiz i klassifikatsiya: predposylki i osnovnye napravleniya* [Cluster Analysis and Classification: Preconditions and Main Directions]. In *Klassifikatsiya i klaster* [Classification and Cluster]. Moscow : Mir, 389. (In Russ.)
19. Bezkhlibna, A. (2019). Analiz pidkhodiv do vyznachennya faktoriv rehional'noyi konkurentospromozhnosti [Analysis of approaches to determining the factors of regional competitiveness]. *Prychornomors'ki ekonomichni studiyi* [Black sea economic studies], 38, 19-23. (In Ukr.)
20. Pistunov, I.M., Antonyuk, O.P., Turchaninova, I.YU. (2008). *Klasternyy analiz v ekonomitsi : navch. posib.* [Cluster analysis in economics: textbook. tool.]. Dnipropetrovs'k : Nats. hirn. un-t, 84. (In Ukr.)
21. Shubat, O.M., Karayeva, A.P. (2016). *Klasternyy analiz v issledovanii sotsial'no-ekonomicheskikh protsessov: opyt kriticheskogo analiza* [Cluster Analysis In Research Of Social And Economic Processes: Experience Of Critical Analysis]. *Problemy modelirovaniya sotsial'nykh protsessov: Rossiya i strany Atr: Materialy II Vserossiyskoy nauchno-prakticheskoy konferentsii s mezhdunarodnym uchastiyem* [Problems Of Modeling Social Processes: Russia And The Apr Countries: Materials of the II All-Russian scientific-practical conference with international participation], [Electronic source] 325-328. Retrieved from: <http://elar.ufu.ru/bitstream/10995/47259/1/shu-978-5-7444-3666-72.pdf> (In Russ.) (Date of access: 22.12.2019)
22. Honcharova, S.YU., Honcharov, A.B. (2005). *Stratehichne upravlinnya lyuds'kymy resursamy* [Strategic human resources management]. *Formuvannya rynkovoyi ekonomiky* [Formation of market economy], 159-162. URL: <http://www.repository.hneu.edu.ua/bitstream/123456789/11989/1/%92.pdf> (Date of access: 01.12.2019) (In Ukr.)
23. Sotnichenko, L.L. (2014) *Vyznachennya rivnya rozvitku infrastrukturi regioniv Ukraini* [Determining the level of infrastructure development in the regions of Ukraine] *Finansi, uchet, banki* [Finances, accounting, banks], 1 (20), 246 - 254. (In Ukr.)
24. Bezkhlibna, A. (2019). *Derzhavne upravlinnya v sy'stemi zabezpechennya pidvyshhennya regional'noyi konkurentospromozhnosti* [The state manages in systematic advance divisions of regional competitiveness]. *Biznes-navigator* [Business navigator], 5, 15-19. (In Ukr.)
25. Bezkhlibna, A. (2019). *Pryncy'py sy'stemnogo pidxodu u filosofiyi upravlinnya regional'noyi konkurentospromozhnisty* [Principles of a systematic approach in the philosophy of regional competitiveness management]. *Problemy sy'stemnogo pidxodu v ekonomitsi* [Problems of systematic approach in economy], 3(7), 55-59. (In Ukr.)

**Primary Paper Section: A**

**Secondary Paper Section: AH, AE.**