

Analyzing the Economic Potential of Romanian Administrative Regions

by

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Abstract. This paper proposes a scientific approach of regionalization activity in Romania. The approach consists of applying the Principal Components Analysis (PCA), a complex multivariate method for marketing data analysis, implemented in SPSS, for some instantaneous statistical series of economic indicators available in the Statistical Yearbook, at the level of one year, here, 2010, collected for all the counties of Romania. After identifying the significant factors of economic development at the national level, they are combined in two principal components, depending on the socio-economic meaning of the most correlated variables. Then the PCA is applied for the counties of each region, using the same socio-economic variables identified as principal features of the economic policies undertaken at national level, for all counties, in 2010. In this way there are emphasized the socio-economic differences between the counties of a region, but also there can be seen the differences between the development level of regions, depending on the relative positions of their counties, on the same map of the considered economic coordinates. In this way it can be appreciated the different impact of the economic policies, at national level, and at regional level. The approach can be repeated for the following years, to see any dynamic changes, as consequences of the economic policies. The methodology used in this paper can be used to better manage the economy of Romanian regions and to establish macroeconomic marketing policies to stimulate different regional activities depending on the economic targets.

Key words: administrative regions, counties, economic potential, principal components analysis, regionalization.

JEL classification: O11, R11, R15

1 Introduction

A scientific approach can be the basis for decision making process of implementing the economic policies, in Romania.

Some socio-economic indicators available for all regions and counties of Romania were collected from the site www.insse.ro, of the Romanian Statistical Yearbook, 2011. The instantaneous data series are available for the year 2010. The statistical method in SPSS of identifying the principal components, considers those variables very correlated, whose influence is combined in at least two orthogonal components. A chart named “circle of correlations” based on the Eigenvalues calculated through a complex mathematical approach, offers the possibility to prefer only two components for making easier the

interpretation of statistical units’ positions face to identified components.

Applying this method separately for each administrative region of Romania, there can be identified the components concerning the regional impact of national economic policies. There can be established a position of the Romanian administrative regions in 2010, depending on both chosen components. The next step of approach is to use same components for analyzing the same impact of economic policies for each region. A final presentation of the results shows together all the counties of all Romanian regions on the chart of the two identified components. The position of the counties and their overlapping can offer important information about the socio-economic national impact, emphasized at microeconomic level, meaning at county level.

2 Analyzing the Romanian regions, in 2010

The process of identifying the significant socio-economic variables of the principal components supposes repeated attempts of applying the Principal Components Analysis (PCA) in SPSS software. The components will receive names, depending on the socio-economic meaning and significance of variables.

The collected data about the administrative regions in Romania, also available for all the counties characterized the economic, social, demographical, geographical, cultural and educational aspects of Romanian development, in 2010.

2.1. The Principal Components Analysis for regions

Analyzing the correlations between variables and applying the PCA in SPSS, there are obtained two principal components, which explain approximate 91% of the entire variation between the regions.

The two components can be named, depending on the variables most correlated with them, as that of socio-economic development and the second, being of tourism activity.

The positions of administrative regions, in 2010, are presented on the chart of identified components, in figure 1.

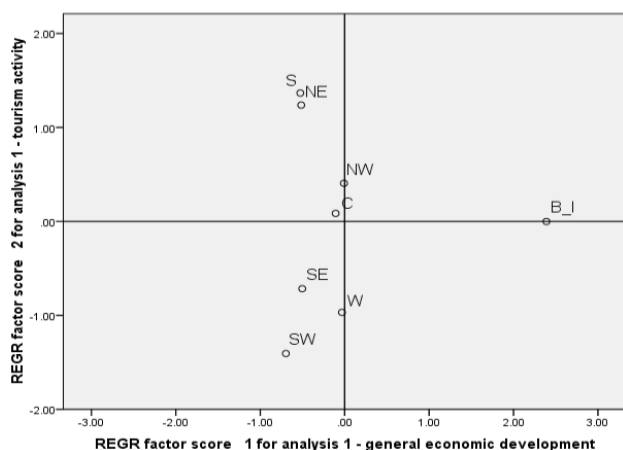


Figure 1: The position of administrative regions, in 2010

It can be seen that the region Bucharest-Ilfov is an outlier situated on the Ox axis, at more than two standard deviations face to the average of

both components and face to the second component, but just on to the first component. The high degree of urbanization of this region, where the capital of the country lies, makes it to be an outlier. All the other administrative regions are situated at around of one standard deviation of the economic development component, on the left side of the average level of this component.

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The North-East (NE) and South (S) regions seems to have more retired persons than other regions – being placed between one and one and half standard deviations in the positive way, compare with the negative similar positions of regions: South East (SE), West (W) and just close, also South West (SW) – concerning the first component, having more developed tourism activity, in 2010. The regions Center (C) and North West (NW) are not emphasized in any direction: neither urban, nor rural, and also not in tourism or agricultural field.

2.2. Renouncing at the outlier region

Eliminating the outlier – the region Bucharest-Ilfov and testing again the significance of all variables, the new components are different. There are some variables which are not significant anymore, and which emphasize the differences between the administrative regions face to the most developed region, Bucharest-Ilfov. The excluded variables are those with extreme values for Bucharest, which made differences face to other regions, in previous analysis. These variables are: unemployment rate, which is low in Bucharest, and quite similar for all the other regions; the added value of agriculture production, knowing that Ilfov has a great contribution to this field; the population density which is very high in Bucharest, the number of retired, which being in correlation with other considered variables, does not continue to explain the differences between the regions and the students number

which usually is very high in Bucharest, face to the other regions.

There were also some new considered variables which make differences between regions and which entered in the structure of the new components, as: international migration, the weight of rural population and the number of hospitals. Without considering the region Bucharest-Ilfov, the two new components have another meaning. The variation of regions explained by these two components is reduced to 86.6%, but it is still a high proportion.

On the new circle of correlations there can be identified the first component of economic development, emphasizing the development of tourism field, at the left side as opposite to the variables as regional GDP, R&D expenditure, hospitals and number of employees. The interpretation is that the development of tourism field didn't contribute to the increasing of GDP, neither of employees' number.

The second component can be that of characterizing the labor force: at upper side the international migration and the weight of rural population, and downside, the internal migration and the level of pension, complete the two sides of the component describing some features of labor market.

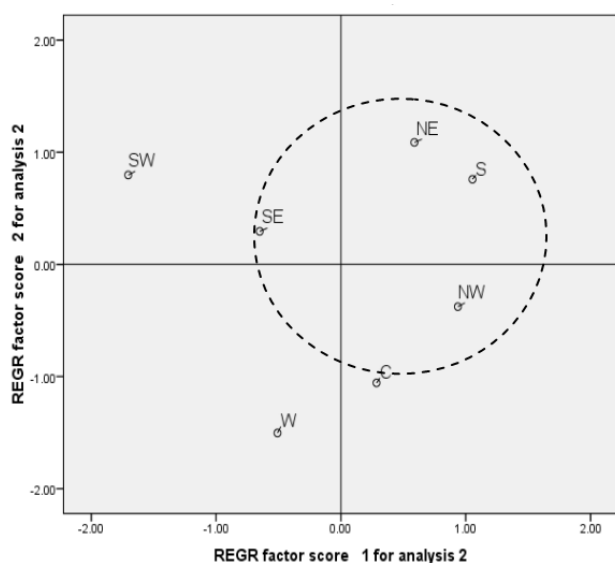


Figure 2: The position of Romanian administrative regions, in 2010 face to the new principal components

On the chart in figure 2, there is presented the relative position of the Romanian administrative regions in 2010, face to the new identified components. The units having the greatest projections on the considered components are the most representative for them.

In 2010, the most economic developed regions were South (S) and North-West (NW). But all the other regions were developed in the same way, most of them being placed at less than one standard deviation face to this component.

It seemed that in 2010, the regions South-West (SW), South-East (SE) and West (W) were less developed. The conclusion which can be formulated about the positions of mostly all regions, in an interval of plus or minus one standard deviation face to the second component and face to the mean of both components, is that of a certain homogeneity of regions.

The region South-West (SW) had the best activity in tourism. The international migration was higher than the average, in North-East region. The weight of rural population is higher in North-East (NE) and South (S), but also in South-West (SW). The internal migration, from rural to urban medium was higher in West region (W), where, also the value of pension seemed to be greater.

3 Analysis of counties' development for each region, in 2010

Considering the principal components obtained for the regions, without Bucharest, there can be seen the places of the counties for each region. Some counties will distinguish face to the others, depending on their level of development. For some regions, the principal components can change their place. Some of the considered variables can combine differently, forming new components. The defined components can be seen for each region in the titles of the corresponding charts.

3.1 The North-East region, in 2010

Applying the PCA for the data of the counties from North-East region (NE), the two components explain a proportion of 89% of the entire variation of these counties. The chart of the counties from North-East region is presented in figure 3.

It can be noticed that the county Iasi is the most developed from the NE region, being also placed close to the first component at the urban development direction and at more than one standard deviation face to the component of movement of labor force.

The migration was higher for the two counties Neamt (NT) and Suceava (SV), especially the international migration.

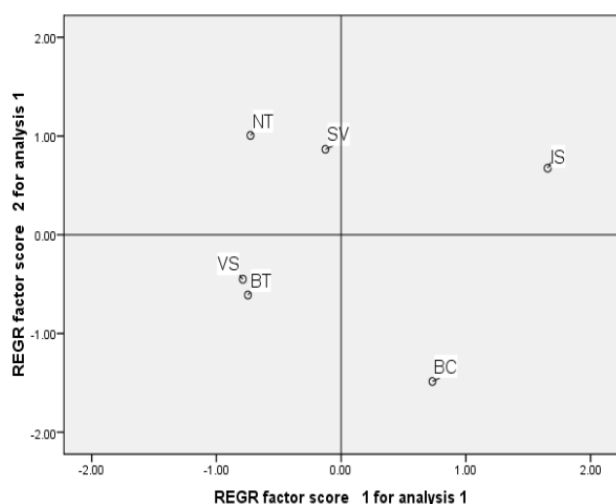


Figure 3: Relative positions of the counties from North-East region, in 2010

The counties with the greatest weights of rural population are Vaslui (VS) and Botosani (BT), but less economic developed. Bacău is a county with low rate of migration, and more developed than the other counties, being placed on the second place after Iasi. For the counties of North-East (NE) region, in 2010, the important aspects were the rural size of population, urban development and migration phenomenon.

3.2 The South-East region, in 2010

For the South-East (SE) region the two components explain 86.5% of the entire

variation of the counties from South-East region in 2010. The relative position of the counties from South-East depending on both identified components is presented in figure 4.

The international migration was greater in Vrancea, where also the weight of rural population was higher than in Buzău and all the other counties of the South-East region.

The most developed county is Constanta, being placed close to the position of the variables on its circle of correlations. Constanta is also the destination of a more intense internal migration than all the other counties of the region.

Galati is characterized by a greater value of pension, R&D activity then in the other counties.

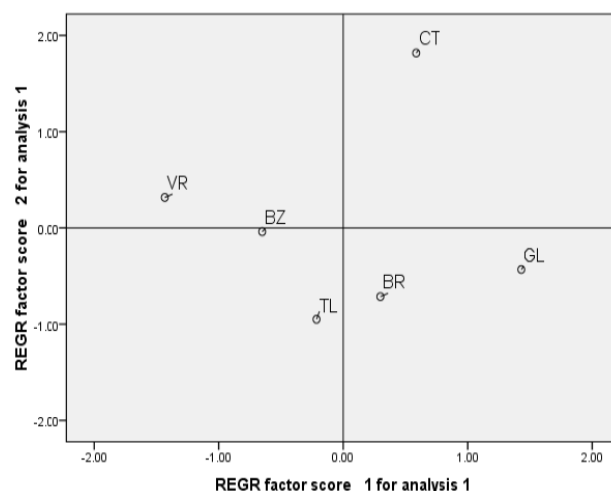


Figure 4: Relative positions of the counties from South-East region, in 2010

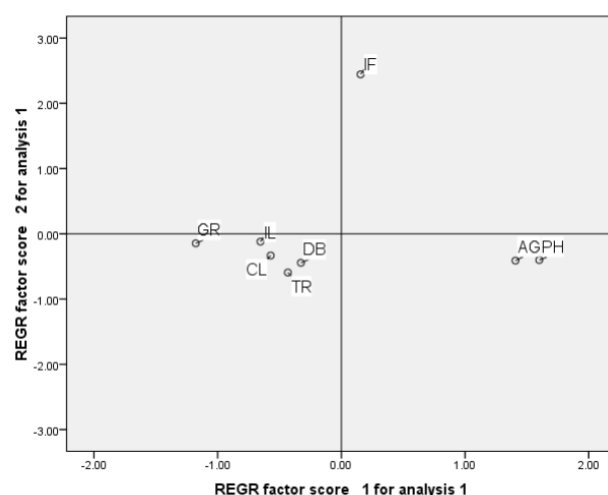


Figure 5: Relative positions of the counties from South region, in 2010

3.3 The counties of South region, in 2010

For the South region, the two components explain 80% of entire variation of all its counties. The position of the counties from South region is presented in figure 5.

In the PCA it was also considered county Ilfov together with the counties from South region, because it is placed in the south part of the country. For the counties of South region and Ilfov, the index of net use of tourism capacities became insignificant, meaning that this activity is not different in any county of the South region.

The counties Prahova and Arges are the most developed with a high degree of urbanization, placed at more than one standard deviation in the positive direction. Both counties have similar size of migration phenomenon.

Giurgiu is placed at the other end at the same distance but in a negative way. Giurgiu is less developed from economic point of view and the proportion of rural population is greater.

The other counties: Ialomita, Călărași, Dâmbovită and Turnu-Severin are homogeneous being placed at the same close distances of one standard deviation face to both components. Only Ilfov is important for migration phenomenon, being very close to the second component, Ilfov is less developed being placed at more than two standard deviations face to the first component.

3.4 The South-West region, in 2010

Even that for the counties from South-West region, it seems that no variable is high correlated with the two initial components they still explain 84% of the counties' variation. The two components refer just to the two faces of migration: international and internal. The counties from South-West have the positions shown in figure 6.

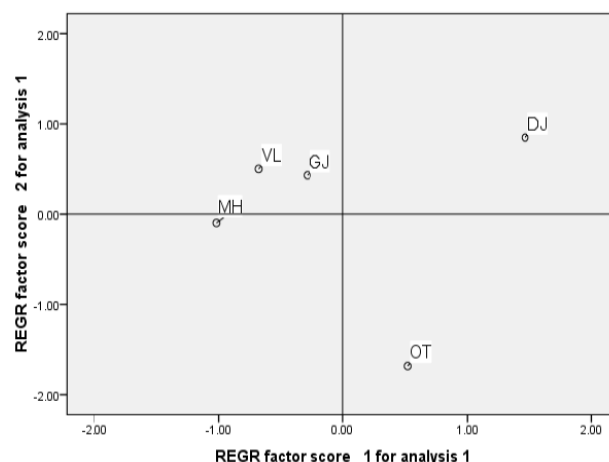


Figure 6: Relative positions of the counties from South-West region, in 2010

The county Dolj is the most developed, because its position is mostly the same with that of the variables of socio-economic development: GDP, R&D, employees and number of hospitals – in the circle of correlations. Olt is the less developed being situated at the other end of the second component, having the high weight of rural population. The tourism is more developed in Vâlcea and followed by Gorj. Mehedinti is more characterized by the international migration, but also the less developed face to other counties.

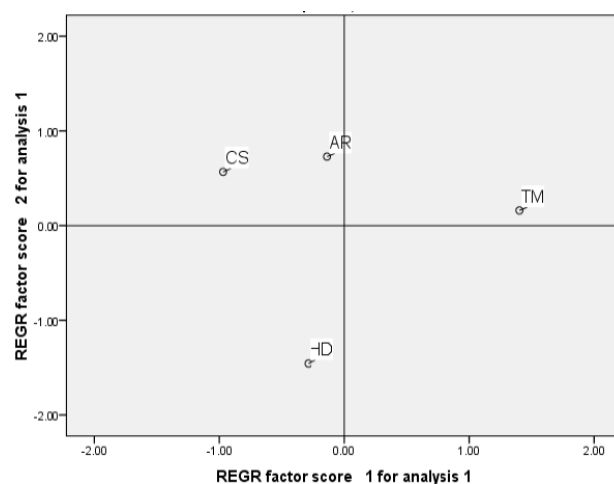


Figure 7: The counties of West region, in 2010

3.5 The counties of West region, in 2010

For the counties from West region in 2010, there are clear the two components for urban

and rural development, which explain more than 91% of the variation of the Western counties.

The chart of the West counties is presented in figure 7.

The county Timis is the most developed of the region. In county Hunedoara there are the greatest level of pensions and the same level of development as in Arad. International migration is more representative for Caras-Severin.

3.6 The North-West region, in 2010

For the counties from North-West region, the principal components explain 89% of the variation. The relative positions of the counties from North-West is presented in figure 8.

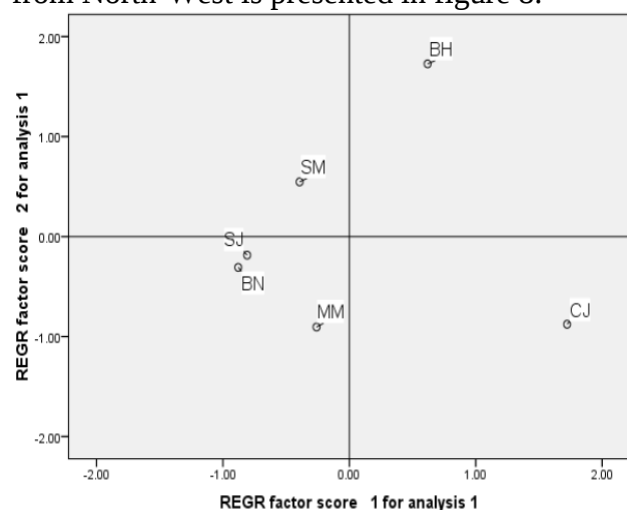


Figure 8: The counties from North West region, in 2010

Four counties are placed in the interval of the average of both components plus and minus one standard deviation. Cluj is the most developed county of the region, followed by the county Bihor which is also representative for tourism activity.

3.7 The counties of Center region, in 2010

The principal components, obtained after applying the PCA for the counties of Center region, in 2010, explain 83.5% of their variation. For the counties in the region Center, the tourism cannot be considered to differentiate the counties. Also the weight of rural population and the international migration were not important for this region, in 2010.

The position of the counties is presented in figure 9.

Brasov is the most developed county of the region, being placed at close two standard deviations face to the average of first component. Four counties are placed within an interval of average of components plus and minus one standard deviation. From this group it can be concluded that the counties Harghita and Covasna are least developed of the region. These counties are representative for the greater weight of rural population and international migration.

Sibiu is less developed as the average, but it is representative for the internal migration. Sibiu had the greatest projection on the second component.

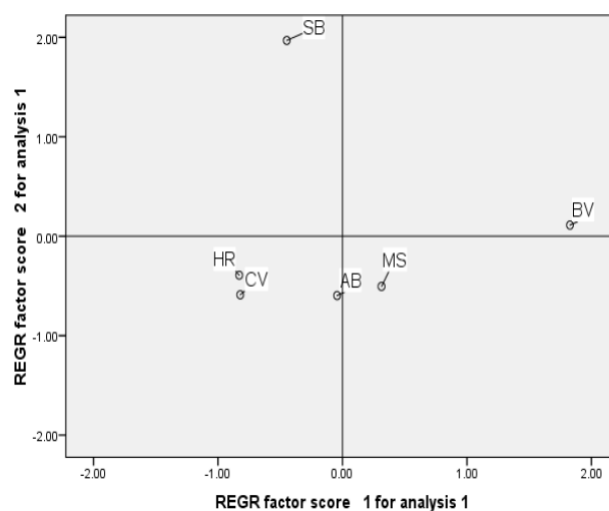


Figure 9: The counties from Center region, in 2010

The investments in this county made it attractive for the population from other counties.

4. Analyzing the development of Romanian counties, in 2010

The representation of the coordinates for the two components initially selected for the regions and then calculated for all the counties are represented on the chart from figure 10, together with the coordinates of regions.

The most developed counties form a separate group: Brasov, Cluj, Iasi, Prahova, Dolj, Arges, Galati, Timis. This group of developed counties

is situated at a distance of more than one standard deviation face to the intersection of both axes. Another group of three counties, placed in the first frame: Bihor, Constanta and Ilfov - is situated at close two standard deviations face to the average of both

components, but having the greatest projections on the second component, the meaning is that they have high values of the rural population and have the economic development level over the mean of all the counties.

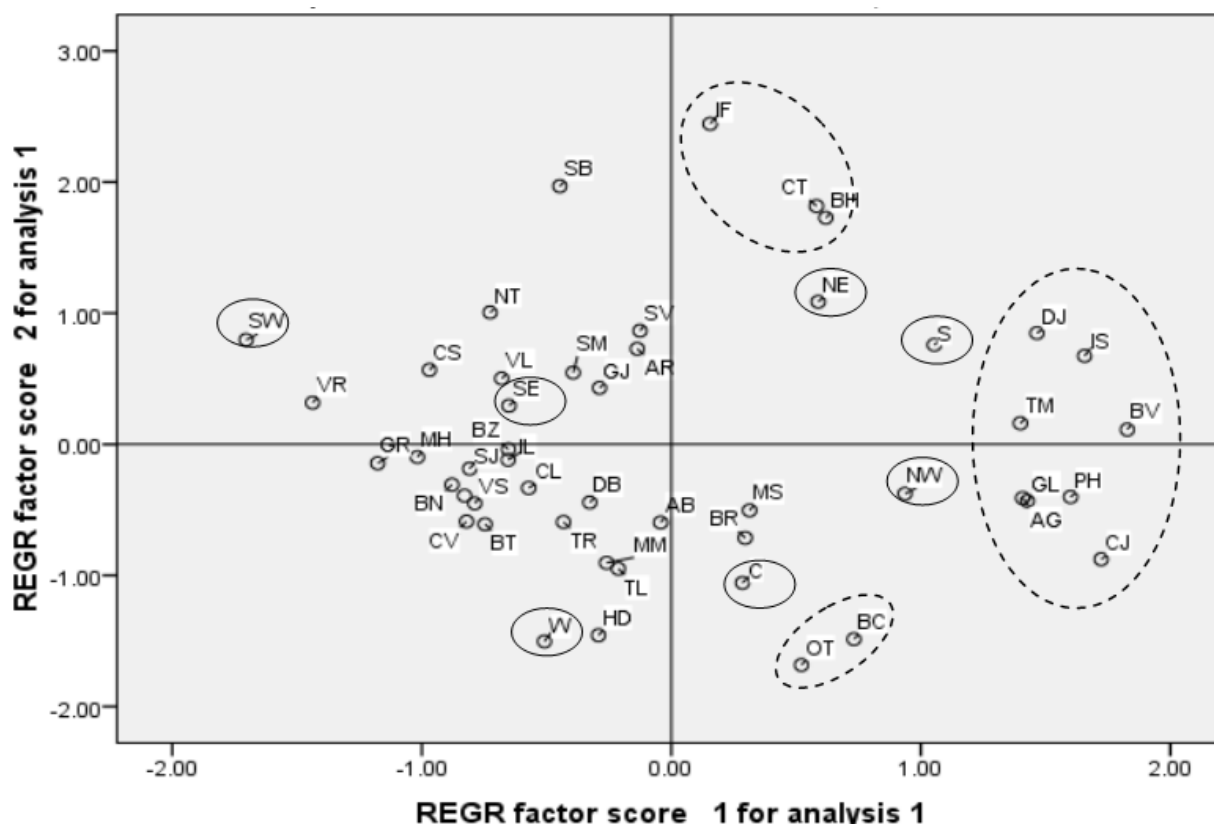


Figure 10: Correspondence between the counties and their regions, on the regional principal components, in 2010

As a consequence, these three counties had good agricultural productions.

A great majority of counties form a big group situated within the interval of the averages of components plus and minus one standard deviation. The variation between them is not high. The counties Olt and Bacău, had the economic development greater than the average, but they are placed in the fourth frame, having negative projections on the second component, at more than one standard deviation – they are representative for high internal migration.

Vrancea is the less developed county. Sibiu is placed in the second frame, being representative for international migration and under the average of economic development.

4.1 Marketing approach for regional development

Looking at figure 10, which summarizes the previous results, the counties from first and fourth frames can be potential development centers of the regions. The most developed regions of the country in 2010 were: South (S), North-West (NW), North-East (NE) and Center (C) – having positive projections on the first component of socio-economic development. The other regions are less developed, particular South-West region. Except this region, all the other regions and mostly all the counties are placed within an interval of plus and minus one standard deviation face to the averages of principal components. All the regions have

counties, placed in the group of the most developed counties. The region South has, in 2010, two developed counties: Prahova and Arges, North-West with Cluj, North-East with Iasi and Center with Brasov.

From the other regions having negative projections of development, the South-West (SW) is the most envisaged. Their developed counties are: for West (W) - Timis, South-East with Galati and South-West (SW) with Dolj. These counties could be development poles for their regions. Because the region South has two well developed counties: Prahova and Arges and the South-West region is the least developed region, it can be take in consideration to establish Arges as part of the South-West region.

The marketing research in the public administration can be based on such kind of analyses. Knowing for each region, the relative positions of its counties could be useful for establishing the place of different state administrative agencies close of their interest activity. Another conclusion is that it can be noticed the changing of principal components as a mirror of economic policies at national level. Any change of the components' meaning shows the consequences of the undertaken economic policies. In the presented analyses for 2010, all the variables for the initially established components for the Romanian regions explained over 80% of the variation of the counties for each region. The explained proportion of variation between the counties was varying from the lowest for the South region, of 80% until the highest for the West region, about 91%. These proportions form an interval around the value of 86% which was the explained proportion of variation between regions, considering the same variables.

The analyses can be improved considering other socio-economic variables of interest, like: investments in different fields.

4.2 Efficiency of regional policies in Romania

Considering all the counties of Romania, depending on the regional components, as a

whole for a new PCA, there is obtained the following circle of correlations between the significant variables, which explains approximate 71% of variation.

The variable characterizing the efficiency of tourism activity was insignificant, meaning that the investments in promoting the image of Romania and other investments in tourism didn't have any effect in the development of the counties. The analysis without considering the indices of net using of tourist capacities explains close 80% of variation.

It can be said that eliminating the variable characterizing the efficiency of tourism activity, the explanation of variation increases with 10%. There is a difference from the proportion of 86% explained variation of regions until the proportion of 71% explained variation of the counties, based on the same variables, which equals about 15%. This proportion of 15% can be considered as a measure of inefficiency of regional policies. From this difference, approximate 10% is due to the tourism policy. The source of this inefficiency was the economic policies in tourism, undertaken at regional level, but which didn't find any result at the development of counties' level.

The other 5% correspond to other reasons, as the variable of R&D expenditure, which changed its position, from the first component of economic development to the second component of labor mobility for R&D activity. The conclusion is that the allocation of R&D funds didn't find the results in the increasing of GDP. The allocative efficiency of R&D funds was not attained, because the distribution of R&D funds was not based on objective reasons and strategic objectives. It seems that R&D funds became a reason to differentiate the development of the counties, but not of the regions.

Ilfov is an outlier placed at more than four standard deviations face to the average of the second component. Ilfov was representative for the internal migration in 2010 and R&D activity in agriculture and biology research. For such cases, the outlier is eliminated to better see the new relative positions of the counties.

The relative positions of the counties without Ilfov, are presented in figure 11.

A group of developed counties is placed at more than one standard deviation face to the average of first component. The seven counties marked as a group were well developed in 2010, more than one standard deviation face to the average. Giurgiu is a county having a great weight of rural population.

4.3 Development policies in Romanian counties, in 2010

Analyzing all the counties for all the collected variables, after many applying operations of PCA, it was found a proportion of 91.7% explained by the two principal components. The two components seem to be the same as in the previous analysis.

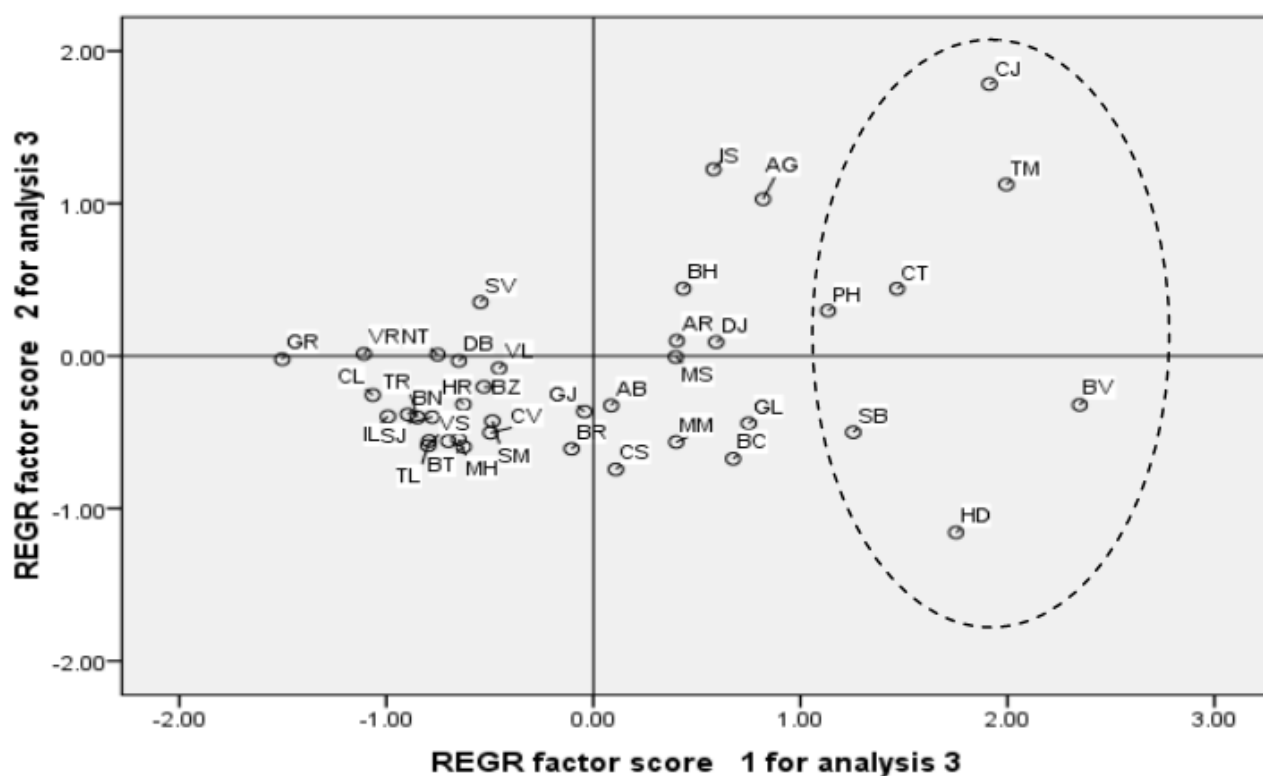


Figure 11: Relative positions of the counties depending on economic development and efficiency of internal migration

For these two components, the chart of individuals after elimination of the outlier Ilfov is presented in figure 12.

The most developed counties are mostly the same, except some changing positions for some counties. Comparing this chart with the positions of the counties after unified regional analyses, from figure 10, within the group of the most developed counties it was also Galati, whose place was taken by Constanta, both in the analysis of the counties after regional components in figure 11, also in this analysis of

independently consideration of all counties, in figure 12.

The positions of the counties within this group changed in the independent analysis face to the analysis on regional variables. The analysis on regional variables contained also Sibiu and Hunedoara which do not appear here, in the independent analysis of the counties. This means that these two counties were artificially sustained by political influences which acted at regional level.

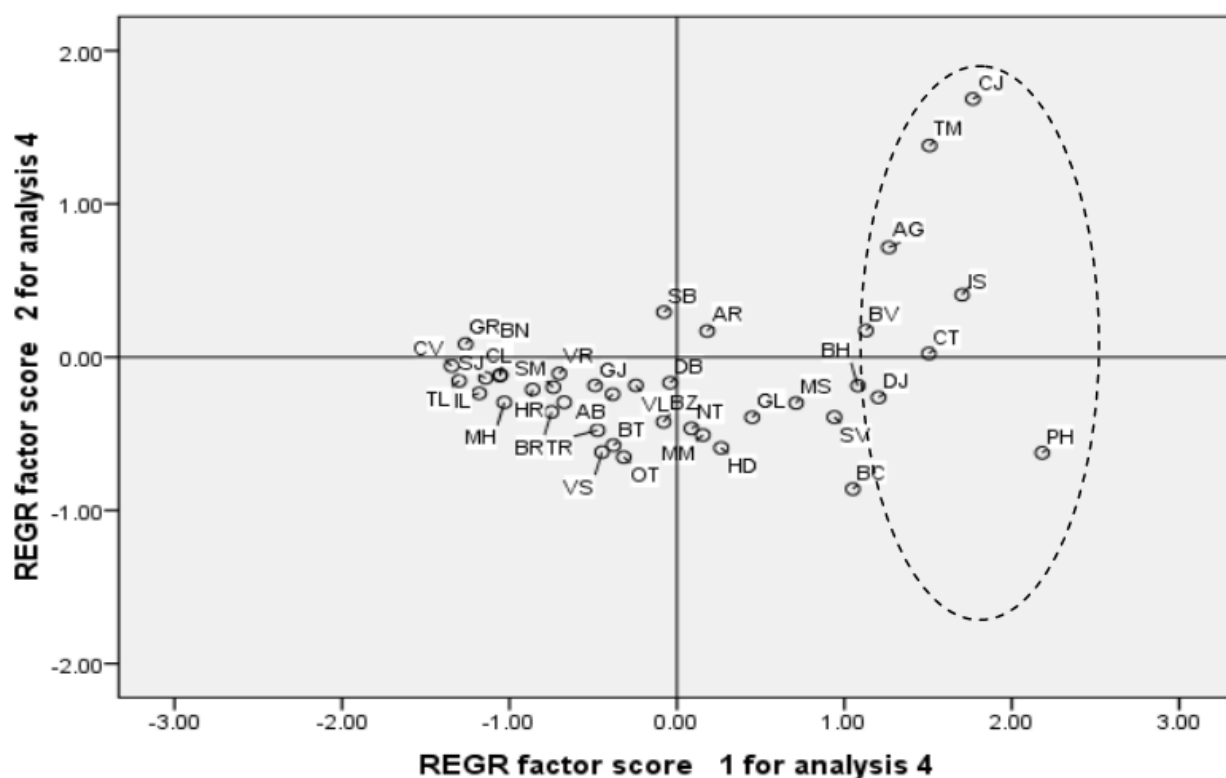


Figure 12: Analysis of the counties depending on economic development and efficiency of internal migration, in 2010

In the same way the marketing policies at national level can contribute for the welfare of all regions, to eliminate the disparities between the economic development levels of the counties.

The same counties which appeared in all the analyses in the group of developed counties deserve to become poles of development.

5 Conclusions

The analysis of the regions established some principal components combining some significant variables for the interest of this research approach. These variables should signify the impact of socio-economic policies at national level.

In order to eliminate the disparities between the regions, the identified components at regional level should keep their place for the analysis of the development level of the counties for each region. Every changing of components means that the envisaged policies didn't attained their purpose, meaning that they were inefficient.

The analysis of the counties without considering the regions, will offer maybe like in this example, the same principal components.

The groups which can be established should have the same composition in both kind of analysis at regional and at county level. Otherwise it is the proof of any subjective action, which can produce the changing of individuals within the groups.

This approach can be used to evaluate the impact of different policies and to simulate different ways of regionalization of Romanian territory, respecting certain criteria which should be the long and medium objectives of strategic national management.

References

- Duguleană, L., Duguleană, C. (2009), Changes in the Development of European Tourism during 1990-2004, Proceedings of the 2nd WSEAS International Conference CULTURAL HERITAGE and TOURISM (CUHT '09), Greece, WSEAS Press, pp. 107-112, www.wseas.us/e-library/conferences/2009/rodos/CUHT/CUHT16.pdf

Duguleană, C. (2011), Effects of Economic Crisis in Romania, *Journal for Labour and Social Affairs in Eastern Europe*, 14 (1): 17-27,

College of Europe, Journal Table of Contents (Journal TOC), Available at:

http://www.library.coleurop.pl/documents/journals_toc/to_c_2011_11_cee.pdf, Brussels, Belgium

Duguleană, C (2012), *Introducere in Microeconomie*, Brasov: Transilvania University.

Duguleană, L. and Petcu N. (2005), *Metode cantitative în analiza datelor*, Brasov: Infomarket.

Duguleană, L. (2011), *Metode de previziune economică*, Brasov: Transilvania University.

Duguleană, L. (2012), *Bazele statisticii economice*, București: C.H. Beck.

Statistical Yearbook of Romania (2011), www.insse.ro.

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