ROMANIA'S REGIONAL INEQUALITIES IN RELATION TO THE OBJECTIVES OF THE EUROPE 2020 STRATEGY

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Abstract
The present paper represents a study of the competitiveness of Romania in relation to the targets of the Europe 2020 strategy, in order to draw up a current regional ranking of the competitiveness. There are significant disparities in the regional contribution to the achievement of Europe 2020 national targets, which will affect both Romania's competitive position within the European Union and its long-term evolution. The purpose of this paper is to highlight these regional differences in terms of progress in achieving the Europe 2020 targets by analyzing their evolutions in the period and at the end of the implementation program. In this respect, the Principal Component Analysis method is used to establish two regional rankings corresponding to 2016 and 2020 that illustrate their intermediate and final progress. The results show that employment rate and tertiary education are the targets with the greatest impact on the final regional score and those that most differentiate the regions between them. On the other hand, the results show the tendency of regions to diverge from some strategic targets, which will further complicate Romania's long-term competitive mission.

Key words: *Europe 2020 Strategy; Principal Component Analysis; Regional competitiveness; target, employment; tertiary education*

JEL Classification: I25, J20, J23

I. INTRODUCTION

From the literature review, we have noticed that Romania, from multiple perspectives, faces territorial inequalities that negatively influence national growth and competitiveness: economic and social inequalities before and after the economic crisis (Cismaş et al., 2015, Goschin et al. 2008, Zaman et al., 2014, Ailenei, 2009, Goschin, 2014, 2015, Constantin, 2007, Ionescu, 2015), regional imbalances post-integration into the EU (Constantin, 2007), inequalities in the labor market (Cismaş et al., 2009), income inequality (Cristescu et al., 2014), differences in human capital (Cismaş et al., 2012, 2010).

Considering regional GDP or GDP per capita as the main indicators of competitiveness, domestic studies have demonstrated some general perpetuated trends over the years: increased disparity between western and eastern regions, as well as between Bucharest-Ilfov region and the rest of the regions; increasing intra-regional disparities trends; low convergence capacity; significant deviations in most macroeconomic indicators.

As was to be expected, there are significant gaps in contributing to the achievement of the Europe 2020 national targets. Indeed, the rise in regional disparities is currently an alarming phenomenon at the level of the entire European construction, as well, that "will have to change its political and economic approach to reduce and eliminate regional differences and increase its credibility as a global actor" (Ionescu, 2015).

Considering the consensus of studies on regional disparities in Romania, there is justifiable interest in researching how the indicators covered by the Europe 2020 Strategy are influencing this phenomenon, and how they influence regional competitiveness.

Thus, we have built our research on this chapter on the basis of the following research hypotheses:
H1: Regional disparities remain strong in terms of Europe 2020 targets;
H2: Employment rate is the vector with the strongest reaction to regional competitiveness;
H3: At the regional level, the Europe 2020 objectives have a different trajectory in terms of volume and trends.

The objectives of this paper are: analysis of the strategic targets evolution at the regional level; the achievement of the regional competitiveness classifications corresponding to the start of implementation (2010) and the current one (2017); calculating the values for the 2017-2020 range and comparing the results with the previous ones.

In order to verify these hypotheses, the research methodology used consists in the synthesis of the specialized literature on the issue of regional disparities related to the strategic targets; the Principal Component

Analysis method for highlighting the correlations on regional target values and compiling regional competitiveness charts; the forecasting method for determining the values for the 2017-2020 range.

The first part of the paper is to summarize the studies that analyzed the regional disparities in Romania with reference to the objectives of the Europe 2020 Strategy. The second part presents the working methodology for hypothesis testing and the analysis of the strategic indicators at the national level and in the last part, we discuss the results obtained for analyzed years.

II.   LITERATURE REVIEW

National literature is very rich in regional analyses that seek to identify the determinants of regional competitiveness from multiple perspectives: R & D, R & D spending, foreign direct investment attraction, education level, labor productivity, rate of return activity, temporary migration of migrants by age and level of education, presence of multinationals, geographical location advantages, population age structure, regional economic profile, etc.

In this section, we present some studies that are very close to the indicators of the Europe 2020 Strategy, analyzed at the level of the Romanian regions.

Concerning the employment rate, the differences between the North-East and West regions were confirmed in the case study by P. Rotaru (2014). The processing of the 2011 statistical data led to the conclusion that, in the North-East and West regions, the employment rate was indirectly correlated with labor productivity and directly related to household incomes. On the other hand, a study on unemployment (Cismaş et al., 2010) shows that in the South-East (8.5%), Center (8.5%) and South-Muntenia (8, 2%), unemployment was highest. Since the beginning of the economic crisis, in 2009, the unemployment rate has grown at the level of the whole country, especially in the West region, characterized before the crisis by low values, and in the North-East and South-East, generally characterized by high rates unemployment.

An interesting aspect is that studies on the impact of spending on R & D activities did not reach a clearly defined agreement. On the one hand, there are analyzes (Goschin, 2014) which show that between 2005 and 2010 the R & D spending on regional competitiveness gains had a significant impact, confirming that "the innovation-driven growth strategy as a result Of rising investment in R & D may lead to higher regional growth rates "(Goschin, 2014). On the other hand, there are also studies (Simionescu, 2016) that argue that the regional competitiveness level has not been strongly influenced by spending on research activity in a similar period to the study mentioned above (2006-2013). The study shows that in 2006 regional competitiveness was positively influenced by regional GDP growth rates and employment rates, and in 2013 it was independent of R & D spending and the number of employees in the sector.

From the human capital perspective, regional studies support the cause of investment in this field and argue for a positive influence on regional and national competitiveness (Cismaş, Maghear, 2010, Constantin, 2007).

At all stages, education plays a key role in forming the individual in society. If the impact of higher education has been more and more specifically demonstrated in specialist studies, the role of primary and secondary education has often been underestimated. Early school drop-out is a threat to a young generation of a nation, and identifying prevention measures must be a priority for the authorities. A regional study on the determinants of secondary school graduates (Pintilescu, Baciu, 2011) shows that Romania's poor regions are characterized by higher rates of early school leaving and by a low rate of secondary school enrollment.

The research on the risk of poverty and social exclusion at the level of Romania's regions (Buşan, Ecobici, 2016) points out that the highest values of this indicator correspond to the South-East, North-East and South-West regions. The main causes identified are the lack of jobs corresponding to the regional professional profile, low salary levels, large concentrations of vulnerable groups (Roma children, disabled, elderly), education level, predominantly agricultural economic profile or lack of modernization (Buşan, Ecobici , 2016, p.6).

At the same time, at the national level, the following "paradox: has been detected: the economy grows, poverty is increasing "(Keysfin, 2016). Economic analysts point out that, although the Romanian economy has grown and maintains an upward trend over the next two years, the poverty level has grown alarming and the measures adopted seem to have no effect. Moreover, the unequal distribution of poverty determines the phenomenon of Romania's three-speed development (Keysfin): the Bucharest-Ilfov and West regions (characterized by economic dynamism), the Central and North-West regions (with a medium competitive profile) and the southern and northern regions -East (characterized as "true enclaves of poverty, where business stagnates and the workforce has no chance but to migrate to potential areas" - Keysfin). Keysfin specialists' recommendations emphasize the urgency of infrastructure development in poor regions as a key factor in attracting investors who can deliver "production and jobs".

III. RESEARCH METHODOLOGY AND DATA

This section seeks to identify and analyze the determinants of regional competitiveness in terms of the Europe 2020 objectives. This option is justified by the fact that through this variant a specific picture of national competitiveness is obtained, depending on the developments at the regional level, which leads to the possibility to formulate recommendations specific to each territory. This approach is also supported by the recommendations of the European Commission for adapting regional strategies to regional competitiveness features, in order to reduce regional disparities and promote territorial cohesion.

The identification of regional disparities with regard to the level of regional competitiveness in relation to the Europe 2020 indicators has been achieved through the multivariate statistical analysis method, Principal Component Analysis, also known as Hotteling transformation or Karhunen-Leove transformation. This technique allows highlighting the correlations on the variables used among the observed units. The main advantage of this method is that it allows reducing the number of variables by compressing large information without the risk of losing them, being among the most commonly used methods in regional analyses.

The application of the method was done through the SPSS program and the input data were selected from the official Eurostat website. The variables used in the analysis are: GDP per capita, occupancy rate (20-64 years), share of RDI expenditures as percentage of GDP, early school leaving rate (18-21 years), higher education graduates (30-34 years) and the risk of poverty and social marginalization as a percentage of the total regional population. The data included in the analysis corresponds to 2016 (Eurostat) and to 2020, according to the values we estimate by the extrapolation method using correlation functions.

The Principal Component Analysis method can be expressed in mathematical language (Chuang, 2007):
Initial indicators:

$$X=(X1, X2,..., Xn) \tag{1}$$

Principal Component:

$$F=(F1, F2,..., Fp) \tag{2}$$

Expression of Principal Component:

$$F=LX \tag{3}$$

Calculation of the Principal Component g, in region i:

$$F_{ig} = \sum_{j=1}^{n} L_{ij} X_{ij} \tag{4}$$

Calculation of region i score:

$$Z_i = \sum_{g=1}^{p} \lambda_g F_{ig} \tag{5}$$

where: n, the number of indicators, p, number of principal components, L, the coefficient of principal components matrix, λ, the weight of main components, i, region, j, observed g, the main component.

The weight of each component is determined by the change in the number of units observed. The main components are classified by their weight (($\lambda_1 \geq \lambda_2 \geq .....\lambda$), the weight of the first component being the highest, while the weight of the last component is close to 0.

The coefficients values can not be used in this form unless they are converted by the following formula (Chuang, 20017, p. 736):

$$L_{gj} = \frac{e_{gj}}{\sqrt{\lambda_g}} \tag{6}$$

where,
g is the principal component
λ_g represents the weights after the rotation of the factors.

For the use of regional data in the presented method, they were initially standardized and replaced in the calculation formulas to obtain the main component and final score values. The first step consisted in calculating the total variance explained by the main components. The data obtained for the two years of analysis are:

Table no.1 – Total Variance Explained (2016)

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.601	60.024	60.024	3.601	60.024	60.024	3.438	57.305	57.305
2	1.220	20.338	80.362	1.220	20.338	80.362	1.383	23.057	80.362
3	.707	11.780	92.142						
4	.330	5.496	97.638						
5	.123	2.047	99.685						

6	.019	.315	100.000						

Source: author's calculation

Table no.2 – Total Variance Explained (2020)

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.772	62.864	62.864	3.772	62.864	62.864	3.772	62.864	62.864
2	1.351	22.522	85.387	1.351	22.522	85.387	1.351	22.523	85.387
3	.441	7.345	92.732						
4	.387	6.445	99.177						
5	.028	.463	99.640						
6	.022	.360	100.000						

Source: author's calculation

The second step was to extract the Component Matrix table, which provides the factorial solution, according to the contribution of each of the extracted factors, after the rotation operation (Annexes).

IV. EMPIRICAL RESULTS

By replacing with the principal components (e_g) for each indicator j, the values of the principal components coefficients become:

$C1\_{2016}= 0,094054X_{ik}+0,445946X_{ik}-0,41622X_{ik}+0,51027X_{ik}-0,33135X_{ik}+0,503243X_{ik}$

$C2\_{2016}=0,801709X_{ik}+0,408547X_{ik}+0,384615X_{ik}+0,133 X_{ik}-0,11453X_{ik}+0,147009X_{ik,}$

$C1\_{2020}= 0,154274X_{ik}+0,47949X_{ik}-0,29243X_{ik}+0,490891X_{ik}-0,45455X_{ik}+0,464086X_{ik}$

$C2\_{2020}=0,780706X_{ik}+0,167906X_{ik}+0,579957X_{ik}-0,13658 X_{ik}-0,10528X_{ik}-0,02216X_{ik}$

where

C1_2016, 2020 = score of the first component

C2_2016, 2020 = score of the second component

$i=\overline{1,8}$, = the number of regions

X_{ik} = the standardized value of k in region i, k $=\overline{1,6}$

By replacing the standardized regional data on strategic targets, we obtained the following rankings:

Table no.3 – Regional competitiveness Ranking (2016)

Rank	Regions	RankC1_2016	Rank C2_2016	Final Rank_2016
1	Bucharest - Ilfov	4.266578	2.008388	6.274966
2	North-West	0.34594	0.598301	0.94424
3	Center	0.119136	-0.04317	0.075968
4	North-East	-1.56241	1.454755	-0.10765
5	South - Muntenia	-0.58087	-0.20744	-0.78831
6	West	0.065849	-1.51177	-1.44592
7	South-West Oltenia	-0.95997	-1.42099	-2.38096
8	South-East	-1.69426	-0.87808	-2.57234

Source: author's calculation

First of all, we note the increased competitiveness of the Bucharest-Ilfov region compared to the rest of the country and the significant differences compared to the following ranked regions. Secondly, it is clear that the West Region is poorly competitive with the Europe 2020 targets, due to low employment rates and the stagnation of R & D spending. Also, the West is the only region where exposure to poverty and marginalization has increased over the past 6 years and not by a little, but by 4.5 percent. The Northwest and Center regions are more competitive with the higher levels of occupancy rate (Northwest), RDI spending (Center), and higher education graduates.

At the same time, the North East region is losing its competitive advantage under the influence of the decline in the share of graduates, the lack of progress towards the indicator on RDI spending and early school leaving.

Although in the South-Muntenia region the early school dropout (5 percent) has decreased, which has led to an increase in tertiary education graduates (5.3 percent), this has a low potential for competitiveness in 2016, fifth position. Southwestern and South-Eastern regions re-confirm their poor performance in competitiveness, negatively impacted by lower employment rates, the share of spending on research, and the rise in early school leaving (South East).

At the same time, the Northwest and Center regions have succeeded in achieving the lowest poverty and social exclusion rates below 30%.

Next, we calculated the values for the 2017-2020 period and made the final regional ranking for 2020.

Table no.3 – Regional competitiveness Ranking (2016)

Rank	Regions	RankC1_2020	Rank C2_2020	Final Rank_2020
1	Bucharest - Ilfov	4.407515	0.133658	4.541173
2	North-West	0.807258	0.835345	1.642603
3	North-East	-1.37689	2.088661	0.711773
4	Center	-0.2295	0.035097	-0.1944
5	South-Muntenia	-0.72171	-0.18578	-0.9075
6	South-East	-1.79551	0.036417	-1.7591
7	West	-0.40148	-1.37606	-1.77754
8	South-West Oltenia	-0.68967	-1.56733	-2.25699

Source: author's calculation

The results confirmed the impact of the employment rate on competitiveness, along with tertiary education and RDI expenditure. According to the values calculated for 2020, the Nordic regions (West and East) are strengthening their competitive strength through the employment advantage and tertiary education, while the western region loses its position due to the negative evolution of this objective. Overall, the target for tertiary education will be reached by five regions and less by the southern regions (East, Muntenia) and Northeast; the objective of employment has the potential to move closer to the proposed target but is negatively influenced by the southern regions; the risk of deprivation and social marginalization is diminishing in most territories (except the Center and West regions); the target of reducing early school leaving is only achieved by the capital and West region; expenditure on RDI remains very low, given that this sector will not be prioritized by the authorities.

From the estimate values for 2020, it turns out that the Nordic regions will become more competitive by increasing employment but also by increasing the number of tertiary education graduates (Northwest).

The capital city region is in the first place, favored especially by tertiary education and by the percentage of expenditures in RDI. The Central Region loses its position as compared to 2016, under the negative influence of occupancy that exceeds only 65%, but also by the low level of investment in RDI.

South-Muntenia, although very poorly competitive, manages to occupy the fifth position by the advantage of localization to the capital, mainly due to investments in RDI. The region is positively evolving in the direction of reducing school dropout and increasing the share of the population with tertiary education.

In the western region of the country, two unfavorable trends in the analyzed range are encountered, namely: the fall in employment and the increase in the risk of poverty and social exclusion, both trends were detected in the current analysis period. For this reason, the West region will lose competitive advantage over strategic indicators. Furthermore, the western region, with a predominantly aging population, will have to further promote intraregional migration, thus hiring a younger workforce. The advantages of the area (opening up to Western culture, study opportunities, the presence of investors and international companies, the quality of universities, etc.) are solid premises for improving employment, and implicitly for reducing the risk of deprivation.

The southern regions (East and West) remain negatively affected by the low employment rate and the lack of regional allocations in RDI. They show the greatest real gaps in the country's strong regions, even if they are not well reflected in the proposed rankings. The results confirmed the employment rate impact on competitiveness, along with tertiary education and RDI expenditure. According to the figures for 2020, the Nordic regions (West and East) are strengthening their competitive strength, with the advantage of employment and tertiary education, while the western region loses its positions due to the negative evolution of this objective. Overall, the target for tertiary education will be reached by five regions and less by the southern regions (East, Muntenia) and North-East; the objective of employment has the potential to move closer to the proposed target but is negatively influenced by the southern regions; the risk of deprivation and social marginalization is diminishing in most territories (except the Central and West regions); the target of reducing early school leaving is only achieved by the capital and West region; expenditure on RDI remains very low, given that this sector will not be prioritized by the authorities.

V.   CONCLUSIONS

From the analyses carried out in the paper, the research hypotheses are confirmed as follows:

H₁: Regional disparities remain strong in terms of Europe 2020 targets - confirms. The differences between the values of the strategic targets were found by simply observing them from the beginning of the implementation period. Among the determinant causes we have identified: the aging population - the West, the advantages / disadvantages of geographic positioning and neighboring external influences, proximity to more competitive regions, regional natural resources, intraregional migration, emigration for labor (by age, gender and education level) The attitudes of the population towards education (major differences between North-East and West), the predisposition of citizens to work, the territorial economic specificity, the political support, the efficiency of the valorisation of the strengths, etc.

H₂: Employment rate is the strongest vector of regional competitiveness - confirms. The analysis of the macroeconomic effects of the targets on the national framework showed that the closest link is between the employment rate and the national GDP per capita. Similarly, by applying the Principal Component Analysis method, employment has been a strong and decisive element in classifying regions by competitiveness levels.

H₃: At the regional level, the Europe 2020 objectives have a different trajectory in terms of volume and trends - partially confirmed. From the analysis of the regional progress towards the achievement of the strategic targets (2010-2016) and from the observations on the projected period (2017-2020), their growth/decrease pace differs significantly from one region to another (employment rate, early school leaving) And that the directions of evolution are opposite (the employment rate decreases in the case of the southern and western regions, exposure to poverty and social marginalization increases in the Center and West).

VI.   REFERENCES

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VII. ANNEXES

Rotated Component Matrix[a]

	Component	
	1	2
Zscore(occupancy_2016)	.299	.906
Zscore(gerd_2016)	.930	.195
Zscore(dropu-out_2016)	-.567	.673
Zscore(education_2016)	.952	-.158
Zscore(poverty_2016)	-.882	-.122
Zscore(gdp_2016)	.900	-.026

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 2 iterations.

Rotated Component Matrix[a]

	Component	
	1	2
Zscore(occupancy_2016)	.174	.938
Zscore(gerd_2016)	.825	.478
Zscore(dropu-out_2016)	-.770	.450
Zscore(education_2016)	.944	.156
Zscore(poverty_2016)	-.613	-.134
Zscore(gdp_2016)	.931	.172

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.