

A MULTIFACTORIAL STATISTICAL MODEL FOR DEVELOPMENT REGIONS HIERARCHY IN ROMANIA

TIBERIU CRISTIAN AVRĂMESCU *

ABSTRACT: *Hierarchy of administrative units using an index of development is particularly important in measuring of economic disparities between the Romanian regions. Knowing regional disparities, we can determine accurately regional development policy priorities and provide supports for regional development strategies achievement. To achieve this hierarchy, we used a set of six indicators relevant to express the development level of a region and we realized the hierarchy using two methods: ranks method and relative distances method.*

KEY WORDS: *regional development; regional disparities; regional policy; development index.*

JEL CLASSIFICATION: *C43; R11; R12.*

1. INTRODUCTION

Since its establishment, the European Community proposed as a priority a harmonious, balanced and sustainable development of economic activities, a high level of employment and social protection, growth of living standards, solidarity and economic and social cohesion for European countries.

Thus, regional policy target is to reduce social disparities and to express solidarity with disadvantaged social groups (vertical cohesion) or to reduce regional disparities and to express solidarity with people in declining areas (horizontal cohesion). Through this policy, financially supported by structural funds, the EU helps undeveloped regions and supports the conversion of industrial areas in difficulty, diversification of rural economic activities and urban regeneration of cities (Constantin, 2010, p. 138).

* Lecturer, Ph.D., University of Pitești, Romania, cristiavr@yahoo.com

Disparities in levels of development of different regions are the result of "equipping" their natural resources and human differentiated, and the teaching of evolution relatively specific (economic, technological, demographic, social, political and cultural) that shaped his development throughout history (Biriescu & Butuza, 2011, p. 21).

2. ROLE OF STATISTICS IN SPATIAL ANALYSIS

Regionalization is an important objective for European integration, because it allows a zonal monitoring of socio-economic development. Europe is in a continuous change, economic and social development evolutions require a statistical system adaptable to change, that it can cope with the development of European policy. The priorities of statistics at European level relate to (Ștefănescu et al., 2003, p. 69):

- development of relevant indicators to describe the situation of the environment, in support of sustainable development policies;
- development of quality indicators, required by strategic spatial planning problems at European level;
- particularization of statistical data concerning to labor market trends at the regional level, in accordance with continuous changes of economic activity, in occupational and spatial terms.

Statistics provide the conceptual and methodological framework for analysis in spatial terms (regional). Existence of regional imbalances is a reality, due to differential allocation of natural and human resources and different conditions of development (economic, technological, demographic, social, political and cultural).

Regional statistical system must have an interactive relationship with users, so that, by its attributes, to inform the society members about its evolution.

To quantify the level of economic development of a region, an important instrument is *global development index*, with an important role in the hierarchy of administrative units. Elaboration of global development requires several steps (Tacu, 1998, pp. 29-38):

- *identifying indicators and their structure* in groups of indicators. This phase is particularly important, the main objective is establishing of indicators system that reflect better reality and comprise the most significant aspects of the socio-economic development process. In this phase should be considered to ensure the comparability of indicators and availability of statistical data in present and future;
- *determination of criteria and calculation methods* according to logical evolution of phases, for obtaining the global development index, as a generalizing index;
- *sensitivity analysis* of this index variation at other indices or indicators variations, that the global index depends naturally. This analysis can be approached both in terms of dynamic and spatial or territorial aspect.

Rigorous evaluation of regional development is part of the requirements of modern statistics, designed to give those who use it opportunity to know exactly what happened and to outline general trends. Based on these requirements, I propose to present the main methods of multifactorial statistical hierarchy of administrative units.

I shall use this methods to make a classification of Romanian development regions, because multifactorial hierarchy of regions is particular importance to measure gaps and to prepare development strategies.

The hierarchy starts with identification and selection those statistic indicators who provide complex characterization of each territorial unit, using for this purpose a set of indicators. First, we can do provisional classifications by each chosen indicator and then we can use an aggregated method in a single indicator through which is achieved proper hierarchy. (Popescu, 2004, p. 203)

Table 1. Indicators used for Romanian development regions hierarchy

Region	GDP per inhabit. (lei current prices)	Average net monthly earnings (lei current prices)	ILO Unemploy. rate (%)	Gross investments of active local units per inhabit. (lei current prices)	Local active units at 1000 inhabit.	Total expenditure from research - development activity per inhabitant (lei current prices)
North-West						
1998	1539,7	95,08	5,4	435,92	15,30	3,14
2009	21297,4	1161	5,6	3467,24	27,51	71,37
Center						
1998	1689,7	98,83	5,9	404,67	14,54	6,54
2009	22618,8	1223	10,7	4508,20	25,74	67,32
North-East						
1998	1223,3	94,28	7,6	381,93	10,28	2,85
2009	14649,3	1207	6,0	1600,48	15,64	42,46
South-East						
1998	1630,9	108,36	6,3	476,69	14,56	2,74
2009	18738,2	1255	7,5	3146,17	22,11	32,49
South Muntenia						
1998	1427,8	103,61	6,0	428,57	11,07	5,70
2009	19913,7	1294	8,0	3203,56	17,31	67,31
Bucharest Ilfov						
1998	2845,3	125,24	6,0	2170,61	27,82	45,78
2009	55079,3	1817	4,0	16279,84	56,52	602,55
South-West Oltenia						
1998	1452,7	109,33	4,6	642,05	12,33	2,38
2009	17752,8	1308	6,8	3419,33	16,95	33,54
West						
1998	1780,6	97,09	6,2	410,79	13,07	3,44
2009	25602,4	1270	6,0	4874,02	26,01	46,26

Source: calculated by Romanian Statistical Yearbook, 1999, 2000, 2010 and 2011

To make this hierarchy, I chose a set of indicators that I consider relevant to characterize the development level of a region. The indicators were chosen so as to

take into account the most relevant elements that contribute to regional development. Thus, the knowledge of the hierarchy of development regions allows to determine accurately the regional development policy priorities. Thus, we can allocate resources to undevelopment regions in terms of the economic development level.

The selected indicators are:

- Gross Domestic Product per inhabitant (lei current prices);
- Average net monthly earnings (lei current prices);
- ILO unemployment rate (%);
- Gross investments of active local units from industry, construction, trade and other services per inhabitant (lei current prices);
- Active local units from industry, construction, trade and other service at 1000 inhabitants;
- Total expenditure from research - development activity per inhabitant (lei current prices).

To reveal the changes occurring over time and effects of regional policy in Romania, I decide to make a double hierarchy: one for 1998 (year of publication of Law no. 151 concerning regional development) and one for 2009.

The proposed model aims an easy hierarchy of development regions, starting from the premise that ease of use was one of the causes of success for Human Development Index. For this, I proposed a set of indicators whose values are available and easily accessible to national and regional statistical system.

Further are presented datas for indicators who will contribute at Romanian development regions hierarchy.

3. RANKS METHOD

This method presents a classification of territorial units, successively, according to each indicator included in the analysis. Rank **one** is assigned to the unit with the highest quality performance and highest rank, equal to the number of territorial units investigated, is assigned to the unit with minimum quality level. For each territorial unit, it calculates the ranks assigned to each indicator and it obtains the total score depending on which is determined the final rank.

Using ranks method, first position in 1998 is held by Bucharest-Ilfov region, followed by the Centre, North-West and South-West Oltenia regions. In 2009, the Bucharest-Ilfov region retains first position, West, North-West and Centre regions being on next positions.

Table 2. Romanian development regions hierarchy using rank method, in 1998 and 2009

Region	Ranks assigned by						F I N A L S C O R	F I N A L R A N K
	GDP per inhabit. (lei current prices)	Average net monthly earnings (lei current prices)	ILO Unempl. rate (%)	Gross investments of active local units per inhabit. (lei current prices)	Local active units at 1000 inhabit.	Total expenditure from research - development activity per inhabitant (lei current prices)		
Norht-West								
1998	5	7	2	4	2	5	25	3
2009	4	8	2	4	2	2	22	3
Center								
1998	3	5	3	7	4	2	24	2
2009	3	6	8	3	4	3	27	4
North-East								
1998	8	8	8	8	8	6	46	8
2009	8	7	3	8	8	6	40	8
South-East								
1998	4	3	7	3	3	7	27	5
2009	6	5	6	7	5	8	37	7
South Muntenia								
1998	7	4	4	5	7	3	30	7
2009	5	3	7	6	6	4	31	5
Bucharest Ilfov								
1998	1	1	4	1	1	1	9	1
2009	1	1	1	1	1	1	6	1
South-West Oltenia								
1998	6	2	1	2	6	8	25	3
2009	7	2	5	5	7	7	33	6
West								
1998	2	6	6	6	5	4	29	6
2009	2	4	3	2	3	5	19	2

Source: calculated by Romanian Statistical Yearbook, 1999, 2000, 2010 and 2011

4. RELATIVE DISTANCES METHOD

Deficiency of ranks method depend on the double smoothing of variable size of differences between regions, in this case by replacing them with an arithmetic progression with ratio one. To remove this deficiencies, we shall use for hierarchy a much more efficient method: relative distances method. The method involves, first, the establishment of a ideal unit whose characteristics presents maximum quality performance in analyzed colectivity, then, selection of a procedure for measuring the distance between the real unit and this ideal unit for every studied characteristics and

determination, finally, an aggregation process of obtained information from each real unit.

Table 3. Romanian development regions hierarchy using relative distances method, in 1998 and 2009

Region	Relative distances (%) according to						Average synthetic Index* (%)	RANK
	GDP per inhabit. (lei current prices)	Average net monthly earnings (lei current prices)	ILO Unempl. rate (%)	Gross investments of active local units per inhabit. (lei current prices)	Local active units at 1000 inhabit.	Total expendit. from research-developm. activity pe inhabitant (lei current prices)		
North-West								
1998	54,11	75,91	91,30	20,08	54,99	6,90	37,66	5
2009	38,66	63,89	80	21,29	48,67	11,84	36,65	3
Centre								
1998	59,38	78,91	85,86	18,64	52,26	14,28	42,13	2
2009	41,06	67,30	41,56	27,69	45,54	11,17	34,26	4
North-East								
1998	42,99	75,27	67,39	17,59	36,95	6,22	30,96	8
2009	26,59	66,42	75	9,83	27,67	7,04	25,15	8
South-East								
1998	57,31	86,52	81,52	21,96	52,33	5,98	37,49	6
2009	34,02	69,06	56,25	19,32	39,11	5,39	28,52	6
South Muntenia								
1998	50,18	82,72	84,78	19,74	39,79	12,45	38,85	3
2009	36,15	71,21	50	19,67	30,62	11,17	30,87	5
Bucharest Ilfov								
1998	100	100	84,78	100	100	100	97,28	1
2009	100	100	100	100	100	100	100	1
South-West Oltenia								
1998	51,05	87,29	100	29,57	44,32	5,19	38,04	4
2009	31,14	71,98	65	21	29,98	5,56	28,26	7
West								
1998	62,58	77,52	82,60	18,92	46,98	7,51	37,25	7
2009	46,48	69,89	75	29,93	46,01	7,67	37,01	2

* Aggregation of coordination size for each region in a average synthetic index was obtained using geometric mean.

Source: calculated by Romanian Statistical Yearbook, 1999, 2000, 2010 and 2011

Expression of observed distance for every studied characteristics was made as a coordination relativ size, calculated for each element of community and compared with the unit with maximum quality performance. Basis of comparison, being

maximum variation for each characteristic, the comparisons between units were limited from 0 and 100 percent.

As other Eastern European countries, Romania started the transition process with a relatively low level of regional disparities compared to countries with traditional market economy. These disparities have grown rapidly, especially between Bucharest-Ilfov region (including the capital of Romania) and other regions. Most foreign investors were attracted to this region, which offers many advantages. Potential investors are not attracted by the poverty of the region. As a consequence, they are reticent on setting up new businesses here (Niță & Drigă, 2008, p. 37).

As can be observed from the data presented for period 1998 – 2009, there were changes in the development regions hierarchy in terms of development level. Bucharest-Ilfov region retains in 2009 its position of most developed region of Romania, too. Also, the North-East region is in 2009 the last in this hierarchy, position held in 1998, too. In 2009, the Western region is second, in comparison with sixth place held in 1998. This is region with the most significant evolution in the analyzed period. A positive performance had North-West region, it occupies third position in 2009, in comparison with fifth position in 1998.

5. CONCLUSIONS

Analyzing regional dimension, we can understand the development trends across the country, these being mainly influenced by the urban dimension, where growth is concentrated in major cities (Bucharest being the most visible example of this phenomenon) and market access (especially the west) - the foreign direct investment and economic growth are positively influenced by easy access to western markets. In contrast, natural barriers proximity for trade (Danube) or undeveloped markets in Eastern Europe (Ukraine and Moldova), usually hindered development. Thus, regions who in 2009 are in the first four positions, have major cities and international airports or are located near or on the western border transport axis (Bucharest Ilfov, West, Centre, North-West).

In contrast, regions that are most serious problems of underdevelopment (Northeast, South West), are either the Danube riverside or are located near the border with Ukraine or Moldova. These regions have a clear decoupling of economic growth. Also, it is important to note that development poles is focused around some cities, usually large.

From this analysis, we can see also two very important aspects: studying average synthetic index values, we can observe that the value decreased in the analyzed period in all regions (except Bucharest Ilfov). This is due to rapid development level of the region Bucharest-Ilfov, the disparities between this region and other regions, exacerbating in the mentioned period.

The concentration of economic growth around Bucharest has become a characteristic of the Romanian economy. It is obvious high dependence of growth to FDI volume. Foreign investment in Romania oriented depending on accessibility to the western markets and urban character of the targeted areas, including the availability of adequate facilities and services for expatriates. Thus, differences in development

between Bucharest-Ilfov region and other regions increased significantly in the analyzed period.

I notice also that the differences between regions were not significantly attenuated. It is obvious that regional development programs and measures that they have proposed are far from achieve to the main target of regional development policy: stimulation of balanced development and mitigation of regional imbalances.

REFERENCES:

- [1]. **Biriescu, S.; Butuza, A.** (2011) *Regional development – past, present and future in Romania*, Annals of the University of Petroșani, Economics, 11(1), pp. 17-32
- [2]. **Constantin, D.L.** (2010) *Economie regională. Teorii, modele, politici*, Editura ASE, București
- [3]. **Niță, D.; Drigă, I.** (2008) *The integration of the Jiu Valley's economy on regional and national level*, Annals of the University of Petroșani, Economics, 8(2), pp. 31-40
- [4]. **Popescu, I.D.** (2004) *Metode de ierarhizare multifactoriale în studiul statistic al dezvoltării regionale*, “Dezvoltarea regională și echilibrul structural al economiei naționale”, lucrările celui de-al patrulea simpozion național al Asociației Române de Științe Regionale, Editura Oscar Print, București, pp. 203-208
- [5]. **Ștefănescu, D.; Dumitrescu, I.; Wagner, P.** (2003) *Statistică regională: instrument esențial pentru fundamentarea politicilor regionale*, Dezvoltare regională și integrare europeană, lucrările celui de-al doilea simpozion național al Asociației Române de Științe Regionale, Editura Oscar Print, București, pp. 69-75
- [6]. **Tacu, A.** (1998) *Global Index of Development – an important instrument in regional analysis*, Anuarul Institutului de Cercetări Economice “Gheorghe Zane”, Iași, Tomul 7, Editura Academiei Române, 1998, pp. 29-38
- [7]. **National Institute of Statistic** (1999, 2000, 2010 and 2011) *Romanian Statistical Yearbook*, Bucharest
- [8]. *Regional Operational Programme 2007-2013*, [Online], Available at: http://www.fonduri-structurale.ro/Document_Files/Regional/00000026/0562v_ROP%20Final%20Version.doc