

THE STAGE OF SUSTAINABLE DEVELOPMENT IN ROMANIA – COMPARISON WITH THE CEE COUNTRIES

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ABSTRACT

In this article we carried out a relative evaluation of the sustainable development level of Romania, by classifying within the ten states which later became EU members, which are closer from the point of view of development. In this analysis we used the aggregate indicator of the relative level of sustainable development which includes eight diagnosis variables characterising the sustainable development of the countries and we could point out the place of Romania within the 10 analysed countries but also the fields of sustainable development which have to be followed with priority on the level of Romania but also the stage of reaching the proposed objectives within the National Strategy regarding Sustainable Development.

The results of the research pointed out the existence of a serious disparity between Romania and the other Member States regarding the progress towards sustainable development and the need for urgent actions. Romania still has an intensive economy, a consumption economy of the resources, a society and an administration, which is still looking for a unitary vision on sustainable development. It is compulsory that Romania reduces the economic, social and technological deficiencies as compared to the EU countries.

INTRODUCTION

For Romania as well as for the other EU Member States, sustainable development is a perspective of national becoming consisting of a new development paradigm. Formally, Romania engaged itself in sustainable development from 1990, when it changed its development pattern, but, as a Member State, Romania has the obligation to accede and to respect the EU commitments in this direction. Therefore, in 2008, Romania adopted the National Strategy for Sustainable Development Horizons 2013-2020-2030.

One the major problems related to sustainable development refers to the need and the probability to determine the progress of the countries in the direction of sustainable development, because it is difficult to assess such a complex concept and there it no method. There are a lot of attempts on various levels: global, national and local, to define the adequate indicators and to measure them, the difficulty coming from the fact that these indicators have to reflect not only the changes in the life quality, but also to demonstrate if these changes are compatible with the current economic limits of the planet. All these methodologies used to measure the sustainable development do not finish the subject and confirm the fact that there is only a single universal tool consisting of the multiple aspects of sustainable development confirming the current reality of the research.

MATERIAL AND METHOD

In this article, the aim is to offer a few answers regarding the progress of Romania in the direction of sustainable development, based on a comparative analysis in the European Union countries which acceded later as opposed to the EU average, using the data supplied by the eight of the most commonly used indicators (Sîrbu, 2015, p.419) to measure sustainable development grouped in the three pillars: economic, social and environment (according to Eurostat) as they are presented in fig. 1.

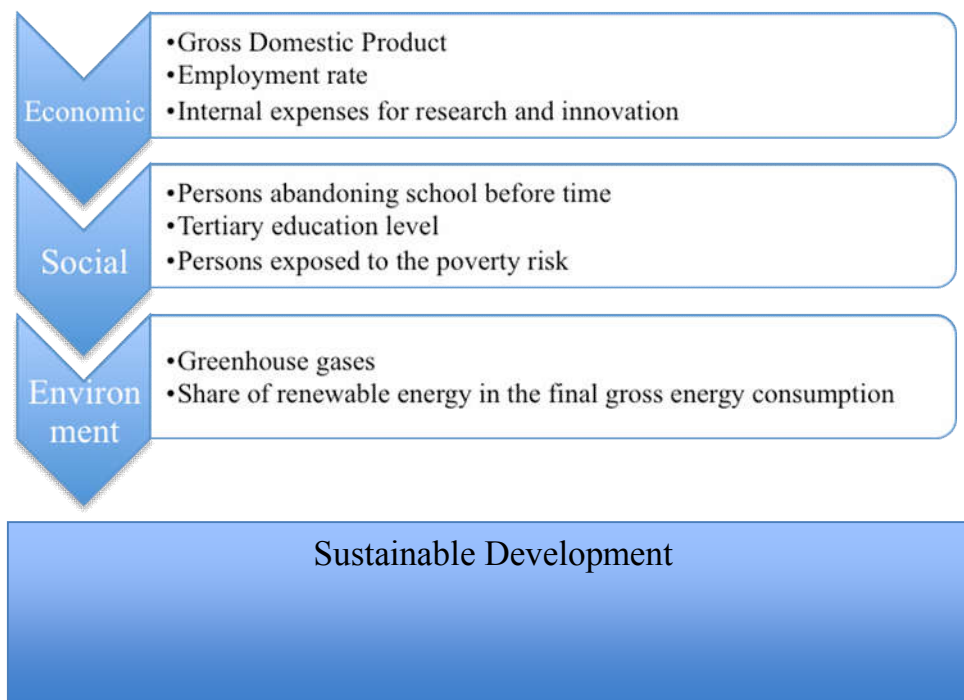


Figure 1. Indicators used to analyse sustainable development
Source: Own calculations

The relative evaluation of the sustainable development level of the 10 EU Member States took place using the aggregate indicator for the sustainable development relative level covering the eight diagnosis variables of the countries. The comparative analysis was carried out based on the linear order of the countries according to the aggregate level and based on the volatility index. The algorithm of research methodology includes 8 stages (Bluszcz, 2015, pp.2593):

1. Defining the data matrix,
2. The calculation of the variation index for all variables and eliminating the variable where the coefficient is lower than 10%,
3. The division of the variables in stimulators and inhibitors,
4. Selecting the unity method for variables,
5. Developing the normal data matrices,
6. Calculating the aggregate indicator of the relative sustainable development level of the 10 EU countries,
7. Calculating the development indicators for the three studied dimensions: social, economic and environmental,
8. Classifying the EU countries according to the relative sustainable development level.

DATA AND DISCUSSIONS

Indicators of the Economic Pillar

➤ *Gross Domestic Product*

Table 1

Gross domestic product in Romania and in the CEE countries (Euro)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Comp with EU	GDP speed*	Place
UE	26.100	26.000	24.500	25.500	26.200	26.600	26.800	27.600	29.000	29,2	100	5,9	
Bulgaria	4.200	4.900	4.900	5.100	5.600	5.700	5.800	5.900	6.300	6.800	23,2	30,7	10
Czech Republic	13.400	15.500	14.200	14.900	15.600	15.400	15.000	14.900	16.000	16.700	57,1	13,9	2
Estonia	12.100	12.300	10.600	11.000	12.500	13.500	14.300	15.000	15.500	16.000	54,7	13	3
Latvia	10.300	11.200	8.800	8.500	9.800	10.800	11.400	11.900	12.300	12.700	43,4	20,4	6
Lithuania	9.000	10.200	8.500	9.000	10.300	11.200	11.800	12.500	12.900	13.500	46,2	35,4	5
Hungary	10.200	10.800	9.400	9.900	10.200	10.000	10.300	10.700	11.300	11.600	39,7	10	7
Poland	8.200	9.600	8.300	9.400	9.900	10.100	10.300	10.700	11.200	11.100	38,0	34,8	8
Romania	6.200	7.100	6.100	6.200	6.600	6.700	7.200	7.500	8.100	8.600	29,4	32,8	9
Slovenia	17.400	18.800	17.700	17.700	18.000	17.500	17.600	18.200	18.800	19.600	67,1	6,2	1
Slovakia	10.400	12.200	11.800	12.400	13.100	13.400	13.700	14.000	14.600	14.900	51,0	31,2	4

Source: Author processing based on Eurostat data

*GDP speed growth – annual rhythm of growth of GDP per capita

As we can notice from table no. 1, Romania registered a cumulated growth of GDP of 32,8% while the highest growth was registered by Lithuania 35,4% and the lowest on the EU 28 level of only 5,9% in 2016 as opposed to 2007, followed by Slovenia with 6,2%. Even if it registered those high growth of GDP, also reported to the GDP value, EU, we notice that the CEE countries need more and more years to recover the disparity. The worst in the region is Bulgaria with a GDP representing only 23,2% from the EU average on the level of the year 2016, and the best position is held by Slovenia with 67,1% of the EU average. Romania is on the 8th place in the region with a level of 29,4% from the GDP average in EU and on the 9th place among the CEE countries from the point of view of the GDP size on the level of 2016.

➤ *Employment rate*

Table 2

Employment rate in Romania and in the CEE countries

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Place
EU	65,3	65,7	64,5	64,1	64,2	64,1	64,1	64,9	65,7	66,7	
Bulgaria	61,7	64,0	62,6	59,8	58,4	58,8	59,5	61,0	62,9	63,4	9
The Czech Republic	66,1	66,6	65,4	65,0	65,7	66,5	67,7	69,0	70,2	72,0	1
Estonia	69,8	70,1	63,8	61,2	65,3	67,1	68,5	69,6	71,9	72,1	2
Latvia	68,1	68,2	60,3	58,5	60,8	63,0	65,0	66,3	68,1	68,7	4
Lithuania	65,0	64,4	59,9	57,6	60,2	62,0	63,7	65,7	67,2	69,4	3
Hungary	57,0	56,4	55,0	54,9	55,4	56,7	58,1	61,8	63,9	66,5	5
Poland	57,0	59,2	59,3	58,9	59,3	59,7	60,0	61,7	62,9	64,5	8
Romania	58,8	59,0	58,6	60,2	59,3	60,2	60,1	61,0	61,4	61,6	10
Slovenia	67,8	68,6	67,5	66,2	64,4	64,1	63,3	63,9	65,2	65,8	6
Slovakia	60,7	62,3	60,2	58,8	59,3	59,7	59,9	61,0	62,7	64,9	7

Source: Author calculations based on the Eurostat data

The highest employment rate in the region is the one from Estonia (72,1%), followed by the Czech Republic and Lithuania which are above the EU 28 average of only 66,7%. Romania with a share of 61,6% in 2016 is still far away from the target of 70% proposed on a national level by 2020, while on the EU level the target is 75%. Although we can notice a growth along the analysed period 2007-2016 from 58% to 61,6%, we still consider that it is necessary to adopt sustained measures in order to improve the employment rate, reaching the target seems almost impossible in 4 years. These measures can be: programmes with subsidies for the employers to employ certain categories of unemployed and supporting investments on a regional/local level to set up new enterprises and to create working places, in order to lower the regional disparities. As compared to the employment rate of the other CEE countries, we notice that Romania is on the last place, Bulgaria being ahead of it.

➤ **Research and innovation expenses % in GDP**

Table 3

Expenses for research and innovation % in GDP in Romania and in the CEE countries

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Place
EU	1,32	1,37	1,52	1,47	1,47	1,50	1,59	1,63	1,62	1,59	
Bulgaria	0,22	0,19	0,22	0,23	0,24	0,25	0,29	0,33	0,37	0,38	7
The Czech Republic											2
Estonia	0,54	0,52	0,65	0,65	0,67	0,79	0,97	1,15	1,19	1,09	
Latvia	0,23	0,30	0,39	0,45	0,50	0,58	0,80	0,88	1,02	0,94	4
Lithuania	0,17	0,15	0,22	0,21	0,23	0,33	0,49	0,53	0,58	0,34	9
Hungary	0,25	0,28	0,37	0,39	0,44	0,47	0,54	0,64	0,69	0,58	5
Poland	0,40	0,51	0,75	0,70	0,71	0,84	0,88	0,93	0,96	0,94	3
Romania	0,38	0,36	0,37	0,29	0,30	0,36	0,38	0,43	0,51	0,49	6
Slovenia	0,12	0,12	0,15	0,16	0,18	0,24	0,31	0,43	0,50	0,33	10
Slovakia	0,85	0,90	1,00	0,90	1,03	1,14	1,34	1,33	1,59	1,63	1
	0,25	0,23	0,23	0,25	0,25	0,27	0,29	0,33	0,39	0,37	8

Source: Author calculation based on the Eurostat data

As for the expenses for research-innovation the level registered in Romania in 2016 places us on the last place in the CEE countries, and the percentage of 0,33% is very far from the proposed target in Romania for 2020 of 2%. The best percentage of the research-innovation expenses in GDP is registered by Slovenia which is placed again on the first place. If we analyse the evolution on the entire period 2007-2016, we notice that in almost all countries the trend was a continuous growth of the percentage of these expenses in GDP less in the case of Romania, Poland and Latvia, where the situation worsened in 2016 making us think that in these states there is no coherent strategy of growing the research-innovation activity. On the level of the EU average the percentage of 1,59% is far from the proposed target for 2020 of 3%. In Romania, the strategy thought for the next years takes into account the strengthening of the connection between research and enterprises through the priority promotion of the CDI activities in the economic sectors with growth potential and with public relevance and by improving the administrative capacity of the national CDI system for the growth of the efficiency of the investments in the field.

Indicators for the average pillare

➤ Greenhouse gases

Table 4

Greenhouse gases (% as opposed to 1990)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2015/ 1990	Place
UE	92,6	90,6	84	85,9	83,3	82,1	80,5	77,4	77,9	22,1	
Bulgaria	65,8	64,6	55,8	58,3	63,4	58,5	53,5	55,6	59,4	40,6	6
The Czech Republic	76,5	74,2	70	70,8	69,9	68,2	66,2	64,2	64,9	35,1	7
Estonia	55,1	49,6	41,4	52,5	52,5	49,9	54,2	52,3	44,7	55,3	3
Latvia	47,5	45,9	43,2	47,6	44,7	44,3	44,1	43,7	44,1	55,9	2
Lithuania	52,9	50,9	41,5	43,2	44,4	44,2	41,6	41,5	42	58	1
Hungary	78,1	76,2	69,6	70,1	68,4	64,3	61,4	61,9	65,3	34,7	8
Poland	88,6	87,1	83,2	87,2	87,1	85,5	84,8	82,1	82,8	17,2	9
Romania	61,2	59,2	51,4	49,1	51,6	50,5	46,9	47	47,7	52,3	4
Slovenia	112,1	115,9	105,4	105,5	105,6	102,5	98,8	89,5	90,7	10,3	10
Slovakia	66,6	67,6	61,5	62,7	61,2	58,2	57,7	54,7	55,6	44,4	5

Source: Author processing based on the Eurostat data

As we can notice Romania was firmly engaged on the line of reducing the greenhouse gases being on the 4th place in the region regarding the percentage dimension towards the reduction as opposed to 1990 (52,3%) so that Romania is registered in the objective to reduce the greenhouse gases but in reality this reduction is the result of de-industrialisation of Romania as it was presented in chapter 6. The situation is similar for Lithuania, Latvia and Estonia. The country registering the lowest reduction of the greenhouse gases as compared to 1990 is Slovenia, observing that this country has the highest GDP level in the region, meaning that this country has the highest level of GDP in the region, the level of industrialisation was not reduced as in the case of Romania but it continued to develop.

➤ The share of the renewable energy in the final consumption of gross energy

Table 5

The share of renewable energy in the final gross energy consumption

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Place
UE	10,4	11,0	12,4	12,9	13,2	14,4	15,2	16,1	16,7	
Bulgaria	9,2	10,5	12,1	14,1	14,3	16,0	19,0	18,0	18,2	6
He Czech Republic	8,0	8,6	9,9	10,5	11,0	12,8	13,8	15,1	15,1	7
Estonia	17,1	18,9	23,0	24,6	25,5	25,8	25,6	26,3	28,6	2
Latvia	29,6	29,8	34,3	30,4	33,5	35,7	37,1	38,7	37,6	1
Lithuania	16,5	17,8	19,8	19,6	19,9	21,4	22,7	23,6	25,8	3
Hungary	5,9	6,5	8,0	12,8	14,0	15,5	16,2	14,6	14,5	8
Polonia	6,9	7,7	8,7	9,3	10,3	10,9	11,4	11,5	11,8	10
Romania	18,3	20,5	22,7	23,4	21,4	22,8	23,9	24,8	24,8	4
Slovenia	15,6	15,0	20,1	20,4	20,3	20,8	22,4	21,5	22,0	5
Slovakia	7,8	7,7	9,4	9,1	10,3	10,4	10,1	11,7	12,9	9

Source: Author processing based on the Eurostat data

In the case of renewable energy as a share in the final consumption of gross energy we notice that the six countries have a level of this indicator above the EU 28 average Latvia, Lithuania, Estonia, Romania, Slovenia and Bulgaria, and the first five of these overcame the proposed indicator by the European Union for the year 2020, that is a

percentage of 20%. In Romania the reform in this field will continue through the implementation of a funding mechanism to accomplish initial investments and to improve the technology of the hydropower plant using geothermal energy, but also to implement investment projects for the renewable energy production.

Indicators of the Social Pillar

➤ *People abandoning school early*

As for the people abandoning the school early the highest share is registered by Romania with 18,5% above the proposed level by the EU for 2020 of 10%. The best in the regions is Lithuania, Slovenia, Poland, Slovakia, the Czech Republic and Latvia registering level up to 10%. What is worrying for Romania is that fact that up to 2013 there was a slight reduction of the share of the people abandoning school early in 2014 and 2015, the trend become higher, so we might say that there was no identified strategy allowing us to reach the proposed target for 2020. The measures to be implemented in the future refer to the continuation of the curricular reform by modernising the school curricula and improving the evaluation system of the students; connecting more and more schools to the internet in the project Internet in your school, increasing the number of school buses for the countryside students.

Table 6

Share of the people abandoning school early

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Place
UE	14,9	14,7	14,2	13,9	13,4	12,7	11,9	11,2	11,0	10,7	
Bulgaria	14,9	14,8	14,7	12,6	11,8	12,5	12,5	12,9	13,4	13,8	9
The Czech Republic	5,2	5,6	5,4	4,9	4,9	5,5	5,4	5,5	6,2	6,6	4
Estonia	14,4	14,0	13,5	11,0	10,6	10,3	9,7	12,0	12,2	10,9	7
Latvia	15,6	15,5	14,3	12,9	11,6	10,6	9,8	8,5	9,9	10,0	6
Lithuania	7,8	7,5	8,7	7,9	7,4	6,5	6,3	5,9	5,5	4,8	1
Hungary	11,4	11,7	11,5	10,8	11,4	11,8	11,9	11,4	11,6	12,4	8
Polonia	5,0	5,0	5,3	5,4	5,6	5,7	5,6	5,4	5,3	5,2	3
Romania	17,3	15,9	16,6	19,3	18,1	17,8	17,3	18,1	19,1	18,5	10
Slovenia	4,1	5,1	5,3	5,0	4,2	4,4	3,9	4,4	5,0	4,9	2
Slovakia	6,5	6,0	4,9	4,7	5,1	5,3	6,4	6,7	6,9	7,4	5

Source: Author processing based on the Eurostat data

➤ *Level of tertiary education*

Also in the case of this indicator Romania is on the last place with a percentage of 25,6% not very far away from the proposed target of 26,6%. The highest level registered of the share of the people with tertiary education was in 2015 in Lithuania, followed by Estonia and Poland, and 5 countries from CEE have a level above the EU 28 average.

Table 7

The share of the people with a tertiary education level in the age group 30-34 years

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Place
UE	30,1	31,1	32,3	33,8	34,8	36,0	37,1	37,9	38,7	39,1	
Bulgaria	26,0	27,1	27,9	28,0	27,3	26,9	29,4	30,9	32,1	33,8	6
The Czech Republic	13,3	15,4	17,5	20,4	23,7	25,6	26,7	28,2	30,1	32,8	8
Estonia	33,5	34,4	36,3	40,2	40,2	39,5	42,5	43,2	45,3	45,4	2
Latvia	25,7	26,3	30,5	32,6	35,9	37,2	40,7	39,9	41,3	42,8	5

Lithuania	36,4	39,9	40,4	43,8	45,7	48,6	51,3	53,3	57,6	58,7	1
Hungary	20,6	22,8	24,0	26,1	28,2	29,8	32,3	34,1	34,3	33,0	7
Polonia	27,0	29,7	32,8	34,8	36,5	39,1	40,5	42,1	43,4	44,6	3
Romania	13,9	16,0	16,8	18,3	20,3	21,7	22,9	25,0	25,6	25,6	10
Slovenia	31,0	30,9	31,6	34,8	37,9	39,2	40,1	41,0	43,4	44,2	4
Slovakia	14,8	15,8	17,6	22,1	23,2	23,7	26,9	26,9	28,4	31,5	9

Source: Author processing based on the Eurostat data

➤ **People exposed to the poverty risk**

In the case of the people exposed to the poverty risk, Romania is again on the first place in the 10 countries, with a rate of the people exposed to the poverty risk of 25,3%, while the lowest rate is registered by the Czech Republic 9,7%, and the EU 28 share is 17,3%. As a number in Romania, in 2016 there were five million people exposed to the poverty risk, registering a worsening of the situation after 2012, because by then the rate decreased by 21,6% and the crisis determined the reversal of the descending trend up to 2015.

Table 8

Rate of the people exposed to the poverty risk

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Place
UE	16,6	16,5	16,4	16,5	16,8	16,8	16,7	17,2	17,3	17,3	
Bulgaria	22,0	21,4	21,8	20,7	22,2	21,2	21,0	21,8	22,0	22,9	9
The Czech Republic	9,6	9,0	8,6	9,0	9,8	9,6	8,6	9,7	9,7	9,7	1
Estonia	19,4	19,5	19,7	15,8	17,5	17,5	18,6	21,8	21,6	21,7	6
Latvia	21,2	25,9	26,4	20,9	19,0	19,2	19,4	21,2	22,5	21,8	7
Lithuania	19,1	20,9	20,3	20,5	19,2	18,6	20,6	19,1	22,2	21,9	8
Hungary	12,3	12,4	12,4	12,3	14,1	14,3	15,0	15,0	14,9	14,5	4
Poland	17,3	16,9	17,1	17,6	17,7	17,1	17,3	17,0	17,6	17,3	5
Romania	24,6	23,6	22,1	21,6	22,3	22,9	23,0	25,1	25,4	25,3	10
Slovenia	11,5	12,3	11,3	12,7	13,6	13,5	14,5	14,5	14,3	13,9	3
Slovakia	10,6	10,9	11,0	12,0	13,0	13,2	12,8	12,6	12,3	12,7	2

Source: Author processing based on the Eurostat data

The strategy Europe 2020 is considered „*the basis for the sustainable development in the European Union*” where the 2020 objectives were set, and they mainly refer to the following targets:

- 75% of the EU population aged between 20-64 should have jobs (69% in 2010);
- 3% of the EU GDP should be invested in research & development (below 2% in 2010);
- Objective „20/20/20” regarding climate changes/energy should be met, that is the reduction by 20% of the greenhouse gases as compared to the levels from 1990 (and if there are favourable conditions, the reduction of the greenhouse gases should reach 30%); the growth of 205 of the renewable source share in the final energy consumption;
- Reducing the share of the people abandoning school early to below 10% (15% in 2010) and increasing the share of the population aged 30-34 years with higher studies to at least 40% in 2020 (31% in 2010);
- Reducing the number of European citizens with 2% living below the national threshold of poverty, so that more than 20 million people could come out of poverty.

Taking into account the strategic objective enumerated above, each Member State is free to adapt the European Strategy 2020 to its specific situation.

We shall move on with identifying the progresses but also the disparities in sustainable development of Romania as opposed to the progresses accomplished on the EU 28 level according to the economic-social and environmental decisions of sustainable development.

Table 9.

Distance of Romania as opposed to the set strategy 2020

Indicators of sustainable development	2009	2010	2011	2012	2013	2014	2015	2016	Romanian targets	EU targets
Employment rate	58,6	60,2	59,3	60,2	60,1	61,0	61,4	61,6	70	75
Internal expenses for research and development	0,15	0,16	0,18	0,24	0,31	0,43	0,50	0,33	2%	3%
People abandoning school early	16,6	19,3	18,1	17,8	17,3	18,1	19,1	18,5	11,3	10
Tertiary education level	16,8	18,3	20,3	21,7	22,9	25,0	25,6	25,6	26,6	40
Persons exposed to the poverty level	22,1	21,6	22,3	22,9	23,0	25,1	25,4	25,3	580000	20.000.000
Greenhouse gases	51,4	49,1	51,6	50,5	46,9	47	47,7	NA	19	20
Share of renewable energy in the final consumption of gross energy	22,7	23,4	21,4	22,8	23,9	24,8	24,8	22,7	24	20

Source: Author processing based on the Eurostat data

RESULTS

In the first stage we carried out the definition of the field of applying the entrance data used to assess the relative level of sustainable development for the 10 countries in the European Union. Based on the Eurostat statistical data there were used eight variables characterising the socio-demographic situation, and the economic and environment situation of the studies Member States. The statistical data refer to the year 2015 and are presented in table 10.

Table 10

Variable on the three dimensions: economic, social and environmental

Variable	Influence	Description
<i>Economic dimensions</i>		
X1- GDP	Stimulating	GDP per capita on the parity of the purchasing power
X2-Employment rate	Stimulating	Workforce employment rate calculating by the division of the number of people aged between 20 and 64 years according to the total population within the same age group.
X3- Gross internal expenses for research and innovation	Stimulating	GERD (Gross Expenses for Research and Development) as a percentage in GDP.

<i>Environment dimensions</i>		
X4- Greenhouse gases	Inhibitor	This indicator points out the trends in the total anthropic emissions generated by the "Kyoto chimney" of the greenhouse gases. It presents the total annual emissions reported to the emission from 1990 "Kyoto basket" of the greenhouse gases. (1990=100).
X5- Share of renewable energy in the final gross energy consumption	Stimulator	This indicator measures to which extent is used the renewable energy and implicitly the extent to which the renewable fuels replaced the fossils and/or the nuclear fossils and in consequence they contributed to the decarbonisation of the EU economy.
<i>Social dimension</i>		
X6- Persons abandoning school early	Inhibitor	The percentage of the population aged between 18-24 years with the lowest education level and who were not in education or continuous education.
X7- The level of tertiary education	Stimulator	A percentage from the population aged between 30 and 34 years graduating the tertiary education (for example universities, higher technical institutions etc.).
X8- Persons exposed to the poverty risk	Inhibitor	This indicator corresponds to the share of the persons who are: exposed to the poverty risk or lack material or live from households with a lower intensity of labour, in the total of the population.

Source: Author processing

The variable potentials of diagnosis adopted for analysis can be characterised by a significant variability, interpreted as the ability to diversify the countries studies, that is why it is imposed a second stage of the studies.

In the stage of the research, the variability indicator V_j was calculated as the report between the standard deviation and the arithmetic average for each potential diagnosis variable. Then, we have to eliminate these variables where the variability coefficient is lower than 10%. Therefore, we carried out the necessary calculations using the formula

$$V_j = S_j^x / \bar{x} \quad (1)$$

$$S_j^x = \sqrt{1/n \sum_{i=1}^n (x_i - \bar{x}_j)^2} \quad (2)$$

$$\bar{x}_j = \frac{1}{n} \sum_{i=1}^n x_i \quad (3)$$

There were carried out calculations based on the formulas 1, 2, 3 while the results of the calculations were presented in table 11.

Table 11.

Variation coefficient for variables

	X1	X2	X3	X4	X5	X6	X7	X8
S_j^x	3,7428	3,5485	0,3991	16,6518	8,2110	4,6040	5,2263	5,2375
\bar{x}_j	12,7000	65,6400	0,7800	59,7200	21,1300	9,5100	18,2500	18,1700
V_j	29,4712	5,4059	51,1715	27,8832	38,8593	48,4119	28,6371	28,8249

Source: Author processing

As we can notice in table no. 11, all the variables were characterised by a significant indicator of the variability, less X2- the employment rate where the index is

5,4059, below the accepted level 10% and that is why it shall be not included in the calculation of the sustainable development index, being eliminated.

The third stage of the analysis involved sharing the variables in stimulators and inhibitors. Stimulators are variables where the growth rate of the values indicate the development of the studied phenomena while the inhibitors are variables where the decrease of the values means the wanted development of the studied phenomenon.

The fourth stage of the analysis involved the normalisation of the data using the method of zero unification, which was carried out based on the formula 4 and 5.

The normalization formula for the stimulating variables is:

$$Z_{ij} = \frac{X_{ij} - \min X_{ij}}{\max X_{ij} - \min X_{ij}} \quad (4)$$

The normalisation formula for the inhibiting variables is:

$$Z_{ij} = \frac{\max X_{ij} - X_{ij}}{\max X_{ij} - \min X_{ij}} \quad (5)$$

The fifth stage of the analysis included the normalisation of the data, through which the variables have various measured of reciprocal comparison are unified by replacing various variability fields of the characteristics with a constant and transforming the absolute values in relative values. Using this method had as a purpose obtaining a uniformity of the variation of the indicators, these having values between 0 and 1, irrespective of the level of the indicator or the margin registered initially. The results obtained through normalisation are presented in table 12.

Table 12

Normalisation of the values for the variables in the analysis

	X1	X3	X4	X5	X6	X7	X8
Bulgaria	0,000	0,000	0,643	0,248	0,404	0,783	0,154
The Czech Republic	0,427	0,656	0,530	0,128	0,915	0,000	1,000
Estonia	0,405	0,520	0,945	0,651	0,489	0,758	0,769
Latvia	0,264	0,168	0,957	1,000	0,652	0,815	0,224
Lithuania	0,291	0,256	1,000	0,543	0,965	0,796	0,218
Hungary	0,220	0,472	0,522	0,105	0,532	0,331	0,692
Polonia	0,216	0,112	0,162	0,000	0,979	0,503	0,513
Romania	0,079	0,104	0,883	0,504	0,000	1,000	0,000
Slovenia	0,551	0,976	0,000	0,395	1,000	0,293	0,731
Slovakia	0,366	0,016	0,721	0,043	0,865	0,166	0,000

Source: Author processing based on the Eurostat data

The sixth stage included the calculation of the aggregate indicator regarding the sustainable development level. The aggregate indicator was calculated as an arithmetic average of the normalised values according to the formula below.

$$IDd_i = \frac{1}{n} \sum_{j=1}^n z_{ij} \quad (6)$$

Table 13

The calculation of the sustainable development index on the level of the year 2015

	Sustainable development index	Place
Bulgaria	0,279	9
The Czech Republic	0,457	5
Estonia	0,567	1
Latvia	0,510	2
Lithuania	0,509	3
Hungary	0,359	6
Polonia	0,311	8
Romania	0,321	7
Slovenia	0,493	4
Slovakia	0,272	10

Source: Author processing based on the Eurostat author

The higher the synthetic aggregate indicator value is, the higher the sustainable development level is, from the Member States studies from the point of view of the variables included in the analysis. The results of the calculations were presented in table 13.

Therefore, on the level of the 10 analysed countries the best aggregate index of sustainable development was up to 2015 registered in Estonia, followed by Latvia, Lithuania and Slovenia. Romania is on the 7th place with a percentage of 0,321 as compared to 0,567 being the highest (Estonia).

In the seventh stage we calculated the development indicators on the three dimensions studied separately: social, economic and environmental. The calculations carried out according to formula 6 were presented in table 14.

Table 14

Aggregate indicators calculated based on the three dimensions of sustainable development

	Economic dimension	Place	Environmental dimension	Place	Social dimension	Place
Bulgaria	0,000	10	0,445	5	0,447	8
The Czech Republic	0,542	2	0,329	7	0,638	5
Estonia	0,463	3	0,798	2	0,672	2
Latvia	0,216	6	0,978	1	0,564	6
Lithuania	0,273	5	0,771	3	0,660	4
Hungary	0,346	4	0,313	8	0,518	7
Polonia	0,164	8	0,081	10	0,665	3
Romania	0,092	9	0,693	4	0,333	10
Slovenia	0,763	1	0,198	9	0,675	1
Slovakia	0,191	7	0,382	6	0,344	9

Source: Author calculations based on the Eurostat data

From the point of view of the economic dimension the first place is occupied by Slovenia, being followed by the Czech Republic and Estonia. Romania is placed on the 9th place from the 10 countries being followed only by Bulgaria. From the point of view of the environment, Latvia, Estonia and Lithuania are on the best places whereas Romania is on the 4th place. From the point of view of the social dimension the 1st place is occupied by Slovenia followed by Estonia and Poland. Unfortunately, Romania is on the last place, pointing out that in the social field we are the last in Europe (table 14 and chart 1).

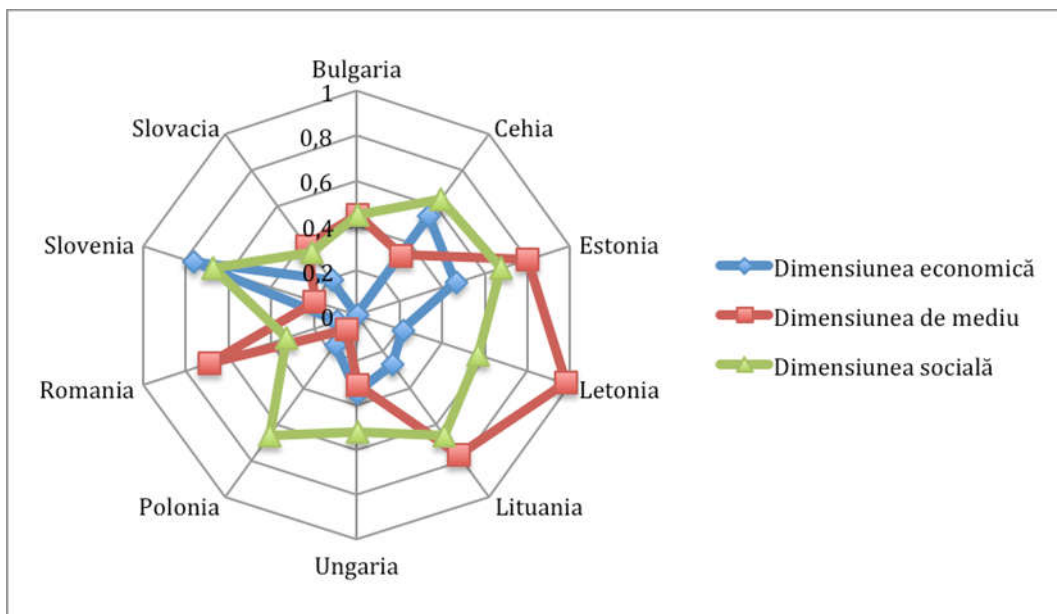


Chart Aggregate indicators for sustainable development for the CEE

Source: Author processing based on the Eurostat data

CONCLUSIONS

As a general appreciation, the results of the research point out the existence of a serious disparities between Romania and the other Member States as for the progress towards sustainable development, and an immediate action is necessary. The results regarding the progress of Romania in the direction of sustainable development as compared to the other EU countries are far from being optimistic. Romania still has an intensive economy, a society and an administration still looking for a unity vision on sustainable development. It is absolutely necessary that Romania should reduce the economic, social and technological disparities, as compared to the EU countries in order to reach a real cohesion in the European Union.

In Romania one of the main problems regarding the future sustainable development is in the field of education. This problem starts from the level of the primary cycle reflected in the high numbers of school abandoning especially for the primary and secondary cycles, especially in the rural environment. Among the causes identified within the various studies regarding the school abandoning the most important are: poverty and losing the rhythm. To fight against them, measures of economic growth are required but also voluntary actions and civic spirit to support students which are weaker.

Another discouraging factor for the future sustainable development of Romania is the one regarding the low expenses with research and development, in 2015 they were of 0.33% from GDP in the context where EU proposes in the 2020 strategy so that they reach

3% from GDP and Romania a level of 2% of GDP but the perspectives are not encouraging, being thus required a change of approach and paradigm. Besides the small resources granted by the state for research, the problem is amplified also by the absence of the interest in research from the private sector. I consider the public funds granted for research could be a real catalyser to co-fund research by the private field and to use effectively the results of the research in economy. Although, in each country there are national sustainable development strategies connected to the EU ones, they proved to be not enough if they are not combined with efforts from the local authorities and if they do not take into account the specific elements for each country which can improve the quality of life.

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