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Romania's Sustainability in European Context Seen from the Point of View of Energy Consumption, Innovation and Education

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Abstract *In the context of sustainable development, national competitiveness and sustainability became a fundamental preoccupation for emerging countries and the advanced countries. Romania has lately appeared in reports of European and international bodies that try to make rankings and to identify solutions to increase competitiveness. This paper is emphasizing, by comparison, Romania's national and sectorial competitiveness, in European context, from the point of view of the productivity of the use of energy resources, of the amount of consumed energy, of the inclusive development index, of the percentage of companies with innovative products and/or processes and of the main indicators in education.*

Key words Competitiveness, energy consumption, sustainable development, inclusive development, innovation

JEL Codes: I21, O13, O15, O31, Q40, Q56

1. Introduction and literature review

„Sustainable development is not a purpose in itself, but a means to stimulate economic and technical progress and to achieve a more equitable distribution, due to effects, upon the current and future generations" (Negulescu, 2014).

In the current complex context, the effort to increase competitiveness can no longer be seen separate from sustainable development. The strategic EU vision has as aim to ,,invest in growth", and not in any growth, but in ,,intelligent, sustainable growth that is favourable to inclusion" which, through its effects, should stimulate development based on three fundamental pillars: social, economic and environmental.

We can, therefore, speak about sustainable development where the three components of sustainability, social system and economic system and ecologic system reach a common point (Popescu *et al.*, 2005).

The strategy of sustainable development, a problem shared by all the countries around the world, must be dealt with by taking into account the problems of the world (Pânzaru and Dragomir, 2012).

Although sustainable development is the aim of any organization in today's world, we must emphasize the fact that the protection of the natural environment is as important as the concept „growth requires investment" (Zenghelis, 2012).

„The transition from industrial economy to an economy based on knowledge and information, the social and ecologic changes caused by the needs of sustainable development modified the requirements imposed on various economic entities and diversification of their responsibilities towards stakeholders and society, in general" (Barbu, 2013).

The purpose of this study is to emphasize the status quo of Romania's sustainable development in European context, from the point of view of the productivity of the use of energy resources, of the amount of consumed energy, of the inclusive development index, of the percentage of companies with innovative products/ process and of the main indicators in education, and all these indicators are elements of the inter-connection between competitiveness and sustainable development.

2. Romania's sustainable development – from the point of view of the indicators provided by Eurostat

The UN has identified a set of objectives for the responsible production and consumption aimed at the most efficient use of resources, reduced food waste, reduced waste and removal of toxic and polluting substances.

The EU actions are focused on removing the impact of the environment upon economic growth, on reducing energy consumption and efficient waste management.

Romania has to recover not only quantitatively the development gaps with the West, but also qualitatively even more gaps, regarding responsible development, combined with economic efficiency and respect towards the environment.

To stress these elements, and to reveal the gaps between Romania and the EU, we have chosen a few relevant indicators from Eurostat:

▪ Productivity of energy resources (expressed in euro per kilo of equivalent petroleum) shows an ascending trend of the ratio compared to the European average value, and an obvious boost after the economic crisis. To note, however, the lagging behind compared to the ration GDP/inhabitant when in fact we should use this factor to quickly reduce the economic gap.

Table 1. Evolution of the productivity of the energy resources (expressed in euro per kilo of equivalent petroleum)

	Year								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Romania	3.1	3.4	3.6	3.5	3.5	3.7	4.1	4.3	4.4
EU28	7.2	7.3	7.4	7.3	7.7	7.7	7.8	8.2	8.3
Report	43%	47%	49%	48%	45%	48%	53%	52%	53%

Source: Eurostat data processing

▪ Romania's big problem as against the European practice is the extremely low productivity in using resources. The ratio deteriorated since the EU accession in 2007 and it is currently a devastating 1 to 7. Despite the fact that Romania could have very well increase its productivity as against the EU average value. It is even more surprising when we think that Romania has access to European technologies and Romania should have reached that level pretty easy, if Romania had had a propensity towards responsible and efficient use of resources.

For the moment, even if we do not take into account the low prices on the domestic market, Romania does not come closer to the relative GDP/inhabitant value.

Table 2. Evolution of resource productivity (expressed in eurocents per kilo)

	Year								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Romania	29.5	24.9	29.5	31.7	28.5	29.4	30.3	30.0	30.9
EU28	157	159	173	181	177	190	195	203	208
Report	19%	16%	17%	18%	16%	15%	16%	15%	15%

Source: Eurostat data processing

▪ To note that not even in the case of the newly purchased cars, from the same sources and irrespective of their number, Romania has not managed to achieve the European score in this respect.

Table 3. CO_2 emissions of new cars (grams CO_2/km)

	Year		
	2014	**2015**	**2016**
Romania	128.2	125	122
UE28	123.4	119.5	118.1

Source: Eurostat data processing

It simply appears that legislation does not help and Romanians do not care how much the newly bought cars pollute, as long as they fall within the European norms, enforced in Romania as well. Last year, Romania imported about 520,000 second hand cars from the West. While 100,000 were bought new. Apart from the plunging age of the cars and the decreased traffic safety, we have 2 more consequences: the „imported" pollution becomes more serious than the pollution caused by the new cars, and *Rabla* program appears without logic. It makes no sense to remove one old car from the traffic as long as we bring 5 old cars instead from imports.

▪ To have a clear image, here are two positive trends, very important, that we should keep, given advanced position, as against the EU28 average value.
The first positive trend refers to the amount of energy consumed, as Romania has had a constant better position than the European average value during the last years.

Table 4. Final energy consumption (index 2005 = 100)

	Year								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Romania	97.5	100.2	90.2	91.4	92.1	9.3	88.3	87.9	88.6
EU28	98.4	98.9	93.6	97.5	93.0	92.9	92.9	89.1	91.1

Source: Eurostat data processing

The second strong point is the significantly high percentage of the renewable energy in the total consumed energy. According to the latest data, Romania had a performance that is close to the average EU value, and somehow stagnated while the EU average value is increasing close to Romania's value, as Romania does not keep up the growth pace in this respect.

Table 5. Percentage of renewable energy (% in total consumed energy)

	Year								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Romania	18.3	20.5	22.7	23.4	21.4	22.8	23.9	24.8	24.8
EU28	10.5	11.1	12.4	12.9	13.2	14.4	15.2	16.1	16.7
Ratio	174%	185%	183%	181%	162%	158%	157%	154%	148%

Source: Eurostat data processing

If we connect the above mentioned low productivity of the energy as a result in euro per amount of consumed energy and the high costs to produce energy from renewable sources (wind energy, solar energy etc.), we should pay attention to the overall economic outcome because it is not justified to use energy that is produced with high costs to make products that are sold cheap. Thus, while keeping the trend of decreasing the amount of energy close to the European values, we should pay attention to the restructuring of the use of energy intro a higher added value that should use the resources consumed as well as possible. That is exactly the weakest segment in Romania at the moment.

3. Romania – from the point of view of the Inclusive Development Index

The Inclusive Development Index (IDI) performs an annual assessment of 103 countries. Apart from the GDP, 12 more elements are taken into account to assess economic progress, based on 3 main pillars:

- Growth and development;
- Social inclusion;
- Equity among generations – sustainability in the management of natural and financial resources.

The 1st pillar is made up of the GDP/inhabitant, employment rate, labour productivity and the healthy life expectancy; the 2nd pillar refers to the median income of households, the poverty rate, Gini income index and Gini wealth index; 3rd pillar refers to the adjusted net savings, public debt (as percentage of the GDP), dependency rate and intensity in carbon emissions of the GDP.

IDI is a project of the Global Economic Forum and its goal is to facilitate the economic inclusive development by enhanced PPP through analysis, strategic dialogue and concrete cooperation, which should also include accelerated social impact through corporatist action.

IDI was conceived as alternative to the GDP to reflect more accurately the criteria based on which people assess the economic progress of their countries. Countries are classified into 2 categories, more advanced and emerging. The scores, achieved according to an assessment from 1 to 7, are not strictly comparable between the 2 categories of states, due to the various definitions of poverty.

After analyzing table 6, we can see that the Czech Republic is the 15th, before South Korea, Canada and France, and 2 former socialist countries appear, Slovenia and Slovakia, before the UK, and followed by Estonia, before the USA and Japan.
Romania is in the second ranking, the ranking of emerging economies, dominated by former CAER colleagues. Beyond the fact that Romania hardly won a place ahead Bulgaria, and Romania keeps a distance regarding the GDP/inhabitant, it is significant that Romania ranks ahead Turkey (16th, with a score of 4.26), the Russian Federation (19th, with a score of 4.20)

and China (26th, with a score of 4.09). The progress expressed by the 5-year trend (2012-2016) is relatively good, although a half compared to Latvia or Hungary.

Table 6. Ranking of inclusive development

Advanced economies	Score	Trend over the last 5 years	Emerging economies	Score	Trend over the last 5 years
Norway	6.08	-0.77%	Lithuania	4.86	+4.90%
Iceland	6.07	+12.58%	Hungary	4.74	+8.10%
Luxemburg	6.07	+0.15%	Azerbaijan	4.69	-2.07%
Switzerland	6.05	+1.92%	Latvia	4.67	+8.60%
Denmark	5.81	+4.76%	Poland	4.61	+3.39%
Sweden	5.76	+0.48%	Panama	4.54	+4.80%
The Netherlands	5.61	+0.43%	Croatia	4.48	+2.89%
Ireland	5.44	+9.28%	Uruguay	4.46	+1.65%
Australia	5.36	+0.46%	Chile	4.44	+1.76%
Austria	5.35	-0.17%	Romania	4.43	+4.21%
Finland	5.33	-2.92%	Bulgaria	4.41	+2.91%
Germany	5.27	+1.72%	Costa Rica	4.32	-0.17%
New Zealand	5.25	+1.04%	Malaysia	4.30	+2.40%
Belgium	5.14	+0.24%	Peru	4.29	-1.40%
Czech republic	5.09	+2.88%	Kazakhstan	4.26	+0.35%

Source: World Economic Forum - The Inclusive Development Index 2018, Report published Monday 22 January 2018, available at: https://www.weforum.org/reports/the-inclusive-development-index-2018; http://www3.weforum.org/docs/WEF_Forum_IncGrwth_2018.pdf

To note for Romania the relation between inclusive development performance and interpersonal trust which places Romania near Uganda, Armenia and Brazil, among states with 5% -10% trust. That is, much below the 20% achieved by Bulgaria, Poland or Moldova, the lowest of the former Eastern block, where Hungary and the Czech Republic have 30%.

To note that the most developed countries also have the highest interpersonal trust rates, of about 75% in Norway, 65% in the Netherlands and Sweden and 60% in Finland. Somehow surprisingly, if Romania wants to see rapid progress, Romania should note that China appeared between the latter two.

4. Romania – from the point of view of the percentage of big innovative companies

The companies with innovative products and/processes represented 3.5% between 2014-2016, 1% below the value between 2012 – 2014, according to the preliminary results of a research conducted by the Romanian National Institute of Statistics released in February 2018 about innovation in the business environment.

The decreasing trend of innovation can be seen both in industry and services sector. The decline is even more of a concern if we take into account all the 3 categories of innovators. The percentage of companies that introduced and implemented new or significantly improved marketing products, processes, and methods as well as new organizational products, processes, and methods was 10.2%, less with 2.6% compared to 2012-2014.

Per categories:

- The percentage of companies that implemented only new and significantly improved organizational methods and/or marketing methods decreased with 1.5%, from 6.3% to 4.8%;

- The percentage of companies with innovative products and/or processes was 2.5% compared to the previous 3.5% (less with 1.0%);

- The percentage of innovators that introduced both organizational products and/processes and marketing methods remained constant, 2.9% compared to the previous 3% between 2012-2014.

Out of all innovators, representing 10.2% of all the companies (the remaining 89.8% are non-innovative companies):

- 4.8% were companies that applied only new organizational or marketing methods;

- 25% were companies that introduced or implemented only new or significantly improved products and/ or processes;

- Out of the total number of innovative companies, 2.9% introduced new products and/or processes as well as new or significantly improved organizational and/or marketing methods.

The innovative companies, according to the number of employees between 2014-2016:

- In the group of big companies, 17.9% were innovative (compared to 2012-2014, less with 9.1%, from the 27.0% in 2012-2014);

- In the group of small and medium companies, only 9.8% were innovative, compared to the 12.2% between 2012-2014.

5. Romania – from the point of view of the main indicators in education

One UN strategic goal for sustainable development is the quality of education - equal access to education as well as lifelong and an appropriate quality of education. A major target is also to increase the number of young people and adults with the needed competences to get hired and for entrepreneurial activities, and removal of gender disparities.

At the beginning of 2018, Eurostat released a set of relevant indicators for the situation in the EU member states, including the data for Romania, showing their evolution since the EU accession in 2007.

Here are the scores in 6 key educational sectors:

Table 7. School dropout rate or professional training dropout rate (%, population aged 18-24)

	Year										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Romania	17.3	15.9	16.6	19.3	18.1	17.8	17.3	18.1	19.1	18.5	18.3
EU average	14.9	14.7	14.2	13.9	13.4	12.7	11.9	11.2	11.0	10.7	10.6

Source: Eurostat data processing

As we can see, right after EU accession, Romania was close to the EU values and later on the score deteriorated. The maximal values appeared during the crisis and after the crisis, which show the inability of the policies to place this issue on the agenda of the governmental decision-makers to follow the EU trend of the last 10 years.

Regarding the number of children attracted to the early education, to note that Romania has the same problem.

Table 8. Children attracted into early education (% of the children older than 4 and below the age of enrolling in compulsory education)

	Year								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Romania	85.0	88.5	88.0	87.2	86.4	85.5	86.4	86.4	87.6
Media UE	90.5	91.6	92.1	92.9	93.2	93.9	94.0	94.3	94.8

Source*:* Eurostat data processing

Romania made the effort to come closer to the EU score right after the EU accession and, later on, slowed down the pace and missed the chance to harmonize its practices with the EU practices. A flickering evolution instead of improving its status in a particular sector seems to be Romania's natural trend.

Unfortunately, regarding the number of youth who are not in education, employment or training, Romania had an unfavourable increasing trend, after a rather low score close to the EU score in 2008 (in Eurostat, NEET - Not in Education, Employment or Training).

Table 9. Percentage of youth not in education, employment or training (% of the population aged 15-29)

	Year									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Romania	14.8	13.1	15.7	18.9	19.5	19.3	19.6	19.9	20.9	20.2
Media UE	13.2	13,1	14.7	15.2	15.4	15.8	15.9	15.4	14.8	14.2

Source: Eurostat data processing

While the EU corrected its score towards the above mentioned score, Romania remained away from performance and had a worrying 20%.

Regarding the percentage of population with tertiary education, the evolution was better, and the gap diminished significantly over the last 10 years, although the score has been around 13% since 2014.

Table 10. Population with tertiary education (% of the population aged 30-34)

	Year										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Romania	13.9	16.0	16.8	18.3	20.3	21.7	22.9	25.0	25.6	25.6	26.3
EU average	30.1	31.1	32.3	33.8	34.8	36.0	37.1	37.9	38.7	39.1	39.7

Source: Eurostat data processing

Regarding the indicator – employment of recent graduates – Romania achieved a rare performance to have a better score than the EU average score in 2008, but re-plunged, just like the EU trend, except that deeper and slower in recovery.

Table 11. Employment of recent graduates (% of the population aged 20-34)

	Year									
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Romania	79.3	84.8	77.6	71.2	70.8	70.2	67.2	66.2	68.1	69.3
Media UE	80.8	82.0	78.3	77.4	77.0	75.9	75.4	76.0	76.9	78.3

Source: Eurostat data processing

The data in the table above place Romania is a worse situation than it was at the moment when it became EU member, which should make us think why. Regarding the participation of adults in education, Romania faces a serious problem, because of the huge gap compared to the EU average, and the decreasing trend since 2013.

Table 12. Participation of adults in education (% of the population aged 25-64)

	Year										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Romania	1.5	1.8	1.8	1.4	1.6	1.4	2.0	1.5	1.3	1.2	1.1
Media UE	9.4	9.5	9.5	9.3	9.1	9.2	10.7	10.8	10.7	10.8	10.9

Source: Eurostat data processing

Such a situation reflected in official statistical data causes major challenges ahead the Romanian educational system; the pressure is felt especially by the high-school education and the academic education.

6. Conclusions

After analyzing the data provided by the Eurostat and World Economic Forum on the productivity of the use of energy resources, of the amount of consumed energy, of the inclusive development index, of the percentage of companies with innovative products and/or processes and of the relevant indicators in education, we can conclude that Romania is forced to adapt and customize the European context of sustainability in order to implement an authentic sustainable development.

In the context of globalization, sustainable development becomes a need. A sustainable society is characterized by ecological investments, investments in research, development and innovation, industrial modernization, updating and new competences for the current professions and for the new professions, ecological and competitive development of the Romanian economy.

Policies are needed to be justified, adopted and implemented; these policies should focus on stimulating the economic development in terms of reduced costs and reduced energy consumption, reduced emissions with greenhouse effect, increased percentage of renewable energy in the final gross energy consumption, improved education, including the tertiary education, promotion of inventions and support for the business environment to guarantee the employment of the labour force.

Without coherent, solid and well-articulated policies, Romania cannot hope to recover the gap compared to the EU, especially the competitiveness gap in R&D, innovation, as against the international competitors.

To implement these policies, Romania needs individuals who should be trained and, more importantly, should be on those positions to be able to put in practice these measures.

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