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TERRITORIAL DISPARITIES IN SUSTAINABLE DEVELOPMENT IN ROMANIA

ABSTRACT

The analysis of the degree of development of a territory is usually based on a system of economic and social indicators. The synthetic indicator by which the overall assessment of the degree of development can be made is the gross domestic product per capita.

The present study attempts to develop and substantiate the Sustainable Development Index (SDI), at county level.

The main objective of the study is to develop the methodology for assessing the degree of sustainable development using SDI, based on five criteria, which included 15 indicators considered representative for sustainable development, with the aim to develop a typology of the current sustainable development stage of counties in Romania.

Key words: territorial disparities, Sustainable Development Index (SDI), Romania.

JEL Classification: R10, O10.

1. INTRODUCTION

Each community in Romania has its own path to modernization and sustainable development, adapted to its own needs and specific requirements. The support to processes, modernization and development, is achieved with the help of socio-demographic structures, of those generated by economy and the environmental systems. In the broad context of sustainable development, the area of investigation of this study focused on the county level. The aim was to achieve a typology of the degree of development of Romania's counties, taking into account the diversity of situations faced by each of them.

2. STATE OF KNOWLEDGE

There is a number of indices developed at international and national level, by which the different degrees and levels of territorial development are measured.

Development indices – at international level

Starting from a multitude of aggregated indicators built on sets of variables defined at territorial level (country, region, locality), a series of indices were developed that measure the different development levels.

***Human Development Index* (HDI)** is a statistic composite index, taking values between 0 and 1, developed within the United Nations Development Program (UNDP), with the aim to capture the human development conditions. It was created in the year 1990 and it is an index used to compare the level of a country development using socio-economic indicators different from those using GDP per capita. The index includes information on education, health and economy, being a standard means of measuring well-being.

The values of the index place countries in four categories of human development: very high human development (HDI>0.8), high human development (HDI with values ranging from 0.7 to 0.799), average human development (HDI with values from 0.555 to 0.699) and low human development (HDI<0.550).

As regards human development, according to UNDP methodology, Romania ranked 93rd out of 142 countries in the year 1990; in the year 2000, Romania was on the 110th position out of 187 countries. Starting with 2014, Romania went into the category of countries with a very high human development.

Table 1

HDI values for Romania in the period 1990–2019

	1990	2000	2012	2014	2015	2016	2017	2018	2019
RO	0.701	0.709	0.795	0.802	0.805	0.807	0.811	0.816	0.828

Source: UNDP, (2020), *Human Development Report.*

The latest human development report of the year 2020, with data for the year 2019, includes 189 countries; Romania, with a HDI value of 0.828 was included in the category of very high human development countries, on the 49th position (UNDP, Human Development Report, 2020). The information provided by the comparative analyses on the basis of this index results in a relevant global picture of human development, with great differences across countries. Thus, there are countries in which HDI value is almost maximum (Norway = 0.957), and there are countries with an extremely low HDI value (the Republic of Niger = 0.394), which reveals an extremely low human development.

Inequality-adjusted Human Development Index (IHDI) is an index derived from HDI. The IHDI combines a country's average achievements in health, education and incomes. The difference between HDI and IHDI is the human development cost of inequality, also named the overall loss to human development due to inequality.

IHDI is also a composite statistic index, expressed as a number between 0 and 1, and its values rank the countries into four tiers in terms of human development: very high, high, average and low. According to UNPD report, in the year 2019, the IHDI value was 0.730 in Romania, which is the highest value reported for our country from 1990 to present.

	1990	2000	2010	2012	2014	2015	2016	2017	2018	2019
RO	0.701	0.698	0.696	0.716	0.720	0.717	0.713	0.718	0.725	0.730

Source: UNDP, (2020), *Human Development Report.*

If we compare the values obtained by the two indicators we can notice that these were identical only in the year 1990, while in the rest of the period the IHDI values were lower than HDI values, which means that it is inequality that imposed the differentiation.

Both indices are calculated at country level and both are criticized by a part of scientific world, which considers that there are errors in the statistics of the three major groups of indicators that are included in both indices.

Development indices – at national level. In Romania, a series of indices have been substantiated and developed, namely:

Local Human Development Index (LHDI 2011), developed with the goal to allow comparisons between all communes and towns with less than 30,000 inhabitants. The index has five components: education, employment, mobility, active age and housing; the education, employment and housing dimensions measure the development level, poverty or deprivation in small territorial units. The five dimensions operate with 12 indicators.

The values of this index places small localities into five development levels: low, medium-low, medium, medium-high and comprehensive. The study was based on data from the Population and Housing Census of the year 2011 and revealed that "only 10% of the rural population is living in villages with a high development level, as compared to 40% of the total population living in small towns. This lower development level means that poverty is higher in villages than in small towns". (Teşliuc, E. *et al.*, 2016:159)

Local Social Development Index (LSDI) was calculated by aggregating seven primary indicators on the basis of a factor score (Dumitru Sandu, 2011, p.5). With the help of LSDI we could identify the main disparities in the social development of Romania. The study conducted in the year 2011 revealed that at the level of historical regions, social development had minimum and equal values for Moldova, Muntenia and Oltenia (LSDI=64) and maximum values for Transylvania (LSDI=75), Banat (LSDI=76) and Bucharest -Ilfov (LSDI=97). At county level, the poorest counties in terms of social development were those located in the southern part of the country – Teleorman and Giurgiu (LSDI=50). The counties with medium-low development level were Suceava, Vrancea, Buzău, Dâmbovița and Vâlcea, and those with a maximum development level were Sibiu, Brașov, Cluj, Timiș and Bucharest-Ilfov.

The indices proposed by Dumitru Sandu measure the poverty degree of villages and communes in Romania rather than the degree of their development.

In 2015, a new model was developed by a group of experts from the Bucharest University of Economic Studies (ASE), who developed *an aggregate indicator of the*

development potential of a locality, on the basis of which the zoning of the rural area was achieved, according to the development particularities of communes. On the basis of this indicator, the authors set out to provide the theoretical and practical premises for the implementation of rural development policies and to substantiate, on medium and long term, the support measures of communes (ASE, 2015:5). For the calculation of this index they used 25 indicators, grouped into 5 categories. Thus, all the 2861 communes on Romania's territory were ranked according to their socio-economic development potential in order to provide financial support for investments and modernization of small-scale infrastructure. The conclusion of the study was that out of the 2861 communes existing in Romania in the year of the study, "most are confronted with an inadequate degree of basic infrastructure, being apparently eligible for investment projects" (ASE, 2015:6).

3. MATERIAL AND METHOD

In the present study we set out to develop and substantiate a *Sustainable Development Index* (SDI) on the basis of which the Romanian counties could be ranked and typologized, in terms of their development stage. The index consists of a set of 15 indicators, grouped into 5 criteria. The indicators proposed for the construction of SDI are chosen according to their relevance in describing the present stage and potential of sustainable development of the Romanian counties, *depending on their availability in the official statistics, as well as on their compatibility with other indicators that are important for describing their sustainable development level*.

The data used were extracted from the official statistics, from the National Institute of Statistics, from the tempo-online database and e-Demos.

The first stage in the process of statistical data processing is data normalization. De maximum and de minimum indicators will be taken into consideration. Most indicators in the SDI composition are de maximum indicators and only two are de minimum indicators. In the case of de maximum indicators, their high values represent a true development potential. In case of the de minimum indicators (number of inhabitants/physician and number of pupils/teacher), high values mean a great pressure on physicians, on teachers respectively, resulting in a low degree of population access to healthcare services and education.

There are several methods of data normalization, but the normalization method chosen is based on the maximum and minimum values of each indicator, used to calculate the absolute amplitude. Thus, we avoid the possibility of obtaining negative, undesired values, in the case of the present analysis. After entering all the values of selected indicators for analysis in the next table, the normalization of indicators is achieved.

The indicators available at the level of each county (I1, I2 ... I15) and in all the counties from Romania are taken into account (J1, J2 .... J42), as follows:

County/indicator	I1	I2	...	I15	I1 normalized	I2 normalized	...	I15 normalized
J 1								
...								
J 42								
Maximum								
Minimum								
Absolute amplitude								

The calculation formula is:

$$v_1 = (v - vmin)/aa,$$

where:

v_1 – represents the normalized value;

v – represents the indicator value;

$vmin$ – represents the minimum value registered by each indicator;

aa – represents the absolute amplitude of each indicator.

Thus, normalized standard values will be obtained for all indicators in the composition of each criterion. By summing up the standard values of indicators for each county, the ranking counties by each criterion will be obtained. Thus, a hierarchy of counties will be established for each of the five analyzed criteria.

Summing up the values obtained for each criterion, a unique value will be obtained, that is the Sustainable Development Index (SDI) for each county, on the basis of which a final hierarchy of counties will be ultimately established in terms of sustainable development stage.

SUSTAINABLE DEVELOPMENT INDEX - SDI

For the development of the theoretical model for the analysis of the current stage of sustainable development of counties in Romania, 5 analysis criteria and a set of 15 indicators were considered.

The first criterion of the analysis – ***human resource***, the human potential, represents the most important resource of the community and it is a factor with maximum influence in the process of economic development.

– *Number of inhabitants* in the counties is important, as it represents the human potential of each county. The inhabitants of an area have a double quality, they represent the labour force, an important production factor, but they are also consumers of the output of economic activities in that territory. The number of population by domicile will be used.

– *Population density* reveals the concentration of population in a specific area and represents the degree of population distribution across a territory. The socio-economic development of a territory depends on reaching a minimum populating degree to allow the functioning of a community within normal limits.

– *Share of the population aged 0–14 in total population of the county* is a relevant indicator in the analysis of the situation of the population as it represents the young population of the county, who will enter labour market in the next years and will actively contribute to the economic development.

– *The share of population aged 15–65 in total population of the county is a very important indicator* because this segment of population is the population of working age, the active population, who currently contributes to the economic development.

The study of the economy across the territory was made both at primary sector level, and at the level of secondary and tertiary sectors.

Thus, for the analysis of **the economy of the primary sector**, the following indicators were selected:

– *Agricultural area* is an indicator that represents the area on which the economic activity is carried out, i.e. agriculture; in quantitative terms, this determines the specificity of a community in terms of economic activities.

– *Number of active enterprises in the primary sector* represents the number of economic operators having as object of activity agriculture and hunting, forestry and forest exploitation, fishing and aquaculture.

– *Turnover rate in the primary sector is an indicator* showing the total incomes obtained in this sector, so it represents the economic output of enterprises in this sector.

For the analysis of the economy of **the secondary and tertiary sectors**, which comprised all the other economic activities, the following indicators were selected:

– *Number of active enterprises in the secondary and tertiary sectors* represents the number of economic operators having as object of activity other activities than agriculture, hunting and related activities.

– *Turnover rate in the secondary and tertiary sectors* represents the total incomes obtained in other sectors than agriculture, thus representing the economic output of enterprises not involved in agricultural activities.

The **social and dwelling criterion** comprises indicators referring to population's access to healthcare services and education, which is very important for ensuring the population's health and educational level, contributing to the improvement of the population's quality of life. The technical-dwelling equipment represents a basic element in ensuring the necessary conditions for a decent living, as well as for the economic development across the territory. Thus, the indicators included in this criterion are the following:

– *Number of inhabitants/physician* is the indicator representing population's access to qualified healthcare services and is related to the general health condition of the population.

– *Number of pupils/teacher* is the indicator representing population's access to education.

– *Number of newly built dwellings* is an indicator that shows how many dwellings have been built in the year of the analysis, being a relevant indicator for the living standard.

The ***environmental criterion*** comprises the available indicators that are considered most relevant. Thus, the indicators within this criterion, even if at first sight pertain to the technical infrastructure, are extremely important in terms of environmental protection, being the following:

– *Length of the drinking water supply network* is an indicator showing the number of km of the drinking water supply network, meaning that the population connected to the central water distribution system have access to drinking water at quality standards.

– *Length of sewer pipes* is an indicator showing the length of the sewerage network in km, which is important because the sewage is collected and no longer reaches the soil or surface waters contributing to their pollution.

– *Length of gas supply network* is an indicator showing the number of km of gas distribution network, an indicator important for environmental protection, because it shows that population does no longer use fire in stoves for food preparation and heating, but natural gas distributed in centralized system.

The indicators needed for the development of Sustainable Development Index have been checked in NIS official database, most of them are available for the year 2020, except for the number of active enterprises in primary, secondary and tertiary sectors, for which the latest data available are for the year 2018, and the agricultural area, for which the latest available data are for the year 2014.

4. RESULTS AND DISCUSSIONS

After the normalization of the component indicators of each criterion, a hierarchy was created, as follows:

Criterion 1 – Human resources. Bucharest Municipality and Iași, Ilfov, Suceava and Vaslui counties rank first in terms of this criterion. The explanation resides in the fact that Bucharest municipality, the capital of Romania, concentrates the largest number of the population and thus it has a surplus of human resources. The increasingly fast development of the capital city has led to the expansion of its borders into Ilfov county, the communes in the proximity of Bucharest becoming practically its neighbourhoods. The other counties with high scores in terms of human resources are the counties in north-eastern Romania, which are well-known for their numerous population that represents an important future labour force (high values of the population aged 0–14 years). Caraș-Severin, Giurgiu, Brăila, Vâlcea and Teleorman rank last, with low values of the population aged 0–14 years.

Criterion 2 – Economy of the primary sector. Contanța, Timiș, Bihor, Călărași and Dolj rank first in terms of this criterion. In all these counties, there is a large number of enterprises with activities in the primary sector, with high turnover rates, these counties being located in the plain, where agriculture is being practiced on large areas.

Dâmboviţa, Buzău, Covasna, Mehedinţi and Gorj rank last, with a relatively low number of enterprises in the primary sector, the turnover rates generated by this sector revealing its real situation.

Criterion 3 – Economy of the secondary and tertiary sectors. Bucharest municipality ranks first, at quite a great distance from the rest of counties; the highest number of firms activating in the secondary and tertiary sectors are found here, and their turnover rates are also high. Cluj, Ilfov, Timiş and Prahova rank next. On the last positions in terms of this criterion we can find Teleorman, Ialomiţa, Botoşani, Covasna and Mehedinţi.

Criterion 4 – Social and dwelling. By this criterion, the following five counties rank first: Ilfov, followed by Bucharest municipality and Călăraşi, Suceava and Constanţa. All these counties have very high values of the indicators: number of inhabitants/physician and number of pupils/teacher, which means that the population in these areas has low access to healthcare and education.

Five counties, Mureş, Harghita, Caraş-Severin, Covasna and Gorj rank last in terms of this criterion. These counties have high values in the indicator number of inhabitants/physician and low values of indicator number of pupils/teacher. We can say that there is a high pressure on physicians and a low pressure on teachers. At the same time, there is a low number of newly built dwellings in these counties.

Criterion 5 – Environment. Prahova and Cluj, Bucharest municipality and Timiş and Mureş counties rank first by this criterion, where the drinking water supply, sewerage and gas supply networks have considerable lengths, which means that a large part of the population in these areas is connected to the sewerage and gas supply networks, so that wastewater is collected, and the heating of dwellings and food preparation are no longer based on burning solid fuels, but on gas, and thus water, air and soil pollution can be kept under control.

Five counties, Covasna, Giurgiu, Mehedinţi, Botoşani and Teleorman rank last, with low values of all three component indicators of the analyzed criterion.

Summing up all the values obtained by each county in each criterion has resulted in obtaining a unique value for each county, which represents the Sustainable Development Index (SDI). Thus, Bucharest municipality ranks first in this hierarchy, as it has been expected, with the value of SDI=11.5.

Timiş, Constanţa, Cluj and Ilfov counties rank next in this hierarchy. The counties with the lowest values are Covasna, Mehedinţi, Caraş-Severin, Teleorman and Giurgiu.

The values obtained by SDI can be classified into 4 categories, to create a typology of the development level:

SDI with values 0≥3 – low sustainable development

SDI with values 3≥6 – average sustainable development

SDI with values 6≥9 – high sustainable development

SDI with values 9≥12 – very high sustainable development

Table 3

Sustainable Development Index (SDI) at county level

County	Criterion					SDI
	Human resource	Economy of the primary sector	Economy of the secondary and tertiary sectors	Social and dwelling	Environment	
Alba	0.963	1.095	0.094	0.820	1.553	**4.525**
Arad	1.109	1.625	0.155	0.934	2.231	**6.054**
Argeș	1.061	1.132	0.259	1.293	2.657	**6.402**
Bacău	1.610	0.877	0.110	1.160	1.496	**5.253**
Bihor	1.369	1.837	0.214	0.649	1.997	**6.066**
Bistrița-Năsăud	1.476	0.749	0.050	1.070	0.948	**4.293**
Botoșani	1.327	0.886	0.009	1.020	0.263	**3.505**
Brașov	1.394	1.130	0.147	1.492	1.848	**6.011**
Brăila	0.698	1.325	0.161	1.193	0.735	**4.112**
Buzău	0.789	0.580	0.080	1.273	1.362	**4.084**
Caraș-Severin	0.784	0.728	0.015	0.512	0.657	**2.696**
Călărași	1.024	1.802	0.016	1.629	0.532	**5.003**
Cluj	1.163	1.184	0.423	1.472	3.021	**7.263**
Constanța	1.507	2.143	0.289	1.602	2.320	**7.861**
Covasna	1.204	0.453	0.006	0.534	0.191	**2.388**
Dambovița	1.185	0.590	0.072	1.593	1.579	**5.019**
Dolj	1.047	1.675	0.181	0.705	1.583	**5.191**
Galați	1.350	1.044	0.123	1.125	1.543	**5.185**
Giurgiu	0.760	0.838	0.020	1.258	0.210	**3.086**
Gorj	1.208	0.404	0.036	0.630	1.113	**3.391**
Harghita	1.115	0.860	0.047	0.438	0.958	**3.418**
Hunedoara	0.883	0.690	0.072	0.894	1.337	**3.876**
Ialomița	1.086	1.333	0.012	1.544	0.642	**4.617**
Iași	2.051	1.181	0.198	1.197	2.153	**6.78**
Ilfov	1.869	0.681	0.412	2.656	1.636	**7.254**
Maramureș	1.396	0.824	0.102	0.942	1.832	**5.096**
Mehedinți	0.874	0.422	0.001	0.888	0.245	**2.43**
Mureș	1.229	1.143	0.163	0.375	2.889	**5.799**
Neamț	1.187	0.851	0.067	1.325	0.886	**4.316**
Olt	0.797	1.117	0.057	1.027	1.011	**4.009**
Prahova	1.071	0.948	0.323	1.433	3.229	**7.004**
Satu Mare	1.526	1.081	0.039	0.889	1.212	**4.747**
Salaj	1.087	0.796	0.044	0.812	0.675	**3.414**
Sibiu	1.360	0.718	0.155	1.045	1.575	**4.853**
Suceava	1.764	1.124	0.121	1.602	0.964	**5.575**
Teleorman	0.100	1.472	0.012	0.924	0.459	**2.967**
Timiș	1.453	2.772	0.365	1.103	2.966	**8.659**
Tulcea	1.113	1.230	0.014	1.125	0.646	**4.128**
Vaslui	1.646	0.966	0.038	1.157	0.576	**4.383**
Vâlcea	0.540	0.692	0.038	0.730	1.447	**3.447**
Vrancea	1.105	1.024	0.033	1.172	0.693	**4.027**
Bucharest municipality	2.896	1.602	2.000	2.005	3.000	**11.503**

Source: Author's own calculations

Following the obtaining of a value for SDI for each county on the basis of the established hierarchy, the counties were grouped as follows: very high degree of sustainable development – Bucharest municipality, high degree of sustainable development – 10 counties, average degree of sustainable development – 27 counties and low degree of sustainable development – 4 counties.

Table 8

The development degree of counties in Romania based on SDI

Degree of sustainable development			
Very high	High	Average	Low
Bucharest municipality	Timiș, Constanța, Cluj, Ilfov, Prahova, Iași, Argeș, Bihor, Arad, Brașov	Mureș, Suceava, Bacău, Dolj, Galați, Maramureș, Dâmbovița, Călărași, Sibiu, Satu-Mare, Ialomița, Alba, Vaslui, Neamț, Bistrița-Năsăud, Tulcea, Brăila, Buzău, Vrancea, Olt, Hunedoara, Botoșani, Vâlcea, Harghita, Sălaj, Gorj, Giurgiu	Teleorman, Caraș-Severin, Mehedinți, Covasna
1	**10**	**27**	**4**

Source: Results of author's own processings

5. CONCLUSIONS

In the present approach, we set out to construct an index by which the development stage of all the counties in Romania can be evaluated. Thus, a methodology for assessing the degree of sustainable development at county level was substantiated, with the help of an index based on five criteria, which included 15 indicators considered representative for sustainable development.

After collecting the data, building the tables, normalizing and processing them, rankings were made by the five criteria taken into consideration. By summing up the values obtained for each criterion by each county, a unique value was obtained, that of the Sustainable Development Index. As expected, the highest SDI value was obtained by Bucharest municipality, which had high values in four of the five criteria, namely: human resources, economy of secondary and tertiary sectors, social and dwelling and environment. Timiș county ranked 2nd, with high values for the criteria: economy of the primary sector and of the secondary and tertiary sectors and the environment criterion. Constanța county ranked 3rd, with high values for the economy of the primary sector and the social and dwelling criterion. Cluj came next, with high values for the economy of secondary and tertiary sectors and the environment criterion, followed by Ilfov county, with high values for the criteria: human resources, social and dwelling and economy of secondary and tertiary sectors.

The following five counties ranked last in the hierarchy: Covasna (that although had a value greater than one in terms of human resources, had extremely

low values in terms of the other four criteria); Mehedinti (with values less than one for all criteria, the lowest value being found in the economy of the secondary and tertiary sectors and environment); Caraş-Severin (that obtained values less than one in all five criteria, the lowest value being in the economy of secondary and tertiary sectors), Teleorman, that obtained low values in three criteria (economy of secondary and tertiary sectors, human resources and environment) and Giurgiu, which had low values for the economy of the secondary and tertiary sectors and environment.

Counties were grouped into four categories in a development typology, based on the SDI values obtained by each county: counties with very high sustainable development (1 county), counties with high sustainable development (10 counties), counties with an average sustainable development (more than two-thirds of Romania's total number of counties) and the last category, counties with low sustainable development (4 counties).

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