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DANUBE COUNTIES OF THE SOUTH-MUNTENIA DEVELOPMENT REGION, ROMANIA, IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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Abstract

Measuring sustainable development is a hot topic in specialized studies. The aim of this study is to compare the Danube counties of the South-Muntenia Development Region in terms of sustainable development. For this, several indicators of sustainable development have been selected. The indicators were analyzed by calculating and comparing averages and average growth rates. Depending on the averages of the analyzed indicators and compared to the other three counties, Teleorman County ranks first. Depending on the average growth rates of the analyzed indicators and compared to the other three counties, Călărași County ranks first. However, the average growth rates are low and even negative and denote the fact that the Danube counties of the South-Muntenia Development Region face different problems in the management of sustainable development.

Key words**:** *Danube counties, South-Muntenia Development Region, sustainable development*

INTRODUCTION

In the current age, also called the age of speed, the development of economic activities is accelerated by the evolution of technology. Out of the desire to evolve as quickly as possible, to make a profit and prosperity, humanity tends to ignore the consumption of resources, falling into a certain trap of selfishness. Thus, irrational resource consumption and selfishness are opposed to sustainable development. The importance of this concept derives from the fact that it involves meeting the needs of the present generation as well as meeting the needs of the next generation, taking into account that meeting the needs of future generations depends on how the needs of the present generation have been met. In order to ensure that the present generation is developing sustainably and that it offers posterity the opportunity to meet its own needs, the goals of sustainable development have been developed [26] and several indicators for measuring them. The methods for presenting and analyzing sustainable development indicators are diverse, starting with analysis through dynamic indices [1] and ending with the use of indicators in the creation of composite indices [5, 13].

Sustainable development is a concept that emerged in the twentieth century against the background of the awareness of the negative effects that human activities have on the environment. However, the concept of sustainable development is not limited to the environment, as this dimension is supplemented by two more, namely the social dimension and the economic dimension. The most widely defined definition of sustainable development in the world is the one published in the report entitled Our Common Future, which was prepared by the World Commission on Environment and Development. Thus, according to the World Commission on Environment and Development [28], sustainable development is "the ability of present generations to meet their own needs without compromising the ability of posterity to meet their own needs." Based on the above definition, it can be deduced that the current generation has a debt to the next generation in terms of resource consumption, because the needs are met by consuming different resources. As a result, the present generation is obliged to adhere to

rational consumption and to avoid wasting resources. Rational consumption and the avoidance of waste of resources will ensure the possibility of posterity to meet and meet their own needs.

In addition to the definition given by the aforementioned commission, there have been other definitions given by various researchers. Thus, sustainable development could also mean "achieving a higher and more evenly distributed level of well-being, within ecological limits" [31]. It can be deduced from the above definition that the way in which resources are consumed is not important, as long as certain environmental limits are met. In other words, from a sustainable point of view, the highest level of well-being is the one that does not exceed the ecological limits and not the one that exceeds these limits. Moreover, the previous definition does not include the concept of future generations, from which it can be deduced that a consumption within ecological limits of the present generation will give the chance to the next generation to benefit from the same resources. In other words, related to the term welfare, sustainable development means "increasing the quality of life of present generations without compromising the interests of posterity" [4].

Hummels and Argyrou [12] pointed out that the definition given by the World Commission on Environment and Development is somewhat vague. As a result, they proposed redefining the concept of development as follows: "sustainable development is development that meets the needs of this generation, respects the limits of the planet and does not compromise the ability of posterity to meet their own needs without exceeding the same limits of the planet" [12]. The previous definition highlights the central elements of the concept of sustainable development, namely the present generation, the planet or, better said, the resources of the planet, and the next generation. Moreover, the above definition emphasizes a particularly important thing, namely that resources are limited. That is why it is considered that "sustainable development does not consume resources, but uses and reuses them endlessly" [9]. In other words, sustainable development is a complex concept that also involves actions to recycle waste, reuse resources and increase the capacity of resources to regenerate.

Being such a complex term and with consequences in the future, the development of objectives and measurement indicators was absolutely necessary. As a result, there have been several stages in the development of sustainable development goals, and in 2015, the United Nations developed 17 sustainable development goals, relating to: 1. Poverty; 2. Hunger; 3. Good health and well-being; 4. Quality education; 5. Gender equality; 6. Clean water and sanitation; 7. Clean and accessible energy; 8. Decent work and growth; 9. Industry, innovation and infrastructure; 10. Reducing inequalities; 11. Sustainable communities and cities; 12. Sustainable production and consumption; 13. Climate action; 14. Underwater life; 15. Earth life; 16. Peace, justice and strong institutions; 17. Partnerships for goals [26]. The objectives set by the United Nations are valid globally. Following an analysis of national voluntary reports on sustainable development goals, the World Tourism Organization and the United Nations Development Program [29] have highlighted that the closest links to tourism are Objectives 8, 12 and 17. In other words, tourism contributes mainly to sustainable development by: creating new jobs, promoting and supporting sustainable production and consumption through sustainable forms of tourism and by creating partnerships involving a multitude of stakeholders.

Sustainable development indicators are closely linked to sustainable development goals. Thus, in 2017 was established a global framework of targets and indicators for the 17 Sustainable Development Goals for 2030 [27]. The European Commission has also set a number of indicators to monitor European progress on sustainable development, the latest report being that of 2021 [10]. Another set of indicators of sustainable development is developed by the OECD – Organization for Economic Co-operation and Development [24]. It should be noted that indicators of

sustainable development can be used and adapted in studies, depending on the areas of activity and their characteristics, such as agriculture [6, 11], tourism [14, 15], construction [21, 30], public health [7] and other areas of activity. In other news, sustainable development has a very wide applicability and the measurement indicators can be adapted, in the sense that they are not standardization for a particular field of research or for a particular area or region.

The South-Muntenia Development Region is composed of the counties of Argeș, Călărași, Dâmbovița, Giurgiu, Ialomița, Prahova and Teleorman. The predominant form of relief is the plain, but there are also mountains, hills and plateaus. Most of the houses in this region are in rural areas. Between urban and rural areas are differences regarding population, its natural movement, age, education level and living standard [20]. School infrastructure and the health system are poorly developed in rural areas of this region [16]. In the field of tourism, the counties of Argeș, Dâmbovița and Prahova stand out. There are several watercourses in the region, including the Argeș and Ialomița rivers, the Danube river. Of the seven counties, only the counties of Călărași, Giurgiu, Ialomița and Teleorman have the privilege of hosting the waters of the Danube river [23]. Thus, out of the seven counties that make up the South-Muntenia Development Region, only the counties of Călărași, Giurgiu, Ialomița and Teleorman can have the title of Danube counties.

From the point of view of social and technological development, the Danube counties of the South-Muntenia Development Region are among the most disadvantaged counties in Romania, according to an index of social and technological disadvantage, calculated for all counties in the country in 2021 [17]. Thus, the causes that led to the fact that the Danube counties of the South-Muntenia Development Region are among the most socially and technologically disadvantaged counties are: the higher number of the elderly population than the number of young (the highest value of this indicator is found in Teleorman County), the infant mortality rate (the highest value of this indicator is found in Călărași County), the rate of employees in agriculture (the highest values of this indicator are in Teleorman counties), the unemployment rate (the highest values of this indicator are found in Teleorman, Mehedinți, Călărași and Ialomița counties), the area inhabited by one inhabitant (Călărași County has the second lowest value of this indicator), the number of doctors per 1,000 inhabitants (in Călărași, Ialomița and Giurgiu counties there are less than 1.2 doctors per 1,000 inhabitants), the length of the sewerage network (Teleorman, Vrancea and Călărași counties have the lowest values of this indicator), the number of passengers using public transport (the second lowest value of this indicator is found in Teleorman County, and the third lowest value is found in Giurgiu County), research and development expenses (Ialomița County recorded zero expenses), the number of computers in schools – the four Danube counties of the South-Muntenia Development Region are among the first seven counties with the lowest values of this indicator [17]. Behind the numbers is the profile of these counties or the reality within these counties, more precisely the fact that the productivity of an employee in these counties must be extremely high to support the local economy, given that the population is aging. The large number of agricultural workers shows that the Danube counties of the South-Muntenia Development Region have an agrarian character, and employment opportunities are relatively low, which means that development is also somewhat limited to the agricultural sector, and the shortage of jobs generates unemployment and the search for jobs in localities outside the county of residence. The small number of doctors, compared to the number of inhabitants, makes it impossible for many citizens to benefit from specialized medical consultations, which can lead to deteriorating health and exhaustion of medical staff. Poor sewerage infrastructure makes it impossible for citizens to enjoy decent living conditions, and the small number of people using public transport indicates that transport infrastructure is not developed or that citizens prefer to use their own means of transport,

which leads to the consumption of significant quantities of fuels and, implicitly, to the increase of the quantities of noxious substances. The small number of computers in schools limits the ability of students to benefit from current teaching-learning methods and to acquire the digital skills needed for the present era. The previous study [17] focuses on comparing all counties based on the index of social and technological disadvantage. Other studies focus on comparing counties, given their membership in different macro-regions. Thus, according to a study conducted in 2014 [8], the Danube counties of the South-Muntenia Development Region and the counties of Argeș, Dâmbovița, Prahova, Ilfov and Bucharest form one of the macro-regions. Also, the main variables of sustainable development for this macro-region are the number of graduates, the built area and the activity rate [8]. While Teleorman County scores well in terms of the variable entitled built area and a less good score on the variable entitled number of graduates, Călărași, Giurgiu and Ialomița counties score poorly in the case of both variables. Thus, based on the variable entitled built area, Teleorman County becomes a "regional main pole" [8]. The variable entitled the built area, in Teleorman County, satisfies rather the economic component of sustainable development and less the environmental component, since by increasing the areas on which buildings that have different purposes (of living, factories, offices, etc.) are built, the area of green spaces is reduced and the overcrowding of localities can be installed. Moreover, in the case of variables entitled number of graduates and the rate of activity, the favourable case would be that they recorded values as high as possible, because from an economic point of view, the performance of a better trained and prepared person is higher than that of an unprepared person, i.e. the local/national economic level increases to the extent that the number of active persons is higher than the number of inactive people.

Other studies [22] show the comparison of counties based on a connecting element, such as the Danube river. Thus, all the Danube counties were compared regarding the vulnerability to climate change, and by the Cluster method, a cluster was obtained consisting of the four Danube counties of the South-Muntenia Development Region [22]. Following the comparison of the Danube counties regarding the vulnerability to climate change, it was obtained that the exposure of the Danube counties of the South-Muntenia Development Region to hydro-climatic factors is low to average, although Ialomița and Teleorman counties are more prone to flood risk [22]. Also, in the four counties the modern factors of production are used to a small extent, the counties are dependent on agriculture, they have quality soils, but the capacity to adapt to hydro-climatic factors is the lowest, compared to the other Danube counties. At the same time, regarding the infrastructure and the level of literacy, the four Danube counties of the South-Muntenia Development Region have the lowest values compared to the other Danube counties [22].

In terms of sustainable development, some authors [9] consider that among the variables to be analyzed are: the rate of establishment of companies, the amount of drinking water and natural gas distributed to the population/household consumers, the share of street length in urban areas that benefit from sewerage in the total length of city streets, the number of libraries, school dropout, the average number of primary and secondary school students related to a teacher, the costs of measures to reduce unemployment. The sustainable development index, built on the variables mentioned above, showed that the counties of Călărași, Teleorman and Giurgiu are on the last places in terms of sustainable development, at least at the level of the South-Muntenia Development Region, and Ialomița County ranks fourth [9]. In other words, based on the sustainable development index, calculated using the variables entitled, the rate of establishment of companies, the amount of drinking water and natural gas distributed to the population/household consumers, the share of street length in urban areas that benefit from sewerage in the total length of city streets, the number of libraries, school dropout, the average number of primary and

secondary school students related to a teacher, the costs of measures to reduce unemployment, the ranking of the four Danube counties of the South-Muntenia Development Region is as follows: Ialomița, Călărași, Teleorman and Giurgiu [9].

Indicators that measure sustainable development actually measure the goals of sustainable development. Based on 90 indicators it was constructed an index of sustainable development goals, in order to measure the achievement of sustainable development goals at local and regional level [3]. For this index was used a scale from 0 to 10, in which 10 is the highest value of sustainable development. Moreover, the values obtained were concentrated in four intervals. As a result, the index of achieving the objectives of sustainable development at county level took values between 2.49–3.16, 3.17–3.80, 3.81–4.46, 4.47–5.96 [3]. Following the calculations, the four Danube counties of the South-Muntenia Development Region: Călărași, Giurgiu, Ialomița and Teleorman, fall within the smallest range. Also, Teleorman County ranks last nationally [3]. In other words, in the counties in the shortest range, the objectives of sustainable development are the least achieved.

Based on these results, it can be admitted that in the four Danube counties of the South-Muntenia Development Region there are concerns about achieving the objectives of sustainable development, but these concerns are at an early stage, and the hierarchy of counties in terms of sustainable development may differ depending on the variables analyzed.

MATERIALS AND METHODS

This paper is a descriptive study, whose purpose is to compare from a statistical point of view, the Danube counties of the South-Muntenia Development Region, through the perspective of the indicators/variables of sustainable development. As a result, the analyzed counties were Călărași, Giurgiu, Ialomița and Teleorman.

The data series were taken from the database of the National Institute of Statistics, more precisely the TEMPO Online statistical database [18]. The data used were presented in the form of time series. The chosen analysis period was between 2007 and 2020, because 2007 is a reference year for Romania, namely the accession to the European Union, and 2020 is the last year for which data were recorded in the aforementioned database.

Due to the fact that in the mentioned database there are statistics under construction, regarding the objectives of sustainable development, indicators of sustainable development have been selected that correspond to those objectives. Due to the fact that there are no statistical records for all indicators of sustainable development, corresponding to the period and counties analyzed, the following indicators (variables) were treated: Land area with soil erosion improvement and erosion control works – LASEIECW, Area of land with irrigation works – ALIW, The amount of chemical fertilizers used in agriculture – ACFA, The amount of natural fertilizers used in agriculture – ANFA (these indicators are related to Objective 2 of sustainable development, namely Zero Hunger); Number of beds for continuous hospitalization – NBCH (this indicator is related to Objective 3 of sustainable development, namely Health and well-being); Classrooms, School workshops – SW (these indicators are related to Objective 4, namely Quality Education); Population connected to sewage treatment systems – PCSTS (this indicator is related to Objective 6 of sustainable development, namely Drinking water and sanitation); Length of public roads – LPR (this indicator is related to Objective 9, namely Industry, Innovation and Infrastructure); Length of modernized city streets – LMCS (this indicator is related to Objective 11, namely Sustainable Cities and Communities); The rate of natural population growth – RNPG (this indicator is related to Objective 16, namely Peace, Justice and Strong Institutions). Abbreviations of variable names were used to analyze data series using the SPSS program – version 20.

The data analysis was performed by comparing the averages and the average

growth rates of the aforementioned variables, reported at the level of Călărași, Giurgiu, Ialomița and Teleorman counties. Usually, the normal distribution of the series is checked to compare the averages, but due to the fact that the analysis period is short, the normal distribution may be redundant. Thus, the averages were found using the SPSS program, through the Compare Means command [25]. For the calculation of the average growth rate, denoted by *R*, the average dynamic index, denoted by *I*, was used. In this respect, the two formulas used were [2]:
Average dynamic index:

$$(\mathrm{I}) = (n-1)\sqrt{\frac{y_n}{y_1}}$$

where:
n = the total number of values/records
y_n = the last value of the data series
y_1= the first value of the data series.

Average growth rate (R) = $(Ix100)-100$

RESULTS AND DISCUSSIONS

Following the calculation of the averages and average growth rates, it can be admitted that in Teleorman and Călărași counties, the concerns for achieving Objective 2 of sustainable development – Zero Hunger, are stronger than in Giurgiu and Ialomița counties. As a result, the average land area with works to improve soil erosion and combat soil erosion is higher in Teleorman County, compared to Călărași, Giurgiu and Ialomița counties. Also, the average growth rates are constant in the case of Călărași, Giurgiu and Teleorman counties, while in Ialomița county there is an average annual decrease of the average land area with works to improve soil erosion and combat soil erosion with 6.81%. With regard to the average area of land with irrigation works, the situation is similar to that of the average area of land with works to improve soil erosion and combat soil erosion in the case of average growth rates, while in the case of the average, the hierarchy is as follows: Călărași County, Teleorman County, Ialomița County and Giurgiu County. In other words, the average surface of the lands arranged with irrigation works is higher in Călărași county, compared to Teleorman, Ialomița and Giurgiu counties.
Concerns about achieving the goal of Zero Hunger in sustainable conditions could also be highlighted by the amount of chemical and natural fertilizers used in agriculture. Both in the case of chemical fertilizers and in the case of natural fertilizers, the average quantities used in Teleorman County are higher than in the case of Călărași, Ialomița and Giurgiu counties. In the coming years, this may change, as in the case of both categories of fertilizers, the highest growth rates are recorded in Călărași County. The positive aspects of this situation are that the average growth rate of the amount of natural fertilizers is higher than that of chemical fertilizers in Călărași County and that in Teleorman County, the average rate of increase in the amount of chemical fertilizers is negative (decreases in the amount of chemical fertilizers). Thus, considering the Zero Hunger objective and the analyzed variables, Teleorman County ranks first in three of the variables, depending on the averages.
In the case of this paper, the objective Health and well-being is represented by the variable entitled number of beds for continuous hospitalization. And in the case of this variable, Teleorman county ranks first both in the average number of beds for continuous hospitalization and in the average growth rate, compared to Călărași, Giurgiu and Ialomița counties. In other words, this shows a major interest in the permanent increase in the number of beds for continuous hospitalization. It is also noteworthy that, in terms of the average number of beds for continuous hospitalization, Călărași County ranks second, but in terms of growth rate ranks last, compared to Teleorman, Ialomița and Giurgiu counties.
In the field of education, the counties with greater concerns are the counties of Teleorman, Ialomița and Călărași. In this paper, the objective of Quality Education is represented by the variables entitled the number of classrooms and the number of

school workshops. Thus, the highest average number of classrooms is found in Teleorman County, and the highest average number of school workshops and the highest average growth rate of school workshops is found in Ialomița County. This indicates that in the county of Ialomița there are permanent concerns for increasing the number of school workshops. In the case of Teleorman County, the concerns are more intense in terms of maintaining the current average number of classrooms and less intense in terms of its growth, as in Teleorman County, the average growth rate of the number of classrooms is the lowest, compared to the counties of Călărași, Ialomița and Giurgiu. Rather, more intense concerns for the increase in the number of classrooms are found in Călărași County, because the average growth rate of the number of classrooms is the highest, compared to Ialomița, Giurgiu and Teleorman counties.

The fact that natural resources are limited is well known throughout the world. In this sense, the solution could be to reuse and recycle resources. Water can be reused through treatment processes. In the four Danube counties of the South-Muntenia Development Region, the highest average number of people connected to sewage treatment systems is in Teleorman county. However, in Teleorman County there is the lowest average growth rate of the population connected to sewage treatment systems, and the highest average growth rate is in Ialomița County. In fact, Ialomița County ranks second in terms of the average number of people connected to sewage treatment systems, and the last place is occupied by Giurgiu County.

Regarding the concerns for public roads, Teleorman and Ialomița counties hold the leading places, compared to Călărași and Giurgiu counties. As a result, the highest average length of public roads is in Teleorman County, and the highest average length of modernized city streets is in Ialomița County. It is noteworthy that Ialomița County ranks last in terms of average length of public roads and first place in the average rate of increase in the length of modernized city streets. Also, the lowest average growth rate of the length of modernized city streets is held by Teleorman County. The capitalization of the various resources and the development of economic activities depend on the transport infrastructure. More than that, transport infrastructure is essential for development, which means that modernized public roads and city streets must be a top local priority.

The responsibility of the present generation is not only to ensure that future generations have the opportunity to benefit from the same resources and to meet their own needs, but also to ensure the existence of future generations.

Table 1. Average dynamics indices (I) and Average growth rates (R) of the sustainability indicators

Variables	Călărași		Giurgiu		Ialomița		Teleorman	
	I	R (%)	I	R (%)	I	R (%)	I	R (%)
LASEIECW	1	0	1	0	0.9319	-6.81	1	0
ALIW	0.9992	-0.08	0.9992	-0.08	0.9984	-0.16	0.9992	-0.08
ACFA	1.0203	2.03	1.0007	0.7	1.0108	1.08	0.9984	-0.16
ANFA	1.1973	19.73	0.8931	-10.69	0	0	1.0239	2.39
NBCH	0.9884	-1.16	0.9952	-0.48	0.9976	-0.24	0.9992	-0.08
Classrooms	1.0160	1.6	1.0114	1.14	1.0141	1.41	1.0006	0.06
SW	0.9602	-3.98	0.9650	-3.5	0.9839	-1.61	0.9537	-4.63
PCSTS	1.0101	1.01	1.0273	2.73	1.0322	3.22	1.0052	0.52
LPR	0.9992	-0.08	1.0022	0.22	1.0003	0.03	1.0015	0.15
LMCS	1.0022	0.22	1.0387	3.87	1.0037	0.37	0.9976	-0.24
RNPG	1.0922	9.22	1.0322	3.22	1.1566	15.66	1.0245	2.45

Source: Own calculation on the basis of data from Tempo on line data base 2007-2020, NIS [18].

As a result, the non-existence of the beneficiary of sustainable development shows that the efforts made to ensure sustainability are useless. Thus, natural growth is a particularly important variable in the context of sustainable development. Unfortunately, in all four Danube counties of the South-Muntenia Development Region, the natural growth rate is negative. There is a contrast with this variable, more precisely, the fact that

the lowest average negative rate of natural increase is found in Ialomița County and the highest average rate of increase of the negative rate of natural growth is also found in Ialomița County, and the highest average negative rate of natural growth is meets in Teleorman county and the lowest average growth rate of natural growth is also found in Teleorman county. It is also known that for the continuity of generations, the natural growth must be at least zero, and in the most favorable case to be positive, and at the level of the South-Muntenia Development Region, more than half of the variation of the natural growth is influenced by the risk of poverty and social exclusion [20].

Considering the analyzed variables (11 variables) and the two indicators (average and average growth rate), Teleorman County has the highest probabilistic chances to hold the first place based on averages, compared to Ialomița, Călărași and Giurgiu.

Table 2. Averages levels for the main chosen indicators reflecting sustainable development

Variables	MU	Călărași	Giurgiu	Ialomița	Teleorman
LASEIECW	ha	2,827	2,637	453.79	6,382
ALIW	ha	360,548.71	169,754.21	209,361.21	237,879.64
ACFA	tons	265,971.93	138,221.57	261,998.79	393,957
ANFA	tons	3,748.71	2,609.07	321.36	5,054.29
NBCH	beds	1,202.93	823.21	857.43	1,925.21
Classrooms	number	1,537.57	1,325.79	1,526.71	1,879.21
SW	number	58.50	28.36	61.07	45.21
PCSTS	persons	72,768.57	59,481	72,776.50	84,989.64
LPR	km	1,337.50	1,167	1,163.50	1,544.21
LMCS	km	333.57	216.93	492.43	367.86
RNPG	%	-4.27	-6.65	-3.08	-9.43

Source: Own calculation on the basis of data from Tempo on line data base 2007-2020, NIS [18].

Thus, the ranking of the four counties according to averages, in the period 2007-2020, is as follows: Teleorman, Ialomița, Călărași and Giurgiu. From a probabilistic point of view, depending on the average growth rates, Călărași County has the highest chances to hold the first place. Thus, the ranking of the four counties according to the average growth rates, in the period 2007-2020, is as follows: Călărași, Teleorman, and Giurgiu and Ialomița occupy the third place.

CONCLUSIONS

Given that the indicators of sustainable development have a very wide applicability, the indicators analyzed in this study came from several fields, such as agriculture, health, education, infrastructure and demography. Following the calculation of the average growth rate, negative growth rates (decreases) were obtained at the level of all four Danube counties of the South-Muntenia Development Region, more precisely in the case of the variables entitled the surface of the lands arranged with irrigation works, the number of beds for continuous hospitalization, the number of school workshops, the natural growth. This highlights some of the issues that exist in the four counties that need to be addressed through quick and effective measures. These issues include the productivity of agricultural land, the agglomeration of the existing hospital units, the decrease of the resident population knowledgeable by trades, the aging of the population. Also, in general, the average growth rates of the analyzed variables are very low. The fact that some average growth rates are negative and others are very low are consistent with the results of other studies [3, 8] which showed that the Danube counties of the South Development Region Muntenia ranks last in terms of sustainable development. Thus, the ranking of the four counties based on the averages and the average growth rates of the analyzed variables denotes the way in which these variables of sustainable development were managed locally in the period 2007-2020.

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