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Changes in the Regional Development of Romania (2000–2019), Measured with a Multidimensional PEESH Index

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Abstract: Measuring development is a long-standing challenge in the social sciences. Although multidimensional and multivariate approaches to development present several conceptual and/or methodological problems, some studies have pointed out that the unidimensional view of economic progress has failed on a large scale. The main purpose of our article is to elaborate a multidimensional composite index called the PEESH (population, economic, education, social, and health) Development Index, for measuring socio-economic development in Romania with a territorial profile. The PEESH DI index presented in this paper contains five sub-dimensions: population dynamics, economy and labor force, education, social conditions and housing, and health and life conditions, including 22 core indicators. The components of the resulting multidimensional index were weighted using factor analysis and then aggregated transversely into a composite index. Our results show that the differentiated increase of the indicators composing the PEESH DI resulted in a certain restructuring of the development hierarchy of Romania's counties between 2000 and 2019. These empirical facts strengthen the idea that development cannot be reduced to only economic growth, it comprises an important social dimension as well. Finally, we have strongly argued in this paper that it is time to switch from a single-sided and reductionist perspective of the measurement of regional disparities, within the framework of the Cohesion Policy in the European Union, to a wider and multidimensional perspective, reflecting the complex character of the development process.

Keywords: development index; multidimensional indexes; factor analysis; regional development; Romania

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1. Introduction

Measuring development is a long-standing challenge in the social sciences. The very concept of development has undergone substantial changes over time, not to mention the indicators used or the methodology applied in the case of synthetic indicators. However, GDP per capita still plays an unquestionably significant role in measuring development; but its limitations are also well documented [1,2].

The measurement of development using composite indices has developed much since the work of Adelman and Morris [3], the General Indexes of Development [4,5], and Morris' Physical Quality of Life Index (PQLI) [6]. Although multidimensional and multivariate approaches to development present several conceptual and/or methodological problems, some studies with cross-border economic interactions and international comparison approaches have pointed out that the unidimensional view of economic progress has failed on a large scale [7–9].

The study of socio-economic development in Central and Eastern European countries has come into the scientific spotlight, especially following EU integration in the 2000s. Romania, along with Bulgaria, had a particular political and socio-economic situation,

which resulted in the postponement of the accession request in 2004. Eventually, accession occurred in 2007, with some safeguard clauses. Therefore, the development of the country and, more specifically, the evolution of Romania's development territorial profile, starting in the 2000s, is of particular interest, both from a methodological and an empirical point of view. The country registered intense economic growth, and a consequent catching up with the EU average development level, from 23% in 2000 to 72% in 2020, measured in GDP/capita (PPP), where EU-27 = 100 [10]. The inverse of this positive development is the intense increase of sub-national disparities, with socio-economic development being polarized by Bucharest, the capital city, and a few regional urban core areas (Timis, Cluj, Ilfov, Sibiu), and with Romania being one of the most unequally developed countries in the EU [11]. Economic disparities are strongly connected with other social dimensions, such as life expectancy at birth, employment, and schooling etc. All these suggest that not only sub-national economic disparities remain significant, but that local human development disparities also show a degree of high variation by region [12]. In the case of urban agglomerations, the proximity to other cities has a great influence on local human development, while for rural areas the share of commuting employees shows positive effects [13]. There is a lack of knowledge regarding the factors determining this development pattern, and there is also a lack of proper measurement instruments that would enable evaluation of this complex picture. Against this background, the objectives of this research can be formulated as follows:

(1) To construct a multidimensional index for measuring socio-economic development in Romania with a territorial profile, which is complex enough not to depend on the variation of one or more simple development indicators. In addition, this multidimensional index should integrate the previous national and international experiences with multidimensional indices for similar purposes. Thus, this index should be relevant and valid for a longer period of time.
(2) To study the evolution of NUTS3 territorial differences in Romania, in the development dimension, with special reference to the changes that have occurred over time, between the years 2000 and 2019.
(3) To identify the factors that have led to the more accelerated development of some territorial areas compared to others.

We also expect that, through the results of the research published in this article, we can contribute to the reformulation of the measurement of regional development, both in Romania and at EU level. We believe that the methodology of measuring regional development in the European Union influences the spatial patterns of disparities. Thus, the recommendation to use a more complex, multidimensional index to measure regional development at NUTS2 and NUTS3 level would lead to more appropriate results than a unidimensional measurement.

2. Theoretical Considerations

2.1. Literature Review and Conceptualization

In this part of the paper, we will first consider the conceptualization of the notion of socio-economic development, then we will review the recent literature on the main contributions to the use of multidimensional indicators in socio-economic development analysis.

Amartya Sen [14] made a great contribution to the conceptualization of human development. In his definition, development is the totality of changes encompassing the entire social system (made up of basic needs, and the needs of social groups and individuals) which, on a material and spiritual level, represent a move towards more satisfying living conditions [14]. Sen, in an earlier work, identified five forms of instrumental freedom, which can be connected to economic development achievements: political freedom, economic facilities, social opportunities, transparency, and security [15]. There is a considerable literature on the critical discussion of Sen's approach, in a large part focusing on advancing and improving his framework [16–21].

The critics of Sen's work focused on two major aspects: his lack of emphasis upon transformative political struggle to enable development and freedom for the post-colonial subject; and the fact that he neglected the structural constraints of the world market and capitalist social relation. Neomarxist criticism pointed out that Sen shifted away from material definitions of human development to more individual, spiritual, or political factors of society [21] (pp. 6–7).

There have been several attempts to measure social and economic development in a territorial profile by compressing the indicators of the different components into a single indicator. Some international institutions (World Bank, United Nations) for decades have shown an increased interest for multidimensional measures of socio-economic phenomena [22]. The most successful of these was the development of the Human Development Index (HDI) by the United Nations Development Program [23]. The new HDI formula has also received some harsh criticism, because its method of aggregation does not reflect the inequality among individuals from a certain population. In addition, the HDI does not reflect cumulative advantage and disadvantage across dimensions [24,25] (p. 458).

A recent methodological advancement was contributed by Yang [25], who developed a Multidimensional Index using the Preference Index. He argued that the HDI and similar indices can be overcome by adopting the following approaches: (1) altering the sequencing of the aggregation procedure, and (2) adopting a preference-driven weighting scheme. He concluded that income was less important for the elderly and individuals with a lower level of education, while young individuals were more concerned about changes in health conditions [25] (p. 473).

In order to conceptualize and operationalize the multidimensionality of social and economic development, we reviewed methodologies on the territorial study of development in different countries. Without the intention of an exhaustive presentation, we analyzed the methodology and the dimensions applied by some works representative of this topic. The Index of Multiple Deprivation 2007 was elaborated by a team from the University of Oxford [26,27]. Theoretically, this methodology starts from Townsend's idea of deprivation: according to it, deprivation cannot be reduced only to material situation; therefore, a multidimensional approach is very important in the construction of such measurements of poverty, deprivation, or under-development [28] (p. 131).

In more recent articles, we can observe a shift towards indices that take a multidisciplinary approach. For example, Lin [29], in a critical analysis about the older methodologies of measuring economic development, such as in Kuznets [30] and Chenery [31], pointed out the role of classical indicators in measuring new technological and economic developments. In his view, material and human capital, and technological innovations make an important contribution in human development. The idea of *new structural economics* refers to the fact that a country that follows a comparative advantage growth strategy can achieve a faster development, a lower economic volatility, and less income inequality than other countries [29] (p. 306). Ganegodage et al. [32] recently revised the pioneering approach of Adelman and Morris (1967), regarding a multidimensional measure of human development. They pointed out that the notion of development is not only multidimensional, but also changes with the stage of development.

Previous methods and techniques for constructing composite indices of development have been applied in a variety of analyses, which have offered important perspectives on the nature of regional development, starting specifically from the following dimensions: education and knowledge, quality of life, and the health status of the population [33].

Several researchers have pointed out that there are difficulties in some aspects of developing an appropriate tool for assessing economic and social development from a regional perspective. In a multidimensional index, a large volume of information can be integrated by using different individual indicators, but it can also have the capacity to retain the value of each of these included measures, to ultimately provide a more multidimensional view in their application [9,34] (p. 167). The authors of [9] (p. 267) also point out that the use of subjective weighting procedures in the construction of these

indices will result in inadequate policy applications, without yielding the desired results. The likelihood of obtaining erroneous and biased results will increase, which may result in inaccurate conclusions.

2.2. Romanian Regional Development: Previous Methods and Analyses

The socio-economic development in Romania at regional scale was studied immediately after the collapse of communism by D. Sandu, using data from the 1992 census, and several other macrosocial indicators collected by the Romanian National Institute of Statistics (NIS). In his first book dedicated to this topic, Sandu [35] conceptualized human capital (educational, professional, and health). Based on a hierarchical cluster analysis, it defined regional clusters of counties, called "cultural areas", which have become a benchmark in the regional analysis of Romania. Sandu delimited 18 cultural areas, five of which are in historic Transylvania, with three each in Wallachia and Moldova. Considering Transylvania (the western and central part of Romania), Sandu noted that it is not homogeneous in development, and the differences between counties are extremely large [35] (p. 154).

When comparing cultural areas with statistically designed regions, established by the Romanian Government (NUTS2), in line with Sandu, we agree that the territorial configuration of the distribution of human capital is closer to that of the development sub-regions as defined in The Green Paper, because they show more relevant differences in socio-economic development, and are also closer to the outline of agro-regions than to the configuration of historical regions [35].

Another social development index for measuring multidimensional socio-economic disparities at local level has been more recently developed by Sandu [36], called the Local Human Development Index (LHDI). The LHDI includes four main dimensions: human capital (education: general school graduation of the local population), health capital (life expectancy at birth), vitality capital (average age of the population over 14), and material capital. The latter includes three housing indicators, an indicator expressing access to natural gas at local level and the number of private cars per thousand inhabitants. These three indicators were combined into a composite index, using a factor analysis. The index also takes into account the demographic size of the settlement, as larger settlements in terms of population generally have a better development potential, for structural reasons. The LHDI index developed in this way has several shortcomings: on the one hand it does not measure deprivation at the local level, because it uses the same system of indicators for towns and villages, and it is less sensitive to differences between rural settlements (Sandu, 2011). This Local Human Development Index (LHDI) has been adapted by the World Bank in a modified version [37]. The first three dimensions were kept unchanged, but in the case of vitality capital, the minimum age was raised to 18 years; and in housing, only one of the three indicators, the average usable floor area of dwellings, was included in the final World Bank index [37].

Additionally, in Romania, a World Bank expert group conducted another analysis to study social development, and poverty and exclusion [38]. The index constructed by them has three dimensions: human capital (general education level), the local labor force situation (share of unemployed population aged 15–64), and housing conditions based on three indicators (share of dwellings without electricity, without water connection, and crowded according to Eurostat). The indicators come from 2011 census data, which were processed in detail for the census wards in the settlement, which in Romanian census practice contains about 200 people on average [38] (p. 12). Another multidimensional index for measuring local, urban socio-economic development in Romania, below 20,000 inhabitants, and this time only for the urban level, has recently been developed and published by Stoica et al. [39], called the Index of Urban Strength. This index concentrates 22 relevant indicators of local urban development, which were grouped into three dimensions as sub-indexes (demographic, socio-economic, infrastructure and land use) using the PCA method. They then calculated the index that allows the assignment of different levels of urban strength (very low, low, medium, and high).

Among recent articles investigating Romania's regional development, Benedek and Moldovan [40], and Benedek et al. [41], provided a multidimensional approach to regional polarization and unequal development, emphasizing the eminent role of large urban growth poles. Török [42] analyzed the regional disparities in human and economic development of Romania, pointing out notable territorial differences and disparities in the socio-economic development between the Romanian counties, and the remarkable stability of historically established core–periphery structures (see also [43]).

2.3. Why a New Multidimensional Index for Measuring Socio-Economic Development from a Regional Perspective?

Starting from Sen's concept of socio-economic development achievements [15], social opportunities can be linked to the educational situation (chances of inclusion in education and graduation rates, level of educational attainment of the population), but it also includes the dynamics of the population. According to the concept of social security, we have included both social housing conditions and medical/living conditions, i.e., everything that relates to the "entire social system" in Sen's definition [14,15]. Another two forms of instrumental freedom, transparency and political freedom, can be considered as constants at a national level, because of the unitary constitutional and legal system. Thus, for a study that concerns the analysis of sub-national differences, these aspects were not included as variables.

The Romanian composite indices, developed previously, in particular by Sandu [35,36] and the World Bank team of Teșliuc et al. [38], did not cover the need to develop a multidimensional composite index for regional development; because Sandu's index from 1999 [35] had a composition of indicators, some of them are not relevant for the years 2010–2020, and the 2011 LHDI and World Bank index [36,38] was constructed to measure development at the local level (towns, villages), and not for regional territorial units at NUTS2 or NUTS3 level.

Based on previous research findings, it was found that the main dimensions of a multidimensional composite index for measuring regional development should include the knowledge accumulation, quality of life, and underlying health levels of societies [33] (p. 4). Thus, also taking into account the dimensions used and presented previously by Ganegodage et al. [32], we consider that the five dimensions defined by us are relevant and appropriate for a regional analysis of the development in a Central and Eastern European country, and the selected indicators are also valid for a longer period of time. However, the specific selection of indicators for each dimension (sub-index) was established with multivariate statistical methods from a larger variable list, which are available in a territorial range for a longer period of time. Thus, we have not included indicators related to digital literacy and internet use, which are very relevant for the last decade, but less applicable for the 1990's or the first years after 2000.

A second important argument is related to the scope of developing multidimensional indicators at various scales, from international to sub-national. In this respect, while for composite indices for studying development differences between countries it is relevant to use dimensions that operationalize political freedom (or the phenomenon of corruption), these dimensions can be considered a constant (and not variable) factor at national level in a given country. There may also be other indicators that do not differ regionally within a country, being nationally regulated (e.g., minimum income, level of social benefits, or the number of compulsory classes in education, etc.); therefore, relevant indices at sub-national level must be different from those that are included at international level. In addition, these regional indices must be partially different in various parts of the world, depending on the level of socio-economic development of the countries concerned (the illiteracy rate or the prevalence of certain diseases are irrelevant as differentiating indicators in other countries).

3. Methodology

For the method of computing and weighting of the dimensions of the new composite index, we tried to find a methodological way to exclude or minimalize any subjectivism mentioned in the presented papers [44] (p. 207), [9] (p. 267).

Research questions. Starting from the dimensions used by Ganegodage et al. [32], and from the methodological and content considerations on cultural areas formulated by Sandu [35,36], and also considering Jongh and Meyer's [9] caution and the advice of Greco et al. [45] on subjective weighting (he warns us to be cautious when constructing-combining and using multidimensional composite indices, because of the subjective weightings or other subjectivities included in the methodology), as well as Periši and Wagner's [44] (p. 207) recent findings on the advantages of multidimensional methods, this research tries to answer the following questions:

(1) How and by which dimensions and indicators can we construct a multidimensional index for studying socio-economic development and territorial differences in Romania for the years 2000 and 2019, given the criticisms of the HDI and other reflections in the recent literature on multidimensional composite indexes?
(2) How have Romanian counties differentiated on the basis of a multidimensional development index and by its dimensions, and what changes can be identified in the social and economic field a decade after EU accession, compared to the pre-accession period (2000–2019)?
(3) Which of the development factors in the period under analysis (2000–2019) have contributed most to the social and economic development in Romanian counties, and how can the differences between counties be delimited from the analysis in this time perspective (2000–2019)?

In this part of the paper, we present a type of composite multidimensional index called the PEESH Development Index. It has been constructed and calculated in a transversal manner (for the years 2000 and 2019). We will briefly describe the statistical methods by which we analyzed the results obtained on the basis of the above-mentioned new index. After that, we present the principles of the bivariate and multivariate methods that we applied to calculate the relationship between the new PEESH Development Index and the sub-indices by dimensions, with respect to the growth values of the basic indicators, in order to answer the main research questions of this paper.

3.1. Data Sources and Analysis

The data source used is represented by macrostatistical indicators included in a database constructed and calculated by the authors, at a county level (NUTS3, N = 41 × 2, from 2000 and 2019) and locality level (NUTS4, N = 3181). The primary unprocessed data originated from two sources: the Romanian National Institute of Statistics, online database: TEMPO Online (for the years 2000 and 2019, for some indicators the latest data was available only for 2018) [46], and the Romanian Population and Housing Censuses from 2002 and 2011 (ratio of population with tertiary education, housing conditions, utilities data) [47]. In total, we started from a set of 32 indicators, of which 22 indicators were selected and included in the constructed composite index. They should satisfy all the requirements of consistency and communality, as will be shown below. The list of variables, the measurement units, and the basic statistical characteristics can be seen in Table 1.

The following indicators, although tested in the first phase of the research, were not selected for the composite index, mainly due to insignificant correlations and communalities: density of population, urban population rate, infant mortality rate, commuting population rate, accessibility to the capital city (in km), causes of death (tumors/100,000 pers, cardio-vascular/100,000 pers), dropout rate (lower secondary), share of employed in ICT/total employment, and number of companies/population.

Table 1. Descriptive statistics of the variables included in the analysis, grouped into the main dimensions of development, 2019 *.

Sub-Index Name	Variable Name (Unit)	Abbreviations	Mean	SD	Min	Max
Population dynamics	Rate of natural increase (‰)	Nat. increase	−3.12	2.51	−9.40	2.30
	Net migration rate (‰)	Net migration	0.32	6.65	−6.93	30.25
	Ageing index (%)	Ageing	112.20	21.38	75.38	177.01
	Temporary emigration rate (‰)	Temp. emigration	20.23	12.62	2.63	62.34
Economy and labor market	GDP per capita *	GDP/capita	32,676.3	14,825.2	15,927.9	99,216.3
	Net employment ratio—20–64 years (%)	Employment	67.13	9.13	47.80	97.70
	People employed in industry (%)	Ind. employment	24.13	5.99	11.21	36.59
	People employed in services (%)	Serv. employment	49.93	9.08	36.10	87.85
	Unemployment rate (%)	Unemployment	3.42	1.72	0.40	7.50
Education	Tertiary education rate (%)	Tert. education	12.18	4.82	6.80	33.66
	Gross school enrolment rate (%)	School enrolment	82.58	7.06	67.10	99.60
	Graduation rate of secondary education (%)	Sec. graduation	68.30	7.52	39.80	79.80
Social conditions and housing	Average floor area per person	Floor	19.34	2.33	14.32	28.85
	Share of households with access to piped water (%)	Water	63.13	15.55	36.80	96.80
	Share of households with access to sewage networks (%) **	Sewage	61.43	15.56	30.50	96.60
	Share of households with a kitchen area (%) **	Kitchen	83.26	7.05	66.80	96.20
	Share of households with a fixed bath (%) **	Bath	57.99	15.19	29.80	95.20
	Share of households with a central heating system (%) **	Heating	38.76	14.74	16.30	91.30
Health and life	Share of physicians per 1000 persons (‰)	Physicians	1.40	1.00	0.50	4.58
	Medical sanitary staff per 1000 persons (‰)	Sanitations	3.94	1.01	1.64	7.25
	Share of hospital beds per 1000 persons (‰)	Hosp. beds	5.18	1.48	2.91	9.54
	Life expectancy at birth	Life expect.	75.71	1.30	73.61	80.83

* The last available data was from the year 2018. ** Data from Romanian Census 2011. Source: INS, own calculations. (N = 82).

3.2. Construction of the Population, Economic, Education, Social, and Health Development Index (PEESH DI)

The proposed multidimensional index is composed of five development dimensions. Each dimension includes various socio-economic indicators that have been used successfully in previous research and that adequately measure one aspect of the regional development process in Romania.

In addition to the considerations described in the theoretical section, in the first stage of the research, a factor analysis (principal axis factoring method) was used to explore and identify significant factors in the data for a large number of indicators that are likely to be highly correlated. Finally, in the second stage, these were used to construct a set of five sub-indices, representing the five main dimensions of development defined in this paper.

Using a factor analysis, we explored whether the variables presented in the previous section could coagulate into coherent dimensions of socio-economic development. Following this exploratory factor analysis, we obtained a valid factor structure using the vast majority of the presented development indicators. The KMO registered a value of 0.69 in the initial model; then, excluding the variable number of firms/population, the KMO value increased to 0.72 (see Appendix A Table A1). Thus, through factor analysis, we identified six factors that have higher eigenvalues and explaining 79.3% of the total variance (initial information), representing a very consistent model. These factors are the following (in order of variance explained): 1. economic and infrastructural development, 2. housing and well-being, 3. demographic dynamics, 4. accessibility–(territorial) mobility

5. non-agricultural population, and 6. health (long life). The first factor had the highest variance, explaining 31.9% of the total variance, followed by factor 2 with 15.7%, factor 3 with 10.7%, factor 4 with 10.1%, factor 5 with 6.4%, and with factor 6 explaining 4.5% of the total variance (see Appendix A Table A1).

In order to establish the main development dimensions forming the basis for the calculation of the PEESH DI, two methodological approaches were used. One of them was theoretical-deductive, where we were inspired by Sen's [14] definition and other contributions on the construction of multidimensional indexes [32,33,35,45]. The alignment of the theoretical–deductive approach with the empirical–inductive one—based on confirmatory factor analysis, by which we tested the method of grouping the dimensions in the mass of variables included—led us to the decision to compute the "economy" and "labor market" sub-dimensions together, calculating a single sub-index. The need to introduce the variables included in the "social conditions of housing" dimension arose from the infrastructural characteristics of Romania, where access to major household utilities and services decisively determines the social conditions in which the housing sector operates [48,49]. The rest of the dimensions of "population", "education", and "health and living conditions" were already well established in the literature (Table 2).

Accordingly, the tested factor structure mentioned above, combined with theoretical and empirical considerations related to the development dimensions, guided us to define the following dimensions, each comprising a sub-index: "population dynamics", "economy and labor market", "education development", "social conditions of housing", and "health situation".

Table 2. Results of the principal component analysis for each sub-index (factor scores, KMO, and total variance explained), 2000 and 2019.

Sub-Index (by PCA)	Component Indicators	Component Scores	Component Scores
		2000	2019
Population dynamics	Natural increase	0.841	0.897
	Net migration	−0.633	0.769
	Ageing	−0.919	−0.888
	Temporary emigration	0.734	0.495
	KMO	0.66	0.70
	Total variance explained	62.2%	60.7%
Economy and labor market	GDP/capita	0.910	0.925
	Net employment	0.271	0.771
	Industrial employment	0.891	0.886
	Services employment	0.945	0.936
	Unemployment	−0.345	−0.493
	KMO	0.65	0.60
	Total variance explained	55.0%	57.0%
Education	Tertiary education	0.792	0.821
	School enrolment	0.908	0.821
	Secondary graduation	0.928	0.610
	KMO	0.67	0.61
	Total variance explained	77.0%	57%

Table 2. *Cont.*

Sub-Index (by PCA)	Component Indicators	Component Scores 2000	Component Scores 2019
Social conditions and housing	Floor area/person	0.408	0.537
	Piped water	0.978	0.979
	Sewage networks	0.981	0.978
	Kitchen area	0.591	0.842
	Fixed bath	0.978	0.985
	Central heating system	0.869	0.895
	KMO	0.75	0.86
	Total variance explained	69.1%	78.0%
Health and life	Physicians	0.923	0.895
	Medical sanitary staff	0.891	0.874
	Hospital beds	0.922	0.947
	Life expectancy	0.322	0.592
	KMO	0.75	0.74
	Total variance explained	64.9%	70.2%

Source: own calculations. (N = 82).

In the next step, we constructed five separate sub-indexes, where each indicator was transformed into Z scores and computed with the principal component analysis (PCA) method in the corresponding development dimensions. The composition of these sub-indexes was slightly modified compared to the content of the factors in the previous exploratory analysis, because each sub-index had to have a separate validity (KMO over 0.6, communalities over 0.25, and total variance explaining over 50%). One factor (the "non-agricultural population") had only one variable, with a negative score; therefore it was included (indirectly) in the sub-index of the "economy and labor force" dimension. The computed sub-indexes, based on the presented indicators, registered the following factor scores (Table 2).

We were also able to construct indices with the same compositeness using development dimensions for both time horizons (2000 and 2019), with one caveat. In the "education" dimension the variable high school graduation rate in 2000 was replaced by the variable baccalaureate pass rate in 2019, given that, in 2000, high school participation was lower, with higher variation by county, but the success rate among graduates was high across the board; and by the year 2019, high school education had massified more intensively, and the success rate of baccalaureate graduates had declined, with a higher variation by county. Thus these two variables showed essentially the same phenomenon: the proportion of those who successfully completed their secondary education.

Based on the component analyses (PCA), the sub-indexes were transposed into Z scores and composed by the following formulas (2019 data):

$$Population\ Dynamics\ subindex = Natural\ increase * 0.897 = Net\ migration * 0.769 = Ageing * (-0.888) + Temporary\ emigration * 0.495 \quad (1)$$

$$Economy\ and\ Labour\ Market\ subindex = \frac{GDP}{capita} * 0.925 + Net\ employment * 0.771 + Industrial\ employment * 0.886 + Services\ employemnt * 0.936 + Unemployment * (-0.493) \quad (2)$$

$$Education\ subindex = Tertiary\ education * 0.821 + School\ enrolment * 0.821 + Secondary\ graduation * 0.610 \quad (3)$$

$$Social\ Conditions\ and\ Housing\ subindex = Floor\frac{area}{person} * 0.537 + Piped\ water * 0.979 + Sewage\ network * 0.978 + Kitchen\ area * 0.842 + Fixed\ bath * 0.985 + Central\ heating\ system * 0.895 \quad (4)$$

$$Health\ and\ Life\ subindex = Physiscians * 0.895 + Medical\ sanitary\ staff * 0.874 + Hospital\ beds * 0.947 + Life\ expectancy\ at\ birth * 0.592 \quad (5)$$

Following the constitution of these sub-indexes as the main dimensions of development, the final multidimensional development index was computed using linear weighting. Subsequently to this, each dimension (sub-index) was weighted and then aggregated into the final composite index for the years 2000 and 2019. The weights were determined using a factor analysis test (principal axis factoring method).

To determine the weights for each dimension, we used the PCA method and the scores from the component-matrix employed in the construction of the development index, which was labelled after the names of the dimensions in the PEESH Development Index. Thus, the weights were slightly different for the two years, and we did not force the data to use the same weights in both time horizons (2000 and 2019), in order to avoid a subjective approach, as mentioned above (see also Jongh and Meyer's work [9]). Based on the factor matrix values (scores), we transformed them into percentages, so that we could exclude any subjectivity and to obtain a comprehensive measurement. The computing formulas were as follows:

$$INDEX_{PEESH_{2000}} = FAC1_{Population2000} * 0.04 + FAC1_{Educ2000} * 0.23 + FAC1_{Econom2000} * 0.25 + FAC1_{SocialHousing2000} * 0.25 + FAC1_{Health2000} * 0.23 \quad (6)$$

$$INDEX_{PEESH_{2019}} = FAC2_{Population2019} * 0.1 + FAC2_{Educ2019} * 0.22 + FAC21_{Econom2019} * 0.24 + FAC2_{Social_Housing2019} * 0.23 + FAC2_{Health2019} * 0.21 \quad (7)$$

3.3. Multivariate Analysis of the Development Patterns in Romania (2000–2019)

In order to determine the factors that contributed significantly to the socio-economic development in Romania (2000–2019), we calculated the differences between the basic development indicators and the components of the dimensions, which are generally expressed in rates of 100 or 1000 units, calculated in this way: (R2019–R2000)/R2000). Thus, the independent variables were growth indicators that expressed the percentage change in the value of an indicator between the two points in time (2000 and 2019) and calculated for each territorial unit. In this way, these independent variables were not identical to the PEESH DI component indicators, but were calculated only from their underlying data, but longitudinally, whereas the PEESH DI index is a transversal indicator.

In addition, we analyzed the correlation coefficients between the PEESH DI and the component variables of the dimensions. Following that, we constructed a linear regression model, where the dependent variable was the PEESH_2019 DI, and the independent variables were the differences between the values of the core indicators between the years 2000 and 2019.

4. Results

4.1. The State of Regional Development in Romania, Based on the PEESH DI and Its Sub-Indices

In order to determine the development path of the Romanian counties, using the PEESH DI, we analyzed and compared the cross-sectional data for the two selected years: 2000 and 2019.

Analyzing the standardized values of the PEESH DI, we found a high stability in the distribution by county (NUTS3 units) from 2000 to 2019 (see Appendix A Tables A2 and A3). Consistently, Bucharest, the capital city, led the list for both dates, followed by Cluj, Timis, and Brasov counties, without any essential variation at the top and bottom of the hierarchy of counties in these years. There were only small variations, for example Iași and Mureș counties improved their position in this period of almost two decades. By contrast, larger

variations could be observed for the five dimensions of the PEESH DI, measured with specific sub-indexes (see Appendix A Tables A2 and A3).

The Population Dynamics sub-index (PD SI) shows the vitality and mobility of the population, where large and relevant changes are observed. The sub-index reflects the rates of natural increase, migratory increase, and population ageing. Between 2000 and 2019 there were important changes in the demographic events in Romania, but especially in their territorial distribution. This sub-index had the weakest correlation with all the other dimensions, and thus had a lower weight in the PEESH DI. We observed a totally different hierarchical distribution of counties, both in relation to the PEESH DI and between the two time horizons (2000 and 2019). Counties with high PD SI values on other dimensions, in the top ten positions, had below average values for the population dynamics sub-index in year 2000: these were Bucharest, Cluj, Timis, Bihor, and Arad. Otherwise, we can observe that there are some counties with a high population vitality, such as Iasi and Maramures, which can be explained by the relatively higher fertility in the north of the country, to which was added the contribution of other indicators, such as migration. The situation changed in 2019: Bucharest, Cluj, Timis, Brasov, and Sibiu repositioned themselves, with increased, above-average sub-index values. Some counties with lower PEESH DI scores even had substantial increases in PD SI: Iași, Ilfov, and Suceava became leaders in population dynamics. Several counties in the historical regions of Moldova and southern Muntenia had minimal, below-average values. In fact, during this period, due to the government demographic and family policy that, though indirectly, helped the employed population more, fertility increased in the highly urbanized counties with a higher employment rate [50,51].

The Economy and Labor Market Conditions sub-index (ELMC SI) reflects the territorial economic situation, both in terms of GDP/capita and the share of the population employed by the main sectors, such as industry, services, or agriculture. Another side of this dimension is the labor market situation, through the employment rate of the active aged population (16–64 years) and the unemployment rate. It was expected that this sub-index would be strongly correlated with both the PEESH DI and the Social Conditions and Housing sub-index. There was a large gap in economic development between Bucharest and the rest of the country, with the sub-index being calculated in z-scores, and with Bucharest having values of 5; while the rest of the counties did not exceed values of 1 in the year 2000. For the year 2019, we can see that counties that can be considered regional poles of development, such as Cluj, Timiș, Brașov, Constanța, and Sibiu, had a substantial increase in the economy and labor market conditions sub-index, and some other counties such as Arad, Alba, and Ilfov were better positioned than in 2000, being above average.

The Education sub-index **(ED SI)** is another component of human development, composed by the share of the population with higher education, the gross educational enrolment ratio, and the average promotion rate in secondary school (2000)/baccalaureate (2019).

The correlation of the ED SI with the PEESH DI was high, for data for the year 2000 $r = 0.83$ and for year 2019 $r = 0.87$, while the hierarchical distribution of the counties also corresponded quite closely with the ELMC SI. The counties with high values on the composite PEESH DI also had high values on the E SI (Bucharest, Cluj, Timisoara, Brasov, Constanta, Bihor) after 2000, but the counties that decreased in the overall development hierarchy in 2019 also decreased in their ED SI values: these were Hunedoara, Bihor, Argeș, and Dolj.

The Social Conditions and Housing sub-index (SCH SI) shows the social situation of the population, in terms of the quality of housing: surface area of the dwelling per person, proportion of dwellings with drinking water, proportion of dwellings with sewerage, kitchen, bathroom, and central heating (own or district). This sub-index correlated strongly with the PEESH DI and with ELMC SI, in both periods the correlation coefficients were above 0.8 (see Table 3). The first eight counties (plus Arad) had high values in social housing conditions during the whole period analyzed. For this dimension, regional differences in material culture, related to housing conditions, with historical roots [50], were very clearly outlined between Transylvania, where counties have above average values, and extra-

Carpathian territories (historically the Old Kingdom), where only the capital Bucharest, and the counties Constanța, Prahova, and Ilfov have above average values. If we compare the social housing situation in 2000 with 2019, we can see a decrease in the gap between Bucharest and the rest of the country, as well as an improvement in values, especially in Ilfov, Maramureș Satu-Mare, Sălaj, and Galați. In these counties, the improvement of housing conditions may have been due to the large inflow of income into households, due to temporary migration or a cross-border way of life [52,53], with the exception of Ilfov, a county strongly impacted by the suburbanization process of the capital Bucharest [54].

Table 3. Pearson correlation coefficients between PEESH DI and the development dimensions specific sub-indexes, in 2000 and 2019.

	PEESH DI		Population		Health		Education		Housing		Economy	
	2000	2019	2000	2019	2000	2019	2000	2019	2000	2019	2000	2019
PEESH DI	1	1	−0.047	0.321 *	0.852 **	0.876 **	0.818 **	0.878 **	0.921 **	0.826 **	0.897 **	0.899 **
Population	−0.163	0.321 *	1	1	−0.005	0.111	−0.206	0.009	−0.034	0.379 *	−0.137	0.292
Health	0.848 **	0.876 **	−0.005	0.111	1	1	0.649 **	0.801 **	0.697 **	0.537 **	0.604 **	0.708 **
Education	0.818 **	0.878 **	−0.191	0.009	0.674 **	0.801 **	1	1	0.612 **	0.556 **	0.618 **	0.788 **
Housing	0.890 **	0.826 **	−0.034	0.379 *	0.697 **	0.537 **	0.582 **	0.556 **	1	1	0.789 **	0.773 **
Economy	0.897 **	0.917 **	−0.104	0.399 **	0.616 **	0.591 **	0.618 **	0.646 **	0.885 **	0.867 **	1	1

* Correlation is significant at a 0.05 level (2-tailed). ** Correlation is significant at a 0.01 level (2-tailed). Source: own calculations. Basic data from NIS (www.insse.ro, accessed on 31 October 2021) (N = 82).

The Health and Life sub-index **(HL SI)** reflects the quantitative ratios of human infrastructure; the inclusion capacity (beds) of the health system, reported per 1000 inhabitants; and the efficiency of the health system, combined with the lifestyle of the population, reflected in the life expectancy at birth. The HL SI better correlated with the PEESH DI ($r > 0.8$), and clearly showed some typical changes in the hierarchy of territorial development in Romania: while the Constanța, Argeș, Prahova, and Dâmbovița counties improved their positions between 2000 and 2019, other counties, such as Hunedoara, Iași, Mureș, and Botoșani regressed and were positioned lower in the hierarchy of Romanian counties. These changes correlated with the general socio-economic repositioning of these counties. In other words, the counties that took more advantage of the economic development opportunities form EU integration also significantly improved their living and health conditions, more so than other counties, which did not profit as much from the economic take off of the last two decades (see Appendix A Tables A2 and A3).

In addition to the analysis of the above presented sub-indexes, we also looked for the correlation between the development dimension specific sub-indices, separately by year, and also between different years on the same dimension. We can see that the PD SI showed a moderate correlation ($r = 0.486$) between the years 2000 and 2019, but the rest of the sub-indexes had very strong correlations ($r > 0.88$, see Table 3).

4.2. The Linear OLS Regression Model for Explaining the Main Sources of Development between the Years 2000 and 2019

Next, we identified the main sources of social and economic development, calculating the differences registered by the value of each core indicator for the years 2000 and 2019 (Table 4).

Moreover, we analyzed through linear regression the relationship between the increase (growth) or decline of the development indicators between the years 2000 and 2019 (see Table 1, for a basic indicator list). Based on the correlation coefficients, we can see that there were three dimensions along which each growth indicator correlated strongly with the PEESH DI for 2019. The most significant correlations were established for the following situations: increase of GDP/capita ($r = 0.868$), increase in the education indicator (share of population with tertiary education) ($r = 0.915$), increase in the employment rate ($r = 0.728$), number of physicians per 1000 pers. ($r = 0.552$), and decrease in the employment rate in industry ($r = -0.547$). These indicators were strongly associated with the level of multidimensional development (PEESH DI) of counties (see Table 4).

Table 4. Pearson correlation coefficients between PEESH DI for 2019 and the differential variables, computed for the change in the years 2000–2019 (increase/decrease).

	Differentiation 2000–2019									
	Population		**Health**		**Education**		**Housing**		**Economy**	
PEESH DI 2019	Net migration	0.346 *	Physicians	0.552 **	Tert. education	0.915 **	Floor	0.272	GDP/capita	0.868 **
	Ageing	−0.073	Sanitations	0.047	School enrolment	0.441 **	Water	−0.183	Employment	0.728 **
	Temp. emigration	−0.198	Hosp. beds	−0.147	Sec. graduation	0.369 *	Bath	−0.047	Ind. employment	−0.547 **
			Life expect.	0.499 **			Heating	0.326 *	Unemployment	−0.073
							Sewage	−0.090	Serv. employment	0.083

* Correlation is significant at a 0.05 level (2-tailed). ** Correlation is significant at a 0.01 level (2-tailed). Source: own calculations. Basic data from NIS (www.insse.ro, accessed on 31 October 2021) (N = 82).

We used a linear (OLS) regression analysis to determine which of the growth indicators with increasing/decreasing values between 2000 and 2019 contributed to the level of socio-economic development measured by the PEESH DI from 2019. Since three variables were removed from the final regression model (increase in the GDP/capita, growth of tertiary education graduation rate, and change the employment rate in industry sector), due to multicollinearity, which anyway had a strong correlation with PEESH DI 2019, with the remaining 13 variables, we obtained a model with a very high explanatory power, where the adjusted R^2 was 0.749 (74.9%). Among the independent variables, the largest effects (measured with standardized Beta coefficients) on the dependent variable were achieved using two indicators: the increase of employment rate, (0.508), and the change of the gross educational enrolment rate between 2000 and 2019 (0.354). Thus, the regression analysis showed which of the growth/decline rates of the different core indicators of the development dimensions discussed in the previous section (see Table 1), between 2000 and 2019, contributed to the multidimensional development level in Romania in 2019, as measured by the PEESH DI, and calculated at the level of the different NUTS3 EU territorial units. This period broadly covers Romania's pre-accession period to the EU and its membership of the EU up to the analyzed date.

Regression analysis brought to the surface an explanatory factor that was not obvious: the increase of employment rate in service sector (0.225), which of course became visible after the elimination of the indicator of the change in the employment rate in the industrial sector. The increase in the number of physicians per 1000 inhabitants (0.220) and in life expectancy at birth (0.200, see Table 5) were also significant.

The analysis of the relationships between the PEESH DI for 2019 and different variables representing the dynamic (increase or decline) of the development indicators between 2000 and 2019 showed that the increase in GDP/capita, the increase of the employment rate, the decrease of worker numbers in industry, and the increase of worker numbers in services decisively contributed to the level of socio-economic development for 2019 (measured with the PEESH DI). At the same time, the absolutely determinant role of education was again confirmed, both by the increase in the population with tertiary education (the strongest correlation, above 0.9) and the gross enrolment rate in undergraduate education. The improvement in lifestyle and health services was also reflected by the increase in the number of doctors and the increase in life expectancy years at birth.

Table 5. Linear regression coefficients to explain PEESH DI 2019 using changes of the development indicators between 2000 and 2019 [1].

Independent Variables (Growth/Decrease between 2000–2019)	B	Standardized Beta Coefficient	Sig.	VIF
(Constant)	−2.425		0.005	
Net migration	0.019	0.146	0.272	2.993
Temporary emigration	0.006	0.086	0.351	1.464
School enrolment	0.056	0.354 **	0.012	3.112
Secondary graduation	−0.002	−0.025	0.839	2.735
Employment	0.044	0.508 **	0.000	1.697
Unemployment	−0.020	−0.072	0.408	1.320
Serv. employment	0.053 *	0.225 *	0.050	2.924
Floor area/person	0.038	0.083	0.468	2.236
Fixed bath	−0.008	−0.056	0.611	2.088
Physicians	0.556	0.220 *	0.041	1.866
Medical sanitary staff	−0.007	−0.006	0.949	1.755
Hosp. beds	−0.162	−0.151	0.245	2.887
Life expectancy	0.159	0.200 *	0.050	1.851
Adjusted R^2		0.749		

[1] Dependent variable: INDEX_PEESH_2019 (N = 82). * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). Source: own calculations. Basic data from NIS [46].

5. Discussion and Policy Recommendations

As Ganegodage et al. [32] reflected on this aspect, the multidimensional index we created includes indicators that can measure both recent and current socio-economic conditions and territorial development. At the same time, we also took into account aspects of the new structural economic framework (see Lin [29]) in the design of the research. In our indicator, within the framework of the economy and labor market sub-index, we mainly relied on indicators of the structure of the labor market, in addition to the usual GDP per capita, as the inclusion of new ICT technology indicators would make the indicator inapplicable for measuring development in the earlier periods (1990s, 2000s) and thus for assessing longer-term changes. However, when constructing the indicator, we experimented with using the share of ICT sector employees instead of the share of service sector employees, but these data were not relevant for all territorial units, especially for 2000, and we therefore refrained from using them, but we still envisage including/replacing this indicator. Furthermore, our indicator also emphasized factors present in both Lin's [29] paper and Ganegodage et al.'s [32] paper: education, health, and migration measures. However, how is our indicator different from those published internationally in the last 3–5 years? Here we stress the relevance of measuring subnational differences, and how such an index should be different from those used for international comparisons: the indicators of institutional culture (political stability, government effectiveness, regulatory burden, rule of law, and control of corruption, see Kaufmann, Mastruzzi and Zavaleta [55], Ganegodage et al. [32]) may be considered invariant within countries, or at least the measurement of existing variation may be too complicated, so they should be omitted for sub-national indicators.

As for the variation in spatial development over the 20 years measured (2000–2019), we echo the findings of Stanickova and Melecký [34]. Our results also confirmed that economic diversification and regional resilience are strengths that provide relative protection to the local economy and labor market, even during economic recessions (see the emergence of the urban poles county group), both of them being complex processes defined in five dimensions by the authors cited: community links (CL), human capital and sociodemographic structure (HC-SDS), labor market (LM), economic performance (EP), and innovation, science, and research (ISR) [34]. In practice, in our research, in the multivariate regression model carried out in the second part of the study, we measured the extent to

which these explained the meso-level spatial development disparities in Romania at the end of the period (2019), using the growth rates of the indicators taken from most of these dimensions. This shows that a lack of growth in a given dimension in some regions is a vulnerability that slows down the development of the territory and can produce a greater recession in the event of crises and set back the development of the region.

Our paper contains two original contributions to the multidimensional analysis of socio-economic development in Eastern Europe. First, the multidimensional composite index, the PEESH Development Index, developed in this paper, comprise five sub-indexes as basic dimensions of socio-economic development, with a total number of 22 indicators. The paper demonstrated that the index has good validity, and it showed similarities with other indexes (Local Human Development Index [35,36]). In addition, it can be used for different time perspectives and is also sufficiently complex to compensate for the irregular variation of one or two indicators, an advantage especially evident in comparison with the Human Development Index and its derives.

The methodology of establishing the dimensions of the PEESH DI can be considered an original contribution, given how the paper managed to match the deductive approach with an empirical inductive one, in line with recent literature [32,33,45] and based on confirmatory factor analysis. The latter allowed us to test the grouping of the dimensions in the mass of variables included, as well as their level of compatibility. Thus, we defined the main dimensions of the PEESH DI, and calculated a sub-index for each dimension: population dynamics, economy and labor force, education, social conditions and housing, and health and life conditions. The inclusion of variables in the dimensions, as well as the combination and weight of dimensions, were utilized to avoid the high degree of subjectivism mentioned in the presented literature [44] (p. 207), [9] (p. 267), so that the results can be accepted with confidence.

Second, if we consider the results of empirical analysis of socio-economic development between 2000 and 2019, based on the PEESH DI, we found a certain restructuration of the development hierarchy of Romania's counties in 2019, in comparison with the year 2000. Thea is a certain stability in the top (positions 1–4) and the bottom (positions 1–5) of the hierarchy; the middle positions had a higher dynamic. The PEESH Development Index values of the least developed counties remained at the level of 2000, which contradicts the mainstream literature based on GDP/capita calculations, and we could not confirm an increase of territorial disparities in regional development, at the level of the counties. However, the positional gains of counties such as Ilfov (+13), Bistrita-Nasaud (+11), and Suceava (+9) were remarkable, but also the position losses registered by Mehedinti (−13), Arad, Caras-Severin, and Teleorman (each −8). If we look for some common explanations for the opposing tendencies, the multidimensionality of the PEESH DI adds new important facts to the existing knowledge on regionally differentiated socio-economic development. Therefore, this paper also provides evidence for the important role played by the improvement of education and health conditions for the socio-economic development of certain semi-peripheral counties. This result highlights that human development cannot be based only on economic growth, it comprises an important social dimension as well, which includes improvements in education, health, and housing conditions. On the other hand, according to this paper, counties with a higher socio-economic development have a regional economy based on large urban centers, a finding which is line with the existing recent literature [40–42].

The applicability of the PEESH indicator-based methodology to the study of subnational-level spatial development differences in certain developing countries may be feasible, with minor modifications, and where some additional conditions are met. These include the following: (1) labor-intensive and precarious work characteristics, in terms of economic empowerment and labor market, are spatially different; (2) in terms of housing conditions, the prevalence of overall comfortable housing is not general (i.e., a significant proportion of the population lives in socially deprived housing, without some basic services: lack of kitchen facilities, piped water, central heating, bathrooms, etc.); (3) in terms of education,

the population does not have a general high school education, and the gross enrolment rate varies significantly between regions, and in the area of health and life, there are differences in life expectancy of at least 2–3 years between territorial units and significant variations in the quality or availability of health services.

We suggest that the results of our paper can contribute to the reformulation of regional development policies. Therefore, we formulate one important policy recommendation, specifically for the Cohesion Policy of the European Union. It is well known that the methodology of the measurement of regional disparities or inequalities influences the spatial patterns of these disparities. The regional interventions of the Cohesion Policy, addressed to the developmental assessment of the least developed regions in Southern, Central, and Eastern Europe, are focused on the reduction of regional disparities and the enhancement of territorial cohesion among member states and regions. This uses a single indicator (GDP/capita) for determining the threshold values for the eligibility of NUTS2 regions to receive Cohesion Policy funding, which is a strongly reductionist, one-sided perspective. We argue in our paper for the adoption of a wider, multidimensional perspective on the measurement of regional disparities, and we think that the instrument developed in this paper, the PEESH Development Index, is suitable for filling this methodological gap.

6. Conclusions

The multidimensional composite index, named the Population, Economic, Education, Social and Health (PEESH) Development index, presented and analyzed in this paper, contain five sub-indexes as dimensions: population dynamics, economy and labor force, education, social conditions and housing, and health and life conditions. The sub-indexes are based on a total of 22 indicators.

The PEESH index has a good validity, as well as similarity with other older indexes (LHDI, Sandu [35,36]), and can be used for different time perspectives, while also being sufficiently complex to compensate for the irregular variation of one or two simple indicators or indexes.

The multivariate analysis of socio-economic development between 2000 and 2019, based on the PEESH DI, showed that the differentiated increase of the indicators composing the PEESH DI resulted in a certain restructuring of the development hierarchy of Romania's counties between 2000 and 2019. While the top (positions 1–4) and the bottom (positions 1–5) of the hierarchy showed a high level of stability, the middle positions were more dynamic. The PEESH DI and the regression model indicated the contribution of the improvement of education and health conditions to the socio-economic development of some semi-peripheral counties. These empirical facts strengthen the idea that development cannot be based only on the economic growth, it comprises an important social dimension as well, which includes education, health, and housing conditions.

A novel contribution is represented by the highlighting of the suburbanization process as a driver of the diffusion of socio-economic development, from core areas to former peripheries, with the case of Ilfov county being the most relevant. In addition, cultural traditions and geographical position still seem to play significant roles in the socio-economic differentiation of counties: while four urban pole-based counties with a high PEESH DI (Timis, Cluj, Sibiu, and Brasov) are located close to the western borders, in Transylvania, the rest of the urban pole-based counties with lower PEESH DI levels (Iasi, Craiova, Bacau, Buzau) are located in the southern and eastern cultural regions of Moldavia and Muntenia. (see Ban [56,57]. It is also notifiable that the vast majority of counties from Transylvania maintained their above average position between 2000 and 2019, although regarding GDP/capita or life expectancy at birth (thus also in HDI and LHDI) they were overtaken by a number of counties from the southern and eastern part of the country.

Finally, we have strongly argued in this paper that it is time to switch from a single-sided and reductionist perspective of the measurement of regional disparities, within the framework of the Cohesion Policy in the European Union, to a wider and multidimensional perspective, reflecting the complex character of the development process.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of BABEȘ–BOLYAI University, Cluj-Napoca.

Informed Consent Statement: The study did not involve humans. The database used containd territorial data, collected by administrative tools.

Data Availability Statement: Raw social and economic data are available on: https://insse.ro/cms/ro/content/sdds-plus-0; http://www.recensamantromania.ro/; https://ot.mdrap.ro/website/maps/, accessed on 31 October 2021.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Results of the principal axis factoring (PAF) analysis, used to explore the structure of the initial list of indicators (factor scores, KMO and % of variance explained), 2018/2019.

		Rotated Factors					
		1. Economy, Labor, and Health Infrastructure	**2. Wellbeing Locative and Migration**	**3. Population Dynamics**	**4. Accessibility-mobility (Territorial)**	**5. Population Employed (Non-Agricultural)**	**6. Health—Long Life**
1.	Share of hospital beds per 1000 persons (‰)	0.852					
2.	Tertiary education rate (%)	0.837	0.398		0.289		
3.	Urban population (%)	0.806				0.283	
4.	Medical sanitary staff per 1000 persons (‰)	0.793	−0.343				
5.	Share of physicians per 1000 persons (‰)	0.790					
6.	People employed in industry (%)	0.778	0.387				
7.	Share of households with a central heating system (%)	0.778	0.441				
8.	People employed in services (%)	0.776			0.529		

Table A1. *Cont.*

		Rotated Factors					
		1. Economy, Labor, and Health Infrastructure	**2. Wellbeing Locative and Migration**	**3. Population Dynamics**	**4. Accessibility-mobility (Territorial)**	**5. Population Employed (Non-Agricultural)**	**6. Health—Long Life**
9.	Share of households with a fixed bath (%)	0.739	0.478			0.341	
10.	Share of households with access to sewage networks (%)	0.722	0.469	0.251		0.347	
11.	Share of households with access to piped water (%)	0.718	0.471			0.360	
12.	People employed in ICT (%)	0.718			0.564		
13.	Net employment ratio—20–64 years (%)	0.713					
14.	GDP per capita	0.709	0.466		0.351		
15.	Gross school enrolment rate (%)	0.520					
16.	Average floor area per flat		0.894				
17.	Average floor area per person		0.870	−0.252			
18.	Share of households with a kitchen area (%)	0.476	0.553				−0.276

Table A1. *Cont.*

		Rotated Factors					
		1. Economy, Labor, and Health Infrastructure	**2. Wellbeing Locative and Migration**	**3. Population Dynamics**	**4. Accessibility-mobility (Territorial)**	**5. Population Employed (Non-Agricultural)**	**6. Health—Long Life**
19.	Net migration rate (‰)		0.534	0.385	0.456		
20.	Unemployment rate (%)	−0.286	−0.508	−0.369		−0.271	
21.	Ageing index (%)		−0.284	−0.850			
22.	Causes of death (cardio_vasc/100,000 pers.)	−0.375	−0.276	−0.703			−0.310
23.	Rate of natural increase (‰)	0.272	0.439	0.691			0.461
24.	Temporary emigration rate (‰)			0.583		−0.377	
25.	Population density	0.502			0.724		
26.	Companies/region area	0.503			0.723		
27.	Mean access. time from capital				−0.625		
28.	Commuting population rate				−0.525		

Table A1. *Cont.*

		Rotated Factors					
		1. Economy, Labor, and Health Infrastructure	**2. Wellbeing Locative and Migration**	**3. Population Dynamics**	**4. Accessibility-mobility (Territorial)**	**5. Population Employed (Non-Agricultural)**	**6. Health—Long Life**
29.	People employed in agriculture (%)					−0.925	
30.	Life expectancy at birth	0.563					0.707
31.	Causes of death (tumors/100,000 pop.)						−0.623
Explained % of Variance		31.870	15.685	10.713	10.142	6.433	4.527

Obs. Extraction Method: Principal Axis Factoring. (KMO = 0.72). Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 9 iterations.

Table A2. The values of PEESH Development Index and its dimensions (Z-scores), 2000.

		SUB-INDEXES (2000)					PEESH Development Index
	County Rank	**Population Dynamics**	**Health and Life**	**Housing and Living Conditions**	**Education**	**Economy and Labor Market**	
1.	Bucuresti	−1.165	2.508	3.195	2.702	5.491	3.720
2.	Cluj	−1.085	2.955	1.284	1.684	0.731	1.790
3.	Timis	−0.529	1.583	1.543	0.552	0.641	1.170
4.	Brasov	0.533	0.295	2.023	0.950	0.966	1.100
5.	Hunedoara	0.369	0.847	1.525	1.097	0.131	0.930
6.	Constanta	0.607	−0.098	1.503	0.507	1.005	0.750
7.	Bihor	−0.316	0.580	0.415	0.719	0.349	0.550
8.	Sibiu	0.334	0.666	1.174	0.058	0.165	0.530
9.	Arges	−0.227	−0.193	0.040	1.765	0.290	0.490
10.	Dolj	−0.873	0.793	−0.336	1.274	−0.134	0.440
11.	Iasi	1.335	1.929	−0.158	−0.303	0.339	0.400
12.	Arad	−1.569	0.397	0.734	0.020	0.015	0.390
13.	Mures	0.000	1.064	0.439	−0.403	0.338	0.380
14.	Alba	−0.060	0.132	0.270	0.807	0.136	0.350
15.	Prahova	−0.610	−0.519	0.310	0.635	0.754	0.340
16.	Caras-Severin	−0.146	0.335	0.468	0.237	−0.226	0.220

Table A2. *Cont.*

		SUB-INDEXES (2000)					PEESH Development Index
	County Rank	**Population Dynamics**	**Health and Life**	**Housing and Living Conditions**	**Education**	**Economy and Labor Market**	
17.	Valcea	−0.408	0.285	−0.728	1.153	−0.219	0.130
18.	Harghita	0.508	0.537	0.493	−0.465	−0.091	0.110
19.	Covasna	0.729	0.784	0.615	−0.841	−0.275	0.050
20.	Braila	−0.748	0.047	0.122	0.233	−0.442	0.020
21.	Gorj	0.290	0.130	−0.611	0.550	−0.046	−0.020
22.	Mehedinti	−0.799	−0.160	−0.791	1.055	−0.607	−0.110
23.	Galati	0.805	−0.447	0.432	−0.409	0.027	−0.130
24.	Maramures	2.272	−0.054	−0.193	−0.643	−0.138	−0.380
25.	Buzau	−0.867	−0.552	−0.764	0.282	−0.583	−0.390
26.	Salaj	0.120	−0.379	−0.768	0.231	−0.638	−0.430
27.	Bacau	0.973	−0.934	−0.311	−0.514	0.231	−0.440
28.	Olt	−0.381	−0.722	−1.008	0.284	−0.394	−0.480
29.	Dambovita	0.536	−0.660	−0.765	0.063	−0.365	−0.490
30.	Satu Mare	1.101	−0.845	0.091	−1.076	−0.325	−0.610
31.	Neamt	0.830	−0.695	−0.479	−0.533	−0.496	−0.620
32.	Teleorman	−2.313	−0.800	−1.072	−0.309	−0.647	−0.630

Table A2. *Cont.*

		SUB-INDEXES (2000)					PEESH Development Index
	County Rank	**Population Dynamics**	**Health and Life**	**Housing and Living Conditions**	**Education**	**Economy and Labor Market**	
33.	Tulcea	0.390	−0.797	−0.362	−0.540	−0.646	−0.630
34.	Bistrita-Nasaud	1.455	−0.363	−0.400	−0.892	−0.557	−0.650
35.	Vrancea	0.519	−0.538	−0.802	−1.013	−0.433	−0.750
36.	Suceava	1.409	−0.727	−0.938	−0.764	−0.322	−0.790
37.	Botosani	0.688	−0.002	−1.231	−0.958	−0.858	−0.840
38.	Ilfov	−1.735	−1.412	−0.593	−1.698	−0.019	−0.870
39.	Ialomita	−0.282	−1.163	−0.840	−0.727	−0.701	−0.890
40.	Vaslui	1.140	−0.592	−1.419	−1.020	−0.898	−1.090
41.	Calarasi	−0.745	−1.546	−1.017	−1.594	−0.773	−1.250
42.	Giurgiu	−2.084	−1.669	−1.091	−2.155	−0.775	−1.370

Table A3. The values of PEESH Development Index and its dimensions (Z-scores), 2019.

		SUB-INDEXES (2019)					PEESH Development Index
	County Rank	**Population Dynamics**	**Health and Life**	**Housing and Living Conditions**	**Education**	**Economy and Labor Market**	
1.	Bucuresti	0.607	3.269	2.445	3.605	5.090	3.150
2.	Cluj	0.357	2.412	1.352	2.057	1.461	1.840
3.	Timis	0.803	1.604	1.606	0.962	1.345	1.390
4.	Brasov	0.772	0.069	1.667	1.003	0.935	0.940
5.	Sibiu	0.694	0.443	1.143	0.619	0.652	0.760
6.	Iasi	2.087	1.418	−0.292	0.343	0.048	0.660
7.	Constanta	0.396	−0.175	1.379	0.702	0.525	0.630
8.	Hunedoara	−1.055	0.800	1.093	0.508	−0.031	0.570
9.	Mures	0.298	1.475	0.497	−0.192	0.136	0.550
10.	Bihor	0.297	0.589	0.542	0.410	0.435	0.510
11.	Alba	−0.463	0.278	0.329	0.573	0.549	0.330
12.	Arges	−0.540	−0.112	0.062	1.293	0.290	0.330
13.	Prahova	−0.695	−0.191	0.511	0.740	0.504	0.270
14.	Harghita	0.193	0.593	0.656	−0.513	−0.263	0.210

Table A3. *Cont.*

		SUB-INDEXES (2019)					PEESH Development Index
	County Rank	**Population Dynamics**	**Health and Life**	**Housing and Living Conditions**	**Education**	**Economy and Labor Market**	
15.	Dolj	−0.456	0.860	−0.614	0.616	−0.431	0.180
16.	Covasna	0.184	0.758	0.439	−0.657	−0.400	0.140
17.	Maramures	1.005	0.014	0.319	−0.202	−0.036	0.140
18.	Gorj	−0.457	0.629	−0.639	0.563	−0.258	0.100
19.	Valcea	−0.759	0.685	−0.753	0.412	−0.004	0.030
20.	Arad	−0.102	−0.748	0.691	−0.054	0.514	−0.010
21.	Galati	0.094	−0.367	−0.024	0.249	−0.565	−0.070
22.	Braila	−1.493	−0.006	−0.267	0.623	−0.353	−0.080
23.	Bistrita-Nasaud	0.797	−0.531	0.094	−0.340	−0.144	−0.150
24.	Caras-Severin	−1.047	−0.172	0.676	−0.524	−0.434	−0.160
25.	Ilfov	2.606	−1.435	1.532	−1.832	0.495	−0.210
26.	Satu Mare	0.705	−0.894	0.389	−0.515	−0.187	−0.240
27.	Suceava	1.966	−0.693	−0.566	−0.394	−0.438	−0.300
28.	Salaj	0.002	−0.615	−0.285	−0.315	−0.238	−0.370
29.	Buzau	−1.178	−0.289	−0.763	0.283	−0.586	−0.390
30.	Bacau	0.498	−0.820	−0.463	−0.378	−0.413	−0.460

Table A3. *Cont.*

		SUB-INDEXES (2019)					PEESH Development Index
	County Rank	**Population Dynamics**	**Health and Life**	**Housing and Living Conditions**	**Education**	**Economy and Labor Market**	
31.	Dambovita	0.309	−0.579	−0.511	−0.530	−0.302	−0.460
32.	Neamt	−0.090	−0.526	−0.450	−0.617	−0.357	−0.500
33.	Olt	−1.377	−0.165	−1.586	0.435	−0.628	−0.560
34.	Vrancea	−0.072	−0.650	−0.656	−0.706	−0.434	−0.620
35.	Mehedinti	−0.896	−0.216	−1.189	−0.231	−0.832	−0.630
36.	Botosani	0.581	−0.489	−1.575	−0.601	−0.638	−0.750
37.	Tulcea	−0.813	−0.938	−0.681	−0.722	−0.462	−0.800
38.	Ialomita	−0.388	−1.213	−1.041	−1.153	−0.840	−1.090
39.	Vaslui	0.999	−0.875	−1.777	−1.312	−1.015	−1.110
40.	Teleorman	−2.523	−0.507	−1.236	−1.215	−0.797	−1.190
41.	Calarasi	−0.667	−1.189	−1.047	−1.452	−0.918	−1.210
42.	Giurgiu	−1.177	−1.501	−1.004	−1.540	−0.977	−1.380

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