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Territorial patterns of socio-economic development in the Romanian Danube valley

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Abstract

The territorial patterns of socio-economic development in the Romanian Danube Valley (micro-scale, LAU2) are identified in this paper by using the complex index of development (INDEV). The paper presents the computation of secondary indexes reflecting the main aspects of socio-economic development (dwellings, public utilities infrastructure, health, employment, demography, education and local economy). The territorial distribution of the secondary indexes and the complex index of development values emphasized a difference between the rural and urban administrative units, the rural areas shaping the low and very low pattern of socio-economic development and the towns and municipals representing the average pattern of socio-economic development. The complex index of territorial disparities, computed by the variant of the relative distances ranking method (using as baseline the national average value of each statistical indicator selected), shows the overwhelming predominance of socio-economic development pattern below the Romanian average.

Keywords: *territorial pattern, socio-economic development, territorial disparities, Romanian Danube Valley*

Rezumat. Modele teritoriale de dezvoltare socio-economică în sectorul românesc al Văii Dunării

În acest studiu sunt analizate modelele teritoriale de dezvoltare socio-economică în sectorul românesc al Văii Dunării, la nivel de micro-scară (unităţi administrative locale – LAU2) prin intermediul indicelui complex de dezvoltare (INDEV). Lucrarea prezintă calcularea indicilor secundari, care reflectă principalele aspecte ale dezvoltării socio-economice (locuinţe, infrastructura de utilităţi publice, sănătate, ocupare, demografie, educaţie şi economie locală), precum şi distribuţia teritorială a acestora şi a indicelui complex de dezvoltare. Sunt evidenţiate diferenţe între unităţile administrative urbane şi rurale, arealul rural fiind caracterizat de o dezvoltare socio-economică slabă şi foarte slabă, în fapt fiind subdezvoltat, iar spaţiilor urbane fiindu-le specifică dezvoltarea de nivel mediu. Indicele complex de dezvoltare (calculat prin metoda rangurilor reale (sau distanţelor relative) în aplicarea căreia valoarea medie naţională a fiecărui indicator statistic utilizat a fost considerată ca reper) arată că în sectorul românesc al Văii Dunării, comparativ cu nivelul mediu naţional, predomină modelele teritoriale de dezvoltare socio-economică slabă şi foarte slabă.

Cuvinte-cheie: *model teritorial, dezvoltare socio-economică, disparităţi teritoriale, Valea Dunării Românești*

Introduction

Socio-economic development refers to the ability of producing an adequate and growing supply of goods and services in a productive and efficient ways of accumulating capital and distributing "the fruits" of production in a relatively equitable manner (Jaffee, 1998). Vast territorial differences in the socio-economic statistical indicators, such as income levels, living conditions etc., are broken down into leading areas and lagging areas. This situation is not beneficial to the process of socio-economic development of the European Union and, indeed, it becomes one of its major barriers (Churski, 2014). The Danube Basin is now largely a European (EU) space (Fig. 1) and socio-economic development, competitiveness, environmental management and efficient growth of resources should be improved, security and transport corridors modernized. These development directions are reflected in the four main objectives of the EU Strategy for the Danube Region (EUSRD), a political initiative of Romania and Austria promoted in June 2008 in order to: 1. connect the Danube region; 2. protect the environment; 3. build prosperity and 4. strengthen the Danube region.

In view of the above, the present study has been focused on the Romanian Danube Valley, aiming to identify the territorial patterns of the socio-economic development at micro-scale (local administrative units–LAU2) and assess the territorial disparities in this sector. Thus, the authors can apply the relative distances ranking method, compute and represent on maps a series of secondary indexes and the complex index of development.

In Romania, four development regions and twelve counties (with 238 rural local-administrative units and 28 urban local-administrative units - LAU2) are situated along the Danube (1,075 km long). The Romanian Danube Valley, spatially delimited by eight terraces (*Geography of Romania,* 2005), is an area with numerous rural settlements, but also towns of appreciable age, human and economic potential (Fig. 2).

Theoretical background

Romanian geographers deal with the "geographical complex of the Romanian Danube Valley" (*Geografia Văii Dunării Românești*, 1969, p. 9), as a territorial sub-system, with focus on the geographical problems of population, settlements and labour (employment, employment structures, commutation etc.). Before the

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historical events at the end of the `80s, scientific geographical research focused on the Danube towns (Ştefănescu, Alexandrescu, 1978), rural settlements and functional types of settlements from various Danube Valley geographical sub-regions (Baranovsky, 1969, Herbst, Băcănaru, Caranfil, 1969), landscape changes (Iordan, Iacob, Ianoş, 1984), geo-demograhic landmarks (Ianoş, Popescu, Tălângă, 1989), etc.

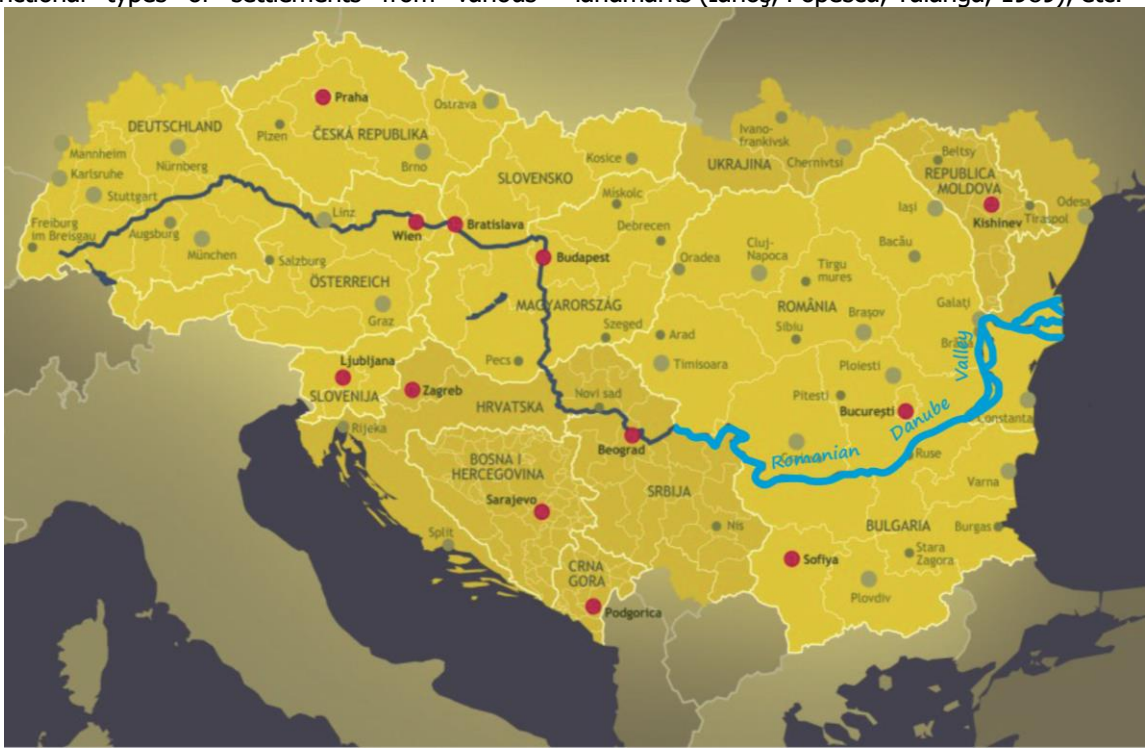

Fig.1: The Danube Basin and the Romanian Danube Valley
(Source: www.danube-region.eu)

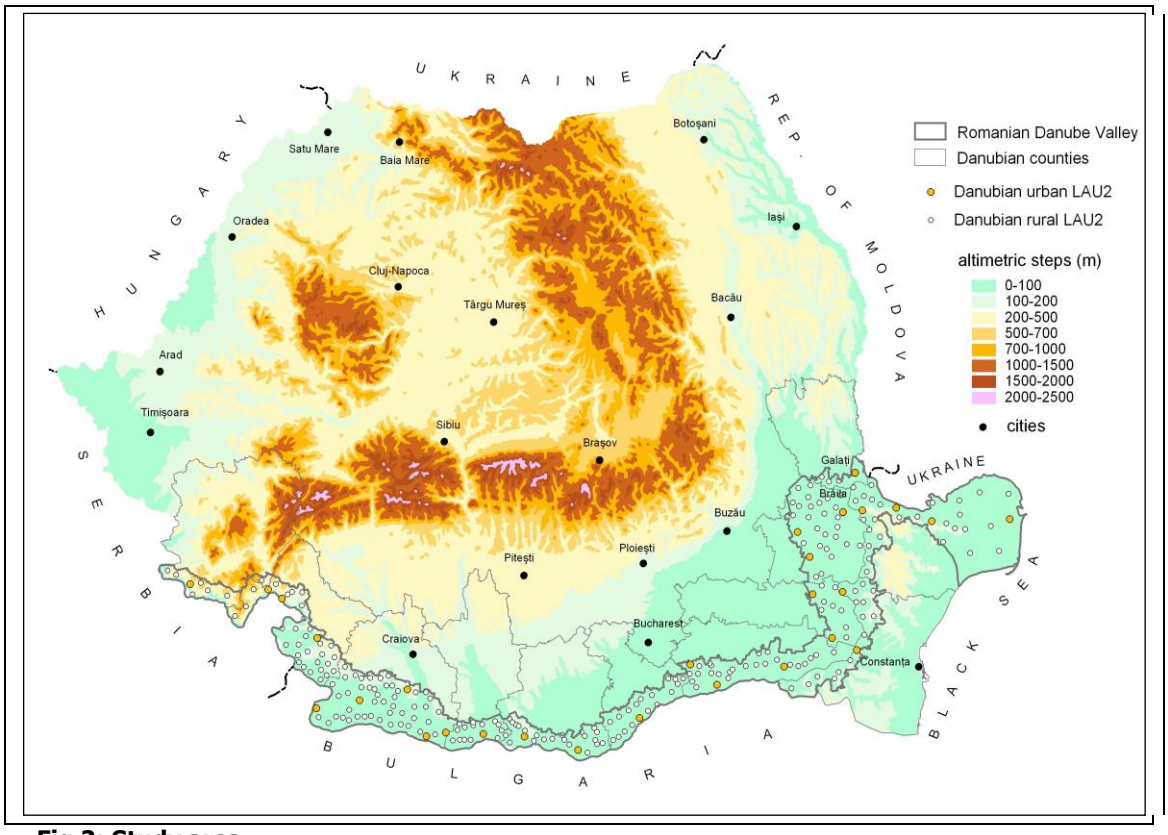

Fig.2: Study area
(Source: Bălteanu, et al., 2006, up-dated and modified)

After December 1989, the transition from socialist centralized economy system to the free economy of capitalism captures the research interest of Romanian geographers. Ever more scientific works on the Danube Valley areas and also a wider range of problems tackled were being published, e.g. urban geography (Ianoş, Tălângă, 1993, 1994, Vîrdol, 2009), rural geography (Ianoş, Popescu, 1990), transport geography (Tălângă, 1994), geography of industry (Popescu, 1991, 1994, 2000, Tălângă, 1995). A comprehensive analysis of the Romanian Danube Valley (Ianoş, 2000) revealed the intra-regional development disparities in terms of economic, demographic, infrastructure and living standard indicators. The study concluded that the Romanian sector of the Danube Valley had a low development level compared to the average national values of the indicators used. In 2005, the Romanian Danube Valley was the subject of a general geographical analysis in the *Geography of Romania*, volume V, edited by the Romanian Academy. Given the complexity of our analysis, the research hypotheses taken into account in order to identify the favourable and less favourable areas for socio-economic development are numerous and inter-related. The indicators of housing and public utilities infrastructure are included in consumption indicators, which show the level of development in a specified space. Access to drinking water, bathroom, sewerage network, etc. is relevant for the level of the population's incomes because payment for drinking water and the construction of a bathroom and service-pipe implies having financial resources. On the other

The labour force reflects the complex linkage between general employment, employment in agriculture, unemployment and social consequences of insecure jobs, finally giving information on the quality of employment. Unemployment is detrimental to the quality of life (Winkelmann, 2014), the social consequences of unemployment and of insecure jobs having negative impact on the employment situation in households and communities. Infant mortality is dependent on a number of factors accepted worldwide, which are: the socio-economic background, the educational and cultural level, behavior, medical factors, geographical and environmental factors and incidental factors (epidemics, disasters, etc.) (UNFPA, 2003). So, infant mortality is a key indicator of a specific area's development level. School enrolment measures the access of a population to the educational system and it is simply a count of the number of children who have registered with school (Baker, Halabi, 2014). There are many territorial differences of school enrolment, because of inter-group disparities regarding the opportunities for academic achievement (educational inequalities). Historically, educational inequality affects some particular social groups, some minority groups being especially concerned (Husen, hand, these indicators underline how deep-going are the socio-economic problems of the poor population, which have no access to some elementary conditions of life (UNFPA, 2003). Deprivation in housing conditions is measured by the absence of facilities that are deemed necessary for maintaining a minimum standard of quality of life (Weick, 2014, Domanski et.al. 2006). The indicator living floor (sqm/inhabitant) is a key indicator of housing quality, which measures the adequacy of living space in dwellings (a low value of this indicator being a sign of overcrowding) (Millennium Development Goals Dashboard, 2014). Drinking water (freshwater intended for human consumption through activities such as drinking, cooking, or bathing) is critical to assuring human health and well-being. Water is considered to be safe for consumption when using it represents a low risk of immediate or long-term harm, which means having the water supplied through a network system.

A safe supply of drinking water is a cornerstone of public health and community well-being (Kot, Castleden, Gagnon, 2014). Green urban areas (oxygen generating surfaces) fulfill multiple functions and give a certain quality to urban environment and housing (Cucu, Ciocănea, Onose, 2011), also relating to environmental urban and rural health. The physical and built environment (residential structures, infrastructure, and different functional areas) may affect health, especially if there are issues of water quality, sewerage, or air pollution. The urban and rural environment also presents benefits to health through open, green, and recreational spaces (Wuerzer, 2014). 1972, Crahay, Dutrévis, 2014). The economy and urban development of riparian regions have been partly determined by some economic factors (e.g., limited endowments for water transportation) and the geopolitical context, due to the historical events of the late '80s and the early '90s (e.g. the blockade of traffic due to the ex-Yugoslavia crisis) (Hardi 2013).

Data sources and methodological aspects

The study valorizes the data-base on LAU 2 (NUTS V) level, such as TEMPO Online time series published by the National Institute of Statistics, the results of the Population and Housing Census (October, 2011) and other publications edited by the National Institute of Statistics (e.g. The goods transported on inland waterways in 2012). The selection of indicators for an index is still the result of subjective/personal choice, taking into account the aim of the study and the availability and accuracy of the statistical data specified for the process/phenomenon analyzed (Niemeijer, 2002, Niemeijer, de Groot, 2008). In this case, the indicators selected are inspired by the following research paper, reports and studies: Regional

disparities in Romania 1990 - 1994 (1996), Green Paper. Regional Development Policies in Romania (1997), Preda, 2003, Romania's Millennium Development Goals. Progress Report, 2010, Sandu, 2003, 2011, Kaufmann et al., 2007, Michalek, Zarnekow, 2012, Ianoş, 1997, 1998, 2000.

The identification of areas that are favourable and less favourable to socio-economic development is made based on a series of 21 statistical indicators. The following statistical indicators might have consequences for the socio-economic development level: 1) the share of dwellings with kitchen out of the total number of dwellings (KITCH); 2) the share of dwellings with bathroom out of the total number of dwellings (BATH); 3) living area (sqm/inhabitant) (LIVING); 4) the length of the water supply network (km) (WATER); 5) the length of the sewerage network (km) (SEWER); 6) the green space area (sqm)/inhabitant (GREENSP); 7) hospital beds/1,000 inhabitants (HBED); 8) physicians/1,000 inhabitants (PHYS); 9) variation rate in the number of employees between 2007 and 2012 (%) (EMPLOYEES); 10) unemployment rate (%) (UNEMPLOY); 11) employment rate (%) (EMPLOY); 12) rate of employment in agriculture (%) (EMPLOYAGR); 13) rate of economic dependency (%) (DEPENDEC); 14) infant mortality rate (‰) (INFANT); 15) vitality index (%) (VITALIT); 16) number of pupils enrolled in the primary and secondary education system (PUPILS); 17) number of high school graduates out of the total population over 20 years of age (%) (GRAD); 18) goods transported on inland waterways (thousands tones/km) (TRANSP); 19) number of economic agents (ECAG); 20) physiological density (inhabitants/farm-land area in ha) (PHYSDENS); 21) number of tourist accommodation units (TOUR).

These statistical indicators might influence the general level of socio-economic development and the territorial distribution of the patterns of socio-economic development. A graph matrix was made to establish the degree of determination or subordination of each indicator on a dichotomous query. The value of the determination score (D) reflects the level of dependence or independence on a scale ranging theoretically between +1 (fully determinant) and -1 (totally determined) (Stângă, Grozavu, 2012). In our study, determination score values are very low (positive ones between 0.050 and 0.250 and negative ones between (-0.100) and (-0. 050) (Table 1).

In these conditions, the authors of this paper have considered all the 21 statistical indicators to identify the territorial patterns of each of the seven secondary indexes, the selected indicators being analyzed in terms of their spatial distribution and effects on the secondary index they belong to.

The statistical indicators selected are measured in different units and this comparative analysis of a series of statistical variables with so many characteristics requires standardization. The standardized value of the statistical indicator "X "for the "i" LAU is Xsi = (Xi – Xmin)/(Xmax – Xmin), where Xi is the absolute value of the statistical indicator "X" for the LAU "i", Xmax is the maximum value of X indicator and Xmin is the minimum value of the Xi indicator. The statistical indicators are grouped by seven categories, reflecting the main aspects of socio-economic development: dwellings (DWELL), public utilities infrastructure and green area (INFRGREEN), health (HEALTH), employment/unemployment (LABOUR), demography (DEMO), education (EDU) and local economy (ECONOMY). The seven categories mentioned above represent the secondary index assessed as Hull Score and they are the main components for the complex index of development (INDEV) computation. The Hull Score, with a mean of 50 and a standard deviation of 14, varies between 1 and 100 and it is calculated as the sum of the direct or reverse relation of each statistical indicator or index in relation with the development process: "the indicators with a direct influence have been considered in the determination process as positive and those with a reverse influence were assumed to be negative" (Ianoş, 1997, p. 105, Regional disparities in Romania 1990 - 1994, 1996). Taking into account these remarks, the formula for calculating each secondary index as a Hull Score and the complex index of development are shown in Fig. 3.

Table 1 Categories, initial indicators and selected statistical indicators for identifying the territorial patterns of socio-economic development

Category	Indicators	D=(IS-DS)/n-1 (n is the number of indicators in the matrix)	Indicator selected
DWELL	KITCH	-0.100	
	BATH	-0.150	
	LIVING	0.050	LIVING
INFRAGREEN	WATER	0.150	WATER
	SEWER	-0.050	
	GREENSP	0.000	
HEALTH	HBED	0.100	HBED
	PHYS	0.050	
LABOUR	EMPLOYEES	0.000	
	UNEMPLOY	0.000	
	EMPLOY	0.000	
	EMPLOYAGR	0.100	EMPLOYAGR
	DEPENDED	-0.300	
DEMO	INFANT	0.100	
	VITALIT	0.150	VITALIT
EDU	PUPILS	-0.100	
	GRAD	0.100	
ECONOMY	TRANSP	0.2500	TRANSP
	ECAG	0.2000	
	PHYSDENS	0.0000	
	TOUR	0.1500	

Source: authors' compilation

All indicators are equally weighted in the final index and three territorial patterns of socio-economic development are worked out: very low, low and average.

Aiming to integrate the patterns of socio-economic development of the Romanian Danube Valley into general picture, that of the whole of Romania, the paper uses herein the relative distances ranking

method (Goschin, 2008, Iordan, Chilian, 2004, Voineagu et al., 2007, Avrămescu, 2012, Anghelache et al., 2013). The method involves the transformation of the initial values of variables referred to the relative values of the best performance (value) of each criterion (variable). In this study, the variant of the relative distances ranking method used, the best performance for a variable was replaced by the national average value of that variable (Goschin et al., 2008): each statiscal indicator (KITCH, BATH, etc.) is divided by the national average values of the mentioned indicators.

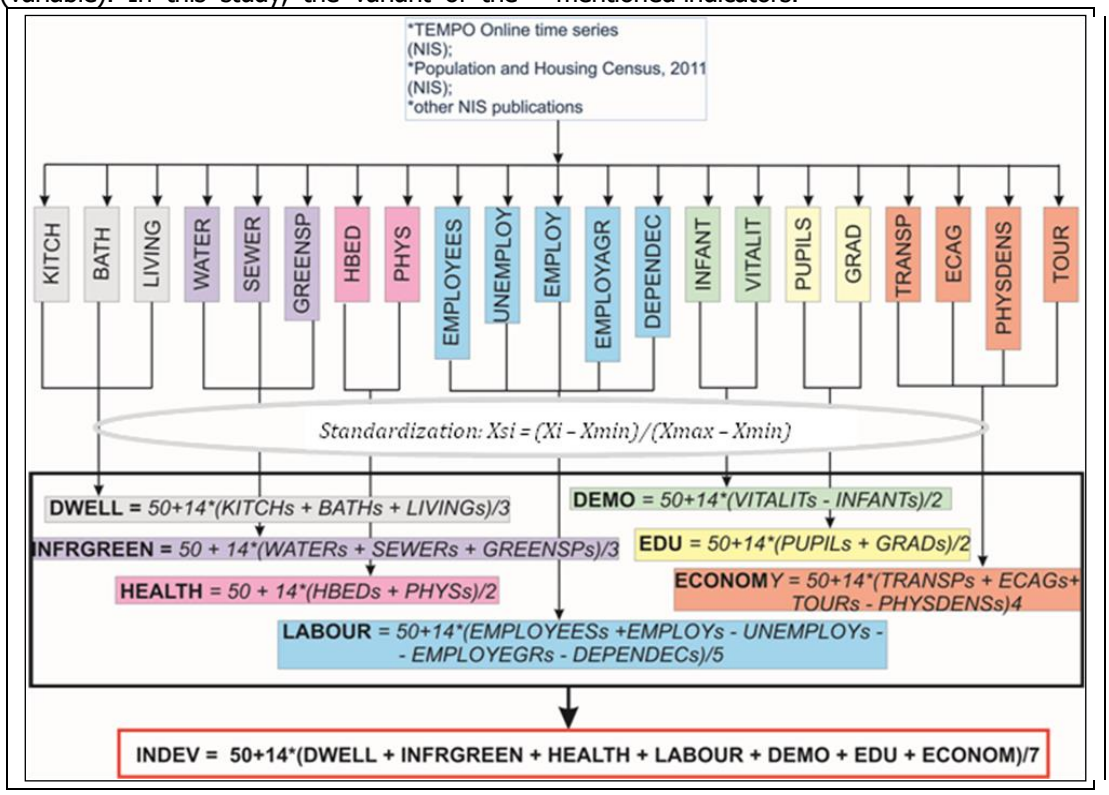

Fig.3: Index design (Source: authors' compilation)

Regarding the indicators with a negative influence on the process of development (e.g. UNEMPLOY, INFANT, DEPENDEC, etc.), the relative distance to the national average for the territorial unit "i" is adapted to this particularity by inverting the fractions (the national average value of these variables being divided by the value specific for territorial unit "i"). According to the methodology of relative distances ranking, the next step is to calculate the average relative distance of each local territorial unit to the national average as a simple geometric mean of the previous ratios for all variables. The local territorial units can be ranked according to the decreasing value of the average relative distance (assimilated to the complex index of territorial disparities (CID).

Results

Identifying and analysing the territorial differences of the secondary index

The secondary index of dwellings comfort (DWELL) shows that the lowest values are clustered over relatively wide areas in Dolj and Brăila counties, and smaller ones in Teleorman, Giurgiu and Ialomiţa counties. The administrative units with a high level of dwellings comfort represent 63% of all of the Danube Valley territorial administrative units, including county-seats, municipia and towns. Some rural units, situated in the neighbourhood of urban centres (Cazasu close to Brăila, Şendreni near Galaţi) have a score comparable to town, because townspeople have built residential places there; a similar situation is specific to the tourist rural settlements located in the Iron Gate Defile and in the Danube Delta (Fig. 4).

The living floor/person (LIVING) is the statistical indicator selected as being determinant for the DWELL category (D = 0.050). The values of this indicator by residential environments show greater scarcity of dwellings in town (18.6 m^2/person) than in the country-side (20 m2/person). In the last ten years, the average living floor/person has been increasing, due especially to increases in the country-side. The largest living floor/person (over 20 m2/person) have the towns of Vânju Mare, Corabia, Sulina, Zimnicea, Moldova Nouă, Orşova, exceeding the average value of the region; similarly, more than 100 communes (in decreasing oder: Carcaliu, Sfântu Gheorghe in Tulcea County, Goicea, Cioroiaşi in Dolj

County and Devesel, Pristol, Burila Mare in Mehedinţi County), register over 30 m2/person.

Mapping the secondary index of public utilities infrastructure (INFRAGREEN) shows that the very low development level is widespread (91% of all the Danube Valley territorial administrative units) because of the null values specific to many rural administrative units in the case of indicators such as "length of the water supply network" (30% of all the Danube rural and urban settlements) and "length of the sewerage network" (in the Valley sectors of the Dolj, Olt, Teleorman and Giurgiu counties the majority of the rural settlements are not connected to the sewerage system). The low level of development in terms of the public utilities infrastructure and green space is characteristic of some Danube towns (e.g. Dăbuleni, Bechet, Vânju Mare, Ţăndărei, Sulina), even municipia (Turnu Măgurele) and is caused by the low values of the length of the water supply and sewerage networks. As regards the "green space area/inhabitant" indicator, small towns meet the EU standard (e.g. Băileşti Municipality has the highest green area/inhabitant (86 m2/inh.), due to the position of the "Balta Cilieni-Băileşti" Protected Area of National Interest inside its administrative boundaries). The average development level registered by the public utilities infrastructure and green space is characteristic of the Danube county-seats and of some other small towns (due to the highest values of the green space area/inhabitant indicator – e.g. Băileşti and Bechet Dolj County, Ianca, Brăila County) (Fig. 5).

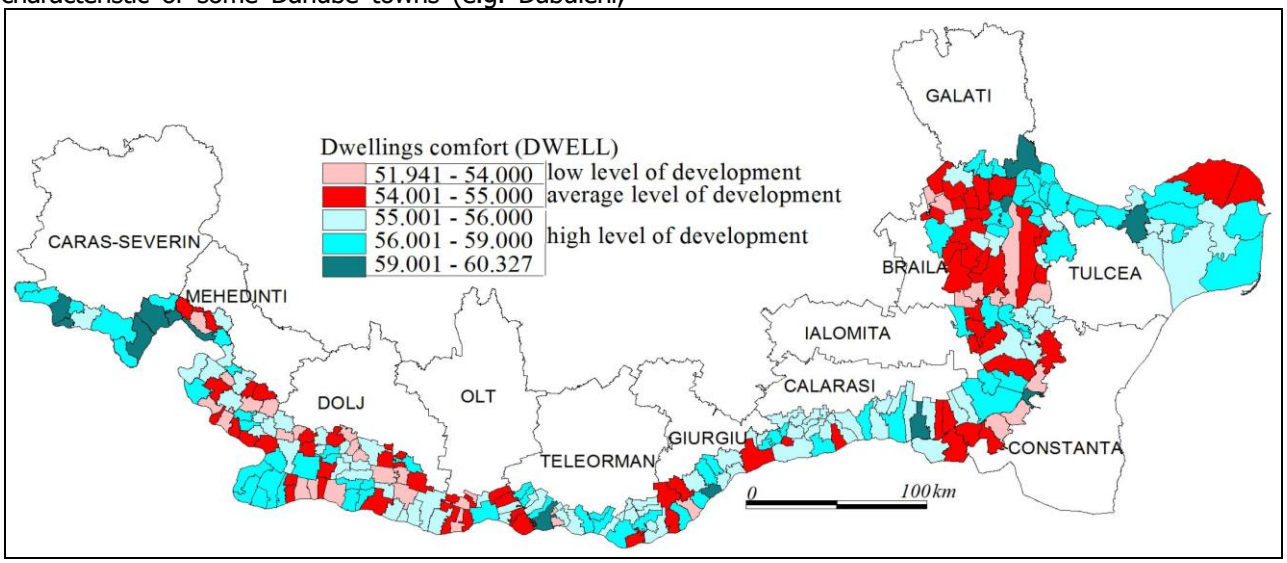

Fig.4: The territorial patterns of dwelling comfort
(Source: 2011 Population and Housing Census and TempOnline statistical data processed and mapped by the authors)

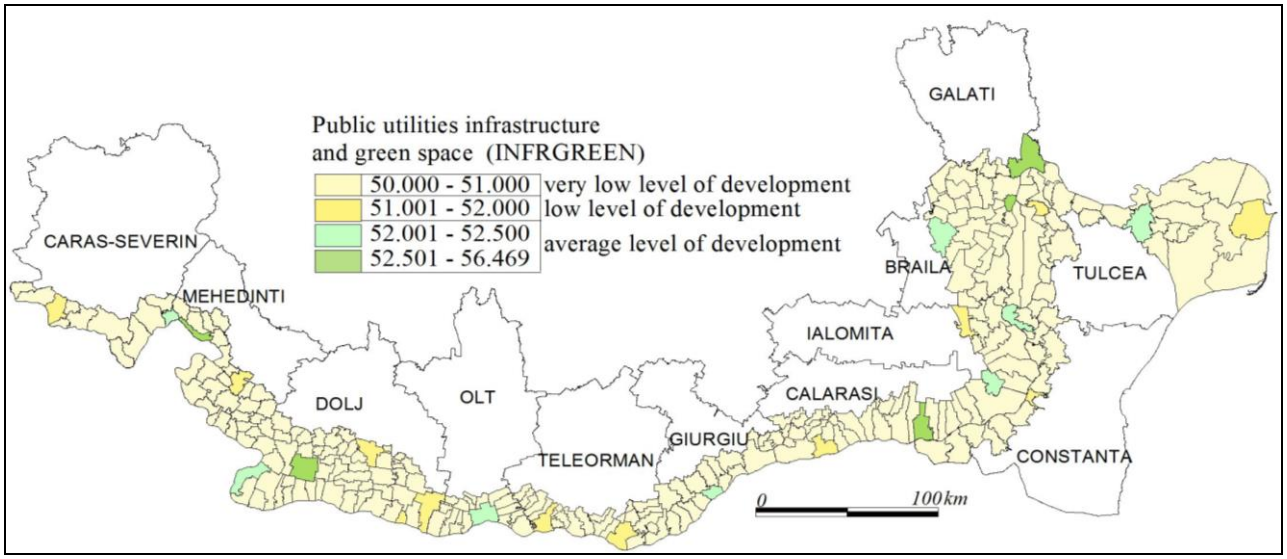

Fig.5: The territorial patterns of public utilities infrastructure and green space development
(Source: 2011 Population and Housing Census and TempOnline statistical data processed and mapped by the authors)

The length of the water supply network (km) (WATER) is the statistical indicator selected as being determinant for the INFRAGREEN category (D = 0.150). In theory, a central-based water supply

system, which treats, surveys and permanently controls the water pumped into the network, warrants quality and safety (Chiriac et al., 2001). In practice, the micro-biological and chemical tests performed by some Danube county environmental protection agencies, which monitor the quality of water, have revealed that 99.3% in town and only 68% in the villages of supplied water meets drinking water standards (Dolj County Environmental Protection Agency, 2010). In 30.4% of all Romanian Danube Valley LAU2 (founded inside the Dolj, Giurgiu, Teleorman and Olt counties) are not connected to the drinking water supply system. Another 27 localities (10% of all) hold less than 10 km. In the Danube countryside 33% of the population live in settlements unconnected to the water supply system. Water is taken from people's own fountains and wells and water catchments which usually are improper to drinking. These are the only alternative supply sources. The low quality is the consequence of the absence of a sewerage system, insufficient waste water treatment, improper building of wells, household waste dumps, etc.

The secondary index of infrastructure and human resources in the health system (HEALTH) registers very low and low levels of development in 91% of all the Danube Valley territorial administrative units (half of them have a very low level) because of the null values of "hospital beds/1,000 inhabitants" indicator and the sub-unity values of "physicians /1,000 inhabitants" indicator. Average and high levels of development have 23 territorial administrative units, the majority being urban localities and only 3 rural settlements. The health care index (Dumitrache, 2004) indicates the geographical distribution of health-care resources in Romania, the most disadvantaged counties being located along the Danube Valley: Ialomiţa County is the poorest in terms of health-care resources, limited resources being in the area of Giurgiu, Teleorman, Olt, Mehedinţi, Brăila and Tulcea counties (Fig. 6).

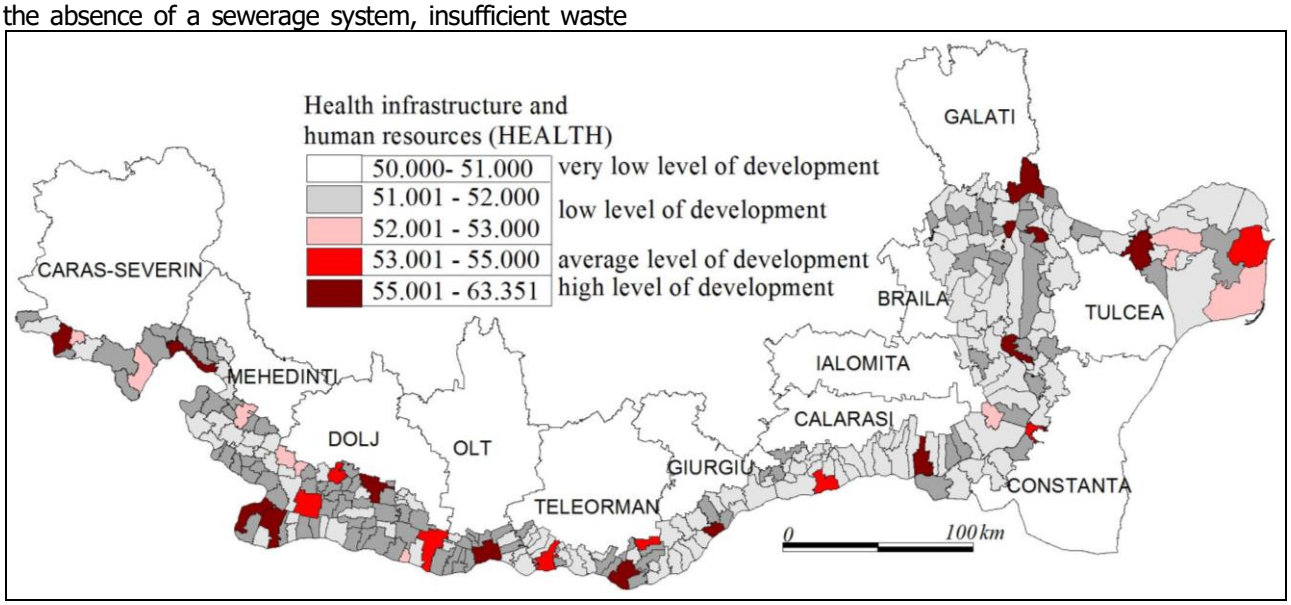

Fig.6: The territorial patterns of the health infrastructure and human resources
(Source: 2011 Population and Housing Census and TempOnline statistical data processed and mapped by the authors)

The number of hospital beds/1,000 inhabitants (HBED) represents the statistical indicator determinant for the HEALTH category (D = 0.100). In Romania, the value of this indicator was of 5.7 in 2013, but according to the National Health Strategy, European values of 4.8 should be attained by 2014-2020. Out of all 266 Danube LAU2, no more than 20 have one or several hospitals (health-centres included) with 9,819 beds in all. The average value of this indicator (5.7 in 2011) results from a value range between a minimum of 5 beds/1,000 inhabitants (Feteşti, Ialomiţa County) and a maximum of 50 beds/1,000 inhabitants (Poiana Mare rural administrative units in Dolj County, population of 10,740 where they have a psychiatry hospital with 540 beds).

The secondary index of employment and unemployment (LABOUR) has the lowest values (44.391) in 97.3% of all of the Danube Valley LAU2, highest ones (51.897) being recorded only in six rural settlements. In fact, the great majority of Danube settlements have alarming labour market problems, as a result of the cumulative effects of restructuring the town industries (top specialisation in the metallurgy in Galaţi, Călăraşi, Ziminicea and Tulcea sector and in the chemical industry in Turnu Măgurele (Ianoş, 2000). The effects of restructuring the town industry was primarily in the downscaling of specific activities and even in stopping them altogether, reducing jobs and closing down units, hence growing unemployment. Along the Romanian Danube Valley, urban economies were severely affected by the restructuring process, the rural

economy being dominated by subsistence. The economic-financial crisis that started in 2008 had immediate and generalised consequences in the territory by increasing the number of the unemployed population (Fig. 7).

The rate of employment in agriculture (%) (EMPLOYAGR) represents the statistical indicator selected for the LABOUR category (D = 0.100). The Danube Valley rural settlements are largely engaged in agriculture. As expected, the structure of the occupied urban population is diversified, with services dominating (Drobeta-Turnu Severin, Bechet, Corabia, Calafat, Giurgiu, Turnu Măgurele, Călăraşi and Sulina), however, industrial activities hold a good share in the occupational profile of the local workforce (Galaţi, Tulcea and Brăila). The territorial distribution of the rate of employment in agriculture shows that the elevated values of this indicator correlate very well with the highest values of the general employment rate (easily observable in the settlements of Balta Brăilei and in some valley sectors of Giurgiu, Olt and Mehedinţi counties).

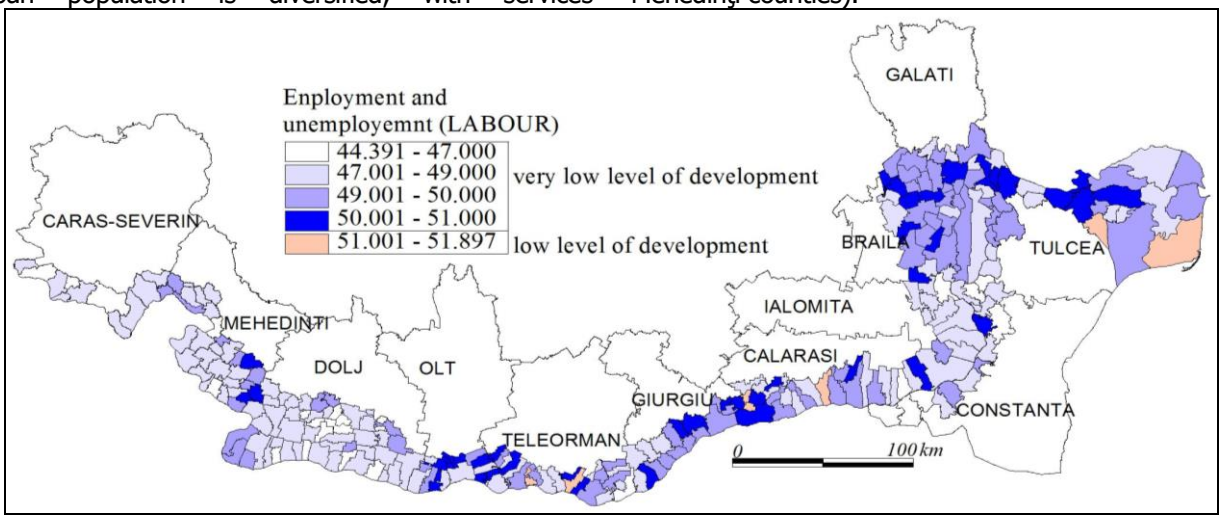

Fig.7: The territorial patterns of labour market development
(Source: 2011 Population and Housing Census and TempOnline statistical data processed and mapped by the authors)

The majority of the Danube urban and rural localities (68.1% total territorial units) register a very low development level in terms of the secondary index of demographic characteristics (DEMO): the cause lies in a mix between the lowest values of the vitality index, which has a positive impact on the development process, and the highest values specific to the infant mortality indicator, that have a negative impact. This class is formed especially by rural administrative units, but there are some urban settlements, too (Orşova, Caraş Severin County and Turnu Măgurele and Zimnicea, Teleorman County). The low level of development is characteristic of one third of all the Danube territorial administrative units spread along the Valley, with some territorial concentrations around the county-seat muncipia (e.g. the cases of Galaţi and Brăila and their surrounding territorial administrative units). The average level is specific only to three territorial administrative units where the vitality index has the highest values (Ţăndărei Town – 307.3% and Stelnica – 170% in Ialomiţa County and Roseti – 150% in Călăraşi County) (Fig. 8).

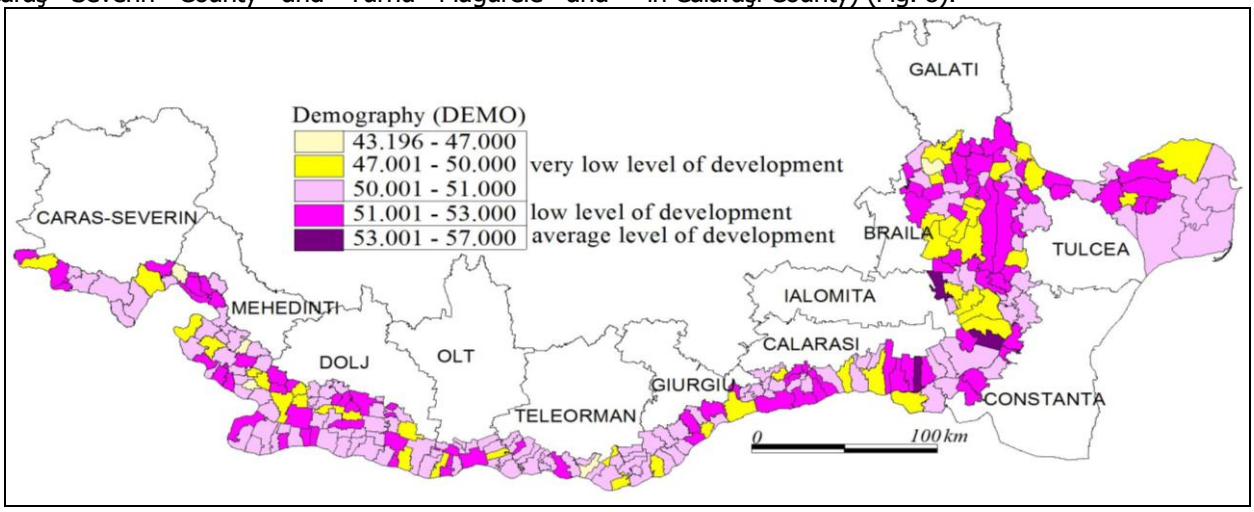

Fig.8: The territorial patterns of demography aspects
(Source: 2011 Population and Housing Census and TempOnline statistical data processed and mapped by the authors)

The vitality index (VITALIT), the statistical indicator selected for the DEMO category (D = 0.150), represents the percentage ratio between the number of live newborns and of deceased people over a certain period of time. Depending on the number of newborns (higher, lower, or equal to the deceased), the vitality index is lower, higher or equal to 100 (when index values near 100, or equal it, the population tends to become stationary, in the absence of migration its number remaining unchanged; when the index tops 100, there are more newborns than dead people and the population tends to increase).

In 2011, the vitality index value of 52.87 indicated a numerical fall in the Danube Valley population, because simple reproduction had not been attained. A detailed analysis of this index by Danube counties shows values above 100 in Călăraşi (6 settlements), Constanţa and Mehedinţi (each with 4 settlements), Brăila and Ialomiţa (3 settlements each), Dolj (2 settlements), Galaţi, Tulcea and Caraş-Severin (one settlement each). Settlements in Olt, Teleorman and Giurgiu counties failed to reach the 100 index value, suggesting that the deceased were in excess of newborns. The low vitality index score in the majority of settlements means the numerical decrease of inhabitants through a negative natural balance and migration of population.

The secondary index of education (EDU) shows that very low and low levels cover most of the Romanian Danube Valley: 93.6% of all territorial administrative units. Very few units (4.5% of total) fall into the class of average education development level: these are urban settlements and some rural localities (with a large number of pupils enrolled in primary and secondary schools, as well as in high schools). The three large Danube county-seats (Galaţi, Brăila and Drobeta Turnu-Sevrin) represent the class of high education development level (Fig. 9).

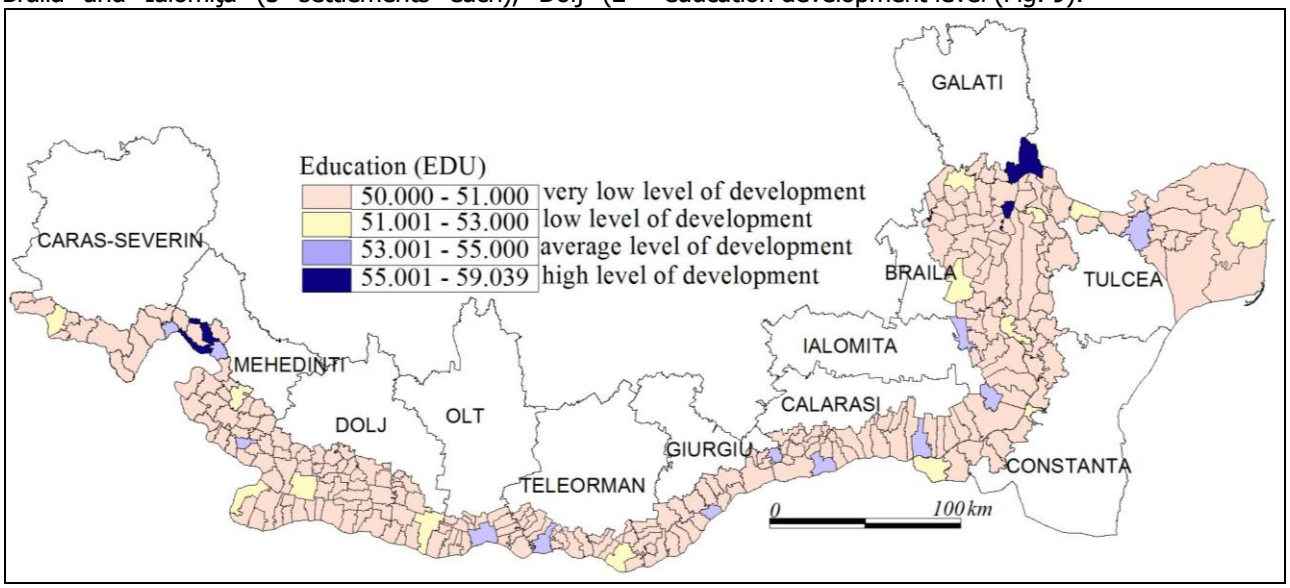

Fig.9: The territorial patterns of the education development
(Source: 2011 Population and Housing Census and TempOnline statistical data processed and mapped by the authors)

The statistical indicator selected for the EDU category (D = 0.100) is the percentage of high school graduates from the total population aged over 20 years (GRAD). In the majority of all Danube territorial units (86.8%), the values of the indicator concerning the percentage of high school graduates from the total population aged over 20 years are null because the high schools are present only in the towns/municipia and in six rural settlements (Izvoru Bârzii, Cujmir, Şimian - Mehedinţi County, Hotarele - Giurgiu County, Poiana Mare, Cetate - Dolj County). Almost half (48.2%) of all high school graduates (16,918 persons) is concentrated in the 55 high schools located in Galaţi, Brăila and Drobeta Turnu-Severin county-seat municipia.

The percentage of high school graduates from the total population aged over 20 years registers the highest values (still only 3% - 6.6%) in some rural administrative units in which high schools operate (Izvoru Bârzii, Cujmir and Hotarele). This is the effect of the shrinking population aged over 20 years in these settlements, compared with the situation specific in the urban settlements, especially in the county-seats muncipia, where the population aged over 20 years is larger and the percentage values are much smaller (Galaţi – 1.9% and Brăila – 1.6%).

The secondary index of the economy (ECONOMY) shows the overwhelming predominance of the very low level of development (96.6% out of the total Danube territorial administrative units). This class includes some of the small Danube towns (e.g. Dăbuleni, Segarcea and Băileşti – Dolj County, Însurăţei – Brăila County, Ţăndărei – Ialomiţa County) and the majority of small port-towns (Moldova Nouă and Orşova – Mehedinţi County, Bechet, Calafat and Corabia - Dolj County, Turnu Măgurele and Zimnicea –

Teleorman County, Giurgiu – Giurgiu County, Oltenița – Călărași County, Hârșova and Cernavodă – Constanţa County, Sulina – Tulcea County) (Fig. 10).

Many of the port-towns lost their economic basis and population, becoming peripheral towns (Hardi, 2013).

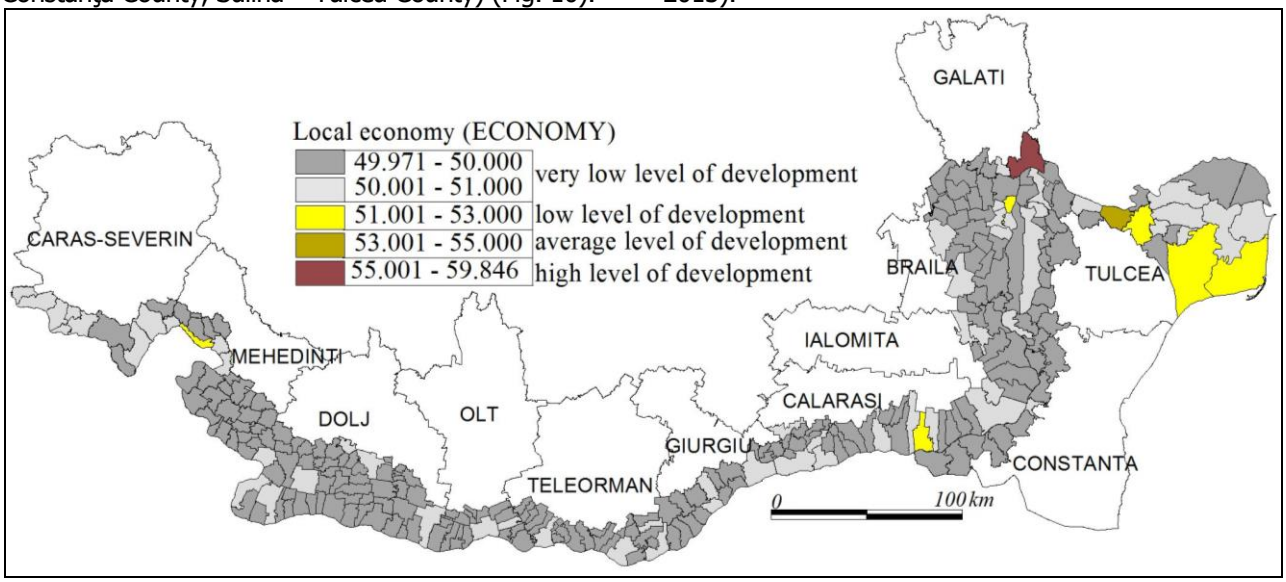

Fig.10: The territorial patterns of local economic development
(Source: 2011 Population and Housing Census and TempOnline statistical data processed and mapped by the authors)

Only six Danube LAU2 have a low developed economy. It is the case of four municipia discharging complex urban economic activities, especially port-related ones (Tulcea, Drobeta Turnu Severin, Brăila and Călărași, which cummulate 22% of all the goods transported on the Danube River), second ranking two rural settlements (Murighiol and Sfântu Gheorghe) located along the Sfântu Gheorghe Arm, in the Danube Delta tourist area. Tourism is the main activity at Somova, is the only territorial unit representative for an average development level. The high development level class includes one LAU2 alone: Galaţi Municipality, which is the most important urban and economic centre of the Lower Danube; it is the largest river-maritime port, located on the left bank of the Danube, which benefits from easy access to the Black Sea (The goods transported on inland waterways in 2012, INS, 2013), also having the largest iron-and-steel plant in Romania (ArcelorMittal Galați), which was state-owned until 2001 (former Sidex) (Popescu, 1991, 2000, Săgeată et al., 2004).

The goods transported on the Danube (thousands tones/km) (TRANSP) is the statistical indicator determinant for the ECONOMY category (D = 0.250). The Danube River in Romanian is the backbone of the Lower Danube and of the entire Danube Region and its economy (Fairway Rehabilitation and Maintenance Master Plan–Danube and Its Navigable Tributaries, 2014), connecting Rotterdam harbour (North Sea) to Constanţa harbour (Black Sea). The 20 Danube harbours facilitate the transport of goods (e.g. agriculture products, coal and lignite, crude oil, metal ores and other mining and quarrying products, wood and wood products, chemicals, chemical products, machinery and equipment, secondary raw materials and municipal waste dumps), the main harbours being Galaţi, Drobeta Turnu Severin and Tulcea, which cumulate 75.5% (3,860,385 thousand tones/km) of the total goods transported on the Danube.

Territorial patterns of socio-economic development

A synthetic profile of socio-economic development attributes in the Romanian Danube Valley was obtained by computing and mapping the complex index of development. In the light of this index, the Romanian Danube Valley settlements fell into three territorial patterns: very low, low and average (Table 2).

Table 2 Synthetic situation of the Romanian Danube Valley local administrative units in terms (LAU2) of patterns of development

INDEV values/ Patterns of socio-economic development	Number of LAU2	Population (inh.)
49,697 – 51,000 = very low level	162	489,673 (28.5%)
51,001 – 52,000 = low level	82	274,239 (15.9%)
52,001 – 56.119 = average level	22	960,016 (55.6%)
Romanian Danube Valley	268	1,723,928 (100%)

Source: authors' compilation

The very low pattern of socio-economic development is characteristic of the majority of Danube LAU2 which cumulate almost 29% of the total Romanian Danube Valley population. This type of socio-economic development is wide-spread along

the Valley, being specific especially to the rural settlements (only one small town is included in this pattern, Însurăţei, Brăila County). The very low pattern of socio-economic development is the result of the structural imbalance at the demographic and economic levels and implicitly in the labour market. Also, this pattern of socio-economic development mirrors major deficiencies in the systems of health, education and public utilities, as well as in the low quality of dwellings (Fig. 11).

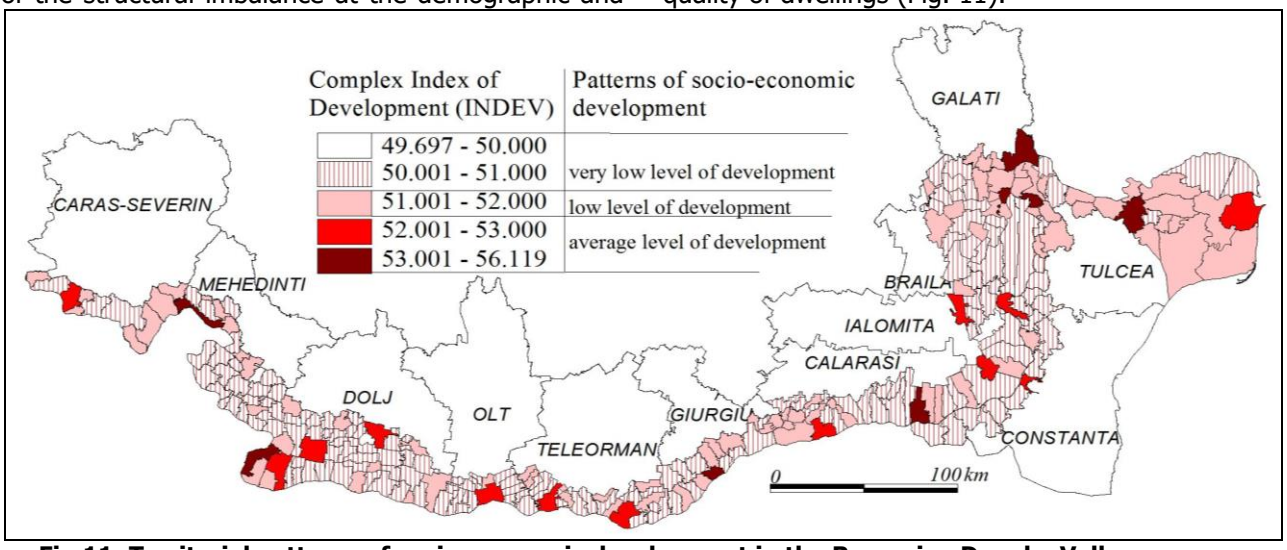

Fig.11: Territorial patterns of socio-economic development in the Romanian Danube Valley
(Source: authors' compilation)

The low pattern of socio-economic development is specific to 80 rural settlements and only 4 towns (Ianca, Brăila County, Isaccea, Tulcea County and Dăbuleni and Bechet, Dolj County). Their socio-economic situation is not much better than that of the very low development ones. The quality of dwellings level and in some cases of economic level (e.g. the rural administrative units located close to large cities, or discharging tourist activities in Danube Delta and the Iron Gate Defile) are the indicators promoting them in the Romanian Danube Valley hierarchy .

More than 20% of the Romanian Danube Valley population live in the 22 towns which fall into the class of average socio-economic development pattern. Their highest secondary index values have a positive impact on the general socio-economic development level mainly through the high quality of dwellings, general public utilities and more dynamic economies, moreover in Galaţi, Brăila and Drobeta-Turnu Severin where population is better-educated and the medical services are the best at regional level.

Comparing the national average values of each statistical indicator selected with the value specific for each territorial unit "i" and with the secondary indexes values analysed above, the Romanian Danube Valley, it falls into a general context of socio-economic development. In terms of territorial disparities in socio-economic development at micro-scale, it is important to underline that the values of the complex index of territorial disparities (CID) above unity (baseline = the national average) indicates the developed (leading) areas versus the national average, while values below unity designate the territorial units which need economic assistance (lagging areas).

In the Romanian Danube Valley, mapping the complex index of territorial disparities ranks between 0.21 and 2.53, revealing the existence of three disparity pattern degrees (Fig. 12).

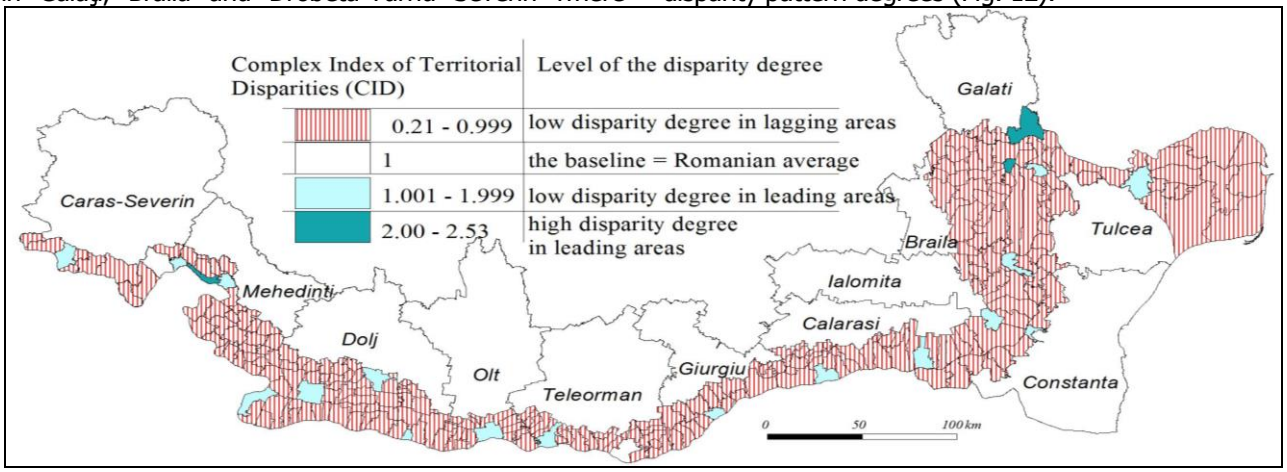

Fig.12: Territorial disparities in the Romanian Danube Valley

The spread of values below unity (92.4% of all of the Danube Valley territorial administrative units) shows the overwhelming predominance of lagging areas, forming the low disparity pattern degree.

This reality shows that 246 of the total of 263 Danube LAU2 units have a socio-economic development level below the national average.

Compared with the national average, the disparity patterns degrees in 7.6% of all Danube settlements are low and average. The majority Danube towns represent the leading urban segmented areas with low disparity degree, the difference between them and the national average being reduced.

Conclusion

The present study shows the Romanian Danube Valley to be a wide lagging area, with leading urban centres. The less-favoured areas, socio-economically developed are spread all along the Valley (rural lagging being in the Dolj, Teleorman, Ialomişa, Brăila and Tulcea counties). There are also urban centres with a good socio-economic potential for development (Galaţi, Brăila, Drobeta Turnu-Severin, Tulcea etc.), and small towns (Moldova Nouă, Băileşti, Corabia, Cernavodă, etc.). The influence of towns (especially of Galaţi, Brăila, Drobeta Turnu-Severin and Tulcea municipalities) on their neighbouring areas confirms the spillover effect.

Looking at the socio-economic life, the Romanian Danube Valley was and still is experiencing an uneven development. The basic solution for the less developed areas is to connect the local/regional communities to the opportunities offered by developing cities. The convergence of living standards will occur as benefits from leading urban areas spill over to surrounding communities and people who had left the rural and small urban lagging areas bring capital, jobs and modern ideas. The outflow of town population to the surrounding country-side, relatively recently experienced by Romania (Ianoş, 1998, WB, 2013), has resulted in suburbanization in metropolitan area Galaţi-Brăila within the Romanian Danube Valley. The development policy should focus on measures to create conditions for the rural to absorb the positive effects of development from urban areas and reinforce their functional links.

Key investment priorities should be different in the Romanian Danube Valley between leading and lagging areas. Driving forces in lagging areas might consist in basic public utilities, education, health, and the implementation of measures targeting the marginalised groups or communities. The importance of public utilities is reflected by the statistical coefficient of correlation between the ranking values of secondary indexes of the public utilities infrastructure and services and the INDEV values. This coefficient is more than representative: R2 = 0.897. Also, the values of this statistical coefficient of correlation and human resources in health and education systems and the INDEV values are statistically representative (R2 = 0.885 and R2 = 0.780, respectively) suggesting that an increase in these domains might ensure a higher socio-economic development for lagging areas.

Improving the connective infrastructure between cities and surrounding areas and promoting quality-life investments represents a key driving-force for turning lagging areas into leading areas. At mezo-scale, improving the connection between developed areas and less-favoured areas at macro-scale (country) level would enable efficient concentration of resources and spillover effects.

The existing geographic distribution of socio-economic development patterns in the Romanian Danube Valley is the result of driving forces which have actioned in a distinctively and with variable intensity during the last 25 years as well as before 1989. In this respect, the future research agenda includes assessement of the main changes in the territorial patterns of socio-economic features, the outcome outlining the future spatial trends of less-favoured and of developed areas. The future research agenda will be in line with the EUSRD priority areas, especially with PA9 - "*Investing in People and Skills*", which referes to this topic of great importance not only for the Danube Region, but also for Europe 2020.

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