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## Comparative analysis of the basic infrastructure's development level, by urban-rural typology

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# COMPARATIVE ANALYSIS OF THE BASIC INFRASTRUCTURE DEVELOPMENT LEVEL, BY URBAN-RURAL TYPOLOGY

MIHAI ALEXANDRU CHÎȚEA<sup>1</sup>

**Abstract:** *The present paper follows the evolution of the basic infrastructure development, at county level, focusing on the urban-rural typology, on a ten-year period, starting from the premises of its importance to sustainable development at territorial level. The paper turns to usual statistical methods for the analysis of the indicators specific to this domain, derived from official statistical data sources. The working hypothesis was the following: there is a significant disparity between the categories of counties, by urban-rural typology, namely a lower development level in the case of predominantly rural counties, compared to intermediate and predominantly urban ones, a process that imposes a concentration of investment efforts at this level, in order to reduce the current territorial disequilibrium.*

**Keywords:** *basic infrastructure, county level, urban-rural typology.*

**JEL Classification:** O18.

## INTRODUCTION

The present paper follows the evolution of the main indicators that express, in the author's vision, the basic infrastructure development across counties, on a ten-year period from the moment of Romania's accession to the European Union, by urban-rural typology. This represents a key element to support the economic development of a territory, being one of the most important factors taken into consideration by the potential investors in their decision to develop the existing/ new businesses. In this context, Puia asserts that the development of infrastructure has been a major priority at the level of the actors involved in the socio-economic activity, from public authorities to private organizations and civil society [3]. Romania's integration into the European Union structures represented an essential moment, from this point of view, through the inflow of European funds meant to narrow the territorial gaps between the EU New Member States and the EU average. According to the National Commission for Prognosis, the implementation of the structural funds had a net positive effect on the Romanian economy and society [1]. This process was doubled by the financial efforts from the national budget, so that the evolution of specific indicators followed an upward trend, however differentiated by the urban-rural typology. As expected, the development process mainly targeted the rural and intermediate areas, which, at the moment of accession, had a less developed basic infrastructure compared to the predominantly urban areas. In this context, the efforts focused on these areas determined a stronger dynamics of specific indicators, yet the final values continue to signal out a series of territorial gaps that are maintained between the categories of territorial units, by urban-rural typology.

## MATERIALS AND METHODS

In order to evaluate the basic infrastructure development level by counties, we used classical statistical analysis methods, tracking the evolution of 4 specific indicators, considered relevant in our approach, namely the share of modernized roads in total public roads and the share of localities connected to the public utility networks (drinking water, natural gas supply, sewerage networks). The data were extracted from the Tempo-online database of the National Institute of Statistics and processed in Excel. For the graphical representations we used GIS GeoDa software, in which we introduced the values resulting from primary data processing, corresponding to the 42 counties in Romania. Based on them, graphical representations of map type were generated, which highlight the evolution of selected indicators across counties, in the period 2007-2017.

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## RESULTS AND DISCUSSIONS

The first indicator considered relevant for the evaluation of the basic infrastructure is the share of modernized roads in total public roads. The quality of road transport infrastructure is an important indicator for any potential investor, the fast access to the national and European road network being an essential condition for carrying out various economic activities. According to Fistung, as a member of the EU, Romania needs to modernize the transportation system, according to the European common market principle [2]. It is without doubt that the extension of the road network (including here the highways) is also an important element, but having in view the particularities of such an endeavor, i.e. the high costs involved and the long execution time, we consider that, from the perspective of the current approach, a qualitative indicator (modernization of road infrastructure) better corresponds to our purpose.

At national level, in the period 2007-2017, the length of public roads followed a slightly upward trend, to reach 86099 km in the year 2017, by 6.4% higher compared to that in the year 2007. The slow expansion rate of the public road network was based on both economic and institutional factors. The lack of coherent programs for road transport infrastructure extension, the difficulty of providing funding from the public budget, as well as the complexity of attracting European funds for this purpose (including here the long periods of time necessary for preparing the technical and financial documentations, the bidding procedures and the execution of works), aspects that have been increasingly reported in recent years in the public space, both by the representatives of the business environment and of the civil society, have determined the same slow increase rate of the length of public roads.

By urban-rural typology, a stronger rate of road infrastructure extension and modernization in the period 2007-2017 was noticed in the case of predominantly rural counties; the national rural development programs of the two programming periods, as well as the local development programs have essentially contributed to the improvement of the road network quality at this level, the share of modernized roads being 43.7% in the year 2017, above that of intermediate counties. In the case of these counties, road infrastructure also benefitted from investments in the investigated period, both for the extension of the road network and for road modernization.

**Table 1. Evolution of the length of public roads, by urban-rural typology, 2007-2017**

County category	2007		2017	
	Length-km	% modernized	Length-km	% modernized
Predominantly rural	45982	29.7	49204	43.7
Intermediate	34021	23.1	36006	35.8
Predominantly urban	890	63.1	889	54.1

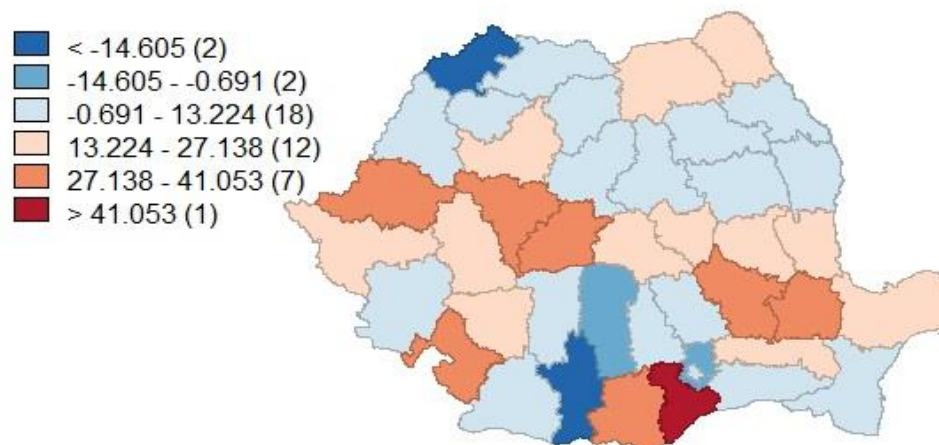
*Source: author's processing based on Tempo Online data, NIS*

Another interesting aspect can be noticed in the predominantly urban counties, where the share of modernized roads decreased from 63.1% in the year 2007, to 54.1% in 2017. This in the conditions in which, for Bucharest municipality, the road network has been entirely modernized, the difference being made by the county Ilfov, where the share of modernized roads decreased from 59.5% to 48.9%. This phenomenon can be attributed to the fast development of the economic activities and of the real estate sector in the investigated period, which led to the significant increase in traffic values (heavy traffic in particular) and to a faster deterioration of road infrastructure implicitly, for which no sufficient funds were allocated.

At county level, in the period 2007-2017, most territorial units had an upward evolution in terms of road quality infrastructure, represented by the increase in the share of modernized roads in total roads. The counties Olt, Satu Mare, Ilfov, Argeş and Maramureş are an exception, in which this share decreased, in certain cases significantly: Olt – -19 pp, Satu Mare – -16.7 pp and Ilfov – -10.6 pp. In this category we find units representing all the types of counties, by urban-rural typology. As regards the counties where the road infrastructure quality increased, these are mainly represented by the predominantly rural counties, being concentrated in the south-eastern, southern,

north-eastern, central, western and south-western areas, among which we mention the following: Buzău (+27.4 pp), Mehedinți (+27.9 pp), Arad (+30.0 pp), Teleorman (+32.8 pp), Alba (+35.1 pp), and Giurgiu, which ranks 1<sup>st</sup> with +42.7pp.

**Figure 1. Dynamics of the share of modernized roads, at county level, 2017/2007 (percentage points)**



*Source: author's Geo Da processing, based on Tempo-Online, NIS data*

However, the road infrastructure quality at county level remains an important problem – the investments made in this field in the investigated period contributed to its improvement, significantly in certain cases, but the present modernization level continues to be low, below 50%, for most territorial units.

Another important indicator for the evaluation of the development level of the technical infrastructure is represented by the share of localities connected to the drinking water supply network. As a basic element of infrastructure, alongside with the sewerage network and the natural gas supply network, its presence at county level contributes not only to the increase of the population's life quality but it is also an important criterion for carrying out economic activities at this level.

Nationwide, in the period 2007-2017, the investments made both through the national development programs, with financial support from the EU, and through the local initiatives, determined the expansion of the drinking water supply network at national level. As a process that requires a certain technical complexity, the network expansion was performed at a slower pace, yet constantly, throughout the investigated period. This was translated, at national level, by the increase of the share of localities with drinking water supply network from 62.5% in the year 2007, to 79.7% in 2017, by 14.5 percentage points respectively.

**Table 2. Evolution of the share of localities with drinking water supply network, by urban-rural typology, 2007-2017**

County category	2007		2017	
	No. of localities with drinking water supply network	% of total	No. of localities with drinking water supply network	% of total
Predominantly rural	1194	62.9	1462	77.0
Intermediate	853	68.9	1040	83.7
Predominantly urban	23	56.1	32	78.0

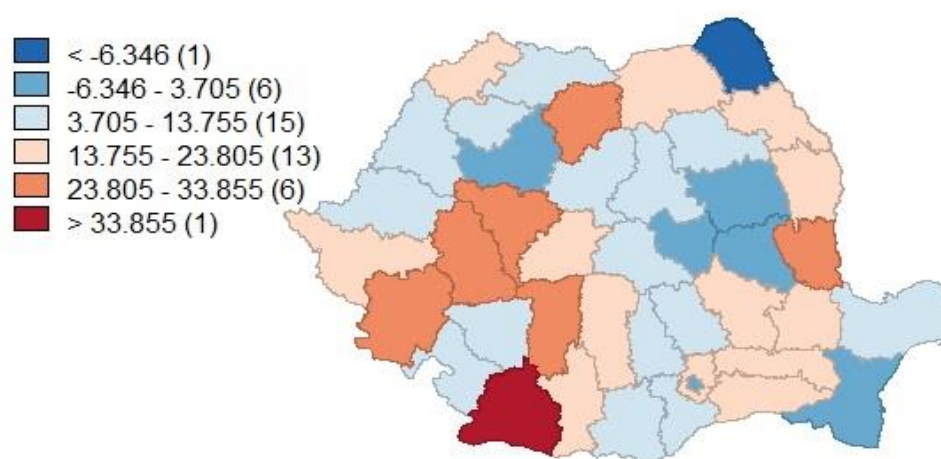
*Source: author's processing based on Tempo Online, NIS data*

As regards the evolution by urban-rural typology at county level, all the three categories of counties followed an upward trend of the share of localities with drinking water supply network in the period 2007-2017.

As expected, the efforts mainly targeted the predominantly rural areas: in this case the number of localities with drinking water supply network increased by 268 in the investigated period; in this conditions, by the end of 2017, the share of localities benefiting from drinking water supply reached 77.0%, close to that of the urban areas. In the case of urban localities, excluding Bucharest municipality (where the presence of the water supply network was maintained constant), the evolution of the indicator was strictly based on the development of the network in Ilfov county, where the number of localities increased from 23 in the year 2007, to 32 in 2017, leading to the increase of this share, per total rural areas, from 56.1% to 78.0%.

At county level, in the period 2007-2017, most territorial units followed an upward trend in terms of the share of localities with drinking water supply network. Botoşani county is the only exception, where this share decreased from 67.9% to 61.5% in the investigated period.

**Figure 2. Dynamics of the share of localities with drinking water supply network, at county level, 2017/2007 (percentage points)**



*Source: author's Geo Da processing, based on Tempo-Online, NIS data*

Other 3 counties, namely Constanţa, Bucharest municipality and Vrancea had identical values with those from the reference year. The counties that followed a strongly increasing trend in terms of water supply network extension (with an increase by over 20 percentage points) are located in the north-eastern, south-eastern, southern, north-western, central and south-western areas, being mainly predominantly rural countie: Buzău (+20.7 pp), Satu Mare (+23.6 pp), Alba (+26.9 pp), Vâlcea (+28.1 pp), Bistriţa-Năsăud (+30.6 pp) and Caraş-Severin (+33.8 pp).

We also find a predominantly urban county in this category, namely the county Ilfov, as well as 3 intermediate counties, namely Iaşi, Galaţi and Dolj. Although at the end of the year 2017 most counties had values over 80%, there are still territorial units with modest values in terms of the share of localities with drinking water supply network, namely Giurgiu, Teleorman, Suceava and Dolj.

An important element of the basic infrastructure is represented by the sewerage network, this complementing the drinking water supply network. Although the two networks can also exist separately, in environmental protection terms, the existence of the sewerage network ensures the disposal of wastewater from households and economic operators through a circuit that finally allows wastewater treatment before it is released into the natural circuit. On the other hand, having in view the complexity level of such an endeavor (in technical, economic, execution period terms), the expansion of the sewerage network is a more expensive and complicated process, presupposing a longer period of time for its execution.

Nationwide, in the period 2007-2017, the share of localities with sewerage network followed an upward trajectory, from 23.1% in 2007, to 39.3% in 2017.

By urban-rural typology, the counties with the most numerous sewerage network extension projects in the investigated period were the predominantly rural counties, the number of localities with sewerage network increasing from 374 in the year 2007, la 702 in 2017, so that their share in total localities increased by 17.3 percentage points. However, this remains a low value, so that more than 60% of the localities in this category do not have access to this basic infrastructure element.

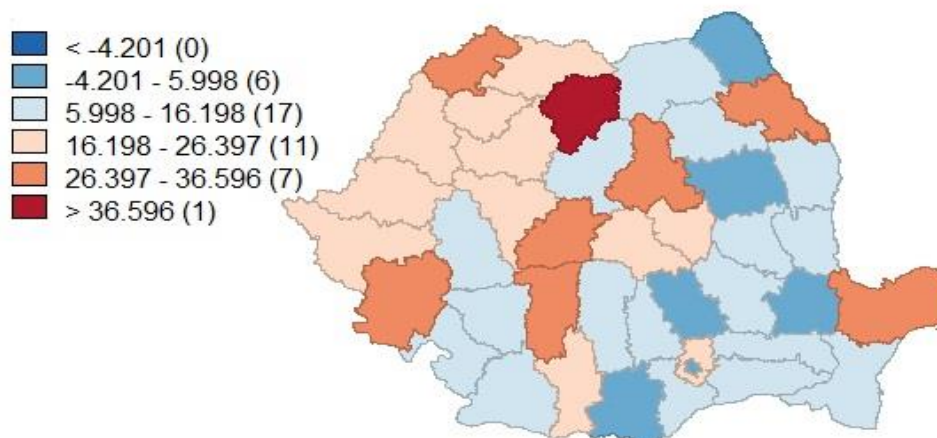
**Table 3. Evolution of the share of localities with sewerage network, by urban-rural typology, 2007-2017**

County category	2007		2017	
	No. of localities with sewerage network	% of total	No. of localities with sewerage network	% of total
Predominantly rural	374	19.7	702	37.0
Intermediate	342	27.6	520	41.9
Predominantly urban	19	46.3	29	70.7

*Source: author's processing based on Tempo Online, NIS data*

In the intermediate counties the sewerage network also increased in the analyzed period, the share of localities increasing from 27.6% in 2007, to 41.9% in 2017; in this case, too, most localities are not connected to the sewerage network. In the case of predominantly urban counties, except for Bucharest Municipality, the investments in network expansion were made in the county Ilfov, the number of connected localities increasing from 18 to 28 in the investigated period.

**Figure 3. Dynamics of the share of localities with sewerage network, at county level, 2017/2007 (percentage points)**



*Source: author's Geo Da processing, based on Tempo-Online, NIS data*

At county level, in most units the share of localities with sewerage network increased in the period 2007-2017; the counties Bacău, Botoșani and Brăila are an exception, with a decreasing trend by more than 2 percentage points. At the opposite pole, i.e. the territorial units with significant increases of the share of localities (by more than 20 percentage points), we can mainly find predominantly rural counties, like Alba (+21.2 pp), Covasna (+22.2 pp), Harghita (+26.9 pp), Tulcea (+27.5 pp), Vâlcea (+29.2 pp), Satu Mare (+33.6 pp), Caraș-Severin (+36.4 pp) and Bistrița-Năsăud, which ranks first, with 38.7 pp. 4 intermediate counties – Timiș, Cluj, Sibiu, Iași, as well as a predominantly urban county – Ilfov, complete this ranking. In terms of territorial distribution, these are mainly found in the north-western, central and western areas. Despite an obvious development of the sewerage network in all the categories of counties, most of them still have low values of the share of connected localities, i.e. under 50%; in certain counties, such as Teleorman,



Brăila, Giurgiu, Botoșani, Dolj, Ialomița and Vrancea, the share of connected localities is even under 20%. Only 6 counties exceeded 60% at the end of the period of analysis, out of which 3 predominantly rural counties (Caraș-Severin, Covasna and Harghita), an intermediate county (Cluj) and two predominantly urban counties (Ilfov and Bucharest Municipality).

The last specific indicator for basic infrastructure is the share of localities with natural gas supply network. Alongside with the drinking water supply network and the sewerage network, the natural gas supply network is a key element of basic infrastructure. Nationwide, in the period 2007-2017, efforts were made to extend the natural gas supply network, but having in view the technical and economic particularities, the intensity of this process was low, and the share of localities increased by only 3.5 percentage points.

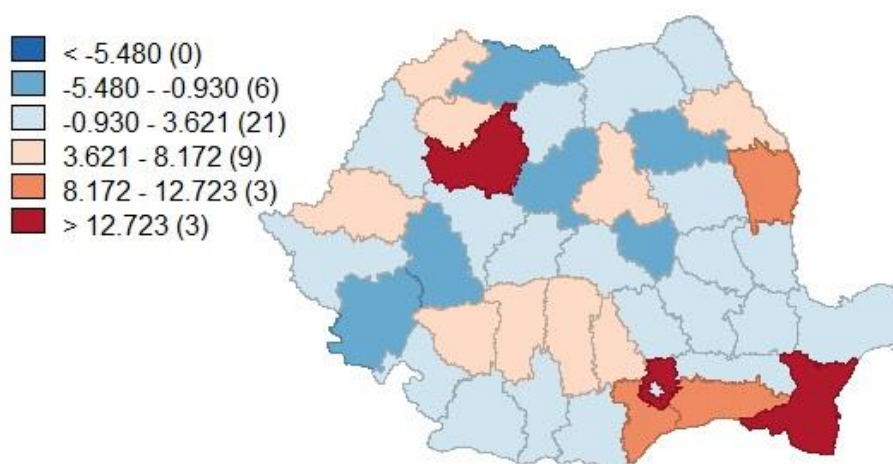
**Table 4. Evolution of the share of localities with natural gas supply network, by urban-rural typology, 2007-2017**

County category	2007		2017	
	No. of localities with natural gas supply network	% of total	No. of localities with natural gas supply network	% of total
Predominantly rural	412	21.7	469	24.7
Intermediate	363	29.3	414	33.3
Predominantly urban	32	78.0	38	92.7

Source: author's processing based on Tempo Online, NIS data

By urban-rural typology, the expansion of the natural gas supply network mainly targeted the predominantly rural and intermediate counties, the number of localities increasing by 57 and 51 respectively, in the period 2007-2017. This process determined the increase of the share of localities with natural gas supply network to 24.7% in the predominantly rural counties and to 33.3% in the intermediate counties, which are still low values. In the case of predominantly urban counties, the share of localities reached 92.7% in late 2017, due to the expansion of the network in Ilfov county.

**Figure 4. Dynamics of the share of localities with natural gas supply network, at county level, 2017/2007 (percentage points)**



Source: author's GeoDa processing, based on Tempo-Online, NIS data

By counties, in the investigated period, the share of localities connected to the natural gas supply network increased, yet at a slow rate. An exception is represented by the counties Covasna, Hunedoara, Maramureș, Caraș-Severin, Neamț and Mureș, where the evolution followed a decreasing trend, in the sense of decrease in the number of localities with natural gas supply

network and of the share in total localities respectively. In this group we find both predominantly rural and intermediate counties. At the opposite pole, i.e. counties with a stronger increase of the share of localities, we can mainly find predominantly rural units – Satu-Mare, Dâmbovița, Călărași, Vaslui and Giurgiu and intermediate units – Constanța and Cluj, as well as one predominantly urban unit, i.e. Ilfov county. Out of these, in the year 2017, only 3 counties had a share of localities connected to the natural gas supply network of over 50%. The counties with the most extended supply network in the year 2017 were Brașov (72.4%), Sibiu (76.6%), Mureș (80.4%), Ilfov (92.5%) and Bucharest municipality (100%). In the case of Mureș county, although the number of localities with natural gas supply network decreased, the share continued to be one of the highest at county level in late 2017. However, the presence of the natural gas supply network remains low in most counties, with shares below 30%. In certain cases, like in the counties Mehedinți, Teleorman, Tulcea and Botoșani, the share did not exceed 10%.

## CONCLUSIONS

The decade that passed from the moment of Romania's accession to the European Union marked an obvious process of basic infrastructure development at county level, which received significant financial support from the European programs devoted to infrastructure development. Furthermore, these also represented an impetus for national authorities to focus their efforts and resources on complementing the EU funds and participate in basic infrastructure development programs. Together, these contributed to the upward evolution of specific indicators, mainly in the predominantly rural and intermediate counties, which were the main beneficiaries of the European and national programs. However, at the level of most specific indicators, there is still a significant gap between these and the predominantly urban counties, and this situation highlights the need to continue the efforts of expansion/modernization of the public utility networks in these areas in the next programming period as well. This process is an essential condition both for increasing the people's quality of life and for supporting the overall economic development, by ensuring the basic conditions for carrying out any economic activity.

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