Urban Development, Significant Factor in The Economic Development of The Regions

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Abstract

Global economic development has always been accompanied by a complex process of urbanization and an important role has been played by the development of effective strategies at the level of these communities. The purpose of this analysis is to determine the manner and extent to which the economic growth of the regions of the country, has been influenced by certain financial, social, population-setting factors, of public utilities and the administration of the territory, specific to the urban environment, with the help of econometric analysis on panel data and by comparative analysis applied on two data sets from 2000-2019, for the eight regions of the country.

The results of the final analysis, obtained using the REM_{robust} model, showed the significant influence of nine factors, from twelve indicators investigated, on the result indicator-$PIB_{regional}$.

These analyses are the levers through which decision-makers can capitalize on financing opportunities, through viable regional development projects.

Key words: development plans, economic growth, regions
J.E.L. classification: C23, H79, I31, R11

1. Introduction

In the current period, when Romania is experiencing the major effects of the global economic crises, as well as the social and economic impact of the Covid-19 pandemic, there is increasing pressure on public funds, both from the state budget, as well as those from local budgets, and the authorities are constantly looking for solutions to achieve a judicious allocation of public resources, as well as a prioritization of investment objectives with a significant impact on the quality of life of the citizens of the country.

An important tool for economic recovery and a transition to a green and digital society can be harnessed with help of the recovery mechanism, launch by European Union-wide, which is a lever to increase the country's resilience. Reforms and investment projects, which underpin recovery and increase the resilience capacity, are based on six pillars: *transition to a green economy; digital transformation; smart, sustainable economic growth, social and territorial cohesion; health and institutional resilience; children, young people, education, and skills* (*The National Recovery and Resilience Plan of Romania*, 2021). But, in order to achieve the general objectives, such as *sustainable economic growth, social and territorial cohesion*, we need to set specific objectives, and these are influenced by the characteristics of each region of the country.

This fact was the motivation of present research, namely, the analysis of some factors that characterize the eight regions of the country and how they can influence their economic evolution.

In the literature were found practical works, such as: studies elaborated by various specialized organizations, as well as reports realized over 1-5 years by regional development agencies, where graphical and tabular comparisons of data reported for two similar periods are presented. (*The Development Plan of the Central Region 2014-2020, 2020, Studies and analyzes-North-West RDA, 2020*).

Also, were carried out academic research papers focused on sociological, political, geographical, economic studies, but with a pronounced descriptive character for example in a study of regional disparities in Romania the geographical research methodology is used (Săgeată, 2007).

A practical approach was carried out in an analysis on the economic characterization of the eight regions of the country, but also on the highlighting of economic and social disparities, carried out in 2009, using the main components analysis method (PCA), but the situation of the regions has evolved, and new data has emerged, as well as new methods of analysis (Lefter and Constantin, 2009).

At the same time, we found econometric studies, but in which other categories of indicators were used and the total values of indicators at the level of the regions were not compared with the values specific to the urban environment in those regions, in order to be able to highlight the level of influence of these categories of factors.

The purpose of our paper is to emphasize the importance of analysing some phenomena and social economic processes that can influence regional development, over a period of 20 years, which includes a period before Romania's accession to the European Union, as well as the post-accession period. These analyses must adapt step by step to the new requirements arising from social-economic, structural and technological changes.

The main objective of the analysis is to determine how, but also the extent to which they can influence the economic development of the regions of the country (represented by the evolution of the regional GDP), certain categories of factors specific to the urban environment, (*financial indicators; indicators of social statistics; indicators of economic statistics; indicators specific for public utilities of local interest and administration of the territory; indicators specific for the migration of the population*). The originality of this paper consists in the construction of a three-dimensional econometric analysis model to examine the effects of several relevant indicators (presented in Table 1) on regional GDP, addressing the particularities of each region of the country and their evolution over time. In order to analyse the heterogeneity factor, two models were considered for comparison: The Fixed Effects Model (FEM) and the Random Effects Model (REM), and finally the most suitable model for the analysis of the influence of independent variables on the dependent variable was chosen.

The work was structured as follows: *the first part* includes the introduction, where we defined the purpose and objective of the research, followed by *the second chapter* with a brief presentation of the specialized literature; in *the third part* we presented the research methodology and the methods used; *the fourth part* includes the results of econometric analysis and the appropriate econometric model resulted for the analysis of the proposed indicators, followed by the discussions contained in *the fifth part*, and in *the sixth chapter* are the conclusions and proposals of the study.

2. Literature review

A country's sustainable economic development is achieved through well-founded investments, so that all its regions are supported by investment, but at the same time help more the less developed regions in the faster transition to the desired level. For developing countries, the investment effort is supported by both the private and public sectors.

The economic development of the country is characterized by the economic growth of each region, which they are also influenced by endogenous and exogenous factors. In the regional theory put forward by Zaman, it groups economic growth factors into endogenous factors - represented by *local resources, local infrastructure and local actors* and exogenous factors - represented by the *infusion of external capital, with innovations implemented from outside the region and a infrastructure determined by external factors*. For a sustainable development of the regions of the country, it is important to place a special emphasis on endogenous factors, as an important element of regional performance is the internal capacity of each region to develop, namely: *productive capital, human and social capital, creative capital* and, lately, *ecological capital*. Endogenous development models were also approached from the perspective of regional development theories, using the econometric model, having as its dependent variable "annual regional gross domestic product", but which has been empirically tested using a set of proposed independent variables, consisting of: *total R&D expenditure by region, productivity of regional labour, population*

employed by region, gross fixed/annual capital formation by region, employment in high-tech industries by region and inter-regional inequalities (Zaman et al, 2015).

An analysis of the economic and social disparities at regional level in Romania was carried out using the method Gini/Struck concentration coefficients, (this method was frequently used in spatial planning*).* The values of coefficients were presented for the regional level, by comparison between the years 2008 and 2011 for: *concentration of the Gross Domestic Product per capita, demographic concentration, labour force concentration, companies' concentration, and concentration of local budgets and of regional infrastructure* (Antonescu and Popa, 2014).

In another paper, an analysis was carried out on the optimal level of regionalization (which would be the optimal size of the regions) in the Central and Eastern European area and a number of conditionalities were presented, which should be taken into account in order to increase the social and economic performance of the regions, but also to address the specific problems of each region, such as economic disparities and poverty (Sandu, 2012).

Also, Melecký create an econometric panel data model with techniques using Dummy variables for a regional competitiveness evaluation, to observe regional disparities for 35 regions at NUTS level 2 of selected EU15 countries, in the reference period 2000 – 2008 using the *Gross domestic product* as explained variable and *Gross fixed capital formation, Gross domestic expenditures on research and development, Net disposable income as independent explanatories variables.* (Melecký and Nevima, 2011).

In a study, from 2016, the dynamics of economic growth and its determinants are analysed and presented, using the model with panel data, for the period 1996 – 2011, in the cities that act as growth poles in regions in Romania, respectively Brasov, Cluj-Napoca, Constanta, Craiova, Iasi, Ploiesti and Timisoara. The indicators considered where: *number of students, unemployment, investment in research and development, population, and migration* (Simionescu, 2016).

However, in the analysed works we did not find a comparative presentation of the influence of economic growth by certain categories of factors, by using the total values at the level of the region and the values specific to the urban environment, therefore we propose the analysis that follows.

3. Research methodology

The purpose of this research is to determine the degree of significance of certain factors specific to the urban environment, in the development of each region of Romania.

The question, which was the basis of this research, is **whether the evolution of indicators specific to the urban environment** (*financial, social, investment, those specific to public utilities and those specific to population mobility*) **have a significant influence in the economic development of the regions of the country?**

How and to what extent they can influence the evolution of the result indicator, represented by the economic development of the regions of the country, i.e., *regional GDP*?

In order, to demonstrate the importance of the influence of factors in the urban environment, we have compiled two sets of panels, using the available data from the period 2000 – 2019, specific to the 8 regions of the country, extracted from the TEMPO - online databases of the Romanian National Institute of Statistics, which we processed using the STATA-1 statistical analysis software.

In this research, we analysed 33 factors that could have significantly influenced the economic development of Romania's regions, and finally selected 12 independent variables (presented in Table no.1) to build the model of analysis and estimation of their degree of influence.

Table no 1. The dependent variable used for panel data regression – for the 8 regions of the country

Category of indicators	Specific Indicator / unit of measurement	Indicator Code (abbreviation)	Description of indicators / relevance
Specific indicator of economic development	Regional GDP - current prices /million lei (RON)	Regional_GDP	GDP is the sum of consumption expenditure of private households and private non-profit organizations, gross investment expenditure, state expenditure, investments for storage purposes, and export earnings minus import expenditure

Source: INSSE, TEMPO online

Table no. 2. Independent variables used for panel data regression – for the 8 regions of the country

Category of indicators	Specific Indicators / unit of measurement	Indicator`s Code (abbreviation)		Description of indicators / relevance
1. Financial indicators	**1.1.** Execution of local budgets - total revenues (Revenue receipts) / million lei	Exec_local_budgets_total_revenues		**1.1.** The means by which local government authorities establish the level, options and priorities in financing their economic, social, cultural or public services actions.
2. Social statistics indicator	**2.1.** Average monthly gross salary gain /lei	Average_month_gross_salalary		**2.1.** Indicator of living conditions includes rights in money and in kind due to employees for the work performed, with all the bonuses, allowances and prizes awarded, as well as other legal additions to salaries.
	2.2. Employment rate of labor resources / percent (%)	Employment_rate_labor_resources		**2.2.** It is the ratio of civilian employed population to labor resources - %
	2.3. Relative poverty rate / percent (%)	Relative_poverty_rate		**2.3.** The share of poor people in the total population, i.e. people with an disposable income lower than the poverty threshold level.
3. Economic Statistics indicator	**3.1.** Completed dwellings, during the year **(total on region / versus urban area) /** number of homes	Total_Completed _dwellings_year	Urban_Completed_ dwellings_year	**3.1.** Housing completed during the year, (total from public sources and private sources)
4. Indicators specific for public utilities of local interest and administration of the territory	**4.1.** Total length simple network distribution of drinking water **(total on region / versus urban area) /** kilometres	Total_Length_ network_ distrib_water	Urban_Length_ network_ distrib_water	**4.1.** Total length simple network distribution of drinking water.
	4.2. Capacity of drinking water production plants **(total on region / versus urban area) /** Cubic meters a day	Total_Capacity_ water_production _plants	Urban_Capacity_ water_production _plants	**4.2.** The maximum amount of drinking water that can be given by the water supply facility in a time unit, according the technical documentation, as well as any upgrades and retrofitting that lead to the increase of the initial capacity.
	4.3. Simple total length of sewer pipes / kilometres	Length_pipes_sewer		**4.3.** The length of the waste water collection and discharge channels and those from precipitation on the territory of the locality with public sewerage
	4.4. Length of cities streets (streets arranged) / kilometres	Length_cities_streets		**4.4.** The length of the streets arranged in the locality that ensures the circulation between different parts of it, being included the roadways from the new residential complexes.
	4.5. The intravilan surface of municipalities, cities / acres	Cities_Intravilan_surface		**4.5.** Represents the area of the territory included in the buildable perimeter of municipalities and cities, including their component localities (according to the systematization plan).
5. Indicators specific for the migration of the population	**5.1.** Total Moves with domicile **(total on region / versus urban area) /** number of persons	Total_Moves _with_domicile	Urban_Moves _with_domicile	**5.1.** Persons who, in a certain period of time (year), have established their domicile by moving from one locality to another.
	5.2. Total Residence stablishments **(total on region / versus urban area) /** number of persons	Total_Residence _stablishments	Urban_Residence _stablishments	**5.2.** Persons who, in a certain period of time (year), have changed their residence from one locality to another.

Source: INSSE, TEMPO online

The stages of analysis of the proposed model are:

In a first step, to answer these questions, we carried out the regression of the OLS (using the STATA 17.0 software application) on two data sets for 12 indicators, where for the first set, we used the total values specific to the regions to 5 indicators, and in the second set we replaced the values at 5 indicators (*complete dweldings, during the year; total length simple network distribution of drinking water; capacity of drinking water production plants; total moves with domicas; total residence conditions*) with the specific data of the urban environment of the regions. Then, we proceeded with a comparative analysis the results obtained for the data set with the total values, versus the data set with the values specific to the urban environment.

The second stage of the research was the comparative analysis of the two data sets (with total values versus urban values), applying the regression types FEM (Fixed Effect Model) and REM (Random Effect Model), and following the Hausman test (to see if the difference between the coefficients is systematic or not) we chose which model is more relevant in our research.

In the third stage of the research, we proposed to check the robustness of the model chosen for the analysis of indicators, by performing the REM_{robust} regression and were confirmed by the significant influences of the analysed factors (independent variables specific to the urban environment) on the result indicator, represented by the economic development of the regions using the REM_{robust} model. This verification was carried out by testing the following hypotheses:

H_0: factors specific to the urban environment **have no significant influence**. There **are large differences** between the total values of the region-specific indicators and the values specific to the urban environment.

H_1: factors specific to the urban environment **have significant influence**. There are small differences between the total values of the region-specific indicators and the values specific to the urban environment.

The regression equation used to analyse the correlations between variables is:

$$\begin{aligned} \textbf{\textit{Regional\_GDP}} = {} & \alpha + \beta_1 Exec\_local\_budgets\_total\_revenue_{it} + \beta_2 Average\_month\_gross\_salalary_{it} + \\ & \beta_3 Employment\_rate\_labor\_resources_{it} + \beta_4 Relative\_poverty\_rate_{it} + \beta_5 Total\_Completed\_dwellings\_year_{it} + \\ & \beta_6 Total\_Length\_network\_distrib\_water_{it} + \beta_7 Total\_Capacity\_water\_product\_plants_{it} + \\ & \beta_8 Length\_pipes\_sewer_{it} + \beta_9 Length\_cities\_streets_{it} + \beta_{10} Cities\_Intravilan\_surface_{it} + \\ & \beta_{11} Total\_Moves\_with\_domicile_{it} + \beta_{12} Total\_Residence\_stablishments_{it} + \mu_i + \varepsilon_{ea} \end{aligned} \quad (1)$$

where: **α** - regression equation constant (the intercept for all 8 regions of Romania); $\boldsymbol{\beta_{1,2,\ldots,12}}$ - the coefficient for each explanatory variable in the regression equation (OLS, FEM, REM); **i**- Romanian region analysed, i = *1,..., 8*; **t** - the analysed year of the panel data time period, t = *2000,..., 2019*; $\boldsymbol{\mu_i}$ - the time constant individual specific effects; as proved in the results section, the random effect model assumes that the entities' error is not correlated with the explanatory variables; $\boldsymbol{\varepsilon_{it}}$ - the error term ("*regular*" error term), which varies over countries and time ($1 \leq i \leq n$ și $1 \leq t \leq T$).

The influences of all these variables on the dependent variable after running the model are shown in the next section of empirical results.

4. Findings

4.1. Data analysis by applying OLS regression

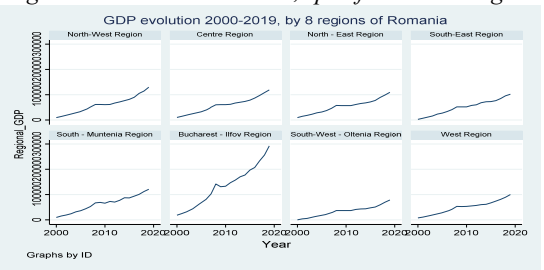
For the 20 years analysed, we find a large standard deviation in the case of the **result indicator *Regional_GDP*** (46,982.89 million lei), where, GDP has had the following developments:

- *Very good*: well above average value Bucharest-Ilfov Region/quadrant 6 (133,314.0 million lei);
- *good*: for regions close to average: South-Muntenia Region/quadrant 5 (62,925.3 million lei); North-West Region/quadrant 1 (59,880.8 million lei); South-East Region/quadrant 4 (58,880.4 million lei) and Centre Region/quadrant 2 (57,977.7 million lei);
- *weak* for regions that are well below average: South-West-Oltenia Region/quadrant 7 (39,556.0 million lei); West Region/quadrant 8 (49,335.7 million lei), North-East Region/quadrant 3 (53,778.3 million lei). To illustrate the progress of the result indicator, we present the panel graph:

Figure no. 1. The 8 regions of Romania

Source: https://www.gazetaromaneasca.com

Figure no 2. GDP evolution, specific to the 8 regions



Source: TEMPO online+graph data representation by author with the STATA econometric software

In order to highlight how and to what extent $PIB_{regional}$ is influenced by the independent factors proposed, we proceeded to a first regression of the OLS model, of the 12 variables, where, for the first set, we used the total values specific to the regions to 5 indicators, and in the second set we replaced the values of these 5 indicators (*Completed dwellings, during the year; Total length simple network distribution of drinking water; Capacity of drinking water production plants; Total Moves with domicile; Total Residence stablishments*) with *the specific data of the urban environment of the regions*.

Looking at the two datasets, for each factor of influence, we see a similarity in the two datasets regarding the variables that have a significant influence on regional GDP, as well as the way they influence (positive or negative), with small differences only in the coefficient values. So, we have nine variables with a significant impact on the evolution of the response variable $PIB_{regional}$.

On a first picture, the OLS model shows us that the set of proposed independent variables have a significant influence on the evolution of the dependent variable $PIB_{regional}$, because *F statistic* it has significant value ($F_{statistic/grup1}$=258.67, $F_{statistic/grup2}$=385.50, Prob.>F = 0.00).

But, in order to certify the validity of the proposed analysis model, on the two datasets, we conducted the test of multicollinearity, using the inflation factors of variation (VIF). Thus, for the first data group (with total values/region), the average VIF value was 4.41 < 5, which illustrates a moderate degree of multicollinearity between influence factors (predictors), and in the second data group (with values specific to the urban environment/region) the average value VIF was 6.53 < 10, higher than in the first group, but in this case too, the multicollinearity is characterized as moderate. If the VIF is above 10, then it indicates a high correlation, and the greater the variation of influence factors, the less reliable the regression results will be (Dodge, 2008).

Following the tests Breusch-Pagan/Cook-Weisberg (*with the value p= 0.0002<0.05, chi2 = 8.79, Prob >chi2 = 0.0030*) and the white heteroskedasticity test (*with the value p= 0.0002<0.05, chi2(90) = 100.04, Prob>chi2 = 0.2202*), the null hypothesis of homoskedasticity was rejected, the variation of errors not constant over time. As a result, the ols model was found to be inappropriate, with the model showing signs of heteroskedasticity (Baltagi, 2005, Torres-Reyna, 2007).

4.2. Data analysis by applying Fixed Effect Model and Random Effect Model regression

With the main purpose of presenting a more relevant picture of the evolution over time of the dependent variable $PIB_{regional}$, we addressed the particularities of each region of the country and their evolution over time. In order to analyse the heterogeneity factor, two models were considered for comparison: the Fixed Effects Model (FEM) and the Random Effects Model (REM).

With the help of the FEM regression, we wanted to analyse the impact that independent variables had on their evolution over the 20 years studied, assuming that there are unique characteristics of the individual cross-section that do not change over time and these unique characteristics are not correlated with the individual dependent variable Y. (Torres-Reyna, 2007).

Analysing the two datasets with the regression of the FEM, for each influence factor, we find that a smaller number of independent variables resulted which had a significant influence on the evolution of the economic phenomenon characterized by $PIB_{regional}$ and there are differences between the two datasets, as follows:

1.a) *In the first* data group, there are only five variables that have a significant impact on the evolution of the response variable $PIB_{regional}$ (with the value p<0,05, p<0,10), from which: four variables have positive coefficients and support growth $PIB_{regional}$ and one factor has a negative coefficient and means that it affects significantly $PIB_{regional}$.

b) *The second* set has more homogeneous data and resulted in six variables that have a significant impact on the evolution of the response variable $PIB_{regional}$ (with the value p<0,05), from which: five variables have positive coefficients and support growth of $PIB_{regional}$, and one factor has a negative coefficient and means that it affects significantly of $PIB_{regional}$.

REM regression implies that there is a systematic random effect of the individual cross-section and there is a unique, time-constant characteristic of individuals that are not correlated with individual independent variables x_1, x_2, ..., x_{12}. The results are summarized in Table 3.

Table no. 3. Regression analysis with Random Effect Model

Independent variables	***Total values*** *(for five indicators)*			***Urban values*** *(for five indicators)*		
	Coefficient	***z***	**P > |z|**	**Coefficient**	***z***	**P > |z|**
Exec_local_budgets_total_revenues	9.9842	9.53	0.000***	6.7387	7.64	0.000***
Average_month_gross_salalary	18.7706	11.57	0.000***	15.4478	11.08	0.000***
Employment_rate_labor_resources	675.9743	3.49	0.000***	515.2628	3.05	0.002***
Relative_poverty_rate	-1,194.3250	-7.84	0.000***	-864.6882	-5.42	0.000***
Total/Urban_Completed_dwellings_year	**1.1785**	**2.51**	**0.012****	**3.3029**	**5.14**	**0.000*****
Total/Urban_Length_network_distrib_water	**-2.3100**	**-3.93**	**0.000*****	**-4.9207**	**-1.21**	**0.228**
Total/Urban_Capacity_water_production_plants	**0.0058**	**2.26**	**0.024****	**0.0013**	**0.43**	**0.671**
Length_pipes_sewer	-8.7564	-4.80	0.000***	-6.4990	-3.26	0.001***
Length_cities_streets	19.8904	6.81	0.000***	20.0494	7.32	0.000***
Cities_Intravilan_surface	-0.1685	-1.15	0.252	-0.1846	-1.59	0.113
Total/Urban_Moves_with_domicile	**0.1254**	**0.93**	**0.353**	**0.8853**	**4.96**	**0.000*****

Total/Urban_Residence_stablishments	**-0.7272**	**-3.33**	**0.001*****	**-0.7606**	**-4.72**	**0.000*****
Constant	-56,221.0900	-2.99	0.003	-51,515.7800	-2.38	0.017
Number of observations	104			104		
Wald chi2 (12)	3,104.09			4,626.04		
Prob > chi2	0.00			0.00		
Number of groups	8			8		
R-Squared-within	0.9201			0.9406		
R-Squared-between	0.9961			0.9995		
R-Squared-overall	0.9715			0.9807		

A p-value is statistically significant if: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.10^{*}$.

Source: TEMPO online+author's calculation using STATA econometric software

Analysing the two datasets, for each factor of influence, we find that the largest number of independent variables resulted that had a significant influence on the evolution of the economic phenomenon characterized by $PIB_{regional}$ and we note that there are differences between the two datasets, as follows:

1.a) In the first data group there are ten variables that have a significant impact on the evolution of the response variable $PIB_{regional}$, from which: six variables have positive coefficients and support growth of $PIB_{regional}$ and four variables have negative coefficient and mean that they affect significantly $PIB_{regional}$.

b) In the second set, with data predominantly specific to the urban environment, nine variables resulted with a significant impact on the evolution of the response variable $PIB_{regional}$, from which:

six variables have positive coefficients and support growth of $PIB_{regional}$ and three variables have negative coefficient and mean that they affect significantly $PIB_{regional}$.

4.3. Data analysis by applying the Hausman test

The two models, FEM and REM have their own limitations and, to select the best estimation model, the Hausman test was performed for these two datasets. We propose the following hypotheses:

• H_0: The Random Effect Model is the right model (*Difference in coefficients is not systematic*).
• H_1: The Fixed Effect Model is the right one (*Difference in coefficients is systematic*).

Equation (2) shows the result of chi2(11) in econometric analysis:

$$chi2(11) = (b\text{-}B)'[(V\_b\text{-}V\_B)^{(-1)}](b\text{-}B), \qquad (2)$$

a) for the total value model, we have the following results:
chi2(11) =191.40, *Prob>chi2 = 0.00*, so, the alternative hypothesis cannot be accepted, so the null hypothesis seems more appropriate to me.

b) for the model with specific values of the urban environment, we have the following results:
chi2(11) = 24.65, Prob>chi2 = 0.0103, so, the alternative hypothesis can be accepted, yet the null hypothesis seems more appropriate to me.

In conclusion, **the most appropriate model** for analyzing the influence of independent variables on the dependent $PIB_{regional}$ variable **is the REM model**.

At the same time, the choice of analysis model with based on REM regression is based on the influence of most independent factors on the dependent variable (six independent variables: *Exec_local_budgets_ total_revenues, Average_month_gross_salalary, Employment_rate_labor_ resources, Urban_ Completed_dwellings_year, Length_cities_streets și Urban_Moves_with_ domicile),* compared to the FEM regression analysis model which has only five variables with significant influence on evolution $PIB_{regional}$. These conclusions are based on the main statistical results presented in Table 3 ($t_{student}$/z test, value *p* and the coefficients of the predictors).

4.4. Data analysis by applying Random Effect Model robust regression

In *the third stage* of the research, we proposed to check the robustness of the chosen model for the analysis of indicators, by performing regression REM_{robust}.

The comparative analysis of the data, obtained and summarized in Table 7, helps us to answer the main question of this research: **whether the evolution of indicators specific to the urban environment** (financial indicators, social indicators, investment, those specific to public utilities and those specific to population mobility) **have a significant influence on the economic development of the regions of the country**? In what sense and to what extent can they influence

the evolution of the result indicator, represented by the economic development of the regions of the country, i.e. *Regional GDP*?

Table no. 4. Regression analysis with Random Effect Model robust

Independent variables	***Total values*** *(for five indicators)*			***Urban values*** *(for five indicators)*		
	Coefficient	***z***	**P > |z|**	**Coefficient**	***z***	**P > |z|**
Exec_local_budgets_total_revenues	9.9842	5.48	0.000***	6.7387	5.40	0.000***
Average_month_gross_salalary	18.7706	12.39	0.000***	15.4478	9.19	0.000***
Employment_rate_labor_resources	675.9743	3.47	0.001***	515.2628	2.69	0.007***
Relative_poverty_rate	-1194.3250	-5.47	0.000***	-864.6882	-4.02	0.000***
Total/Urban_Completed_dwellings_year	**1.1785**	**2.59**	**0.010*** **	**3.3029**	**3.39**	**0.001*** **
Total/Urban_Length_network_distrib_water	**-2.3100**	**-2.67**	**0.008*** **	**-4.9207**	**-1.05**	**0.293**
Total/Urban_Capacity_water_production_plants	**0.0058**	**1.33**	**0.183**	**0.0013**	**0.48**	**0.628**
Length_pipes_sewer	-8.7564	-3.75	0.000***	-6.4990	-2.81	0.005***
Length_cities_streets	19.8904	5.91	0.000***	20.0494	5.36	0.000***
Cities_Intravilan_surface	-0.1685	-0.81	0.421	-0.1846	-1.14	0.255
Total/Urban_Moves_with_domicile	**0.12537**	**1.35**	**0.176**	**0.8853**	**2.95**	**0.003*** **
Total/Urban_Residence_stablishments	**-0.7272**	**-2.19**	**0.029** **	**-0.7606**	**-5.97**	**0.000*** **
Constant	-56,221.0900	-3.40	0.001	-51,515.7800	-2.59	0.010
Number of observations	104			104		
F-statistic (12 /84)/Wald chi (11)	-			-		
Prob. > F/Prob > chi2	-			-		
Number of groups	8			8		
R-Squared-within	0.9201			0.9406		
R-Squared-between	0.9961			0.9995		
R-Squared-overall	0.9715			0.9807		

*A p-value is statistically significant if: p<0.01***, p<0.05**, p<0.10**.*

Source: TEMPO online+author's calculation using STATA econometric software

This verification was carried out by testing the following hypotheses:

H_0: factors specific to the urban environment **have no significant influence**. There **are large differences** between the total values of the region-specific indicators and the values specific to the urban environment.

H_1: factors specific to the urban environment **have significant influence**. There **are small differences** between the total values of the region-specific indicators and the values specific to the urban environment.

We note that **for both sets of data, we have nine independent variables,** from a group of twelve indicators, **with significant influence on the evolution of the dependent variable**, of which **eight factors are common**, as follows:

- three variables (*Relative_poverty_rate, Length_pipes_sewer și Total/Urban_Residence_ stablishments)* affect the performance of $PIB_{regional.}$ because they are a deterrent to development, that is, a relative poverty rate does not provide an attractive picture for the region and can lead to a higher fluctuation of residents. Residents are not characterized as beeing stable taxpayers, having no registered properties or vehicles to generate taxes and taxes to the local budget, but they are consumers - beneficiaries of local public services (through positive externalities).

Although, we expected that the development of the sewerage network will favourably influence the dependent $PIB_{regional}$ variable, however, from the analysis of statistical data, resulted a negative influence, which the researcher puts on the quality, that is, the results of the investments in increasing the length of the sewerage network were not up to the expectations of exploitation.

- five variables *(Exec_local_budgets_total_revenue, Average_month_gross_salalary, Employment_ rate_labor_resources, Total/Urban_Completed_dwellings_year, Length_cities_streets)* its favorably influences the evolution of the $PIB_{regional}$, through their role in the economic development of the regions, having a synergistic effect: a good rate of labour use, leads to a gross wage incomes increase. At the same time, by increasing housing construction and urban development (of the street network), it offers the possibility of increasing the establishment of domicile, which leads to the increase of revenues to local budgets, having as sources the taxes on buildings/dwellings, taxes on motor vehicles, etc.

- alternatively, an independent variable *(Urban_Moves_with_domicile)* it is important in the favorable development of the $PIB_{regional}$ (for the urban data set), and another independent variable (*Total_Length_network_distrib_water)* affect the performance of $PIB_{regional.}$, the results of the

investments in increasing the length of the water network were beeing not up to operating expectations.

The last three independent variables, although they do not appear to have a significant influence on the $PIB_{regional}$, they were included in the analysis model because they still have meaning, so:

- *Total/Urban_Length_network_distrib_water* and *Total/Urban_Capacity_water_production_plants* there are investment elements that can, in the future, support the attractiveness and development of the regions by improving the living conditions of the inhabitants.
- *Cities_Intravilan_surface* it is a factor that must be taken into account in the future because it is an important income generator in that the tax on these lands is higher compared to other categories of land and represents the area of the territory included in the built-up perimeter of cities, including their constituent localities, it is a potential for development of the regions.

In conclusion, the econometric results obtained by using the model $REM_{robust,}$ **we accept the hypothesis H_1: *factors specific to the urban environment have a significant influence on the result indicator***, represented by the economic development of the regions ($PIB_{regional}$).

For the two data sets analyzed (with total values of region-specific indicators versus urban environment-specific values of these indicators), the same independent variables, which influence the dependent variable, resulted. At the same time, the way these influence factors (positive or negative) act is similar in both data sets, and their coefficients have similar values.

So, the regression equation used to analyze the correlations between variables is:

$$\begin{aligned} Regional\_GDP = {} & -51{,}515.7800 + 6.7387 * Exec\_local\_budgets\_total\_revenue_{it} + \\ & 15.4478 * Average\_month\_gross\_salalary_{it} + 515.2628 * Employment\_rate\_labor\_resources_{it} - \\ & 864.6882 * Relative\_poverty\_rate_{it} + 3.3029 * Urban\_Completed\_dwellings\_year_{it} - \\ & 4.9207 * Urban\_Length\_network\_distrib\_water_{it} + 0.0013 * Urban\_Capacity\_water\_product\_plants_{it} - \\ & 6.4990 * Length\_pipes\_sewer_{it} + 20.0494 * Length\_cities\_streets_{it} - 0.1846 * Cities\_Intravilan\_surface_{it} + \\ & 0.8853 * Urban\_Moves\_with\_domicile_{it} - 0.7606 * Urban\_Residence\_stablishments_{it} + \mu_i + \varepsilon_{ea} \end{aligned} \quad (3)$$

This studiy complete the picture of factors that can influence the evolution of economic growth, but there are certain limitations to these categories of studies, as well as to this study, limitations caused by the perishability of data, because economic and social phenomena evolve over time, and lately, major events occurring globally, they've led to an accelerated rate of data change.

5. Conclusions

The comparative analysis of the two sets of panels, with data specific to the 8 regions of the country (for the period 2000-2019), showed that factors specific to urban development had a significant influence on the evolution of the economic growth of the regions ($PIB_{regional}$), and this should be taken into account in future plans, because the attractiveness of a region depends on its capital, infrastructure, the state of the factors in the region, some of them analysed in this paper.

Why are such analyses important? Because these analyses show us the categories of indicators that influence the economic and social phenomena of the area of interest and show a certain degree of interdependency between the influence factors that underpin the validation of the analysis models.

The results of these types of analyses are the levers through which decision-makers can capitalize on the opportunities for financing many development projects, but only based on viable projects, especially for infrastructure development. The contribution of infrastructure to regional development tends to become a driver of economic progress in the region and an increasing number of regional authorities have developed integrated studies on the economic future of the region.

One of the greatest opportunities in this period is the financing of development projects through the National Recovery and Resilience Plan, which is an important tool in correcting regional imbalances and promoting economic development. The regional planning process is inseparable from the allocation of financial resources and involves their correlation at different territorial-administrative levels. These correlations can be achieved with the help of administrative consortia, which support the improvement of the efficiency of public services and increase the effectiveness of the implementation of investments and, implicitly, support the achievement of the interests of local authorities (*Draft law supplementing O.U.G no. 57/2019 on the Administrative Code*, 2022).

Currently, there is a draft law to supplement the Administrative Code, which supports the establishment of administrative consortia, by associating several administrative territorial units. These administrative consortia, without legal personality, can reduce the negative impact of the reduced administrative capacity of some administrative-territorial units and can be mandated to exercise attributions regarding spatial planning, urbanism, authorization of the execution of construction works, initiation and realization of investments in the context of the territorial Development Strategy of Romania (SDTR) and PNRR (Puiu, 2022).

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