

**THE RELATIONSHIP BETWEEN THE WORKING CIVILIAN POPULATION, THE
EMPLOYMENT RATE AND THE EXPENSES REGARDING THE SOCIAL
PROTECTION OF THE UNEMPLOYED IN ROMANIA**

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***Abstract:** The purpose of this research is to analyse the employment rate by districts and the expenses related to unemployment. The processed values are collected from the "TEMPO ONLINE" database of The National Institute of Statistics. The setting up of the employment rate results - by aggregating the values by districts and Bucharest. I believe that the employment rate and the expenses concerning unemployment are factors of national interest with significant effects on the working population.*

***Key words:** analysis, economy, indicators, variables, expenses*

***JEL Classification:** I23, I25, I29*

1. Introduction

This paper presents a series of analyses based on geostatistic, econometric and statistical methods. The indicators relationship is realised between indicators from the same domain through correlation of some specific variables from different domains.

Nationwide, any economy manifests itself as an assembly of organised markets linked together.

The Government policies regarding the labor force support through incentives to individuals who have reached retirement age have been influenced by demographic changes and obviously by the ageing population.

2. Literature review

Enache, S., (2013) shows through studies that the downward trend of the unemployment rate is linked to the high level of education. According to Jolliffe, I., (2002), the fact that the study of the essential elements was presented - for the first time - by Karl Pearson in 1901, is accepted. In his article "On lines and planes of closest fit to systems of points in space" he states that the used analyses in his work can be applied to many variables. Identifying the main lines of identification and social regional disparities is the aim of the research (Sandu (2011). Methods and techniques for data analysis and research are the tool for identifying causal structures and obtaining multipurpose information. In his work, Shenngen, F., (2011), has determined the defining characteristics of the regions and has classified them according to the employment rate of the total working population. It also developed a study on the relationship between economic policies and regional asymmetry models. In his article "Regional Disparities Analysis in Romania", Barabaș, C., (2014), highlights the fact that the global economy is still changing and offers opportunities and challenges in order to improve the economic aspects. According to Porter (1990), clusters are considered important for regional economies, because they create economic growth. Clusters are considered to be fundamental to regional economies.

3. Population and workforce in Romania

The population is a fundamental component of the national economy and makes up the market, which is made up of labor market supply and demand on the goods and services market. Therefore the population is the factor of work production.

3.1. Indicators and statistics

- Indicator 1 - Working population by districts;

- Indicator 2 - Average number of employees by district;
- Indicator 3 - Employment rate of the active population by districts;
- Indicator 4 - Annual expenses on social protection for the unemployed by districts.

The occupation rate in Romania - by districts - in relation to unemployment, is low. In Romania reform policies for the labour market are: attracting as much labor force as possible by reducing indirect costs through the development of education and vocational training and maintaining the current workforce.

3.1.1. Description of the indicators

Indicator 1 – Working population by districts

“The active population by districts characterises the potential workforce and the employment rate of the population, including the occupied population and the registered unemployed. The calculation formula: $Pac + Poc + S$, where Pac = the working population; Poc = employed population; S = unemployed.”

Indicator 2 - Average number of employees by district

The average number of employees by districts encompasses the persons hired with a labour contract/employment relationship fixed or temporary (including seasonal workers, manager or administrator), whose labour contract/employment relationship was not suspended in the reference year.

The calculation formula: Average number = $\sum (E_i) / Z_c$, with i ranging from 1 to n , where: E_i = daily manpower numbers of employees in the reference period, including weekly rest days, public holidays and other non-working days; Z_c = total number of calendar days. The distribution of employees by development regions, districts and activities of the national economy is carried out based on the place where they carry out their activity.

Indicator 3 - Employment rate of the active population, by districts

The employment rate is related to the active population. The calculation formula: $S / Pac * 100$, where S = employees, Pac = The active population.

Indicator 4 - Annual expenses on social protection for the unemployed, by districts

“The expenses regarding the social protection of the unemployed are represented by: the dole and the aid for professional registration (until 2004); indemnity for loss of job; support allowance (until 2006); expenses for vocational training; graduates payment; payments to stimulate the unemployed who get a job before the end of the period of unemployment; payments to boost labor mobility; payments in order to stimulate workers who qualify as disadvantaged unemployed; compensation payments carried out in the framework of recruitment programs for restructuring, privatisation and liquidation; prima de activare¹; prima de relocare²; other expenses (starting from 2017 it includes also prima de activare Art. 73*2 O.U.G. 60/2016 and prima de relocare Art. 76(2) O.U.G. 6/2017” (<https://insse.ro/cms>)

Periodicity indicator: annual

Source: The National Institute of Statistics

Method of calculation: longitudinal analysis and correlations between indicators

3.1.2. Descriptive analysis of a time series

The analysis is a complex and systematic process of applying the statistical-mathematical technique in order to extract from the established database all the necessary information for the decision-making process.

Ordinal variables

- frequency table, median, module

¹ Registered unemployed persons who are not receiving any benefits, if they are employed and work for 3 months, they will receive a sum of money as a bonus

² Registered unemployed persons who work farther than 50 km away from where they live, they will receive a sum of money as a bonus

- the usefulness of the average is questionable (the intervals between categories are not equal in size)
- oftentimes, the average is stated - it is assumed that the scales intervals are equal or, at least approximately equal (http://www.baicus.ro/MCS/Statistica_descriptiva.pdf, 28.01.2021).

Variables types - descriptive statistics

Quantitative variables

- the measure of the central tendency (the average, median, module)
- measure of dispersion (standard deviation, variation)
- the normal distribution

The description of the current situation and the evolving trends in each district - 41 - and Bucharest in 2019.

Chart no. 1. The distribution of the analysed indicators by districts

No.	District	Active population - persons-	Average number of employees -persons-	Annual expenses on social protection for unemployed -LEI-	Employment rate %
1	Alba	168500	93251	43861633	55,34
2	Arad	211900	131041	23787852	61,84
3	Arges	258900	155376	47423755	60,01
4	Bacau	213200	111653	41844562	52,37
5	Bihor	264200	165185	54927593	62,52
6	Bistrita-Nasaud	128500	65439	47563404	50,93
7	Botosani	137300	55538	39256557	40,45
8	Braila	122200	68647	25446800	56,18
9	Brasov	262700	179723	27069363	68,41
10	Buzau	171700	82863	33860764	48,26
11	Calarasi	91300	43823	16885742	48
12	Caras-Severin	106500	51918	21393991	48,75
13	Cluj	373500	239293	61639143	64,07
14	Constanta	294700	181817	38998314	61,7
15	Covasna	85800	50783	20924901	59,19
16	Dambovita	192500	84147	41556394	43,71
17	Dolj	266200	134187	66647342	50,41
18	Galati	190000	116449	38291063	61,29
19	Giurgiu	80400	33608	22194045	41,8
20	Gorj	135200	75145	39520751	55,58
21	Harghita	135100	68084	43746411	50,4
22	Hunedoara	171600	104195	73960282	60
23	Ialomita	93800	44859	25469466	60,72
24	Iasi	297300	169360	60218611	56,97
25	Ilfov	207500	152448	23021800	73,47
26	Maramures	201800	106403	48709803	52,73
27	Mehedinti	102000	45255	33066023	44,37
28	Mures	235700	133132	27220782	56,48

29	Neamt	182000	85828	36243838	47,16
30	Olt	161200	71797	31575021	44,54
31	Prahova	291000	177096	54665271	60,86
32	Salaj	103400	48766	30795171	47,16
33	Satu Mare	146300	79666	28200855	54,45
34	Sibiu	196500	133728	34854546	68,05
35	Suceava	231600	106465	59217204	45,97
36	Teleorman	140400	54315	58857047	38,69
37	Timis	350600	240673	23779573	68,65
38	Tulcea	82800	46786	28051741	56,5
39	Valcea	161300	79483	44018020	49,28
40	Vaslui	133500	54220	31580257	40,61
41	Vrancea	136400	57612	25616914	42,24
42	BUCURESTI	1233500	984014	125290214	79,77
	TOTAL	8750500	5164071	1701252819	

Source: data collected and processed by the author, www.insse.ro

According to the data from chart no. 1, Bucharest has the largest number of active population (1233500 persons). The largest number of employees is recorded also in Bucharest (984014). The annual expenses regarding the unemployment reach LEI 125290214 in Bucharest.

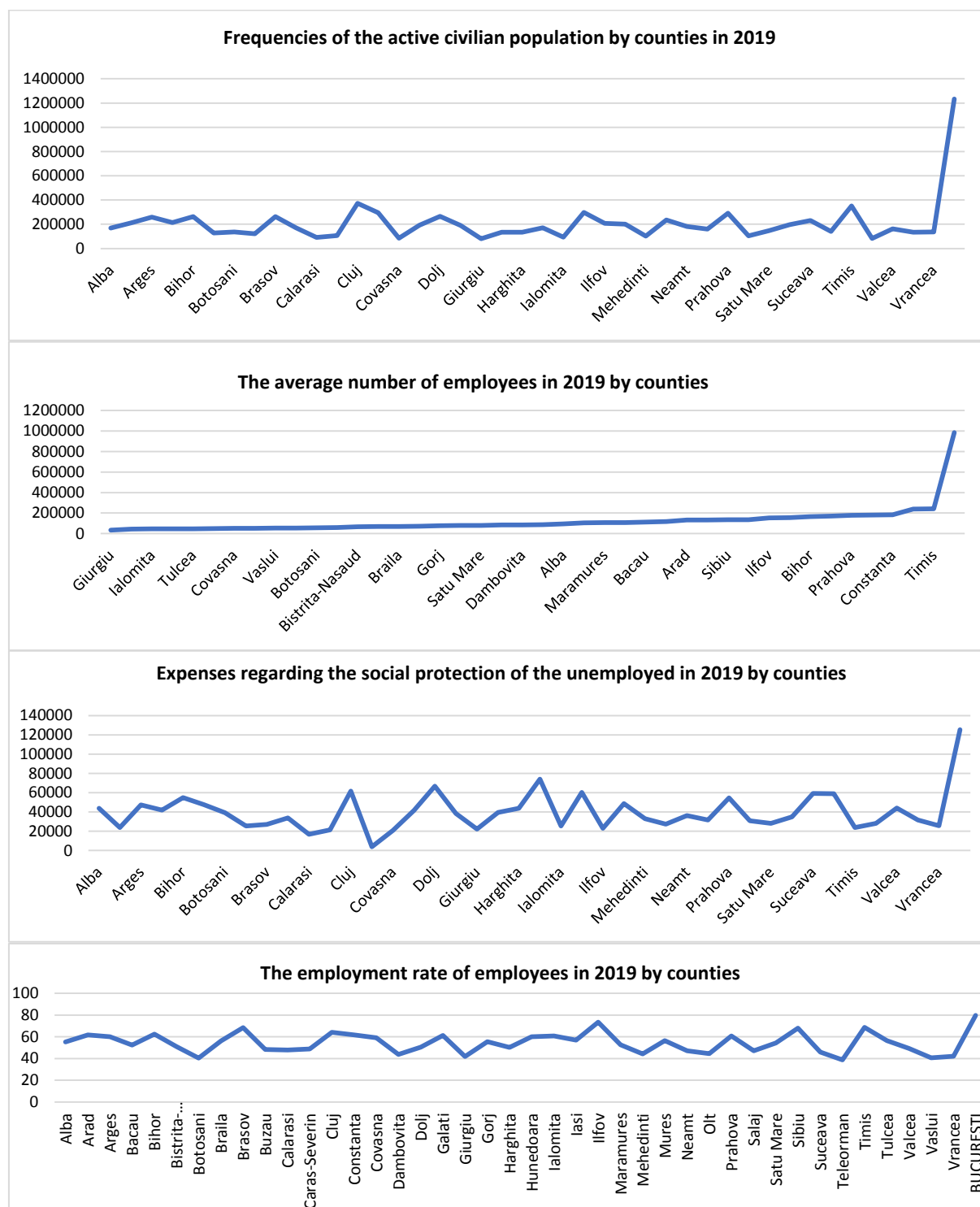
Chart no. 2. The calculation of the average position indicators of the studied variables

	Active population	Average number of employees	Employment rate	Annual expenses on social protection for unemployed
<i>Mean</i>	208345,2381	122954,0714	54,23078405	40506019,5
<i>Standard Error</i>	27471,96442	22545,24063	1,470130619	2988702,786
<i>Median</i>	171650	84987,5	53,59040966	37267450,5
<i>Mode</i>	#N/A	#N/A	#N/A	#N/A
<i>Standard Deviation</i>	178038,6779	146109,8585	9,527535337	19369007,78
<i>Sample Variance</i>	31697770830	21348090750	90,77392959	375158462530290,00
<i>Kurtosis</i>	27,8936597	30,87829386	-0,040481236	7,864964828
<i>Skewness</i>	4,859692367	5,224223361	0,530974652	2,224873852
<i>Range</i>	1153100	950406	41,08824119	108404472
<i>Minimum</i>	80400	33608	38,68589744	16885742
<i>Maximum</i>	1233500	984014	79,77413863	125290214
<i>Sum</i>	8750500	5164071	2277,69293	1701252819
<i>Count</i>	42	42	42	42

Source: done by the author, based on the calculation that were made

According to the data from chart no. 1 I analysed the variables “Active population”, “Average number of the employees”, “Annual expenses regarding the unemployment” and “Employment rate of the total population” and the results are the following: the average active population is 208345,2381, the average number of employees is 122954,0714, and the employment

rate of the total active population is 53,23%. We note that the distribution of the number of employees has a normal division with an average level of employees 122954,07, a standard deviation of 9,53% and a coefficient of variation of 90,77, i.e. a representative average.



Graphic no. 1 Multiple chronogram of the indicators

Source: done by the author, based on the calculation that were made

It is easy to note that the distribution of the number of employees has a normal division with a medium level.

If we analyse the graphic, we can note differences, the biggest discrepancies are recorded in Bucharest. Among the districts with a large number of employees, the following can be listed:

Ilfov, Timiș, Cluj, Constanța, Iași, and the districts with the lowest number of employees are the following: Călărași, Giurgiu, Ialomița, Covasna and Tulcea.

4. Analysis of the links between phenomena

4.1. Theoretical concepts

“We consider that in a volume sample n , the pairs of values (x_i, y_i) were determined, $i=1, \dots, n$, corresponding to the two variables for which we want to study the association and relationship between them. A first assessment of the common distribution will be made if we make the dispersal chart of the values, in fact the representation in an axis system of the points with the coordinates x and y . Visual analysis of the organisation and shape of the chronogram represented by the acquired cloud of points can provide important indications of the relationship between the variables. The survey data will support the hypothesis of association between the variables if the form of the cloud points approaches a functional curve. Thus, linear associations, curvilinear, etc. can be appreciated. If a trend in the cloud of points can't be distinguished, it will be said that the variables are not related”. [13]

4.2. Distributional analyses of the simple regression equation

“The “best” estimated line, in the sense that it expresses the road most central through points: the line for which the sum of the squares of the distances (vertical) between points and the straight line is minimal. The common term for the estimated line is that of the regression line. The distances are referred to as errors (residues). Therefore, the regression line achieves the minimum value of the error squares, in the sense that any other line produces a larger sum of squares”. [13]

4.3. Correlation coefficient

“The regression analysis is, essentially, a method to allow predictions, meaning that we should estimate a variable Y values when we have the value of a associated variable X . However, researchers are often not interested or aware of which variable is independent or dependent in the sense required by practice. They are, however, interested to know if two variables are associated and the degree of association. Such measure is given by the correlation coefficient, denoted by r . This has values ranging from -1 to $+1$, a null value indicates non-association, $+1$ shows a perfect positive association (correlation), and a value of -1 shows a perfect negative association”. [13]

Chart no. 3 Ranges of values, groups set for the calculation and frequencies

Active population - ranges of values	Number of employees	Frequency
[50000,100000)	50000	6
[100000,150000)	100000	17
[150000,200000)	150000	9
[200000,250000)	200000	7
[250000,300000)	250000	2
[300000,350000)	300000	0
[350000,400000)	350000	0
[400000,450000)	400000	0
[450000,500000)	450000	0
[500000,550000)	500000	0
[550000,600000)	550000	0
[600000,650000)	600000	0
[650000,700000)	650000	0
[700000,750000)	700000	0
[750000,800000)	750000	0

[800000,850000)	800000	0
[850000,900000)	850000	0
[900000,950000)	900000	0
[950000,1000000)	950000	0
[1000000,1050000)	1000000	1
[1050000,1100000)	1050000	0
[1100000,1150000)	1100000	0
[1150000,1200000)	1150000	0
[1200000,1250000)	1200000	0
[1250000,1300000)	1250000	0

Source: done by the author, based on the calculation that were made

The correlation coefficient (linear) is a prime method through which forecasts of the estimation of the value of the variables are allowed.

$$r_{xy} = \frac{\frac{1}{n} \sum (x - \bar{x})(y - \bar{y})}{S_x S_y}$$

n = the current sample number

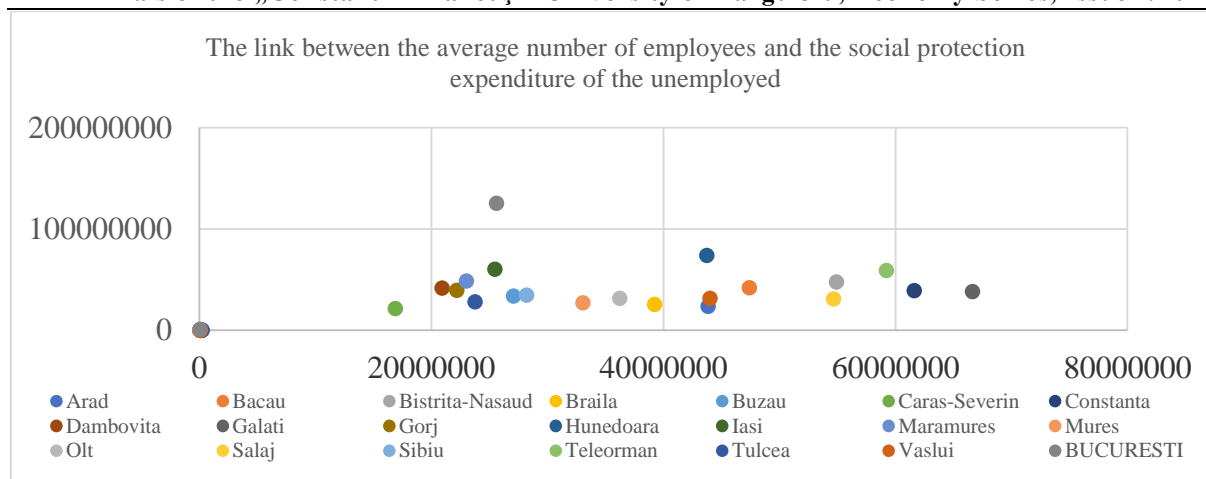
x = individual values of variable x

y = individual values of variable y

\bar{x} = arithmetic mean of all values of x

\bar{y} = arithmetic mean of all values of y

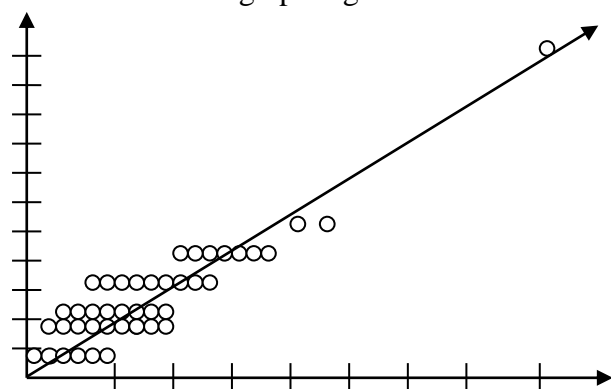




Graphic no. 2 Multiple-point cloud of links between the compared variables

Source: done by the author, based on the calculation that were made

The two variables indicate the existence of a direct link between the active population and the number of employees. The construction of the correlation graphic is necessary. The form of the link shown in the graphic gives a linear link.



The empirical line of the link of the calculated variables

Conclusion

Following the research carried out and the results obtained in the 41 districts and Bucharest in year 2019, we managed to establish the districts which have a close connection between the working population and the number of employees. Bucharest is at the top of the list.

The development level of the Romania districts reflects the number of employees that are working.

We assume that the districts with a higher working population have a higher number of employees as well as expenses regarding unemployment.

Regarding the perspective of future research, I am planning to increase the number of the analysed indicators and to carry out a study in comparison to other EU countries.

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