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THE ROLE OF HUMAN RESOURCES ON THE ECONOMY: A STUDY OF THE BALKAN EU MEMBER STATES

Darko B. Vuković[1], Natalia A. Shpak **, Milan M. Radovanović*, Antonio Portugal Duarte ***, Dejan Radulović*****

* Geographical Institute „Jovan Cvijić"SASA, Belgrade, Serbia
** Ural State Forest Engineering University, Ekaterinburg, Russia
*** Faculty of Economics, University of Coimbra, Portugal
**** Ministry of Economy, Belgrade, Serbia

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Abstract: In this paper we analyze the impact of the quality of human capital on the main economic indicators of South-Eastern Europe countries [SEE] at the NUTS 2 level. The subjects of this research are the human capital indicators of regional competitiveness. The quality of human capital depends largely on the age structure of the population and the quality of education. Those regions, which have the highest percentage of the working-age population and highly educated people, are able to achieve higher productivity and gain a competitive advantage over other regions. As main indicators of the quality of human capital we identified: population; persons aged 25-64 with tertiary education attainment; students in tertiary education and participation of adults aged 25-64 in education and training and human resources in science and technology. As main economic indicators, we identified: regional gross domestic product; employment and income of households. The aim of this paper is to determine whether there is a correlation between the indicators of the quality of human capital and economic indicators. As a main methodology we have used the correlation coefficient which shows interdependence of the analyzed indicators. As part of our analysis, we consider only EU member states that belong to the SEE countries: Slovenia, Croatia, Romania, Bulgaria and Greece. We conclude that in all countries there is a high multiple correlation coefficient between the indicators human resources in science and technology, number of students and employment.

Key words: human capital, economic indicators, NUTS 2, South-Eastern Europe

Introduction

If human capital is observed as one of the most important economic resources, it can be said that the development of any industry or region depends precisely on the quality of this factor. Naturally, the human resources are not the only factor that affect the growth of welfare in specific system or increase productivity. In

[1] Correspondence to: d.vukovic@gi.sanu.ac.rs

other words, we are talking about the economic struggle of any system to achieve the best possible results by relying on a variety of factors from its disposal. Economy in the modern sense is a struggle for a market, taking into account the economic laws, principles and any other categories that are studied in this science. In particular, we can talk about the macro economy, human resources, finance, international relations, productivity, customer relations, etc., where each of these branches or categories can be differently observed and analyzed, but where the combined effects more or less boil down to "certain characteristic" or output that will allow a better position in relation to another company, city, region or country (Vuković, 2013b). The quality of human capital, as one of the key economic factors of development, has been analysed in the paper.

The limitation of this analysis is that it cannot measure all economic indicators and the indicators identified as human capital. The identified human capital indicators are: population, population aged 25-64 with tertiary education, number of students, human resources in science and technology and participation of adults aged 25-64 in education and training. Economic indicators are: gross domestic product [GDP] at current market prices, employment and income of households. The number of indicators could be larger, but only indicators listed above have available data at the NUTS 2 level - Nomenclature of territorial units for statistics (Franc. *Nomenclature des unités territoriales statistiques*).

Specifically, the analysis will be limited only to the South East European countries (transition economies), the EU members, for which there are available data on the Eurostat website. The analysis applies only to the territorial level NUTS 2, which classifies geographic areas and provides a framework for the collection and publication of standardized statistical information that can be used for analysis, but also as a framework for European Policy Initiative (Zarić & Vuković, 2010). In EU legislation the NUTS concept was first mentioned (but without conceptual definition) in Council Regulation [EEC] (Num.2052/88 of 24 June in 1988) in the tasks of the Structural Funds, in the section which defines the regions lagging in economic development (Commission of the European communities, 1988). According to the NUTS classification geographic areas are divided according to the different hierarchical levels: the NUTS 1 is the largest territorial unit, which includes the territory from 3 to 7 million people. The NUTS 2 has a range of 800 thousand to 3 million inhabitants (Figure 1) and the NUTS 3 has a range of 150 to 800 thousand inhabitants.

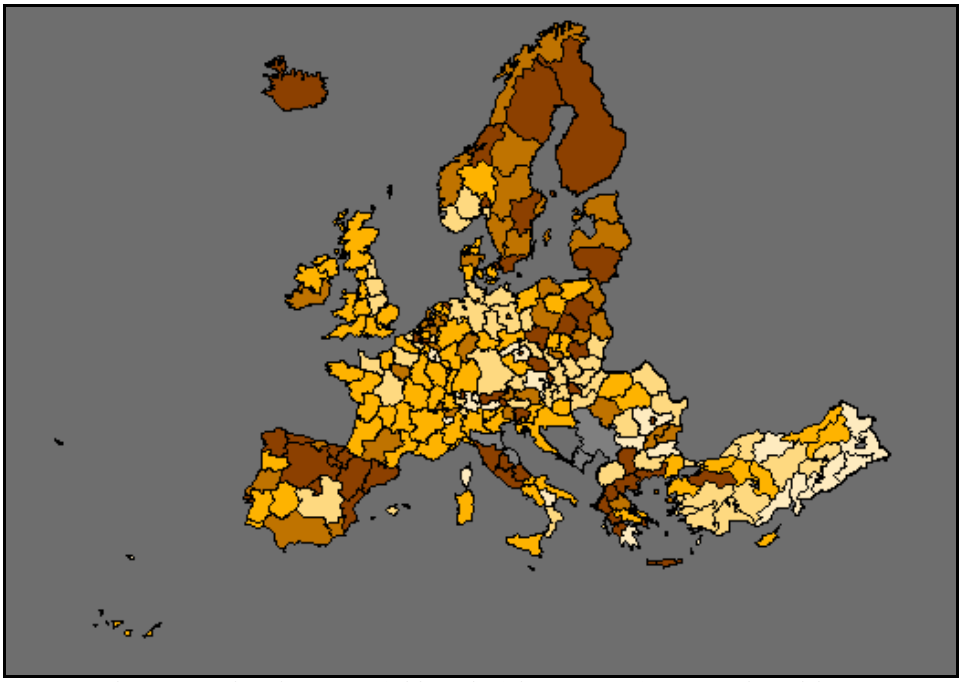

Figure 1. Regions in Europe (with Turkey) by NUTS 2 (Source: Adopted from http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/)

In defining the region, it implies a certain geographic proximity and neighbourhood (Hurrell, 1995) and mutual interdependence (Nye, 1965). Other authors would say that there is a certain degree of cultural homogeneity (Russett, 1967), a compound of cultural relations between specific groups and specific area (Gilbert, 1988) or a sense of community (Deutsch, Burrell, & Kann, 1957). Most often, the region possesses a geographical determinant of specific area, which has a "common social or even natural features", without administrative structures (Vuković, 2013a). If we consider this term geographically, we can even say that regions can be identified by a specific temperature or climatic differences (macro-regional divisions). According to Puhle (1999) region can be defined as any territory that is less than the state and greater than the locality or district. Only one city can be considered as a region, but also the whole country (Radulović, 2013). Definition of region may have natural-geographic designation (Vuković, Jovanović, & Grubišić, 2012) where region is a whole in which there is unity between nature and people. According to Radulović (2013), the best defined region has natural border, but on the contrary, it is often non-ethnic and unnatural, as well as border states.

Exactly, natural and geographic determinants represent our starting point in defining the SE Europe. In this paper, region is defined as an integral part of the wider economic social space, which is different from other neighbouring territories in economic, social, demographic, cultural and natural aspects. In addition to countries of former Yugoslavia, Bulgaria and Greece, Romania is also included in the analysis, as part of South East Europe. It is a transitional state, with traditional regions, which is a good foundation for analysis. Of course, this can be considered as a limitation. Finally, the analysis will include regions and populations of only EU member countries (with data available at Eurostat): Slovenia, Croatia, Romania, Bulgaria and Greece.

Literature background

Alfred Marshall (1890) more than 120 years ago considered human capital crucial to the theory of increasing returns and external economies of industrial localization. This theory is based on the following factors: skilled workforce, supportive and related industries and the knowledge spillover. All these factors can be termed as "light factors" or "industrial atmosphere" (Kitson, Martin, & Tyler, 2004). Innovations depend on the quality of human capital, which are the main generator of economic development. Later, this idea was called a theory - Regions as the centres of knowledge. Innovations are identified as interactive process of learning that requires interaction between numerous actors, such as: producers, equipment and component suppliers, users or buyers, private and public research laboratories. Innovative systems encompass universities and other higher education institutions, suppliers of consultant and technical services, public authorities and regulatory bodies (Hotz-Hart, 2002). High-quality human capital not only affects the innovations and adoption of new technologies, but also provides the ability to create higher added value in manufacturing, increases productivity, which consequently contributes to the growth of the economy (region) and its competitiveness. It is important to note that demographic structure of the population has a great influence, taking into account the age and education level of residents.

The strength of certain economy or region is most commonly regarded as strength of its competitiveness to achieve better economic results. According to the definition of The World Economic Forum, competitiveness is a set of institutions, policies and factors that determine the level of productivity of a country (Schwab & Porter, 2007). According to the same report, it may implicitly be understood that regional competitiveness is the level of quality of life in one region. One of the key factors is the quality of higher education and training of employees which have the most important role in the investment-

driven economies. Global trends and dynamics of economic development require that every modern country has to invest in high-skilled workforce in order that economy could adjust to changes in the environment. Training of employees should not be neglected in order that workers' skills could constantly be promoted and adapted to the growing needs of the production system (World Economic Forum, 2011). In the mid-1990s, a number of authors and institutions defined the concept of regional competitiveness, which has become the subject of theoretical, empirical and political debates (Vuković & Wei, 2010). In the study, "The New Economy: Beyond the Hype" (Organisation for Economic Cooperation and Development - OECD, 2001) it was noted that some countries, the OECD Member Countries, recorded a higher growth of GDP per capita, due to the growth of labour productivity. In other words, rise in labour productivity was the largest generator of growth of GDP per capita. Using comparative analyzes and regression, in a wide set of mostly micro-economic indicators, the study identified the factors that have a strong causal relationship with the growth of competitiveness. The quality of human capital is one of the key factors.

According to Lengyel (2004), the share of educated and skilled workers in the total population is relatively high in regions that make good economic performance. Education is effective in the sense that it is flexible so it can adapt to the changing demands of the labour market and in order to have the ability to prepare the young generation and re-educate the existing workforce to pursue creative and innovative activities (requirements of the information society). The IMD World Competitiveness Center Yearbook (2000) also recognized the quality of human capital as one of the key components of development. It concludes that competitiveness is in the interaction between economic performance and social needs of a nation, taking into account the heritage, values and traditions.

Methods and material

The Pearson's correlation coefficient has been used in the paper. The correlation coefficient is often used statistical method that shows a correlation between values of variables. Correlation analysis does not apply to properties that detects in relationships, but only to the existence and frequency of these relationships. The value of the correlation is determined by measuring the correlation coefficient which is a numeric value that indicates the degree of correlation between two variables. This value ranges from -1 to +1 (Figure 2). The general rule in the correlation is next: When the value of simple linear correlation coefficient is closer to one, the interdependency among the observed phenomena is stronger.

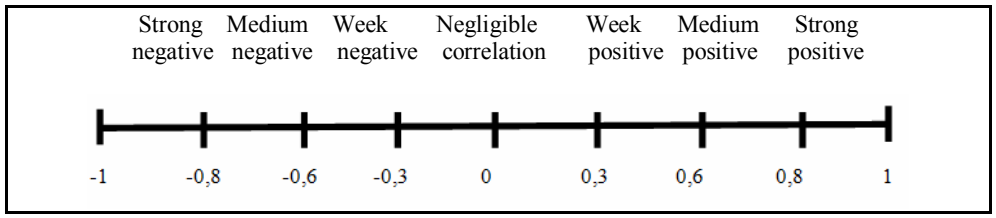

Figure 2. Correlation scale (Source: Vuković, 2013a)

In linear regression, the model specification is that the dependent variable, "γ" is a linear combination of the parameters. In simple linear regression for modelling η data points there is one independent variable xi and two parameters β_0 and β_1 of the form: $\gamma=\beta_0 + \beta_1 x_1 + \varepsilon$. If γ is a dependent variable and $x_1,\ldots,x_k$ are independent variables, then the general multiple regression model provides a prediction of γ from the x_i of the form:

$$\gamma = \beta 0 + \beta 1 x 1 + \beta 2 x 2 + \cdots + \beta k x k + \varepsilon = \beta 0 + \sum_{i=1}^{k} \beta i x i + \varepsilon \quad (1)$$

Where γ is the dependent variable, $\beta_0 \ldots ; \beta_k$ are the k + 1unknown coefficients that need to be estimated and ε is random error. Notice that the model is linear in parameters $\beta_0 \ldots ; \beta_k$ and is therefore called a linear model. Linearity refers to how the parameters enter the model. For instance, the model $\gamma = \beta 0 + \beta 1 x 1 + \beta 2 x 2 + \cdots + \beta k x k + \varepsilon$ is also a linear model. However, the exponential model $\gamma = \beta 0 \exp(-\chi \beta 1)$ is a nonlinear model since the parameter $\beta 1$ enters the model in a nonlinear fashion through the exponential function.

The multiple regression analysis has been used to calculate the coefficients in linear model. After calculation, the dependence was next:

$$\gamma = 11809 + 3.98\,x1 + 2.42 \cdot 10^{-2} x2 + 20.73 x3 - 20.82 x4$$

$$R = 0.69$$

Where Y – Gross domestic product at current market prices, $x1$ – Population aged 25-64 with tertiary education, $x2$ – Number of students, $x3$ – Human Resources in Science and Technology and $x4$ – Employment (15-64), taken cumulatively for all observed regions (tables from 4 to 8). The comparison between real and model data is shown in the Figure 3. As can be seen, plots are

very similar. Main difference is in absolute value, but position peaks are equal. Therefore, the multiple correlation coefficient is not large. It means that model is adequate.

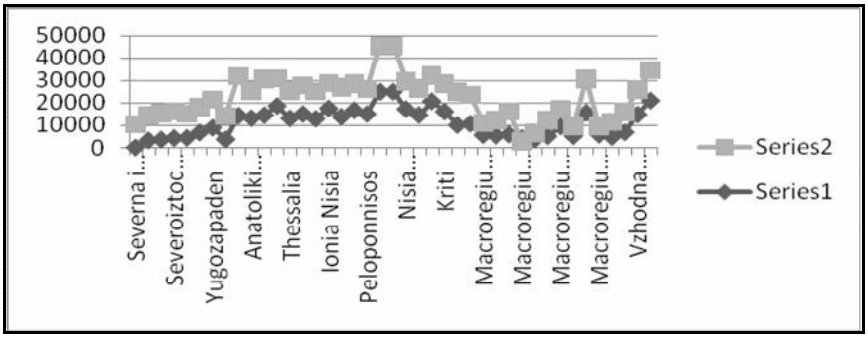

Figure 3. Comparison between real and model data (Source: calculated by authors)

In order to verify model, the results of sensitivity analysis are presented in the Table 1. To determine this, we analyzed how much γ changes by changing each factor x_i in 10%.

Table 1 Sensitivity analysis

Changing each factor x_i in 10%.	Grooving / Y Gross domestic product at current market prices
x1 Population aged 25-64 with tertiary education	0.09%
x2 Number of students	4.03%
x3 Human Resources in Science and Technology	3.89%
x4 Employment (15-64)	-6.59%

Source of data: calculated by authors

As can be seen from the Table 1, Y is the most dependent on x_2 and x_3 factors (grooving is 4.03% and 3.89% respectively for each factors), while x4 factor even has a high negative dependency (grooving is -6.59%). It is clearly seen that output (GDP) almost doesn't depend on x_1 factor. Multiple R is 0.69814, R Square is 0.48739946258187, Adjusted R Square is 0.428816544019798 and Standard Error is 4,709.59797949467, for 40 observations. The following Table 2 contains the rest of regression statistics.

Table 2. Summary output

	df	SS	MS	F	Significance F
Regression	4	738,145,040.5	184,536,260.1	8.319822135	7.947E-05
Residual	35	77,6310,959.5	22,180,313.13		
Total	39	1,514,456,000			

Source of data: calculated by authors

The Table 3 shows the results of presented coefficients, standard errors, t-statistics and P-values for each dependent variable.

Table 3. Coefficients, standard errors, t-statistics and P-values for each dependent variable

Dependent variable	Coefficients	Standard Error	t-Stat	P-value
Intercept	11,809.14	5,202.502	2.269897	0.02948
X Variable 1	3.972645	258.6796	0.015357	0.987834
X Variable 2	0.024295	0.016226	1.497242	0.143295
X Variable 3	20.73362	12.27937	1.688492	0.100209
X Variable 4	-20.8202	6.790763	-3.06596	0.004165

Source of data: calculated by authors

In the Tables 4,5,6,7 and 8, the data are presented on the main economic indicators and the quality of the human capital of countries: Bulgaria, Greece, Croatia, Romania and Slovenia. All data were measured for their regions according to the NUTS 2 level. The purpose of the analysis is to show is there a simple linear correlation between the following indicators:

– Population and population aged 25-64 with tertiary education,
– Population aged 25-64 with tertiary education and gross domestic product at current market prices,
– Number of students and gross domestic product,
– Human resources in science and technology and employment,
– Participation of adults aged 25-64 in education and training and income of households.

The analysis will also include the multiple correlation, taking into account the indicators:

– Number of students, human resources in science and technology and employment,
– Population; participation of adults aged 25-64 in education and training and income of households,
– Human resources in science and technology; employment and gross domestic product.

Table 4. The quality of human capital and economic indicators in regions in Bulgaria according to NUTS 2 classification

Regions	Population	Population aged 25-64 with tertiary education	Number of students	Human Resources in Science and Technology (in 000)	Employment (15-64)	Gross domestic product at current market prices (Euro per inhabitant)	Participation of adults aged 25-64 in education and training (in %)	Income of households (Euro per inhabitant)
Severna i yugoiztochna Bulgaria	3,693,421	20.5	632,988	562	1,370.70	3,900	1	2,190.80
Severozapaden	823,469	18.7	122,262	113	281.9	3,200	1.2	1,859.70
Severen tsentralen	844,511	20.8	154,718	133	314	3,500	0.9	2,041.00
Severoiztochen	957,460	22.5	180,499	156	359.4	4,200	1.3	2,306.90
Yugoiztochen	1,067,981	19.6	175,509	160	415.4	4,300	1.1	2,476.70
Yugozapadna i yuzhna tsentralna Bulgaria	3,591,131	27.4	660,973	730	1,524.20	6,700	1.9	2,962.90
Yugozapaden	2,128,783	33	413,038	518	962.4	8,800	2.5	3,483.60
Yuzhen tsentralen	1,462,348	19.3	247,935	212	561.8	3,600	1.1	2,239.30

Source of data: Eurostat, 2014

According to Pearson's correlation coefficient, the regions in Bulgaria (Table 4) have a low positive correlation with indicators: population and population aged 25-64 with tertiary education (0.40), population aged 25-64 with tertiary education and gross domestic product at current market prices (0.43) and number of students and gross domestic product (0.51). This means that population growth does not have a major impact on the population aged 25-64 with tertiary education. Likewise, the growth of population aged 25-64 with tertiary education will greatly affect the growth of gross domestic product (the same could be said for the growth of number of students). However, there is a strong positive correlation between the indicators: human resources in science and technology and employment (0.98) and participation of adults aged 25-64 in education and training and income of households (0.93). High values of Pearson's correlation coefficient suggest that the greater share of human resources in science and technology affects employment growth. Analyzing the multiple correlation, a high correlation was found between all pairs of measured indicators. More investment in human resources in science and technology, with the growth of number of students will certainly affect the growth of employment (Pearson's correlation coefficient is 0.999). Similar is the impact of the following groups of indicators: population, participation of adults aged 25-64 in education

and training and income of households (0.934) and human resources in science and technology, employment and gross domestic product (0.954).

Table 5. The quality of human capital and economic indicators in regions in Greece according to NUTS 2 classification

Regions	Population	Population aged 25-64 with tertiary education	Number of students	Human Resources in Science and Technology (in 000)	Employment (15-64)	Gross domestic product (GDP) at current market prices (Euro per inhabitant)	Participation of adults aged 25-64 in education and training (in %)	Income of households (Euro per inhabitant)
Voreia Ellada	3,559,848	24.4	725,763	567	1,124.80	14,200	2.5	11,008.20
Anatoliki Makedonia, Thraki	625,203	19.3	118,213	75	193.9	13,100	2.4	10,080.30
Kentriki Makedonia	1,906,645	27.1	405,529	346	609.1	14,400	2.7	11,187.30
Dytiki Makedonia	285,208	18	68,718	35	83.7	18,500	2.3	11,288.80
Thessalia	742,792	23.8	133,303	112	238.1	13,000	2.2	11,185.10
Kentriki Ellada	2,396,346	19.1	473,357	312	808.7	14,900	1.4	10,933.00
Ipeiros	347,052	23.8	74,842	55	116.9	12,800	1.1	11,128.80
Ionia Nisia	211,334	14.7	38,970	23	87.8	17,400	2.6	11,050.50
Dytiki Ellada	677,335	20.8	178,102	102	234.6	13,700	1.8	9,800.70
Sterea Ellada	566,714	17.2	92,675	64	168.2	16,600	1	11,627.30
Peloponnisos	593,911	17.6	88,768	68	201.1	14,900	1.2	11,545.30
Attiki	3,920,124	33.1	746,399	943	1,388.00	24,800	4.4	15,363.10
Nisia Aigaiou, Kriti	1,186,190	19.2	234,062	141	383.7	17,100	2	12,342.10
Voreio Aigaio	208,970	20.7	37,517	27	65	14,500	1.7	12,338.50
Notio Aigaio	347,577	16.1	54,542	34	109.9	20,600	1.6	15,127.80
Kriti	629,643	20.4	142,003	80	208.8	16,000	2.5	10,935.10

Source of data: Eurostat, 2014

Compared to regions in Bulgaria, the regions in Greece (Table 5) have a higher positive correlation between population and population aged 25-64 with tertiary education (0.79). This means the higher share of population aged 25-64 with tertiary education relative to the total population. However, in other three groups of indicators, the correlation is similar in Bulgaria: the population aged 25-64

with tertiary education and gross domestic product at current market prices (0.52), number of students and gross domestic product (0.48) and human resources in science and technology and employment (0.98). However, the Greek regions have low positive correlation between participation of adults aged 25-64 in education and training and income of households (0.53). The value of this coefficient shows that adults aged 25-64 in education and training do not participate significantly in the creation of income of households. High positive correlation exists in human resources in science and technology, number of students and employment (Pearson's correlation coefficient is 0.997). Multiple correlation with other indicators is significantly lower: population and participation of adults aged 25-64 in education and training and income of households (0.547) and human resources in science and technology, employment and gross domestic product (0.765).

Table 6. The quality of human capital and economic indicators in regions in Croatia according to NUTS 2 classification

Regions	Population	Population aged 25-64 with tertiary education	Number of students	Human Resources in Science and Technology (in 000)	Employment (15-64)	Gross domestic product (GDP) at current market prices (Euro per inhabitant)	Participation of adults aged 25-64 in education and training (in %)	Income of households (Euro per inhabitant)
Jadranska Hrvatska	1,407,798	20.2	316,129	226	448	10,000	2.1	n/a
Kontinentalna Hrvatska	2,854,342	17.9	489,115	428	947.4	10,600	2.6	n/a

Source of data: Eurostat, 2014.

According to Pearson's correlation coefficient, regions of Croatia (Table 6) have a perfect positive correlation with indicators: population aged 25-64 with tertiary education and gross domestic product at current market prices (1), number of students and gross domestic product (1) and human resources in science and technology and employment (1). However, perfectly-high values of this coefficient do not mean that the interdependence of these indicators is perfect. In fact, in Croatia only two regions were measured at NUTS level 2, so obtained values have maximal coefficient. Therefore, the statistical significance of the correlation is inadequate. We can say that there is a positive correlation between these indicators, but with no full interdependence. The same applies for indicators of population and population aged 25-64 with tertiary education, but in this case the value of Pearson's correlation coefficient is -1. This means that reduction in the total number of population influences the increase in the population aged 25-64 with tertiary education. In Croatia's case, it was not

possible to determine interactions between the participation of adults aged 25-64 in education and training and income of households, as well as multiple correlation.

Table 7. Quality of human capital and economic indicators in regions in Romania according to NUTS 2 classification

Regions	Population	Population aged 25-64 with tertiary education	Number of students	Human Resources in Science and Technology (in 000)	Employment (15-64)	Gross domestic product (GDP) at current market prices (Euro per inhabitant)	Participation of adults aged 25-64 in education and training (in %)	Income of households (Euro per inhabitant)
Macroregiunea unu	4,959,455	13.9	1,015,565	628	2,113.20	5,500	1.3	2,934.20
Nord-Vest	2,598,877	13.8	544,189	307	1,171.50	5,300	1.4	2,825.70
Centru	2,360,578	14	471,376	320	941.7	5,800	1.1	3,051.00
Macroregiunea doi	5,833,153	12.7	1,181,509	691	2,707.50	4,200	1.7	2,243.30
Nord-Est	3,294,204	13.1	706,626	396	1,647.00	3,600	1.9	1,926.20
Sud-Est	2,538,949	12.2	474,883	295	1,060.60	5,000	1.4	2,662.20
Macroregiunea trei	5,407,944	20.4	1,036,533	925	2,323.00	9,400	1.4	4,737.10
Sud - Muntenia	3,128,799	11.5	513,693	319	1,271.80	5,100	1.3	2,395.90
Bucuresti - Ilfov	2,279,145	32	522,840	606	1,051.20	15,500	1.5	8,108.10
Macroregiunea patru	3,895,444	14.8	755,389	490	1,741.90	5,700	1.1	2,956.40
Sud-Vest Oltenia	2,06,.357	14.2	388,525	250	942.5	4,700	1.2	2,356.40
Vest	1,828,087	15.4	366,864	240	799.4	6,800	1	3,657.10

Source of data: Eurostat, 2014

Regions in Romania virtually do not have any interdependence between indicators: population and population aged 25-64 with tertiary education (-0.11), population aged 25-64 with tertiary education and gross domestic product at current market prices (-0.13), number of students and gross domestic product (-0.08) and participation of adults aged 25-64 in education and training and income of households (-0.03). Moreover, the values of these coefficients are negative, but they have very small significance since they are very low. Similarly, in the multiple correlation indicators: population, participation of adults aged 25-64 in education and training and income of households (0.14). A statistically significant correlation was found for indicators human resources in science and technology and employment (0.82). In the multiple correlation,

coefficient values are: human resources in science and technology, number of students and employment (0.99), human resources in science and technology and employment and gross domestic product (0.934).

Table 8. The quality of human capital and economic indicators in regions in Slovenia according to NUTS 2 classification

Regions	Population	Population aged 25-64 with tertiary education	Number of students	Human Resources in Science and Technology (in 000)	Employment (15-64)	Gross domestic product (GDP) at current market prices (Euro per inhabitant)	Participation of adults aged 25-64 in education and training (in %)	Income of households (Euro per inhabitant)
Vzhodna Slovenija	1,082,181	22.2	190,253	216	470.6	14,700	12.2	10,398.40
Zahodna Slovenija	976,640	31.2	228,454	258	435.8	20,900	15.6	12,338.40

Source of data: Eurostat, 2014

The regions in Slovenia (Table 8) have similar problem as Croatia. According to Pearson's correlation coefficient, there is a perfect negative correlation for indicators: population and population aged 25-64 with tertiary education (-1), population aged 25-64 with tertiary education and gross domestic product at current market prices (-1) and human resources in science and technology and employment (-1). Perfect positive correlation exists with the indicators: number of students and gross domestic product (1) and participation of adults aged 25-64 in education and training and income of households (1). However, perfect positive or negative values of this coefficient do not mean that the interdependence of these indicators is perfect. As with Croatia, only two regions were measured in Slovenia at NUTS level 2, so obtained values have maximal coefficient. Therefore, the statistical significance of the correlation is inadequate. We could say that there is a positive or negative correlation between these indicators, but without full interdependence. In the case of Slovenia, it was not possible to determine the multiple correlation.

Discussion and conclusion

We can conclude that in all analyzed countries (separately) there is a high multiple correlation coefficient between the indicators of human resources in science and technology, number of students and employment. These data indicate that the greater investment in higher education and science and technology has an influence on employment growth. In addition, these indicators affect the growth of gross domestic product, which indirectly indicates how much importance is given to higher education, science and technology on the basic economic indicators. However, considering all the regions together

(cumulative) the multiple regression model showed that the relationship between GDP and employment is even negative. Observed through a simple linear analysis, similar conclusions can be drawn for indicators human resources in science and technology and employment (except Slovenia). Although there are significant regional differences within Bulgaria and Greece, we can say that in these countries the values of coefficients are similar. Other countries are different in the interdependence of the same pairs of indicators (Croatia and Slovenia have the tiniest differences), while Romania has practically no interdependence between the measured indicators, except multiple correlation between human resources in science and technology, number of students and employment. The exact cause of this phenomenon in Romania cannot be determined in this paper, but it can be assumed that this occurs due to large regional differences. Finally, correlation analysis did not have proper importance for regions in Croatia and Slovenia, because a regional sample was too small. This is the greatest limitation of our analysis. The result of the correlation analysis for these countries cannot be taken for granted. The main contribution of this paper is that it will help the development of scientific disciplines of regional economics and economic geography. The analysis is not only important for the studied countries, but also neighbouring and candidate countries (for example Serbia).

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