

Ph.D. Nada Karaman Aksentijević, Full Professor

University of Rijeka/Faculty of Economics
Ivana Filipovića 4, 51000 Rijeka
Phone: +38551355111 Fax: +38551212268
E-mail address: nkaraman@efri.hr

Ph.D. Zoran Ježić, Assistant Professor

University of Rijeka/Faculty of Economics
Ivana Filipovića 4, 51000 Rijeka
Phone: +38551355111 Fax: +38551212268
E-mail address: zoran.jezic@efri.hr

**ANALYSIS OF HUMAN RESOURCES DEVELOPMENT OF EASTERN
CROATIA AND THEIR IMPACT ON ECONOMIC GROWTH***

**ANALIZA RAZVIJENOSTI LJUDSKIH POTENCIJALA ISTOČNE
HRVATSKE I NJIHOV UTJECAJ NA GOSPODARSKI RAST**

ABSTRACT

In Croatia, there are great differences in the development of certain regions measured by standard indicator of GDP per capita, unemployment and employment rate trends, and equipment with various components of the infrastructure. There are noticeable and significant differences in human resources development. The objective of the paper is to analyse human resources development in Eastern Croatia and to establish their impact on the economic growth of Eastern Croatian counties. This will be conducted in three steps: the subject of analysis in the first step will be global human component through quantitative and qualitative indicators (population density, average household size, level of urbanisation); indicators that directly express the degree of utilisation of human resources (employment per 100 inhabitants, employment per sectors), indicators pointing to the existence of the preconditions for the formation of high-quality human factor (coverage of relevant age groups by secondary and tertiary education, the number of pupils and university students per 100 inhabitants). In the second part of the research, the authors will use the Human Development Index (HDI) to evaluate human resources development in Osijek-Baranja County, Požega-Slavonia County, Brod-Posavina County, Vukovar-Srijem County, and Virovitica-Podravina County. With regard to content, the Human Development Index can be used as a good indicator of human resources development, and is, at the same time, the indicator of the achieved level of development of a certain country/region, because it measures life expectancy, education, and GDP per capita. In the third part of the research, quantitative methods will be used to analyse the relationship between HDI and GDP per capita of Eastern Croatian counties and some possible measures for human resources development will be proposed.

Key words: human resources, economic growth, development, HDI (Human Development Index)

SAŽETAK

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U Hrvatskoj postoje velike razlike u razvijenosti pojedinih regija mjerene standardnim pokazateljem BDP-a po stanovniku, kretanjem stope nezaposlenosti i zaposlenosti te opremljenosti različitim komponentama infrastrukture. Uočavaju se i značajne razlike u razvijenosti ljudskih potencijala. Cilj rada je analizirati razvijenost ljudskih potencijala istočne Hrvatske i utvrditi njihov utjecaj na gospodarski rast županija istočne Hrvatske. To će se napraviti u tri koraka: u prvom će se analizirati: globalna ljudska komponenta putem kvantitativnih i kvalitativnih pokazatelja (gustoća naseljenosti, prosječna veličina domaćinstva, stupanj urbanizacije); pokazatelja koji posredno iskazuju stupanj korištenja ljudskih potencijala (zaposlenost na 100 stanovnika, zaposlenost po sektorima); pokazatelja koji ukazuju na postojanje preduvjeta za formiranje kvalitetnog ljudskog faktora (obuhvat relevantnih dobnih skupina sekundarnim i tercijarnim obrazovanjem, broj učenika i studenata na 100 stanovnika). U drugom dijelu istraživanja autori će putem indeksa ljudske razvijenosti (HDI) ocijeniti razvijenost ljudskih potencijala u Osječko-baranjskoj, Požeško-slavonskoj, Brodsko-posavskoj, Vukovarsko-srijemskoj i Virovitičko-podravskoj županiji. S obzirom na sadržaj, indeks ljudske razvijenosti može se koristiti kao dobar pokazatelj razvijenosti ljudskih potencijala, a istodobno je i pokazatelj dostignute razine razvijenosti neke zemlje/regije jer mjeri životni vijek, obrazovanost i BDP po stanovniku. U trećem dijelu istraživanja će se kvantitativnim metodama analizirati odnos HDI-a i BDP-a po stanovniku županija istočne Hrvatske te će se navesti neke moguće mjere za razvoj ljudskih potencijala.

Ključne riječi: *ljudski potencijali, gospodarski rast, razvoj, HDI (indeks ljudske razvijenosti)*

1. Introduction with the Literature Review

In the scientific and technical literature covering studies about the importance and contribution of the human factor to production and development of enterprises, local and regional communities or the national economy, commonly used categories are „human capital“ and „human resources“. They are often interchanged in terms of content and are used as synonyms. Following the historical process of research and measurement of the value of investment in people and the values which people bring into the business process through labour as well as contribution they provide to the creation of a new value, it is concluded that it is necessary to make a distinction between these two categories. In the analysis of human capital, one is focused on the value of investing in people through education and health care, but also all other activities that contribute to human development. These investments represent individual and social cost and increase human abilities, knowledge and skills. In contrast, in the analysis of human resources, one analyses the contribution people provide to the creation of a new value by including their abilities, knowledge, and skills into the business process. When a person, i.e. employee, includes his or her human capital into the business process, this capital becomes the key component of human resources.

The term „human resources“ implies total mental and physical abilities at the disposal of enterprises which they can use to achieve their business goals (Bahtijarević Šiber, F., 1999). At national level, human resources can be defined as total psycho-physical energy owned by the inhabitants of a country, i.e. a society, which can be used to achieve its development goals. In the pre-working age, society has a crucial influence on the formation and development of human resources, primarily through education and health care, but also through other activities such as child care, sports, and cultural activities.

Human resources cannot be directly expressed in value; thus, their value and development are measured indirectly through human capital. The literature covers various criteria for

assessment of the value and development of human resources at the macro level. W. Petty was the first person who tried to quantitatively evaluate human resources in the 17th century England (Vinski, I., *Valorizacija ljudskog potencijala [Valuation of Human Resources], Ekonomski pregled, [Economic Review]*11-12/1977). Petty defined it as budget of total income of the population and the appropriate size of capital the earnings would bring if they were invested at a particular interest rate. Friedrich and Johann von Thunen used two methods to assess the value of human capital: capitalisation of the net value of future earnings per market interest rate and the total cost of development of a person of a certain age (Jarvis, P. H., 2000). They found that the value of human capital in Great Britain in 1891 was five times greater than the value of stocks of physical capital. M. J. Bowman advocated the opinion that human resources should be assessed as a total value of services the employees will provide in predictable working life decreased by a discount for an appropriate number of years (Bowman, M. J., 1974). In their work *Education, Labour Force and Economic Growth*, (Harbison, F., Myers, Ch., 1964), Harbison and Myers developed quantitative indicators to measure human resources development after they had found that economists neglected the study of the human factor and its significance and contribution to economic growth. They concluded that this is primarily due to the inability to determine the input-output relationship, that is indisputable in case of physical capital, because the value of this capital is directly measurable. Interest in the study of human capital was growing in the second half of the 20th century, which is primarily the merit of Nobel Prize Laureates Theodor Schultz and Gary Becker. However, it should be taken into account that this was the time when development of national economies was impossible without an increase in education of the population. Therefore, Schultz and Becker primarily engaged in investments in education which they treated as an investment in human capital, although Schultz found that there were several groups of activities and flows that affect the increase in human capital. These are improvement of health services, formal education, education in the workplace, adult education outside the company, as well as individual and family migrations due to greater employment opportunities (Mervar, A., 2003). OECD publications list three ways of measuring human capital: through the costs of education and training, through testing of competences, through the indicators of „achievements“: wages, job security, work place status.

Lately, the Human Development Index (HDI) is calculated by the OUN. With regard to the content of the HDI, it can be used as a good indicator of human resources development, and the HDI is at the same time a good indicator of the achieved level of development of a country or a region. The index was constructed at the beginning of the 1990s by Amartya Sen, Mahub ul Hak, Gustav Ranis, Meghan Desai, and it has been used ever since by the OUN and is published in the annual Human Development Report. The concept of human development in a broader sense is defined by the OUN as development of the people, development for the people and development by the people (Human Development Report, 1993). The HDI is calculated as a combined index of three indicators. These are: 1. the life span and health condition of the population measured by life expectancy, 2. knowledge and education of the population, 3. purchasing power i.e. the standard of living of the population measured by GDP per capita. The first two indicators indirectly show human resources development, while the third provides a better image of the achieved level of development of a country.

These three indicators are appropriate for indirect demonstration of human resources development at the macro level, because longer life expectancy of the population implies a better state of health, which results in better mental and physical abilities, i.e. greater vitality of the population. Purchasing power of the population indirectly expresses the degree of

fulfillment of the needs, and thus satisfaction and motivation of employees. Also, it indirectly expresses, although not precise enough (because GDP per capita, and not per employee is taken into account), labour productivity. Finally, the achieved level of education indirectly expresses the level of mastery of knowledge and skills necessary to achieve growth and development. Until 2009, all countries of the world were ranked into three groups according to the level of HDI: (0,000 - 0,499 low HDI countries; 0,500 – 0,799 medium HDI countries; 0,800 – 1,00 high HDI countries. Since 2009, the OUN classifies countries into four groups: very high HDI countries (0,9 - 1,00), high HDI countries (0,8 - 0,899), medium HDI countries (0,5 - 0,799), low HDI countries (0 - 0,499). As this is a relatively new indicator composed of multiple components, it is constantly upgraded and its contents therefore constantly change. From 2010, the World Bank introduced a new methodology for calculating the Human Development Index. According to the calculation methodology, by 2010, knowledge and education were expressed by a combined index of literacy of the population and the proportion of corresponding population groups in primary, secondary and tertiary education. Since 2010, this indicator was replaced by a new indicator that shows the level of education which presents access to knowledge and is measured by average and expected years of schooling of the population. Since 2010, new ranking criteria of the countries have been applied in terms of Human Development Index. All countries are classified into four groups; ¼ of the analysed countries is included in each of the groups. 25% of the highest-ranked countries are countries of very high human development level, other 25% of the ranked countries are high human development countries, the third 25% of the ranked countries are countries of medium human development, and the final 25% are low human development countries (Human Development Report 2011). HDI can also be used to measure development of human resources in certain regions and local communities.

The objective of the paper is to analyse the development of human resources in Eastern Croatia and to establish their impact on the economic growth of Eastern Croatian counties. This will be conducted in three steps: the subject of analysis in the first step will be global human component through quantitative and qualitative indicators (population density, average household size, level of urbanisation); indicators that directly express the degree of utilisation of human resources (employment per 100 inhabitants, employment per sectors), indicators pointing to the existence of the preconditions for the formation of high-quality human factor (coverage of relevant age groups by secondary and tertiary education, the number of students and university students per 100 inhabitants). In the second part of the research, the authors will use the Human Development Index (HDI) to evaluate human resources development in the Osijek-Baranja County, Požega-Slavonia County, Brod-Posavina County, Vukovar-Srijem County, and Virovitica-Podravina County. In the third part of the research, quantitative methods will be used to analyse the relationship between the HDI and GDP per capita of Eastern Croatian counties and some possible measures for human resources development will be proposed.

2. Methodology

Data by the National Bureau of Statistics are used in the paper to calculate the HDI. To ensure that all the data are transformed into an index which obtains the values from zero to one, which allows for their comparison and aggregation, the Method of Transformation of Variables is used:

$$x - index = \frac{x - \min(x)}{\max(x) - \min(x)}$$

wherein $\min(x)$ and $\max(x)$ are minimum and maximum values of the variable x . Given the availability of statistical data and the possibility of comparison, the HDI is calculated according to the methodology of the World Bank that was used until 2010. Furthermore, simple linear regression is also used (Ordinary Least Squares Method, OLS). In statistics, the Least Squares Method, (OLS) is a method for estimating unknown parameters in the linear regression model. This method minimises the sum of squares of the vertical distance between the observed indicators and the collection of indicators provided by the linear approximation. The resulting estimates can be expressed by a simple formula, especially in the case of one regressor. Using the Ordinary Least Squares Method, the authors analysed the impact of changes in certain variables of the HDI on the increase in GDP per capita. The same model was also analysed by the graphical method.

3. Analysis of Human Resources Development in Eastern Croatia

3.1. Global Human Component

According to the results of the 2001 Census, a total of 891,259 inhabitants lived in Eastern Croatia, or 20,1% of the total population of the Republic of Croatia. In 2011, 805,998 inhabitants lived in Eastern Croatia (18,81% of the total Croatian population; the Census, 2011). This means that East Slavonia recorded depopulation of 9,56% in the ten-year census period. This is a consequence of negative natural population growth and mechanical attrition. The following table presents the basic data on population, households, and population density of the counties in Eastern Croatia and in the Republic of Croatia in 2011.

Table 1. Population, number of households, proportion of urban population in total population and population density in Croatia and Eastern Croatian counties in 2011.

	Population in 2011	Number of households in 2011	The average number of household members in 2011	The proportion of urban population in total population in 2011 (%)	Population density in 2011 (inh./km ²)
Republic of Croatia	4284889	1519038	3,15	70,39	75,71
Virovitica-Podravina County	84836	29622	3,53	47,48	41,92
Požega-Slavonia County	78034	26408	3,76	74,90	42,81
Brod-Posavina County	158575	52056	3,36	46,27	78,12
Osijek-Baranja County	305032	110009	3,34	63,58	73,41
Vukovar-Srijem County	179521	61094	3,79	49,13	73,15

Source: Authors' analysis according to the NBS, the 2011 Census

The largest population, according to the 2011 Census, lives in Osijek-Baranja County, which also has the highest number of households. In comparison with the analysed counties, Požega-Slavonia County in 2011 had the highest proportion of urban population (74,9%), and Brod-Posavina County has the highest population density (78,12 inhabitants per km²), which represents a positive deviation in comparison with the Croatian average.

Table 2. Global human component of the Republic of Croatia and Eastern Croatian counties

	Total number of employees	Number of employees in the secondary	Secondary school qualifications	Number of high school students per 100	University qualifications per 100	Number of university students per

	per 100 inhabitants, 2012	sector per 100 employees, 2012	per 100 inhabitants, in 2011	inhabitants, in 2012	inhabitants, in 2011	100 inhabitants in 2012
Republic of Croatia	24,89	28,93	44,62	4,36	13,89	3,57
Virovitica-Podravina County	15,48	32,17	38,44	4,49	6,93	2,75
Požega-Slavonia County	17,30	33,74	39,41	4,98	8,33	3,57
Brod-Posavina County	15,73	39,78	42,04	4,79	7,85	3,14
Osijek-Baranja County	22,55	31,90	43,37	4,61	10,78	3,07
Vukovar-Srijem County	16,95	27,21	41,32	4,78	7,85	2,78

Source: Authors' analysis according to the NBS, the 2011 Census

Analysis of the data in Tables 1 and 2 indicates below-average level of development of the global human component in Eastern Croatian counties in comparison with the Croatian average. In fact, all the counties recorded a lag in the number of employees per 100 inhabitants in relation to the Croatian average (Virovitica-Podravina County the most – 37,81%, and Osijek-Baranja County the least – 9,4%), lag in the number of the population with secondary education per 100 inhabitants (Virovitica-Podravina County the most, 13,85%, and the Osijek-Baranja County the least – 2,8%), negative deviation of the number of university graduates per 100 inhabitants (Virovitica-Podravina County the most, 50,11%, and Osijek-Baranja County the least – 22,39%), as well as negative deviation of the number of university students per 100 inhabitants (Virovitica-Podravina County the most, 22,97%, and Brod-Posavina County the least – 14,01%, and no deviations in relation to the Croatian average – Požega-Slavonia County). All the counties recorded positive deviations in the number of high school students per 100 inhabitants (the largest positive deviation had Požega-Slavonia County, 14,22%), and positive deviations in the number of employees in the secondary sector per 100 employees (except Vukovar-Srijem County which had negative deviations in case of this indicator, too). These data indicate that the preconditions have been created for the formation of high-quality human factor in Eastern Croatia.

3.2. Human Development Index (HDI)

As noted above, HDI is an indicator of human resources development. HDI of Eastern Croatian counties and the Republic of Croatia for 2007 and 2011 is analysed below.

Table 3. HDI for the Republic of Croatia and Eastern Croatian counties in 2007

	Human Resources Education Index	GDP/ Pc USD	GDP Index	Life expectancy	Life exp. index	HDI	HDI deviation from the Croatian average
Republic of Croatia	0,8374	13754	0,8218	75,46	0,8410	0,8334	100,00
Virovitica-Podravina County	0,8265	9163	0,7540	73,48	0,8080	0,7962	95,53

Požega-Slavonia County	0,8252	8649	0,7444	74,79	0,8298	0,7998	95,97
Brod-Posavina County	0,8198	7222	0,7143	75,12	0,8353	0,7898	94,77
Osijek-Baranja County	0,8335	10733	0,7804	74,5	0,8250	0,8130	97,55
Vukovar-Srijem County	0,8124	7694	0,7249	75,77	0,8462	0,7945	95,33

Source: Authors' calculation

In 2007, all of the analysed counties lagged behind the average Croatian Human Development Index. The greatest lag was recorded in Brod-Posavina County, which lags behind the Croatian average by 5,23%. This is primarily due to the fact that in 2007, Brod-Posavina County had 48% less income than the Croatian average. All the counties have a lower level of education of human resources in comparison with the Croatian average, but Osijek-Baranja County lags behind the least. The county with the highest human resources development, as measured by the HDI Index, is the Osijek-Baranja County (HDI=0,8130), and, according to the OUN methodology that was used until 2010, this county is the only county that groups among the counties with high Human Development Index (other counties group among the counties with medium Human Development Index).

Table 4: HDI for the Republic of Croatia and Eastern Croatian counties in 2011

	Human Resources Education Index	GDP/ Pc USD	GDP Index	Life Expectancy	Life exp. index	HDI	HDI deviation from the Croatian average
Republic of Croatia	0,8536	14364	0,8291	78,083	0,8847	0,8558	100,00
Virovitica-Podravina County	0,8401	8811	0,7475	74,107	0,8185	0,8020	93,72
Požega-Slavonia County	0,8407	8738	0,7461	76,46	0,8577	0,8148	95,21
Brod-Posavina County	0,8396	8183	0,7352	76,853	0,8642	0,8130	95,00
Osijek-Baranja County	0,8417	11507	0,7921	75,734	0,8456	0,8264	96,57
Vukovar-Srijem County	0,8327	8650	0,7444	75,8	0,8467	0,8079	94,41

Source: Authors' calculation

Osijek-Baranja County was also in 2011 the county with the highest level of human development (HDI=0,8264); however, all the other counties also exceeded the Human Development Index of 0,800. The subject of the following analysis is the change in individual components of the Human Development Index in 2011 compared to the year 2007.

Table 5. The change in the HDI for the Republic of Croatia and Eastern Croatian counties in 2011/2007

	Human Resources Education Index	GDP/Pc USD	GDP Index	Life expectancy	Life exp. index	HDI
Republic of Croatia	101,93	104,44	100,89	103,48	105,20	102,69
Virovitica-Podravina County	101,65	96,16	99,13	100,85	101,30	100,73
Požega-Slavonia County	101,88	101,03	100,23	102,23	103,36	101,88
Brod-Posavina County	102,42	113,31	102,93	102,31	103,46	102,94
Osijek-Baranja County	100,98	107,21	101,50	101,66	102,50	101,65
Vukovar-Srijem County	102,50	112,43	102,69	100,04	100,06	101,69

Source: Authors' calculation

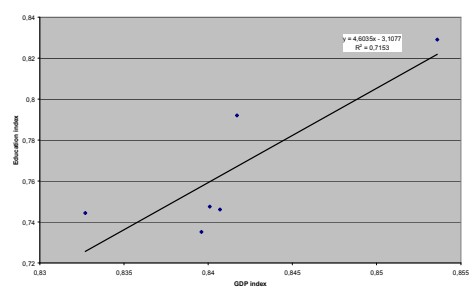
The Republic of Croatia and all the Eastern Croatian counties recorded a positive change in the HDI, while the changes in the Eastern Croatian counties are of lower intensity (with the exception of Brod-Posavina County). Brod-Posavina County (13,31%) and Vukovar-Srijem County (12,43%) achieved the highest income growth per capita in 2011 in relation to 2007. In the same period, Virovitica-Podravina County (one of the analysed counties), recorded a reduction of income (3,84%). Brod-Posavina County and Vukovar-Srijem County also had the highest increase in the education of human resources (Education Index increasing by 2,42 % and 2,5%). However, the Vukovar-Srijem County recorded the smallest increase in life expectancy in 2011 in relation to 2007, and therefore, this county realised HDI growth on the level of other analysed counties. The only county which changed the HDI on the national level of HDI change is Brod-Posavina County. Therefore, it can be concluded that, although all the counties recorded HDI growth in the analysed period, this increase was insufficient for reaching the development dynamics of the most developed Croatian counties in Human Development Index.

3.3. Regression Analysis of the Relationship Between HDI Components

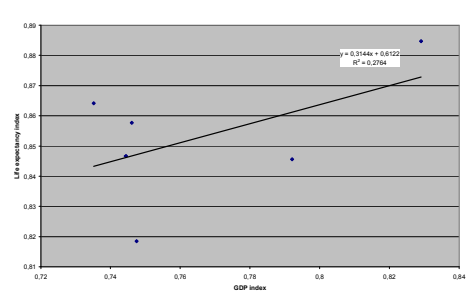
The Least Squares Method is used below to analyse the impact of HDI components on income growth.

Chart 1. The relationship between a) Income Index and Human Resources Education Index, and b) Income Index and Life Expectancy for the Republic of Croatia and Eastern Croatian counties, linear regression

a)



b)



Source: Authors' calculation

The charts confirm the expected positive correlation between the increase in income and the level of human resources development. It is important to note that, although there is a positive correlation in both cases a) and b), faster income growth is achieved by increasing the level of education of the population (and therefore, the correlation coefficient in Chart a) of 84,57%, which means that a strong correlation was established between the increase in the education of the population index and income growth). This means that the Republic of Croatia (and all analysed counties) should make significant investments in education in order to increase generation coverage of the population at all levels of education and extend its duration. In order to achieve this objective, it is necessary to increase allocations for science and education, to fund vocational education (which is currently being accessed in a traditional manner), and the reform of vocational education should be used to fulfill the need for specific practical knowledge and skills as well as general knowledge and skills such as interpersonal relationships and social competence, to encourage life-long learning which is currently mainly carried out through adult education policy, to use best practice from other European economies, to apply ICT in education and encourage diverse, innovative approaches to learning.

3. Conclusion

In recent years, the rise of the role of human resources in the development of enterprises and national economies has resulted in more frequent attempts of their reporting and measuring their impact on economic growth. HDI is increasingly used as an indicator of human development. Analysis of human resources development in Eastern Croatian counties and in the Republic of Croatia indicated that all the analysed counties in 2011 had Human Development Index greater than 0,800 (according to the classification until 2010 – high Human Development Index), and that they made progress in relation to 2007. However, human resources development in Eastern Croatia had a slower dynamics than the average human resources development in Croatia, and, in fact, these counties recorded a developmental lag. Analysis of the impact of education of human resources and life expectancy has shown that it is necessary to make further investments in human resources development through education policy.

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