Jana Masárová, Eva Koišová,
Jozef Habánik

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ASSESSMENT OF THE EVOLUTION OF THE EDUCATIONAL ATTAINMENT IN ECONOMICALLY ACTIVE POPULATION IN THE REGIONS OF THE SLOVAK REPUBLIC

Jana Masárová
Alexander Dubcek University of Trencin, Trencin, Slovakia
E-mail: jana.masarova@tnuni.sk
ORCID 0000-0001-9202-0735

Eva Koišová
Alexander Dubcek University of Trencin, Trencin, Slovakia
E-mail: eva.koisova@tnuni.sk
ORCID 0000-0003-1701-4217

Jozef Habánik
Alexander Dubcek University of Trencin, Trencin, Slovakia
E-mail: jozef.habanik@tnuni.sk
ORCID 0000-0001-7898-2735

ABSTRACT. The economic development of countries is closely connected to human resources development. Education plays a pivotal role in the life of an individual and society as it provides chances for personal development and economic development of society. The Slovak Republic has been unable to cope with profound regional disparities in various areas for a long time. The existence of disparities is demonstrated by the evolution of educational attainment, which is integral to economic and regional development. The purpose of the paper was to determine the evolution of educational attainment of the economically active population in the regions of the Slovak Republic from 2000 to 2020. The educational attainment index was used to assess educational attainment. The research findings show that the educational attainment of the economically active population and employed population is increasing and is the highest in Bratislava. The educational level of the unemployed rises and falls irregularly depending on how the labour market evolves.

Introduction

The economic and social standard of living and development of regions are affected by the globalisation of the world economy. That is why the traditional factors of economic development, such as land, labour, and capital, have been replaced by knowledge. As a result, a knowledge-based economy has emerged with the highlights of human capital (Małkowska et

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al., 2021). An individual's socio-economic status can be assessed from various perspectives, such income, wealth, education and employment.

Education plays a vital role in society, which is confirmed by Bleha and Szabó (2018), who investigated the evolution of educational pathways. Their study provided a spatial view of regional differentiation at the level of administrative units of LAU-I. The importance of education and tracking its evolution gave rise to educational demography, which focuses on the analysis of the relationship between education, demographic phenomena and processes (Barakat and Blossfeld, 2010). The discipline has also been used analysing of human resources in light of education (Moretti, 2004), especially in relation to forecasting the future demographic potential of countries or their regions.

The Slovak Republic has long struggled with major regional disparities in various areas. The existence of disparities has also been supported by trends in educational attainment, which is integral to economic and regional development.

The purpose of the paper was to determine and assess the evolution of educational attainment in the economically active population in the NUTS3 regions of the Slovak Republic from 2000 to 2020. The educational attainment was assessed through the educational attainment index. First, the evolution of employment and unemployment rates by educational attainment was examined. Next, the educational attainment of the economically active population, the employed and unemployed in the regions of the Slovak Republic was assessed. Finally, the dependence of the educational attainment of the economically active population on the unemployment rate in the regions of the Slovak Republic was assessed by means of the Pearson correlation coefficient.

1. Literature review

One of the factors influencing the participation of people in the labour market is their level of education. Bobáková (2018) asserts that highly skilled and educated people are more adaptable to labour market changes and returns to education are high in the form of wages. Belajová (2014) argues that higher level of education and training give people a better chance of getting and retaining one's job or finding a new one. Thus, they can achieve satisfactory status and earn income to raise their standard of living. Human capital also has advantages of non-economic nature, as higher levels of education improve health and promote the education of future generation. Education is associated with more active participation in civic life, volunteering and charitable activities. Sauerberg (2021) found that some countries achieve higher levels of the Healthy Life Years (HLY) indicator as a result of higher educational attainment of the population in the countries given.

Similarly, Hronec, Vicianová and Hroncová (2014) maintain that education and training shall prepare a skilled workforce in response to the needs of the labour market. Education is a public good having a major impact on the development of the entire society from the economic, cultural and social point of view, and therefore deserves increased attention.

Socio-economic changes of recent years have to be reflected in the processes of curriculum drafting. However, on the other hand, the revision of demands put on the education for the society of knowledge cannot lead only to escalation of new topics, or to a non-conceptual matching of content of education to the most actual economic-social situation (Benešová, 2015).

Rakytová (2019) believes that education has been the key factor affecting several spheres of a person's life. In the past, educational attainment determined people's position in employment, their standard of living, earnings or status.

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Porubčinová (2011) states that information society has highlighted the social relevance of education. Education improves workers' adaptability to changing labour market needs since willingness to learn and ability to master the knowledge learned determine one's capability to perform complex tasks. Moreover, educated workers are better able to cope with unemployment, and spend their free time meaningfully.

Bobáková (2018) points out that education does not only provide opportunities for personal development, but also plays an irreplaceable role in economic progress. In terms of the new economy and its focus on innovations of various kinds and degrees, education plays a vital role. Education of a new generation, the generation of critical thinkers, creative and independent young people, employable in the new economy is determined by the quality of education and expenditures on education. Countries which prioritized education and research in the past are now leaders in innovation performance and record low unemployment rates. Educational attainment affects economic growth, and economic growth, in turn, has positive effects on the retention of existing jobs and creation of new jobs.

Šprocha and Majo (2016) emphasize that societal transformation, changes in the economy, and the promotion of knowledge-based economy put enormous pressure on the qualitative aspect of human capital, which is also reflected in the intergenerational changes in the view of education and its value. It is the education that is becoming one of the most important economic factors with a broad range of applications.

Similarly, Rakytová (2019) states that the educational structure of the population has long been considered an important indicator of a country's economic maturity.

Relationship between education and Industry 4.0 has been described by Caballero-Morales et al (2020), who address the essence of Education 4.0 in their research. They argue that Education 4.0 has been defined as the evolution of traditional education considering the new digital age's technological tools, combining real and virtual world information.

In the context of current developments, entrepreneurship education has come to the fore. Entrepreneurship education is held to be able to produce graduates who are not only able to work in an institution but also open new business opportunities by becoming entrepreneurs. Various methods of entrepreneurship education are provided to be able to produce new, more competent entrepreneurs, but whether the entrepreneurship education provided has been truly effective in producing new entrepreneurs in the future (Krisnaresanti et al, 2020).

For economy and regions to advance, human resources and their development are of utmost importance (Rajčáková, Švecová, 2018; Bal-Domańska et al. 2020; Roszko-Wójtowicz & Grzelak, 2021, Grenčíková et al. 2022). The quantity and quality of human resources are primarily determined by demographic trends and structural characteristics of the population. Huňady and Ľapinová (2017) argue that the human factor has the potential to educate, learn, create, transfer and use knowledge, innovate, and is closely related to knowledge economy and society. The human factor is also related to the issue of human, social or social capital in the regions.

According to Žítek, Kunc, and Tonev (2008, in Hamada, Kasagranda, 2014), education is one of the major socio-economic indicators contributing to regional development and regional competitiveness. It is not only the educational attainment of the population living in the given region that matters. In addition, it is the qualification prerequisites that are tightly linked to education and have an impact on local and regional labour markets.

Belajová and Fáziková (2005) maintain that educational attainment of the population affects the structure of production, as well as the dynamics and number of enterprises operating in the region. Better educated people can make more informed decisions, are more likely to participate in the labour market, respond with agility to crises, and are more likely to switch jobs. Thus, well-educated workforce can stimulate economic development of regions.

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Research has addressed the level and quality of human resources and their impact on the economic growth and competitiveness of regions, as well as the assessment of the quality of human resources in light of educational attainment.

Huňady and Ľapinová (2017) examined the role of the human factor in regional development, in particular the role of institutions of higher education. They examined the share of the economically active population with higher education in NUTS2 regions.

Grenčíková, Kordoš and Navickas (2021) analysed the Slovak education system in view of Industry 4.0, and identified the areas on which education should focus.

Rakytová (2019) studied changes in the educational structure of the urban population in Slovakia in 1991 and 2011.

Šprocha (2011) investigated regional differences in the structure of the population by educational attainment. His research findings indicated that the most favourable conditions exist in the economic centres of the country where the largest share of population with higher education live (Bratislava, Košice, Banská Bystrica, Zvolen and their surroundings). Marginalized regions, primarily the border areas of northern, north-eastern and southern Slovakia, on the contrary, are the regions with a more than average share of population with low educational attainment, including that of younger age.

Lauko et al. (2012) examined recent trends in the educational structure of the Slovak population based on census data. Their analyses revealed significant increases in the educational attainment of the Slovak population in the past three decades (especially increases in tertiary-educated population). They also found regional disparities be much more pronounced in the share of university-educated people in total population of districts than in the share of secondary-educated persons.

Švecová and Rajčáková (2014) examined the educational structure of the Slovak population and established that there have been several changes in the structure of the population by educational attainment, drawing attention to the transition of population with lower educational attainment to the category of population with full secondary and higher education.

Literature sources discuss various indicators to measure the level of human capital. As emphasized by Kulčár (2010), it has long been a challenge to measure the quality and qualification level of the workforce in society as a whole from economic and statistical points of view. The 1990s saw a major expansion of empirical research on the effects of educational attainment on the economic growth of a country or society. These effects have been incorporated into several empirical growth models, whereas the exact expression and measurement of educational attainment at the macroeconomic level has been problematic. In their study, Hamada and Kasagranda (2014) present various approaches taken by the researchers to assess educational attainment, such as for instance the number of population with maturita exam certificate and higher professional education, the number of students in primary and secondary schools, the number of university students, the share of population with higher education in total population aged 15 years and above, the share of employed population with higher education in the age group of 15 years and above, etc. Several approaches to measure and express educational attainment with a single sum value (index) have been published in the literature (Kulčár, 2010). Various ways are used to calculate the Educational Attainment Index. Rajčáková and Švecová (2018) calculated the educational attainment index as the share of the population with full secondary education plus three times the share of the population over 15 years of age with higher education. Blažek and Csank (2007) measured the educational attainment index as the ratio of the sum of persons with secondary education plus twice the share of persons with tertiary education in persons aged 15 years and older.

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As mentioned above, quality and development of human capital and its changes have an impact on the socio-economic development of society, and have been given attention by many authors. In our view, education and human capital development is an important indicator of the performance of an economy and its innovative activity and competitiveness.

2. Methodological approach

Educational Attainment Index was used to assess the educational attainment of economically active population, employed people and unemployed people. According to the Czech Database of Strategies web site, the educational attainment index gives information on the social capital in municipalities. Education increases the chances of employment and develops human resource potential in respective areas. There are several ways of calculating the educational attainment index in the literature. In the paper, the estimates were based on the sum of the weighted shares economically active population/employment/unemployment in each education category in total economically active population/employment/unemployment, as follows:

$$EAI_{EAP} = \frac{1 \times EDU1 + 2 \times EDU2 + 3 \times EDU3 + 4 \times EDU4}{economically\ active\ population} \tag{1}$$

$$EAI_E = \frac{1 \times EDU1 + 2 \times EDU2 + 3 \times EDU3 + 4 \times EDU4}{employed\ (working)\ population} \tag{2}$$

$$EAI_U = \frac{1 \times EDU1 + 2 \times EDU2 + 3 \times EDU3 + 4 \times EDU4}{unemployed} \tag{3}$$

Where:

EAI_{EAP} – Educational Attainment Index of economically active population
EAI_E – Educational Attainment Index of employed (working) population
EAI_U – Educational Attainment Index of the unemployed
EDU1 – basic and uneducated
EDU2 – lower secondary
EDU3 – upper secondary
EDU4 – tertiary (academic)

The index values range from 1 to 4. The value of 1 would indicate that all persons in the group have only primary or no education. Conversely, the value of 4 would indicate that all persons in the group have a university education.

Data were drawn from the Statistical Office of the Slovak Republic, DataCUBE database.

Next, Pearson's correlation coefficient was used to assess the relationship between the educational attainment index of the economically active population and the unemployment rate.

A correlation analysis examines correlation links between selected variables. Let us assume there is a linear dependence between the X and Y quantities. Let $(x_1, y_1), ..., (x_n, y_n)$ are the measured values of an independent random sample of n range system of two X, Y random variables of the bivariate normal distribution and let $\bar{x}$ and $\bar{y}$ are their sampling averages. The following relationship holds for Pearson's sample correlation coefficient:

$$r_{x,y} = \frac{\overline{x.y} - \bar{x}.\bar{y}}{\sqrt{\overline{x^2} - (\bar{x})^2} \cdot \sqrt{\overline{y^2} - (\bar{y})^2}}, \tag{4}$$

where:

$$\overline{x^2} = \frac{1}{n} \sum_{i=1}^{n} x_i^2, \quad \overline{y^2} = \frac{1}{n} \sum_{i=1}^{n} y_i^2, \quad \overline{x.y} = \frac{1}{n} \sum_{i=1}^{n} x_i . y_i, \tag{5}$$

Pearson's sample correlation coefficient $r_{x,y}$ measures the tightness of linear relationship between the *X* and *Y* variables on both sides, i.e. $r_{x,y} = r_{y,x} = r$

Pearson's sample correlation coefficient takes values from the $(-1; 1)$ interval and expresses the degree of linear correlation between the *X* and *Y* variables. The closer $|r|$ is to 1, the stronger the linear dependence is and the closer *r* is to 0, the weaker the linear dependence is. (Ostertagová, 2013)

In addition, the methods of analysis, comparison and synthesis were applied.

3. Conducting research and results

As mentioned, education is one of the important factors affecting employability. To prove the truth of the statement, the evolution of employment and unemployment rates by educational attainment in the Slovak Republic was examined.

Employment refers to the engagement of individuals in work processes, in making new products and providing services. The employment rate by educational attainment refers the percentage of the working population with the certain educational attainment out of the population with the same educational attainment. *Figure 1* illustrates the evolution of employment rates by educational attainment in the Slovak Republic.
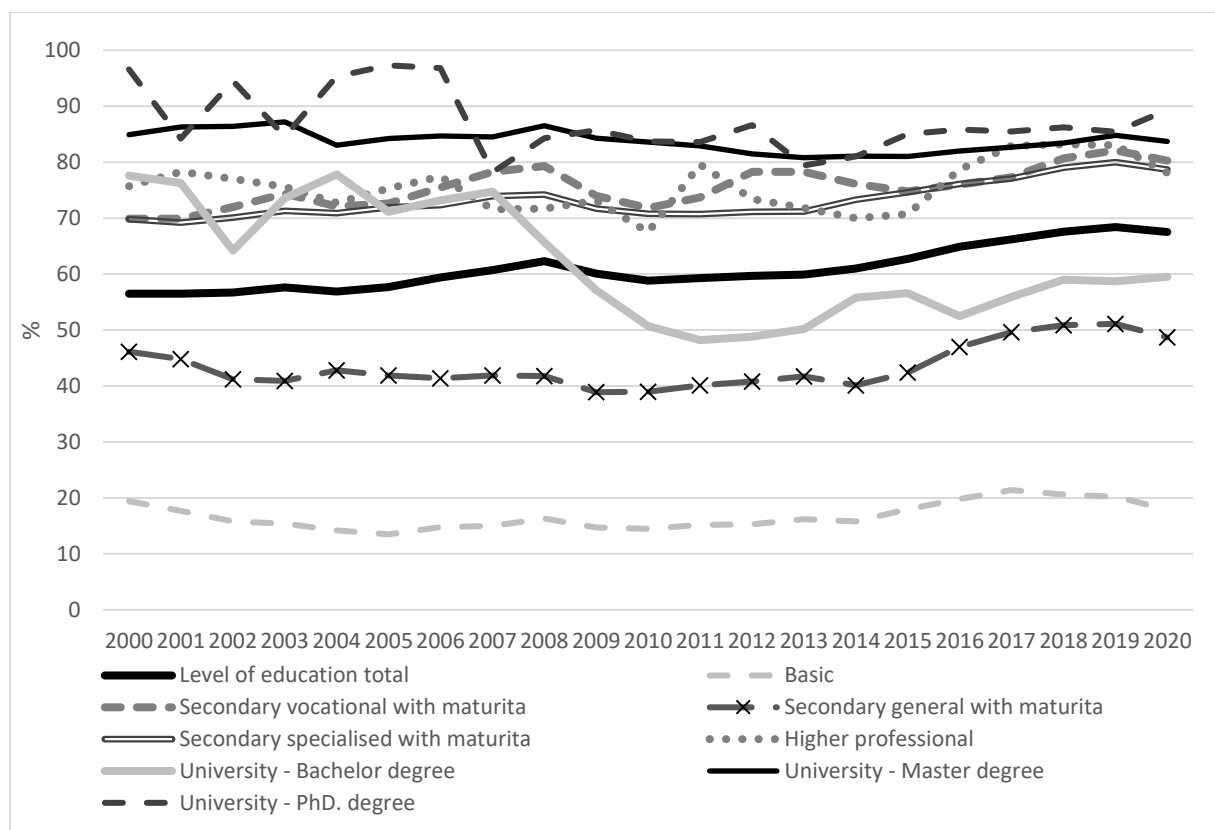

Figure 1. Employment rate by education (percentage)
Source: *Statistical Office of the Slovak Republic, authors' own elaboration*

People with the basic educational level have the lowest employment rate (around 20%). Higher educational attainments also mean higher employment rates. *Figure 1* shows that the following education levels have higher employment rates than the Slovak average: secondary vocational/specialized with maturita and higher education (Master's and doctoral degrees).

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Individuals with a Master's and doctoral degree have the employment rate higher than 80% throughout the period analysed. Naturally, the evolution of employment rates by education is predicated by the economic performance and the overall labour market situation in Slovakia. Those with higher education, however, have less trouble finding a job even in difficult years or downturns.

On the other hand, less educated people have fewer opportunities in the labour market. The unemployment rate by educational attainment refers the percentage of the unemployed with certain educational attainment out of the population with the same educational attainment. *Figure 2* illustrates the evolution of unemployment rates by educational attainment in the Slovak Republic.
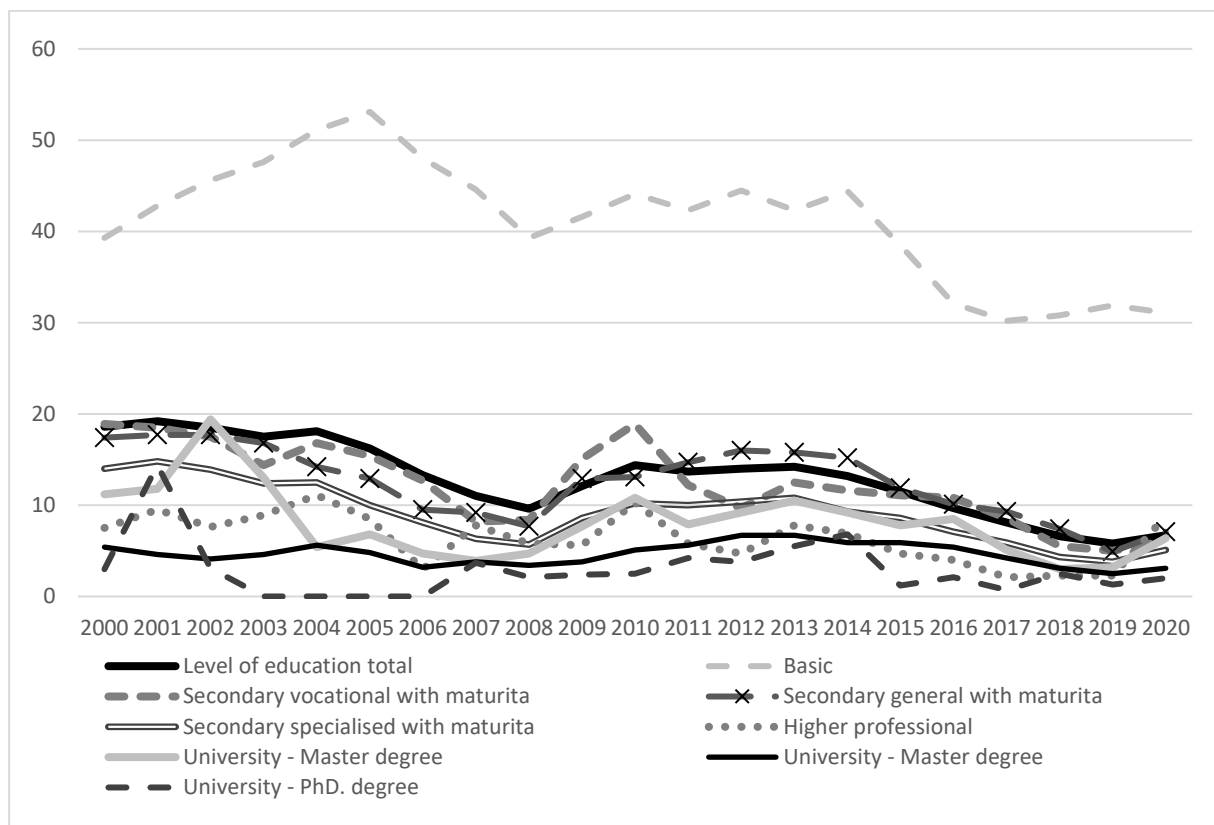

Figure 2. Unemployment rate by education (percentage)
Source: *Statistical Office of the Slovak Republic, authors' own elaboration*

Unemployment rates by education underpin the role of education in job search success. *Figure 2* shows that those with basic level of education have the highest unemployment rate, up to 53.1% in 2004. The chart does not show people who did not even complete primary education due to the missing data for the time period analysed. In some years, however, the unemployment rate for people without schooling reached 100% (e.g. in 2006 and 2007). On the other hand, those with Master's and doctoral degrees do not face difficulties when looking for a job and their unemployment rate is the lowest of all levels of education.

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Assessment of the educational attainment of the economically active population in the regions of the Slovak Republic

In this section, regional disparities in educational attainment by means of the educational attainment index are established. Educational attainment of the economically active population, as well as of those in employment and the unemployed is examined.

Economically active population is made up of those in employment and those who, although not employed, are actively looking for a job. Educational attainment index was calculated for the economically active population and the values are shown in *Figure 3*.
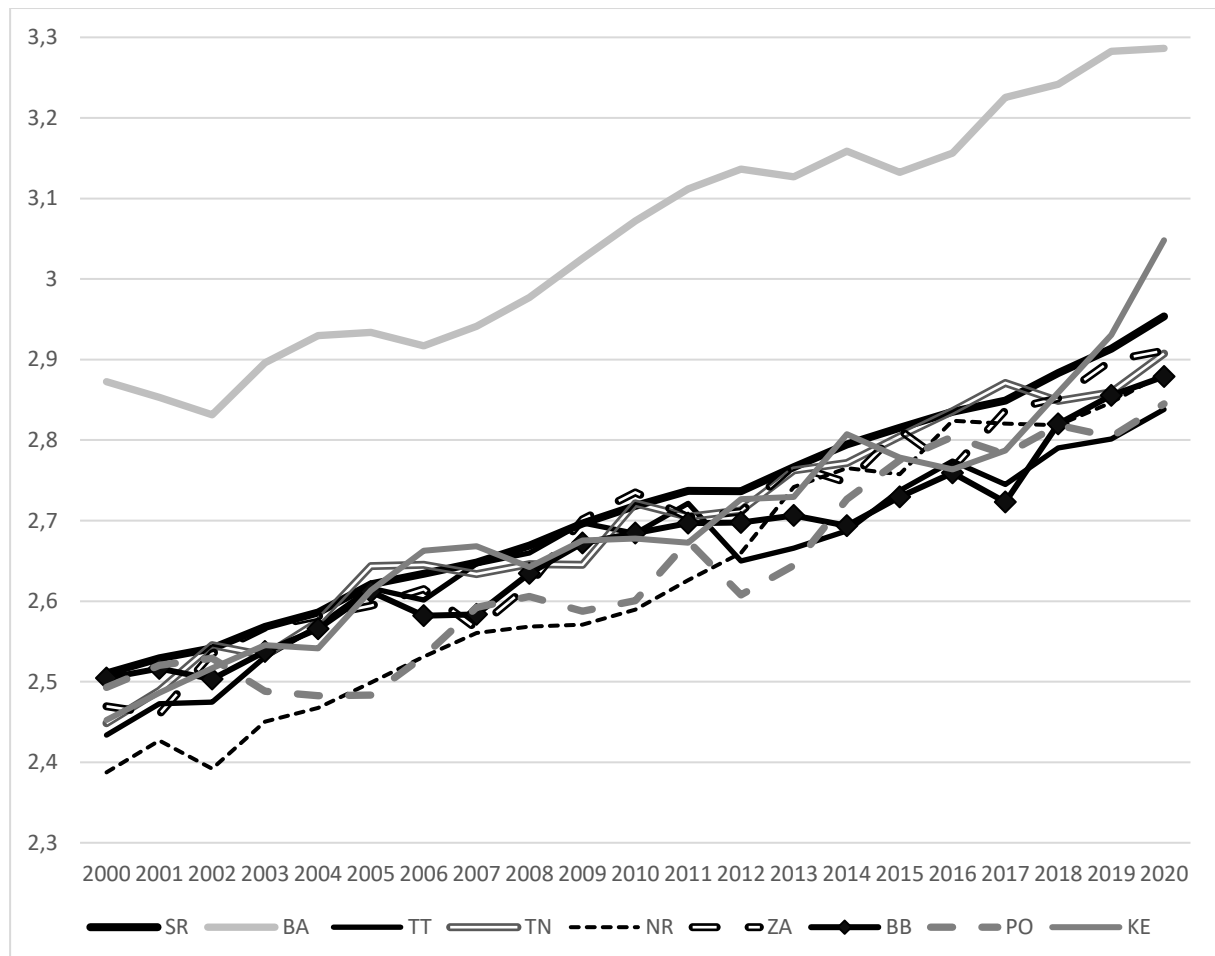

Figure 3. Educational attainment index of the economically active population in the regions of the SR
Source: *Statistical Office of the Slovak Republic, own calculations*
Legend: BA – Bratislava region, TT – Trnava region, TN – Trenčín region, NR- Nitra region, ZA – Žilina region, BB – Banská Bystrica region, PO – Prešov region, KE – Košice region

In the period analysed, the educational attainment level of the economically active population of the Slovak Republic was increasing; in 2020, the educational attainment index reached 2.95 compared to 2.51 in 2000. *Figure 3* shows that the regions are lagging behind the region of Bratislava, where the educational attainment index reached the value of 3.29 in 2020. There are no striking differences in the educational attainment across the remaining regions; the lowest educational attainment of the economically active population was recorded in the region of Nitra for most of the years. For the past years, low educational attainment values were

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recorded in the regions of Prešov, Trnava and Banská Bystrica. In 2020, the educational level of the economically active population in the region of Trnava accounted for 86.36% of the educational attainment of the region of Bratislava.

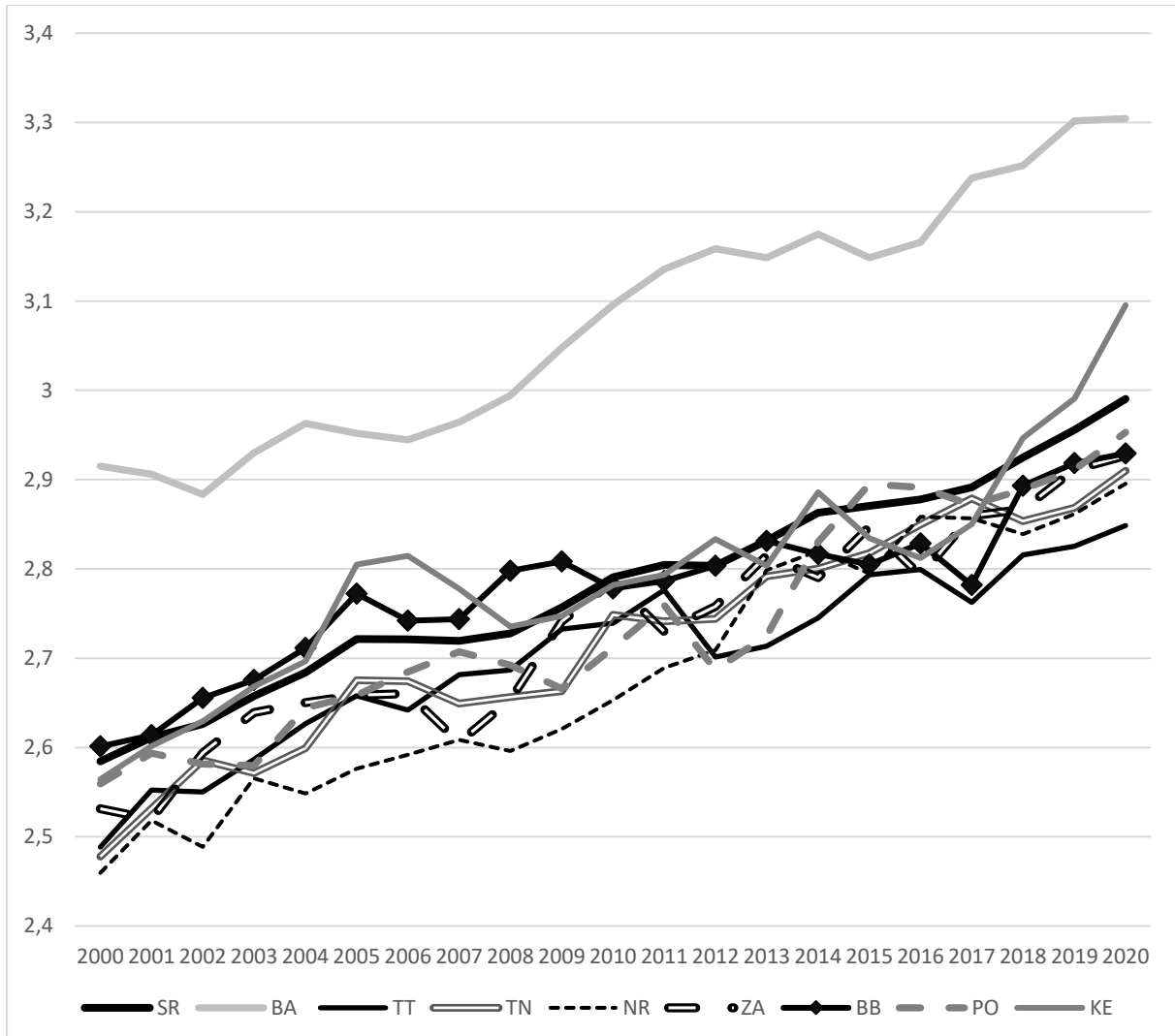The educational attainment index of employed people is illustrated in *Figure 4*.

Figure 4. Educational attainment index of working population in the regions of the SR
Source: *Statistical Office of the Slovak Republic, own calculations*

There is a noticeable increase in the educational attainment in employed population from 2000 to 2020. The educational attainment index of employed people increased from 2.58 in 2000 to 2.99 in 2020. The educational level of the employed in the Bratislava region exceeds considerably the educational attainment in the remaining Slovak regions and the educational index reached the value of 3.30 in 2020. From 2000 to 2011, the lowest educational index was recorded in the Nitra region. Most recently, the lowest education index was recorded in the region of Trnava, whose educational attainment index accounts for 86.21% of the educational attainment index in the Bratislava region.

Figure 5 shows the educational attainment index of the unemployed in the regions of the Slovak Republic.
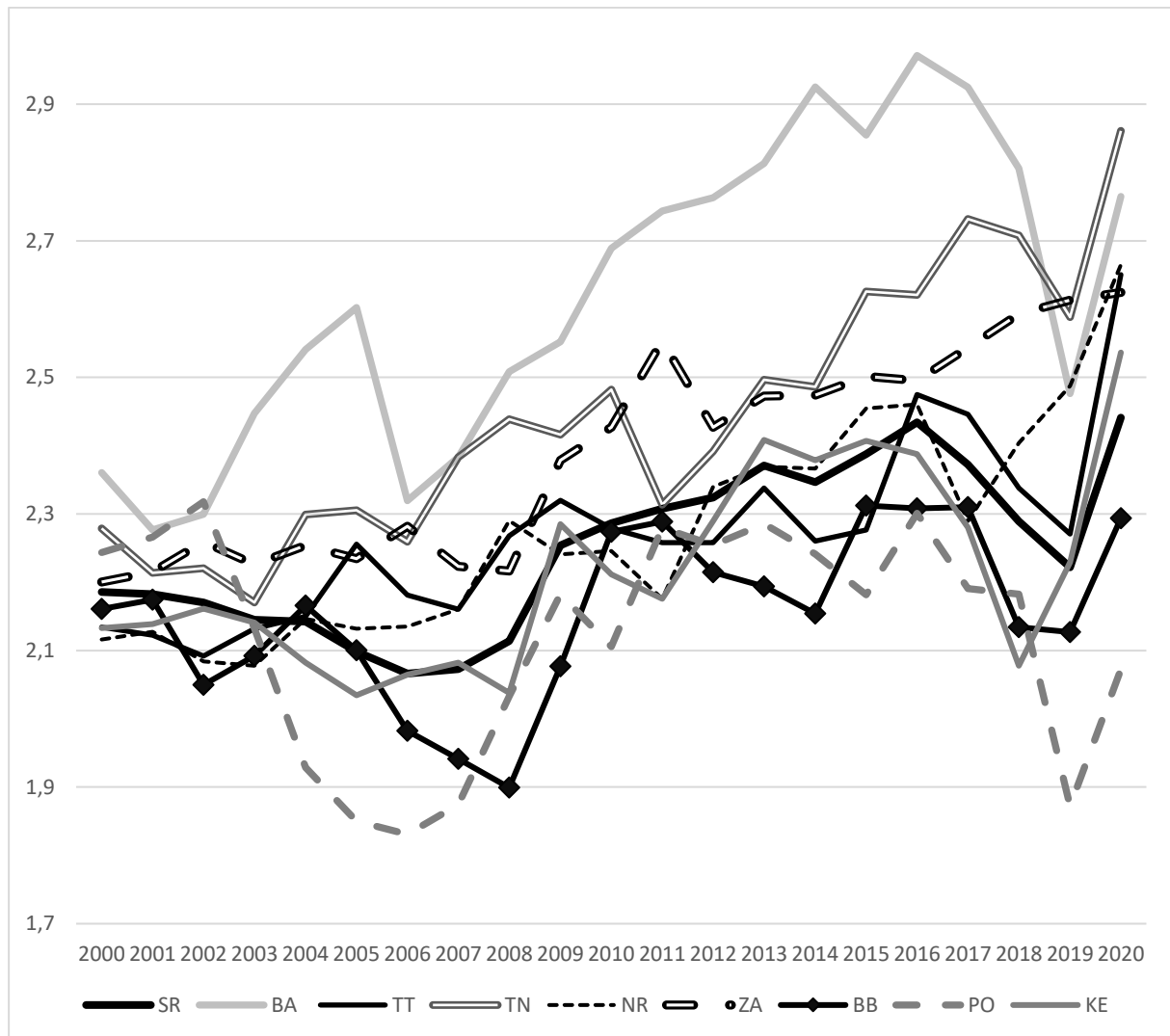
Figure 5. Educational attainment index of the unemployed in the regions of the SR
Source: *Statistical Office of the Slovak Republic, own calculations*

The educational attainment index of unemployed persons fluctuated in the Slovak regions. The educational attainment index of the unemployed generally falls with improvements in the labour market situation, implying that low-educated individuals face the greatest difficulty finding a job. It can be seen in the years 2004-2008 and 2016-2019 in *Figure 5*. The educational attainment index of the unemployed is the highest in the Bratislava region. The lowest educational attainment index of unemployed persons was recorded in the Prešov and Banská Bystrica regions.

Finally, the correlation of the educational attainment index of the economically active population and the unemployment rate in the Slovak regions was examined, whereas the average values for the period analysed were taken into account. *Figure 6* illustrates the correlation of the unemployment rate and the educational attainment index of the economically active population in the regions of Slovakia.
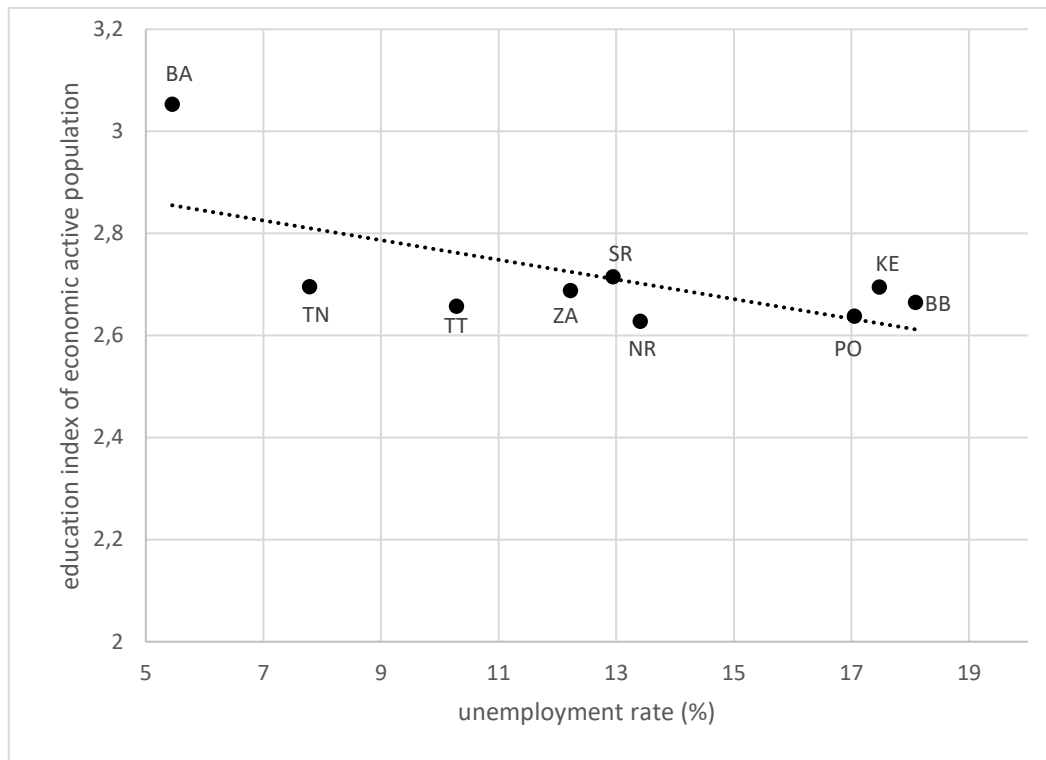
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Figure 6. Correlation of the unemployment rate and the educational attainment index of the economically active population in the regions of Slovakia
Source: *own calculations*

Figure 6 shows that there is an inversely proportional relationship between the unemployment rate and the educational attainment index of the economically active population in the regions of the Slovak Republic. Regions with higher educational attainment have lower unemployment rates and vice versa. To confirm the statement, Pearson correlation coefficient for individual Slovak regions was calculated to assess the unemployment rate and educational attainment index of the economically active population from 2000 to 2020. The calculated Pearson correlation coefficient values are shown in *Table 1*.

Table 1. Pearson correlation coefficient for the educational attainment index of the economically active population and unemployment rates

	BA	TT	TN	NR	ZA	BB	PO	KE
Pearson	-0.66	-0.83	-0.77	-0.89	-0.79	-0.92	-0.81	-0.89

Source: *own calculations*

The values of the Pearson correlation coefficient differ significantly across the Slovak regions, ranging from -0.66 in the region of Bratislava to -0.92 in the region of Banská Bystrica. The above calculations show that there is a strong dependence between the educational attainment of the economically active population and the unemployment rate.

The findings in this paper are partial outputs of two research projects, which overlap to some extent. The project titled Digital Economy and Changes in the Education System to Reflect Labour Market Demands investigates the level of digitalization of the Slovak economy. In terms of digital transformation, the project attempts to identify new requirements and demands for changes in education. The project Multiplier Effects of Human Capital Quality on Economic Performance and Competitiveness of the Slovak Economy aims, among other things,

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to identify changes in the quality of human capital. Further research shall examine the impact of human capital quality on economic performance and competitiveness of economies.

Conclusion

The educational structure of the population is considered an important indicator of the overall economic maturity of countries and regions. Education is an important phenomenon that affects several spheres of people's life and shapes their future. We support the argument by Lauko et al. (2012) that regional disparities are still significant in terms of educational structure, even though some positive trends can be observed. First, the educational structure of the Slovak population has been improving significantly in the long run and the number of those with primary education, i.e. potentially unskilled labour force, has been declining. Next, the positive shifts in the educational structure affect the entire territory of Slovakia, at least to a degree of not further deepening regional disparities. However, despite the overall positive trends, there are also some less optimistic future trends or risks.

The research outcomes indicate that the lowest employment rate of approximately 20% is in the category of workers with completed primary education, whereas the employment rate of those with Master's and doctoral degrees is above 80% over the entire period analysed. In contrast, there is a dramatically higher unemployment rate in workers with primary education, which accounted for 53.1% in 2004. In some years, however, the unemployment rate for people without schooling reached 100% (in 2006 and 2007). On the other hand, people holding Master's and doctoral degrees had the lowest unemployment rates.

In the period analysed, the educational level of the economically active population of the Slovak Republic was increasing. The educational attainment index reached 2.95 in 2020. There are significant disparities across the Slovak regions, especially between the educational attainment of the economically active population in the region of Bratislava and the remaining regions. Similarly, the educational attainment index of working population rose up to 2.99 in 2020. In case of the educational level of the working population, a significant gap between the region of Bratislava and the remaining Slovak regions can be observed. The situation is different in the case of the educational attainment index of the unemployed, which fluctuated depending on the labour market situation.

Pearson's correlation coefficient was used to determine the relationship between the educational attainment index of the economically active people and the unemployment rate. The highest values of inverse dependence were found in the regions of Banská Bystrica, Košice and Nitra.

Acknowledgement

References

Bal-Domańska, B., Sobczak, E., & Stańczyk, E. (2020). A multivariate approach to the identification of initial smart specialisations of Polish voivodeships. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *15*(4), 785–810. https://doi.org/10.24136/eq.2020.034.

Barakat, B. & Blossfeld, H. (2010). The Search for a Demography of Education: Some Thoughts. *Vienna Yearbook of Population Research, 8(1)*, 1-8.

Belajová, A. et al. (2014). *Analýza, monitor fungovania trhu práce z hľadiska zvyšovania zamestnanosti*. Bratislava: Centrum vzdelávania Ministerstva práce, sociálnych vecí a rodiny SR.

Belajová, A., & Fáziková, M. (2005). *Regionálna ekonomika*. Nitra: SPU.

Benešová, T. (2015). Towards Entrepreneurship: Reflections between Theory and Practice. *International Journal of Entrepreneurial Knowledge*, *3(2)*, 5-15. https://doi.org/10.37335/ijek.v3i2.28

Blažek, J., & Csank, P. (2007). The West-East gradient and regional development: the case of the Czech Republic. *Acta Universitatis Carolinae Geographica*, *XL(I.-II.),* 89-108.

Bleha, B., & Szabo, M. (2018). Changing Educational Pathways and Economic Activity. Time and Space Aspects in Slovakia after 1989. *Ekonomický časopis*, *66(10)*, 1031-1050.

Bobáková, V. (2018). Význam ľudského kapitálu a vzdelania pre ekonomický rast. *Verejná správa a spoločnosť, XIX(1)*, 60-75.

Caballero-Morales, S.O., Cordero-Guridi, J.J., Alvarez-Tamayo, R.I., & Cuautle-Gutiérrez, L. (2020). Education 4.0 to Support Entrepreneurship, Social Development and Education in Emerging Economies. *International Journal of Entrepreneurial Knowledge*, *8(2)*, 89-100. doi: 10.37335/ijek.v8i2.119

Databáse strategií, Portál strategických dokumentů v ČR. Available at: https://www.databaze-strategie.cz/cz/online-indikatory/ukazatele-indikatory/index-vzdelanosti

Grenčíková, A., Kordoš, M., & Navickas, V. (2021). The impact of Industry 4.0 on education contents. *Business: Theory and Practice*, *22*(1), 29-38. https://doi.org/10.3846/btp.2021.13166

Grenčíková, A., Habánik, J., Španková, J., Húževka, M., & Šrámka, M. (2022). Current Labour Market Challenges in the Light of Future Economic and Demographic Developments. *European Journal of Interdisciplinary Studies*, 100-112. http://doi.org/10.24818/ejis.2022.07

Hamada, R., & Kasagranda, A. (2014). Vybrané ekonomické, demografické ukazovatele, ukazovatele infraštruktúrnej vybavenosti a vzdelanostnej úrovne obyvateľstva na meranie regionálnych disparít. *Regionální rozvoj mezi teorií a praxí, 3(special number)*, 29-48.

Hronec, Š. & Vicianová Hroncová, J. (2014). Vzdelanie a vzdelávanie ako nástroj zvyšovania flexibility na trhu práce. *Determinanty využívania flexibilizácie práce v SR z pohľadu rodiny a ich implementácia do sociálneho systému*, 8 p.

Huňady, L., & Ľapinová, E. (2017). Vysokoškolské vzdelávanie ako faktor rozvoja ľudského potenciálu a inovácií v regiónoch SR. *Medzinárodná vedecká konferencia Hospodárska a menová politika v kontexte súčasného vývoja európskych integračných procesov,* 13 p.

Krisnaresanti, A., Julialevi, K.O., Naufalin, L.R., Dinanti, A. (2020). Analysis of Entrepreneurship Education in Creating New Entrepreneurs. *International Journal of Entrepreneurial Knowledge*, *8(2)*, 67-76. doi: 10.37335/ijek.v8i2.112

Kulčár, L. (2010). Možnosti modelovania vzťahu medzi vzdelanostnou úrovňou a nezamestnanosťou. *National and regional economics VIII.* Košice : Technical university, Faculty of economics, 549-555.

Lauko, V., Gurňák, D., Križan, F., & Tolmáči, L. (2012). Najnovšie vývojové trendy vzdelanostnej štruktúry obyvateľstva Slovenska v časovo-priestorových súvislostiach. *GEOGRAPHIA CASSOVIENSIS, VI.(2)*, 91-102.

Małkowska, A., Urbaniec, M., & Kosała, M. (2021). The impact of digital transformation on European countries: insights from a comparative analysis. *Equilibrium. Quarterly*

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RECENT ISSUES IN ECONOMIC DEVELOPMENT

Journal of Economics and Economic Policy, *16*(2), 325–355. https://doi.org/10.24136/eq.2021.012.

Moretti, E. (2004). Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-sectional Data. *Journal of Econometrics*, *121(1-2)*, 175-212, https://doi.org/10.1016/j.jeconom.2003.10.015

Ostertagová, E. (2013). *Aplikovaná štatistika.* Košice: Technická univerzita v Košiciach.

Porubčinová, M. (2011). Ľudský kapitál – bariéry a šance rozvoja v podmienkach informačnej spoločnosti. *Prognostické práce*, *3(1)*, 27-49.

Rajčáková, E., & Švecová, A. (2018). Ľudské zdroje – regionálne disparity v kontexte politiky súdržnosti EÚ 2007 – 2013 na Slovensku. *Geografický časopis*, *70(1)*, 79-96. https://doi.org/10.31577/geogrcas.2018.70.1.05

Rakytová, I. (2019). Zmeny vo vzdelanostnej štruktúre mestského obyvateľstva Slovenska v období rokov 1991 a 2011. *Acta Geographica Universitatis Comenianae, 63(2)*, 217-236.

Roszko-Wójtowicz, E., & Grzelak, M. M. (2021). Multi-dimensional analysis of regional investment attractiveness in Poland. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *16*(1), 103–138. https://doi.org/10.24136/eq.2021.004.

Statistical Office of the Slovak Republic. Database DATAcube. Available at: http://datacube.statistics.sk

Sauerberg, M. (2021) The impact of population's educational composition on Healthy Life Years: An empirical illustration of 16 European countries. *SSM - Population Health*, 15(100857), https://doi.org/10.1016/j.ssmph.2021.100857

Šprocha, B. (2011). Regionálne rozdiely v štruktúre obyvateľstva podľa najvyššieho dosiahnutého vzdelania a vnútorná migrácia na Slovensku. *RELIK 2011,* 19 p.

Šprocha, B. (2014). Kvantitatívno – kvalitatívne zmeny vo vzdelanostnej štruktúre Slovenska a jej očakávaný vývoj v najbližších dvoch desaťročiach. *RELIK 2014: Reprodukce lidského kapitálu vzájemné vazby a souvislosti.* 514-527.

Šprocha, B., & Majo, J. (2016). *Storočie populačného vývoja Slovenska II.: populačné štruktúry*. Bratislava: Comenius University and Infostat.

Švecová, A., & Rajčáková, E. (2014). Regionálne disparity v sociálno-ekonomickej úrovni regiónov Slovenska v rokoch 2001-2013. *Regionálne dimenzie Slovenska*, 257-298.