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Human development level as a modifier of education efficiency

1.Introduction

Education inputs were already considered an output in Smith's papers (Smith [1776] 1998, pp. 417-419). Education is seen as one of the many modifiers of human capital (Jabłoński 2011, pp. 81-103). In the transformation process of contemporary economies into the knowledge-based economies the fact should be appropriately emphasized that accumulated knowledge resources and abilities to use it in a proper way play the crucial role in the socio-economic development of countries in the modern world (Turczak 2012, p. 113). A special significance in this respect is attached to the association between formal education level and its quality. One should also note that the education inputs in the majority of European states, Poland included, exceed 5% of GDP. The above-mentioned factors encourage the search for modifiers of education quality so as to enable maximisation of outcomes in the following steps.

In the context of education quality a lot of attention is given to the level of human development as an essential determinant of education quality. The theory about reproduction, indicated as an essential conditioning factor of education quality (Bourdieu, Passeron 2006), is also associated with the level of human development.

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The above-mentioned conditions have led to formulation of the following aim of this paper: demonstration of a connection between the level of education efficiency and the level of human development. The performance was evaluated by verifying the hypothesis which says that there is a connection between the value of Local Human Development Index (LHDI) and education efficiency established by means of the data envelopment analysis (DEA).

2.Socioeconomic factors that modify education quality

Research into modifiers of education points to the impact of the economic context on the education process (Woessmann 2005, pp. 445-504). Particular significance in research on the educational function of output is attached to the income generated by parents, which is seen as a variable that determines the educational performance of students (Barro, Lee 2001, pp. 465-488). In Poland research on the modelling of socioeconomic determinants of education quality was undertaken by Czyżewski and Brelik (Czyżewski, Brelik 2016, pp. 39-48). The results suggested that from the point of view of efficiency of the education process in rural areas, exogenous socioeconomic factors are crucial (an educational function of output was defined for rural areas). In a group of disadvantaged students, the educational performance is determined chiefly by the size of the class (Babcock, Betts 2009, pp. 314-322). On the basis of the results of the study, one may presume that disadvantaged students are the ones who will require higher inputs in connection with the need to provide them with extra classes.

A correlation has also been found between the educational performance of students and the education level of their parents. The performance of students was also influenced by their respective family circumstances (Badr et al. 2003, pp. 1-38).

In OECD member countries around 50% of differentiation in educational performance of students arise from student features (specifically, their socioeconomic status), while 20% arise from school features and 5% arise from education policy. Around 30% of interschool differentiation remains unexplained. It has been found that increased educational resources do not automatically translate to better performance in examinations (Klump, Cabrera 2007, pp. 1-45).

Some research studies revealed a considerable impact of elementary education on the increase of gross domestic product. The said studies concerned developing countries (Glewwe, Kremer 2005, pp. 1-79). However, some authors point to the

faulty methodology adopted in the above-mentioned research (Glewwe 2002, pp. 436-482).

3. Research methods

The analysis covered data for 60 counties recorded in 2013-2015. 30 counties with the highest Local Human Development Index (LHDI) and 30 counties with the lowest LHDI value were selected based on a 2010 ranking published as a part of the National Report on Human Development – the most recent data available at the time of formulation of the paper (Arak et al. 2012, pp. 178-187). Poviats characterized by the highest Local Human Development Index (LHDI) are: Warszawa, piaseczyński, pruszkowski, warszawski zachodni, Kraków, Poznań, Rzeszów, Sopot, Gdynia, legionowski, Opole, Olsztyn, Białystok, Wrocław, Gdańsk, Siedlce, Lublin, Kielce, Zielona Góra, Krosno, poznański, Nowy Sącz, Tarnobrzeg, otwocki, Tychy, lubiński, Katowice, Bielsko-Biała, Leszno, mikołowski; and poviats with the lowest Local Human Development Index (LHDI) are: kazimierski, pińczowski, chełmski, kolneński, przysuski, opatowski, janowski, skierniewicki, opolski (lubelskie), szydłowiecki, lipnowski, Łęczyński, zamojski, lipski, żuromiński, ostrołęcki, piotrkowski, makowski, nowomiejski, włoszczowski, krasnostawski, zwoleński, rypiński, parczewski, bialski, włocławski, poddębicki, buski, sokólski. A separate analysis covered indices that make up LHDI, i.e. Wealth Index (WI), Health Index (HI) and Education Index (EI). The data on the values of the above indices has been made available in the above-mentioned report (Arak et al. 2012, pp. 178-187).

On the basis of the data available in the Local Data Bank kept by the Main Statistical Office of Poland (GUS), the number of students, the number of secondary schools and education inputs of secondary schools per student according to budget classification 80120 have been specified for particular counties. The variables were then placed on the inputs side in the employed DEA-CRS model. The DEA analysis was conducted with DEAFrontier software. In the analysis, the outcome was the number of secondary schools with a positive educational added value in Humanities, Polish, Mathematics and Natural Science, and Mathematics. Information about the educational added value for particular schools in the analysed counties was obtained from the Educational Research Institute (IBE).

The educational added value is understood as the absolute student efficiency considering the increase in student's knowledge in comparison to the state at the

beginning of the student's educational path, and the relative measure of student efficiency, which compares the student's performance against the performance of the class, school, region or country (Walukiewicz 2009, p. 97). The educational added value can also be presented as an added value of a school and this mode of interpretation was adopted for the purpose of this study (Jakubowski 2007, p. 13).

The determination of Education Efficiency Index based on DEA-CRS method at the stage of secondary schooling allowed for putting the counties subject to analysis in order depending on the value of Efficiency Index. In the following step, the counties were allocated to classes according to the following criteria: 25% of counties with the highest efficiency (15 counties) were assigned to class A, the following 25% of counties (15) were assigned to the subsequent classes. The counties assigned to classes in an ascending order according to the Education Efficiency Index defined by means of DEA-CRS were then subject to ANOVA unidimensional analysis of variance for multiple factors.

The applied dependent variables were: Local Human Development Index (LHDI), Wealth Index (WI), Health Index (HI) and Education Index (EI). The quality predictor was the class of Education Efficiency Index determined by means of DEA-CRS.

In the following step, an analysis of contrast was conducted for predictor classes (Efficiency Index) with a simple contrast. A contrast analysis enables definition of the quality predictor classes that determine the analysed variables, i.e. LHDI, WI, HI and EI.

In the final step, the ω index was defined - an estimator of the variance of dependent variable (LHDI, WI, HI and EI) explained by independent variable (Education Efficiency Index determined by means of DEA-CRS). The ω index was defined according to the following formula (Stanisz 2007, p. 367):

$$\omega = \frac{(SS_{effect} - p \cdot MS_{error)}}{SS_{effect} + SS_{error} + MS_{error}}$$

where:

SS_{effect} – the between-class sum of squared differences between the means of variables for each predictor class and their global mean (measure of total differentiation of mean values),

p – degrees of freedom of quality predictor,

SS_{error} – random variation, i.e. the sum of squared differences between the results of the observation and the mean value for a class;
MS_{error} – mean sums of squared errors.

The ω index allows for assessment of the impact of quality predictor, i.e. in the case in question the Education Efficiency Index determined by means of DEA-CRS, on the percentage of differentiation (variation) of particular dependent variables (LHDI, WI, HI and EI) in the analysed population.

4. Results of the research

The counties with the highest Education Efficiency Index (class A) in the three-year period covered by the analysis mostly had the highest values of all the analysed variables with incidental deviations in favour of class B (second class in terms of Efficiency Index value). Since class A and B included counties with the greatest number of students, it points to the high efficiency of education in large counties (which included mostly townships).

The lowest Education Efficiency Index was found in class D (counties with the smallest number of students and schools). The lowest education efficiency in class D coincides with the lowest values of the majority of analysed variables (except for financial inputs per student).

The above-named regularities lead one to a conclusion that education efficiency is determined by the size of a county expressed as a number of students and the associated number of schools. In 2013-2014 the A class counties had the highest financial inputs per student in accordance with the source literature which points to a connection between education inputs and the educational performance of students (Krueger 2003, pp. 34-63). Interestingly, the lowest education inputs were found in class C, i.e. the class that was next to last in the ranking made according to Efficiency Index (table 1).

Table 1. Mean values of efficiency of secondary education in counties based on classification adopted for the efficiency index

Class by Efficiency Index	N	Variable*					
		2013	2014	2015	2013	2014	2015
		x_1			x_2		
A	15	↑5963	4766	↑6133	↑36	↑30	↑20

B	15	4034	↑5020	2714	24	16	9
C	15	1326	1517	1955	8	6	7
D	15	↓789	↓505	↓555	↓5	↓3	↓3
Mean (in total)	60	3028	2952	2839	18	10	10
		x_3			x_4		
A	15	7880	↑9393	↑21015	↑57.46	47.87	↑56.88
B	15	↑8990	8039	9502	52.12	↑60.06	45.64
C	15	↓7652	↓7915	↓8086	37.85	44.39	49.75
D	15	8889	8932	9058	↓35.38	↓30.50	↓30.55
Mean (in total)	60	8353	8569	11915	45.71	45.71	45.71
		x_5			x_6		
A	15	↑50.55	40.04	↑50.60	↑58.19	53.40	↑56.10
B	15	43.84	↑50.76	36.75	56.21	↑62.84	54.15
C	15	30.89	38.50	42.17	44.94	48.94	53.67
D	15	↓29.41	↓25.41	↓25.18	↓42.68	↓36.85	↓38.10
Mean (in total)	60	38.68	38.68	38.68	50.51	50.51	50.51
		x_7			x_8		
A	15	↑67.97	55.83	↑67.76	↑19.67	↑7.93	↑12.00
B	15	61.08	↑71.00	51.63	12.13	6.60	4.93
C	15	43.05	50.15	57.18	2.20	2.20	2.67
D	15	↓38.10	↓33.22	↓33.63	↓0.73	↓0.47	↓0.33
Mean (in total)	60	52.55	52.55	52.54	8.68	4.30	4.98

		x_9			x_{10}		
A	15	↑19.87	↑7.53	↑11.60	↑16.80	↑9.20	↑9.33
B	15	12.27	6.40	5.33	9.93	8.60	3.93
C	15	2.33	2.20	2.47	2.33	2.00	2.47
D	15	↓1.00	↓0.53	↓0.33	↓0.67	↓0.13	↓0.53
Mean (in total)	60	8.87	4.17	4.93	7.43	4.98	4.07
		x_{11}			x_{12}		
A	15	↑16.67	↑9.47	↑8.67	↑1.000000	↑1.000000	↑1.000000
B	15	9.67	8.87	3.73	0.909436	0.942202	0.941050
C	15	2.40	1.87	2.47	0.634797	0.691543	0.705206
D	15	↓0.73	↓0.13	↓0.60	↓0.263672	↓0.238693	↓0.285327
Mean (in total)	60	7.37	5.08	3.87	0.701976	0.718110	0.732896

*x_1- number of students, x_2- number of schools, x_3- education inputs per student in secondary schools, x_4- Local Human Development Index (LHDI), x_5- Wealth Index (WI), x_6- Health Index (HI), x_7- Education Index (EI), x_8- number of schools with positive educational added value in Humanities, x_9- number of schools with positive educational added value in Polish, x_{10}- number of schools with positive educational added value in Mathematics and Natural Science, x_{11}- number of schools with positive educational added value in Mathematics, x_{12}- Education Efficiency Index, ↑- maximum value, ↓- minimum value

Source: original work based on the analysed data

In the following step, a contrast analysis was conducted. The analysis suggests that the change of LHDI level between class A and class D, defined according to education efficiency with DEA-CRS, accounts for 2% in 2014, 4% in 2014 and 10% in 2013. The low impact of LHDI on the education efficiency might be striking, but one must note that the values under consideration refer to a predetermined Efficiency Index set at 0 to 1 (table 2).

A similar order of changes provoked by LHDI level has been found in case of change of class B defined according to education efficiency to class D (changes range from 2 to 7% depending on the year). LHDI level did not modify

significantly the change of Efficiency Index between class C and class D. One should note that in the remaining cases statistically significant differences have been found (put in bold in the table) (table 2).

Table 2. Assessment of contrasts f or Local Human Development Index (LHDI) in 2013-2015

Contrast	Year	Score	Stat. error	t	p	Upper conf. limit -95.00%	Lower conf. limit +95.00%
CONTR. 1 (A vs. D, i.e. 1;0;0;-1)	2013	**22.08**	**7.43**	**2.97**	**0.0043**	**7.20**	**36.97**
	*$SS_{contrast}/SS_{effect}$	**0.10**					
	2014	**17.37**	**7.20**	**2.41**	**0.0191**	**2.95**	**31.79**
	*$SS_{contrast}/SS_{effect}$	**0.02**					
	2015	**26.33**	**7.38**	**3.57**	**0.0007**	**11.56**	**41.10**
	*$SS_{contrast}/SS_{effect}$	**0.04**					
CONTR. 2 (B vs. D, i.e. 0;1;0;-1)	2013	**16.74**	**7.43**	**2.25**	**0.0282**	**1.85**	**31.62**
	*$SS_{contrast}/SS_{effect}$	**0.07**					
	2014	**29.56**	**7.20**	**4.11**	**0.0001**	**15.15**	**43.98**
	*$SS_{contrast}/SS_{effect}$	**0.03**					
	2015	**15.09**	**7.38**	**2.05**	**0.0454**	**0.32**	**29.87**
	*$SS_{contrast}/SS_{effect}$	**0.02**					
CONTR. 3 (C vs. D, i.e. 0;0;1;-1)	2013	2.47	7.43	0.33	0.7406	-12.41	17.36
	*$SS_{contrast}/SS_{effect}$	0.01					
	2014	13.90	7.20	1.93	0.0586	-0,52	28.31
	*$SS_{contrast}/SS_{effect}$	0.02					
	2015	**19.20**	**7.38**	**2.60**	**0.0118**	**4.42**	**33.97**
	*$SS_{contrast}/SS_{effect}$	**0.03**					

Source: original work based on the analysed data

In the following step, the impact of the Wealth Index on the Education Efficiency Index was analysed. There were no constant and fixed changes in the analysed period, thus, it is not possible to form any valid conclusion (table 3).

Table 3. Assessment of contrasts for Wealth Index (WI) in 2013-2015

Contrast	Rok	Ocena	Bł. std.	t	p	Gr. ufn. -95.00%	Gr. ufn. +95.00%
CONTR. 1 (A vs. D, i.e. 1;0;0;-1)	2013	**21.13**	**8.43**	**2.51**	**0.0151**	**4.25**	**38.02**
	$*SS_{contrast}/SS_{effect}$	**0.03**					
	2014	14.63	8.41	1.74	0.0873	-2.21	31.47
	$*SS_{contrast}/SS_{effect}$	0.02					
	2015	**25.43**	**8.37**	**3.04**	**0.0036**	**8.66**	**42.20**
	$*SS_{contrast}/SS_{effect}$	**0.04**					
CONTR. 2 (B vs. D, i.e. 0;1;0;-1)	2013	14.43	8.43	1.71	0.0925	-2.46	31.31
	$*SS_{contrast}/SS_{effect}$	0.02					
	2014	**25.35**	**8.41**	**3.01**	**0.0039**	**8.51**	**42.19**
	$*SS_{contrast}/SS_{effect}$	**0.04**					
	2015	11.57	8.37	1.38	0.1723	-5.20	28.35
	$*SS_{contrast}/SS_{effect}$	0.02					
CONTR. 3 (C vs. D, i.e. 0;0;1;-1)	2013	1.48	8.43	0.18	0.8612	-15.40	18.36
	$*SS_{contrast}/SS_{effect}$	0.00					
	2014	13.09	8.41	1.56	0.1251	-3.75	29.93
	$*SS_{contrast}/SS_{effect}$	0.02					
	2015	**16.99**	**8.37**	**2.03**	**0.0472**	**0.22**	**33.76**
	$*SS_{contrast}/SS_{effect}$	**0.02**					

Source: original work based on the analysed data

The contrast analysis between classes defined for Education Efficiency Index and Health Index points to statistically significant correlation only between class

A and class D, i.e. the classes on the two extremes. The change of Health Index between the two classes will entail a change of Education Efficiency Index of 2 to 4% (table 4).

Table 4. Assessment of contrasts for Health Index (HI) in 2013-2015

Contrast	Year	Score	Stat. error	t	p	Upper conf. limit -95.00%	Lower conf. limit +95.00%
CONTR. 1 (A vs. D, i.e. 1;0;0;-1)	2013	**15.51**	**7.21**	**2.15**	**0.0357**	**1.07**	**29.96**
	$*SS_{contrast}/SS_{effect}$	**0.04**					
	2014	**16.55**	**6.79**	**2.44**	**0.0180**	**2.95**	**30.15**
	$*SS_{contrast}/SS_{effect}$	**0.02**					
	2015	**18.00**	**7.15**	**2.52**	**0.0147**	**3.67**	**32.32**
	$*SS_{contrast}/SS_{effect}$	**0.04**					
CONTR. 2 (B vs. D, i.e. 0;1;0;-1)	2013	13.54	7.21	1.88	0.0657	-0.91	27.98
	$*SS_{contrast}/SS_{effect}$	0.04					
	2014	**25.99**	**6.79**	**3.83**	**0.0003**	**12.39**	**35.58**
	$*SS_{contrast}/SS_{effect}$	**0.04**					
	2015	**16.05**	**7.15**	**2.24**	**0.0287**	**1.73**	**30.37**
	$*SS_{contrast}/SS_{effect}$	0.04					
CONTR. 3 (C vs. D, i.e. 0;0;1;-1)	2013	2.27	7.21	0.31	0.7544	-12.18	16.71
	$*SS_{contrast}/SS_{effect}$	0.01					
	2014	12.08	6.79	1.78	0.0805	-1.51	25.68
	$*SS_{contrast}/SS_{effect}$	0.02					
	2015	**15.56**	**7.15**	**2.18**	**0.0337**	**1.24**	**29.89**
	$*SS_{contrast}/SS_{effect}$	**0.04**					

Source: original work based on the analysed data

In the analysis of the contrasts between Education Efficiency Index classes and Education Index values for those classes, a change of 1 to 3% was found in relation to all contrasts in the three-year period covered by the analysis (except for change from class C to class D in 2013) (table 5).

Table 5. Assessment of contrasts for Education Index (EI) in 2013-2015

Contrast	Year	Score	Stat. error	t	p	Upper conf. limit -95.00%	Lower conf. limit +95.00%
CONTR. 1 (A vs. D, i.e. 1;0;0;-1)	2013	**29.87**	**8.23**	**3.63**	**0.0006**	**13.39**	**46.36**
	$*SS_{contrast}/SS_{effect}$	**0.02**					
	2014	**22.61**	**7.96**	**2.84**	**0.0063**	**6.65**	**38.56**
	$*SS_{contrast}/SS_{effect}$	**0.02**					
	2015	**34.13**	**8.22**	**4.15**	**0.0001**	**17.65**	**50.61**
	$*SS_{contrast}/SS_{effect}$	**0.03**					
CONTR. 2 (B vs. D, i.e. 0;1;0;-1)	2013	**22.98**	**8.23**	**2.79**	**0.0072**	**6.49**	**39.46**
	$*SS_{contrast}/SS_{effect}$	**0.02**					
	2014	**37.77**	**7.96**	**4.74**	**0.0000**	**21.82**	**53.72**
	$*SS_{contrast}/SS_{effect}$	**0.03**					
	2015	**18.00**	**8.22**	**2.19**	**0.0328**	**1.53**	**34.48**
	$*SS_{contrast}/SS_{effect}$	**0.01**					
CONTR. 3 (C vs. D, i.e. 0;0;1;-1)	2013	4.95	8.23	0.60	0.5501	-11.54	21.43
	$*SS_{contrast}/SS_{effect}$	0.00					
	2014	**16.93**	**7.96**	**2.13**	**0.0380**	**0.97**	**32.88**
	$*SS_{contrast}/SS_{effect}$	**0.01**					
	2015	**23.55**	**8.22**	**2.86**	**0.0059**	**7.07**	**40.03**
	$*SS_{contrast}/SS_{effect}$	**0.02**					

Source: original work based on the analysed data

The value of ω index defined for LHDI shows that the level of the Education Efficiency Index accounts for 14 to 19% of variation. The ω index defined for Education Index accounts for 20 to 25%, 9 to 10% in case of the Wealth Index and 6 to 17% in case of the Health Index. Considering that the analysed values are characterised by repeatable dependencies in the three-year period covered by the analysis, one can assume that constant dependencies are observable in case of the Local Development Index of a region, the Wealth Index and the Education Index. The Health Index was characterised by a significant deviation in 2014, thus suggesting that the value should be verified against a different set of variables (table 6). The identified values have already been described in source literature that describes the factors that influence the quality of education (Battese, Coelli 1995, pp. 325-332). However, it should be stressed that in the present study the authors evaluate the impact of Local Human Development Index, the Wealth Index, the Health Index and the Education Index on the Education Efficiency Index determined by means of DEA-CRS.

Table 6. Estimator of variance of dependent variable explained by an independent variable (ω index)

Year	The value of ω index			
	LHDI	WI	HI	EI
2013	0.14	0.09	0.06	0.20
2014	0.19	0.09	0.17	0.25
2015	0.15	0.10	0.08	0.20

Source: original work based on the analysed data

5. Conclusion

The analyses demonstrate that the highest Education Efficiency Index has been recorded in the counties that have the highest values of analysed variables characteristic of the largest counties. The identified dependency is also associated with the highest value of Local Human Development Index and the measures that make up LHDI.

The presented dependencies indicate that smaller counties with fewer schools are characterised by lower efficiency levels determined by means of DEA-CRS. One should note that in the presented analyses a school with satisfactory

performance was the one that obtained positive educational added value. In this instance, the value is a product of examination results of all students, which might potentially distort the analyses. The above referred to the motivation to refer education efficiency to values that describe the level of human development. The results of the analyses have not led to any final conclusion regarding the modification of education efficiency by the level of human development. The principal difficulty arose from the association of large counties with high human development level.

The analysis conducted in this paper has led to a conclusion that more effort should be made in terms of education in smaller agglomerations. The effort should be aimed at improving the quality of education and further at improving the human capital and eliminating social inequalities generated by the education system. These inequalities should undoubtedly be mitigated through the application of appropriately selected tools. The best way to reduce them is to provide all social groups with access to modern education adapted to the requirements of a knowledge-based economy (Turczak, Zwiech 2014, p. 587).

Summary

Human development level as a modifier of education efficiency

The aim of the study was to demonstrate the connection between education efficiency level and human development level. It was assumed that there is a connection between the value of Local Human Development Index (LHDI) and education efficiency established by means of the data envelopment analysis (DEA).

The analysis covered data regarding 60 counties, recorded in 2013-2015. 30 counties with the highest Local Human Development Index (LHDI) and 30 counties with the lowest LHDI value were selected. The counties were selected based on a 2010 ranking of counties ordered according to LHDI values, published as a part of the National Report on Human Development. An additional analysis was conducted to evaluate the connection between Education Efficiency Index and the Wealth Index, Health Index and Education Index.

The data on the counties used for the analyses was obtained from the Local Data Bank kept by the Main Statistical Office of Poland (GUS) and the Education Research Institute (IBE) of the Ministry of National Education.

The efficiency analysis based on DEA-CRS was conducted with DEAFrontier software.

The final stage of the analyses involved an ANOVA unidimensional analysis of variance for multiple factors, with emphasis on contrast analysis (simple contrast). The quality predictor applied in those analyses was the class of Efficiency Index.
The analyses demonstrate that the highest Education Efficiency Index has been recorded in the counties that have the highest values of analysed variables characteristic of the largest counties. The identified dependency is also associated with the highest value of Local Human Development Index and the measures that make up LHDI.

Key words: *human development, quality of education, effectiveness of education.*

Streszczenie

Poziom rozwoju społecznego jako czynnik modyfikujący efektywność edukacji
Celem pracy było wykazanie związku pomiędzy poziomem efektywności edukacji a poziomem rozwoju społecznego. Przyjęto hipotezę, że występuje związek pomiędzy wartością LHDI a efektywnością edukacji wyznaczoną metodą DEA.
Analizie poddano dane charakteryzujące 60 powiatów w latach 2013-2015. Z całej zbiorowości powiatów wybrano 30 powiatów o najwyższej i taką samą liczbę powiatów o najniższej wartości lokalnego wskaźnika rozwoju społecznego (LHDI). Przyjęto ranking powiatów według LHDI dla 2010 roku opublikowany w Krajowym Raporcie o Rozwoju Społecznym. Dodatkowej analizie poddano związek wskaźnika efektywności edukacji z wskaźnikiem zamożności, wskaźnikiem zdrowia oraz wskaźnikiem edukacji.
Dane opisujące charakterystyczne wielkości powiatów w obrębie prowadzonych analiz pozyskano z Banku Danych Lokalnych Głównego Urzędu Statystycznego oraz Instytutu Badań Edukacyjnych Ministerstwa Edukacji Narodowej.
Analizę efektywności metodą DEA-CRS przeprowadzono przy pomocy oprogramowania DEAFrontier.
Ostatnim etapem prowadzonych analiz było przeprowadzenie jednowymiarowej i wieloczynnikowej analizy wariancji metodą ANOVA ze szczególnym zwróceniem uwagi na analizę kontrastów (kontrast prosty). Predyktorem jakościowym w tych analizach były klasy wskaźnika efektywności.

Przeprowadzone analizy wykazały, że najwyższym wskaźnikiem efektywności edukacji wykazywały się powiaty o najwyższych wartościach analizowanych zmiennych charakterystycznych dla największych powiatów. Wykazana zależność jest też związana z największą wartością lokalnego wskaźnika rozwoju społecznego oraz mierników wchodzących w skład LHDI.

Słowa kluczowe: *rozwój społeczny, efektywność edukacji, ANOVA.*

JEL Classification: H19, H40, I21, I22

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