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Review of Economic Perspectives – Národohospodářský obzor
Vol. 24, Issue 1, 2024, pp. 1–15, DOI: 10.2478/revecp-2024-0001

Efficiency Analysis of Elementary Schools in Bratislava – A Two Step DEA Approach

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Abstract: Education is a key area that should matter to the whole society. Measuring efficiency in education is a widely discussed academic and professional topic. The presented article focuses on investigating the efficiency of 57 elementary schools in the city of Bratislava. We used a two-step approach. In addition to measuring the output efficiency of elementary schools through the analysis of the non-parametric Data Envelopment Analysis method (DEA) with variable returns of scale (VRS), we also performed regression analyses to examine the connection between contextual variables and the measured output efficiency. The analysis shows that the achieved output efficiency is positively associated by the technical equipment of schools, staff in schools and the establishment (prestige) of schools in society. We noted a negative association with the number of students with special needs. Our findings can serve the city administration, as they can largely influence the monitored parameters by their own decision.

Keywords: Data Envelopment Analysis (DEA), output efficiency, elementary schools, Bratislava

JEL Classification: C24, H75

Received: 2 August 2022 / Accepted: 5 April 2024 / Sent for Publication: 22 April 2024

Introduction

Every society should be interested in improving the education of its residents. A good education of the population, and therefore a good educational system, is related to the possibility of creating economic growth. And consequently, generating wealth not only for individuals, but also for the inhabitants of individual countries, cities, or communities (Barro, 1991; Glaeser, Scheinkman & Shleifer, 1995). A lot of attention in the academic debate on the topic of quality education focuses on measuring and evaluating the efficiency of schools. Schools are "cornerstone" units that provide education. In order for schools to be able to provide a good education or raise suitable graduates for the labour

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market, they need to appropriately combine a number of factors that result into quality education.

This article focuses on measuring the efficiency of a specific area of the education system, specifically on measuring the efficiency of elementary schools. In the presented article, we looked at the efficiency of elementary schools in the city of Bratislava. The ongoing discussion about the efficiency of education in Slovakia is generally very limited, while several international institutions point to long-term problems. The field of education in Slovakia has been financially insufficiently supported for a long time compared to EU and OECD countries (OECD, 2021; European Commission, 2021). Slovak students achieve below-average results compared to most EU and OECD countries for a long time (OECD, 2018). At the same time, there are large disparities between regions in terms of educational attainment. The 8th Cohesion Report (European Commission, 2022a) as well as the Country Report of the European Commission from 2022 (European Commission, 2022b) specifically point to this problem. Despite the long-term problems identified in reports from the European Commission and the OECD, which point to the need to investigate efficiency in secondary and primary schools, these areas have not received enough attention so far. A study by the Institute of Education Policy (IVP, 2016) only partially deals with the topic of the efficiency of the elementary school network in Slovakia, which points to the problems of different sizes of schools, as well as differences in personnel and technical equipment. However, this study does not evaluate the efficiency of elementary schools. This certain vacuum thus represents a suitable opportunity to investigate the efficiency and factors related to elementary schools and to open a social debate.

Elementary schools fall under the agenda of the Ministry of Education, Science, Research and Sports of the Slovak Republic. The Ministry largely finances the running of elementary schools and determines the curriculum. However, from the point of view of material and technical equipment as well as personnel policy, local governments have significant competences. They partially co-finance elementary schools and decide on who will become the director (manager) of individual schools, thus who are responsible for the staff in schools. The aim of this article is to measure the efficiency of elementary schools in a selected city and examine various contextual factors that may be related to the achieved efficiency.

The structure of the article is as follows. Chapter 2 provides an overview of the relevant research literature, focused on the measurement of efficiency in education with an emphasis on elementary schools. At the same time, the chapter provides an overview of various factors that are used in the relevant literature to measure and subsequently investigate the associations with the achieved efficiency. Chapter 3 provides the methodology of our research along with a description of the statistical data we used. In chapter 4, we present the results of our analysis. Chapter 5 confronts the achieved results with findings from the existing literature. In the final chapter 6, we present recommendations for relevant actors and our conclusions.

Literature review

Efficiency in education is very often investigated in two steps. First, the efficiency of the individual investigated object is measured, and then various factors that may be related to the measured efficiency are examined. Efficiency in education is measured as the

efficiency of the production function, i.e. of specific production units (decision making units - DMU). In education, schools are often considered as DMUs. In order for schools to be considered effective, they need to find an appropriate combination of different inputs that will enable them to produce the best possible outputs. Efficiency in education is usually measured through various parametric methods (for example, the Stochastic Frontier Analysis - SFA method is often used), non-parametric methods (the DEA method is often used), or a combination of different types of methods. These methods are used to measure efficiency at different levels within the education system - in primary, secondary and tertiary education. Examples of the use of the parametric SFA method for measuring the efficiency of schools can be seen, for example, in studies by Grosskopf et al. (2001); Conroy & Arguea (2008); Ferrera et al. (2011), or by Garcia-Diaz, del Castillo & Cabral (2016). The use of non-parametric methods, for example, in studies by Mancebón & Mar-Molinero (2000); Agasisti (2013); Agasisti & Zoido (2019), or by Cordero, Santín & Simancas (2017). The use of combined methods is provided, for example, by Afonso & Aubyn (2006); Witte et al. (2010); Grosskopf et al (2014), or Cheng et al. (2016). Witte & López-Torres (2017) provides, for example, a detailed overview of the academic literature focused on measuring efficiency in education through various approaches and methods.

In practice, efficiency models are further distinguished according to which side of efficiency is given greater emphasis. And it is distinguished whether it is an input-oriented model (more emphasis is placed on achieving the highest possible efficiency on the input side) or an output-oriented model (achieving the best efficiency on the output side). Various school resources are often used as input parameters, such as school material and technical equipment, personnel composition and teacher qualifications (Scippacercola & D'Ambra, 2014; Di Giacomo & Pennisi, 2014; Liouaeddine et al., 2018; García-Díaz et al., 2016; García-Díaz et al., 2020), or the size of schools measured by the number and structure of pupils, or the size of classrooms (Conroy & Arguea, 2008; Fatimah & Mahmudah, 2017, or García-Díaz et al., 2016; García-Díaz et al., 2020). Last but not least, the parameters of the size and structure of school financing are also used on the input side (Scippacercola & D'Ambra, 2014; Di Giacomo & Pennisi, 2014; Liouaeddine et al., 2018; García-Díaz et al., 2016; García-Díaz et al., 2020). On the output side, various indicators of the success of the observed units are used. For example, the number of graduates, test or exam scores, repetition rates, etc. (Conroy & Arguea, 2008; Scippacercola & D'Ambra, 2014; Di Giacomo & Pennisi, 2014; Liouaeddine et al. 2018; Fatimah & Mahmudah, 2017, or García-Díaz et al., 2016; García-Díaz et al., 2020). Authors of school effectiveness studies combine various numbers of inputs and outputs to measure school efficiency.

Following the calculation of the efficiency of individual schools, various contextual factors that may be associated with the achieved efficiency of schools are examined through regression analyses. The studies examine the aforementioned factors related to the size, material and technical equipment of schools, staff in schools as well as their financial resources. Furthermore, the indicators of the pupils' family background, the status of the pupils, or the level of education and employment status of the parents (Kirjavainen & Loikkanent 1998; Scippacercola & D'Ambra, 2014), the socio-economic environment in which the pupils or schools operate (Agasisti & Zoido, 2019) are also examined. The location of the school and its distance from other schools (Liouaeddine et al. 2018; García-Díaz et al., 2016; García-Díaz et al., 2020), or the reputation or the prestige of the school are analysed as well (Ray & Jeon, 2008, MacLeod & Urquiola, 2015).

Data & Methodology

In presented article, we focused on investigating the efficiency of 57 elementary schools in the city of Bratislava. These are all standard elementary schools. In our analysis we have excluded special elementary schools. To fulfil our goal, we chose a two-stage analysis. The first step was to measure the output efficiency of elementary schools. To measure output efficiency, we chose the non-parametric DEA method with variable returns to scale (VRS). Based on the available academic literature, we used three input parameters and one output parameter. We used only one output parameter due to the limited availability of data for the observed DMUs. For example, Alberta Oliveira & Santos (2005), Johnson & Ruggiero (2014), or Scippacercola & D'Ambra (2014) followed a similar approach. As inputs, we used following parameters: number of teachers (full-time + part-time), number of all pupils and the total budget of the school expressed in 1000 euros. The output indicator was the average score of pupils from the T9 mathematics test for a single school.

In the second step, we tested the obtained values from the output efficiency of schools within regression analyses. Through regression analyses, we investigated the connections of the achieved output efficiencies with the parameters of technical equipment of schools, schools' staff, special needs of pupils, establishment (prestige) of schools and geographical distance of schools from the city centre. We consider the geographical distance of individual schools from the city centre to be somehow a novelty for the existing literature, investigating the association of location of schools with their efficiency. We consider the significance of the smaller distance of schools to the city centre to be an interesting aspect that can be positively related to the measured efficiency. We assume that schools that are closer to the city centre are more "on the eyes" of society and will naturally try to achieve higher efficiency. At the same time, proximity to the centre can be positively associated with the efficiency because of "urban buzz" effects described by Storper & Venables, (2004).

Description and justification of used indicators in the analysis and assumed relationships

To investigate the effect of the technical equipment of schools, we chose two variables. The Pup classroom indicator represents the average number of pupils belonging to one classroom. This parameter indicates the capacity possibilities of schools. We assume a positive relation between this variable to output efficiency. This finding can be found in Conroy & Arguea (2008). The second indicator is pup PC, which represents the number of students belonging to one school computer. We assume a negative relation. Agasisti & Zoido (2019) came out with similar conclusions. From the point of view of school staff, we also chose two variables. The share of personnel expenses from the total budget indicates the importance schools gave on staff, respecting their budgetary possibilities. Following Scippacercola & D'Ambra (2014), Di Giacomo & Pennisi (2014), García-Díaz et al. (2016) and García-Díaz et al. (2020), we also assume a positive relation of the variable to output efficiency. The second indicator is Spec_pedag, which represents the number of specific pedagogues for students with special needs. We assume a positive relation between this variable and the output efficiency. We examined the special needs of pupils with a variable - the number of pupils with special needs. We assume a negative relation

to the output efficiency. A similar conclusion was found in Scippacercola & D'Ambra (2014). To examine the effect of the establishment (prestige) of schools, we chose the indicator of school age. Based on findings from Ray & Jeon (2008) and MacLeod & Urquiola (2015), we assume a positive relationship. The last investigated indicator is the geographical distance of schools from the city centre. To investigate this effect, we used the variable distance of the school from the city centre. Following the assumptions provided by Storper & Venables, (2004), we expect a negative relation between this independent variable and the output efficiency of schools.

Due to possible multicollinearity, we run a correlation analysis. The correlation matrix (given in the appendix as Table 5) shows that all the used variables have a low or very low correlation between them. The highest value of the correlation coefficient is between the indicators age2019 and distance. The value of the correlation coefficient is -0.416. We assumed a certain degree of correlation between these two variables. We started from the assumption that older schools are located closer to the city centre and newer schools were built in accordance with the spatial development of the city to its surroundings (and thus further from the city centre). However, we do not consider the resulting value of the coefficient to be problematic for our analysis.

To perform our analysis, we used data from several databases. We obtained all the indicators necessary for the calculation of output efficiency from the Ministry of Education, Science, Research and Sport of the Slovak Republic. Similarly, we obtained indicators on pupils, technical equipment, staff, finances of individual schools, date of establishment of the school and average values from T9 testing from the Ministry. We obtained the distance of the schools from the city centre to every elementary school from Google Maps. We used the air distance in kilometres from the school headquarters to the city centre. We chose St. Martin's Cathedral as the centre. It is an iconic landmark of the city, which is broadly considered as the centre of the city. The location of individual schools in the city can be seen in Figure 1 (in the appendix of the document). All obtained data are dated for year 2019. We chose the data for 2019 due to the availability of complete data and to avoid possible distorted data affected by the COVID-19 pandemic. Table 1 provides an overview of all data used in our analysis.

In order to investigate the association of various factors with the achieved efficiency of schools, we performed two types of regression analyses. Standard used OLS linear regression and TOBIT regression. Both regression analyses were based on the following relationship:

$$Eff\_out2019 = \beta 0 + \beta 1Pup\_classroom2019 + \beta 2pup\_PC2019 + \beta 3age2019 + \beta 4distance2019 + \beta 5specpup2019 + \beta 6Spec\_pedag2019 + \beta 7Share\ Pers\ cost2019 + \varepsilon e2019$$

Table 1. Overview of used variables[3]

Variable	Description	Source
Allteach (I)	Number of teachers (full time + part time)	Ministry of Education, Science, Research and Sport of the Slovak Republic
Pupils (I)	Number of pupils	Ministry of Education, Science, Research and Sport of the Slovak Republic
Budget (I)	The total school budget in thousands €	Ministry of Education, Science, Research and Sport of the Slovak Republic
T9 Mathematics (O)	Average results of pupils in the T9 mathematics test	Ministry of Education, Science, Research and Sport of the Slovak Republic
Eff out	Output efficiency of the DEA model (VRS)	Own calculation
Pup classroom	Average number of pupils per classroom	Ministry of Education, Science, Research and Sport of the Slovak Republic
pup PC	The number of students belonging to one school computer	Ministry of Education, Science, Research and Sport of the Slovak Republic
Share Pers cost	The share of personnel expenses from the total budget of the school	Ministry of Education, Science, Research and Sport of the Slovak Republic
Spec_pedag	Number of specialist teachers for pupils with special needs	Ministry of Education, Science, Research and Sport of the Slovak Republic
Specpup	Number of pupils with special needs	Ministry of Education, Science, Research and Sport of the Slovak Republic
age2019	School age as of 2019	Ministry of Education, Science, Research and Sport of the Slovak Republic
Distance	Distance of the school from the city center	Google Maps

Source: Source.

Results

The analysed sample consisted of 57 elementary schools. The largest school was attended by 862 pupils. 106 pupils went to the smallest school. The average number of pupils belonging to one elementary school was 470 pupils. The calculated output efficiency (Eff out) showed that in 2019 there were 4 schools in the city that achieved maximum efficiency (the value of the indicator was 1). The remaining 53 elementary schools achieved lower efficiency. In terms of average classroom size, the smallest school had an average of 8 students per classroom. On the other hand, the "largest" school had an average of 22

[3] Note: The indicators marked (I) represented the input indicators to the DEA model, and the indicator marked (O) represented the output indicator.

students per classroom. From the point of view of the technical equipment of the schools, the least equipped school had 1 computer per 10 pupils. The best equipped school had 1 computer for less than 2 pupils. From the point of view of the share of personnel costs, the obtained values between schools ranged from less than 84% to roughly 87% of the total budget. On average, elementary schools spent 85.6% of their expenses on personnel costs. From the point of view of the presence of special pedagogues, the schools differed as follows. One school employed 4 special pedagogues, and seven schools did not employ any special pedagogue. From the point of view of the number of pupils with special needs, the difference between the schools was as follows. The average number of pupils with special needs belonging to one elementary school was 30 pupils. The maximum number of pupils with special needs in one school was 79 pupils. The minimum number was 3 pupils. The oldest school celebrated its 127th anniversary in 2019. The youngest elementary school was 26 years old in the observed year. The elementary school located closest to the city centre was located less than 2 kilometres from St. Martin's Cathedral. The farthest school was located less than 16 kilometres from the centre. Table 2 provides detailed descriptive statistics of all indicators that we used in the following analysis.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Allteach (I)	57	31.825	10.766	13	66
Pupils (I)	57	469.684	175.176	106	862
Budget (I)	57	528.425	183.684	188.451	925.390
T9 Mathematics (O)	57	63.246	10.858	36	85.3
Eff out	57	0.780	0.118	0.577	1
Pup classroom	57	15.95	3.440	8.154	22.519
pup PC	57	4.574	1.477	1.374	9.846
Share Pers cost	57	0.856	0.006	0.837	0.866
Spec_pedag	57	1.158	0.727	0	4
Specpup	57	29.719	14.621	3	79
age2019	57	52.053	19.947	26	127
Distance	57	7.195	3.719	1.700	15.600

Source: Authors.

Table 3 provides the results of OLS linear regression. The R-squared value of our model is 0.284. The results of the regression analysis show the following. The most statistically significant indicator is the number of pupils with special needs. The relationship between the variables is negative, which means that the more pupils with special needs attend elementary school, the lower its efficiency. From the point of view of the school's technical equipment, only the Pup_classroom indicator was statistically significant. The regression shows a positive relationship between the variables. We can interpret this relation as the greater the number of pupils in one classroom, the higher the efficiency of the elementary school. Another statistically significant indicator was the share of personnel costs provided by schools. The relationship between the variables is also positive, which means that the greater part of their budget a school spend on its employees, the higher its efficiency. The last statistically significant variable is the school age indicator (age2019). The relationship between the variables is positive, which can be interpreted as the older the school is (more established and therefore more prestigious), the more efficient the school is. Other variable indicators are statistically insignificant.

Table 3. OLS Linear regression

Eff_out	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Pup_classroom	.012	.005	2.41	.020	.002	.021	**
pup_PC	-.003	.011	-0.29	.774	-.025	.019	
Share_Pers_cost	4.392	2.588	1.70	.096	-.810	9.593	*
Spec_pedag	.004	.021	0.17	.868	-.039	.046	
specpup	-.003	.001	-3.06	.004	-.005	-.001	***
age2019	.002	.001	2.07	.044	.000	.004	**
distance	.005	.004	1.08	.285	-.004	.013	
Constant	-3.188	2.265	-1.41	.165	-7.739	1.362	

Mean dependent var	0.780	SD dependent var	0.118
R-squared	0.284	Number of obs	57
F-test	2.774	Prob > F	0.016
Akaike crit. (AIC)	-85.704	Bayesian crit. (BIC)	-69.360

*** *p<.01, ** p<.05, * p<.1*

Source: Authors.

The findings from the elaborated OLS linear regression analysis are also confirmed by the results from the TOBIT regression (see Table 4). From the point of view of statistical significance, the size of the classroom (Pup_classroom), the share of personnel costs from the total budget (Share_Pers_cost), the age of the school (age2019) and the number of pupils with special needs are significant. The other indicators were statistically insignificant, just like in the OLS model. Also, the signs of the coefficients of the individual variables are the same as in the OLS model.

Table 4. TOBIT regression

Eff_out	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Pup_classroom	.012	.005	2.52	.015	.002	.022	**
pup_PC	-.006	.011	-0.53	.601	-.027	.016	
Share_Pers_cost	4.528	2.553	1.77	.082	-.600	9.657	*
Spec_pedag	.003	.021	0.16	.872	-.038	.045	
specpup	-.004	.001	-3.45	.001	-.006	-.002	***
age2019	.002	.001	2.28	.027	.000	.004	**
distance	.005	.004	1.25	.216	-.003	.014	
Constant	-3.299	2.234	-1.48	.146	-7.785	1.188	
var(e	.011	.002	.b	.b	.007	.017	

Mean dependent var	0.780	SD dependent var	0.118
Pseudo r-squared	-0.333	Number of obs	57
Chi-square	19.814	Prob > chi2	0.006
Akaike crit. (AIC)	-61.276	Bayesian crit. (BIC)	-42.889

*** *p<.01, ** p<.05, * p<.1*

Source: Authors.

Discussion

The results of our analysis showed that the technical equipment of elementary schools, the representation of pupils with special needs, the share of personnel costs that the elementary school spends from its budget and, last but not least, historical roots (establishment in society or prestige of the school) can be associated with the achieved output efficiency of elementary schools in the city of Bratislava.

From the point of view of technical efficiency, a statistically significant and positive relationship emerged between the size of the classroom and output efficiency. We interpret the result as it is more efficient for schools to have a larger number of students in one classroom as a smaller number within the same classroom. More pupils are getting the same education at the same time. It is naturally efficient for the school if one teacher can teach more pupils in the classroom than less pupils. For example, Conroy & Arguea (2008) reached similar conclusions. On the other hand, the indicator of the number of students belonging to one computer was statistically insignificant. However, the sign of the coefficient was negative, as we expected. More students belonging to one computer is less efficient for the school than if fewer students share one computer. Agasisti & Zoido (2019) came out with similar conclusions to our expectations, for example. From the point of view of staff within school, the relationship between the share of personnel costs in the total school budget and the level of output efficiency was statistically significant and positive. The association can be interpreted as the schools achieve higher output efficiency if they give more emphasis (more money) to staff in their budgets. The more resources schools spend from their budgets on is staff, the more quality or more suitable employees they can hire. This can positively influence the school's output efficiency. Similar conclusions were reached by Scippacercola & D'Ambra, 2014; Di Giacomo & Pennisi, 2014; García-Díaz et al., 2016; García-Díaz et al., 2020). On the other hand, the relationship between the number of special pedagogues and the achieved output efficiency turned out to be statistically insignificant. Even though the coefficient was positive, our assumption that the more special teachers a school has, the higher its efficiency will be, was not confirmed.

From the point of view of the representation of pupils with specific needs, a negative, statistically significant relationship emerged from our model. We interpret this connection as follows. The more pupils with specific needs attend the school, the worse the output efficiency the school achieves. However, the interpretation must be taken sensitively, as pupils with special needs naturally require special approached with special teachers. Interesting findings in this area are provided, for example, by Scippacercola & D'Ambra (2014).

The age of the school came out as significant and positive in our analysis. Thus, our assumption has been fulfilled and we interpret this relation as the older the school is, the longer it has been established in the educational system. As a result, the school has built a certain reputation and prestige within society and older institution also has more experiences with the education system, therefore it is positively reflected in higher output efficiency. Similar findings were also published by Ray & Jeon (2008) and MacLeod & Urquiola (2015).

The last investigated factor, the distance of the elementary school from the city centre, was statistically insignificant. Thus, our assumption that elementary schools located

closer to the city centre are affected by intangible effects that can be simply described as urban buzz was not confirmed. It does not follow from the results of our analysis that the physical proximity of the school to the city centre would have a association with its output efficiency. The resulting sign of the coefficient, which turned out to be positive, is interesting. We assumed an opposite result.

Finally, we are aware of several limitations of our analysis. Especially the omission of several variable indicators that, according to the academic literature, point to associations with output efficiency. In our analysis, we did not include indicators that would reflect the socio-economic surrounding or environment (e.g. unemployment rate), which may be negatively related to output efficiency, or the family background of pupils, as interpreted by, for example, Kirjavainen & Loikkanent (1998) and Scippacercola & D'Ambra (2014). We are also aware that our findings may be influenced by the omission of other specific indicators pointed out in the scientific literature. The limits of our analysis result mainly from the limited availability or non-existence of suitable statistical data.

Conclusion and policy recommendations

The aim of the presented article was to measure the efficiency of elementary schools in the city of Bratislava and to examine selected factors that may be related to the achieved efficiency. Despite several limitations of our analysis that we are aware of (selection of one city, sample of schools, only one year investigated, selection of indicators used to measure efficiency, as well as selection of indicators used to investigate the connection with achieved efficiency), several interesting results emerged from our analysis. Our findings can serve not only to the professionals but also to the academic public. Our results confirmed some findings from foreign academic articles and studies. For example, a positive association between the achieved efficiency of elementary schools with an emphasis on staff funding, the size of the school (measured by the size of classrooms), the establishment of the school and a negative association with the number of pupils with specific needs. Since Slovak local governments can largely influence the technical equipment of schools, as well as their staff, our results should serve as inspiration for the officials of the city of Bratislava and individual districts that operate elementary schools. Using the example of elementary schools in Bratislava, it would be appropriate for local authorities to consider optimizing the size of classrooms within their elementary schools, increase the emphasis of funding on employees, as well as pay more attention to students with special needs. The mentioned areas can be changed and influenced to a better state even from the position of the local government. From an academic point of view, we consider our findings to have a little contribution to the ongoing debate about the efficiency of elementary schools due to the stated limitations of the research. At the same time, we consider our findings from the analysis of elementary schools in Bratislava to be a good starting point for the creation of more sophisticated and extensive analyses of efficiency. As every community, city or country should be concerned with the maximum efficiency of its educational system, our approach could be simply replicated to get the result.

Acknowledgements: We would like to thank two anonymous reviewers as well as the editor for their valuable comments. Their suggestions and ideas improved the quality of this paper.

Funding: This contribution was supported by APVV Agency under the contract No. APVV-19-0263 titled "Possibilities of smart governance methods application on local and regional level."

Disclosure statement: No potential conflict of interest was reported by the authors.

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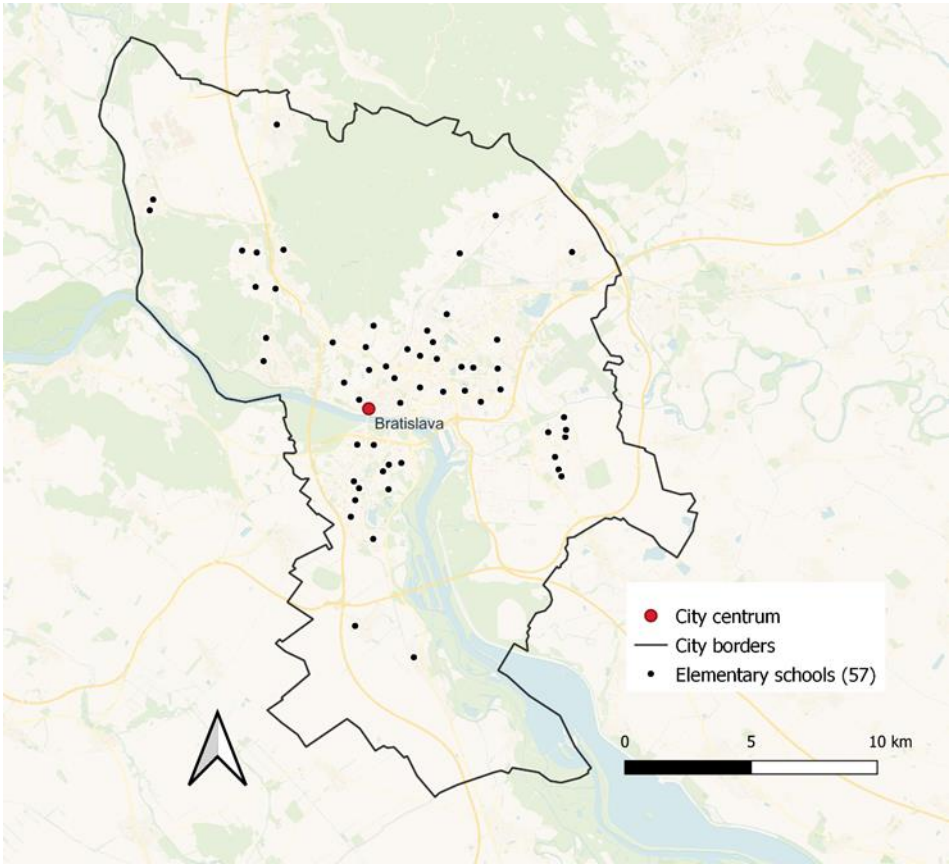
Appendix

Figure 1. Localization of 57 elementary schools in Bratislava (2019)



Source: Authors.

Table 5. Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Eff_out	1							
(2) Pup_classroom	0.203	1						
(3) pup_PC	0.096	0.205	1					
(4) Share_Pers_cost	0.066	-0.361	-0.018	1				
(5) Spec_pedag	-0.107	-0.170	-0.104	-0.041	1			
(6) specpup	-0.343	0.177	-0.264	-0.065	-0.006	1		
(7) age2019	0.233	0.157	-0.198	-0.252	-0.192	0.012	1	
(8) distance	-0.002	-0.131	0.181	0.069	-0.067	-0.030	-0.416	1

Source: Authors.