Budgeting school operational assistance in Central Java using three spatial process modelling

by Rochdi Wasono

PAPER • OPEN ACCESS

Budgeting school operational assistance in Central Java using three spatial process modelling

To cite this article: R Wasono *et al* 2019 *J. Phys.: Conf. Ser.* **1217** 012112

View the article online for updates and enhancements.

Budgeting school operational assistance in Central Java using three spatial process modelling

R Wasono[1], A Karim [1], M Y Darsyah[1] and Suwardi[2]

[1]Department of Statistics, University of Muhammadiyah Semarang, Semarang City, Indonesia
[2]Department of Management, University of Muhammadiyah Semarang, Semarang City, Indonesia

E-mail: abdulkarim@unimus.ac.id

Abstract. The formulation of Indonesian school operational assistance is a complex issue, as each region has different characteristics. The aim of this research was to find out the mapping of the distribution of school operational assistance budget in Central Java Province, to develop the equalization model of Indonesian school operational assistance of Central Java Province using spatial through three spatial processes namely spatial lag X (SLX), spatial autoregressive (SAR), and spatial error model (SEM). Spatial modeling is expected to be a tool of educational development planning so that the development is more directed to equitable distribution of Indonesian school operational assistance in Central Java. The distribution of funds for the program is one form of government expenditures in the form of subsidies for the education sector as the compensation from reduced subsidies for fuel oil. The research results show that the SEM model is the best model, and the estimation results show that the school development budget, school management and human development index can significantly be a determinant of the distribution of Indonesian school operational assistance.

1. Introduction

Based on [1], they bring the consequences to autonomy in education. The national education system that was centrally regulated has turned into a decentralized approach. In supporting the implementation of educational autonomy, it is necessary to ensure the availability of budgets for the Ministry of Education and Culture in the regions to provide the best education services. The core of educational autonomy is the decentralization of education implementation as a consequence of the delegation of some policies and responsibilities from the Central Ministry of Education and Culture to regional Ministry of Education and Culture. Law Number 25 of 1999 in conjunction with Law Number 33 of 2004 on Financial Balance between Central and Regional Governments is a legal basis for regulating financial transfer procedures from the central to regional governments.

The formulation of School Operational Assistance funds distribution is a complex problem because each region has different characteristics. The Ministries of Education and Culture in the Regencies and Cities in Central Java have different student populations in elementary and junior high schools. In addition, the geographical conditions of Central Java Province cause the differences in financing to build educational facilities. It means that the higher the level of geographical difficulty in a region (for example, mountainous or river-separated areas), the higher the price level in the area for the construction of facilities and infrastructure in the form of buildings, laboratories, and other supporting facilities.

In understanding the phenomenon above, the relationship between various variables was defined in a mathematical form. The first law of geography was put forward by Tobler in [2]; the condition at one point or area is related to the condition at one adjacent point or area. This law is the basis for regional science studies. An observation in a location frequently depends on the observation in another location. Then, to overcome this, a development of regression model with spatial approach was carried out.

The research on school operational assistance was conducted [3] which explored the budgeting process of school operational assistance in public primary education institutions. The results of their study indicate that there is a lack of parents and community participation in budgeting for school operational assistance. Karim and Alfiyah [4] used global moran's test to find out the spatial dependency of school operational assistance in Central Java. Through this study, it can be seen that the funding of school operational assistance in Central Java has significantly inter-regional relation. The research on government investment in education using a spatial approach was conducted [5]. They concluded that the spatial effect on government investment in education is related between one province and another in China. The other spatial modelling study was conducted by [6] using spatial data panel modelling. The importance of this study is to map the school operational assistance budget, based on the factors that influence it, then classify the area based on these influential factors to determine the cluster so that later it can be used for planning educational development programs in Central Java Province so that development is more focused on equity

2. Method
The data used in this study were the data obtained from the Ministry of Education and Culture for the period of 2016. In this study, the observation units were the regencies and cities in Central Java Province. The variables used were based on variables: payment of honorary staff, personnel, shopping for goods, teaching and learning activities, student activities and building maintenance [7] are summarized into 3 predictor variables, namely : Total cost of supervision/ coaching per regency and city, Total management costs per regency and city and Human development index (HDI) per regency and city The full explanation can be seen below:

Table 1. Operational definition of variables

No	Variable	Indicator	Description
1	Y	BOS value per regency and city	Million rupiahs
2	X1	Total cost of supervision/ coaching per regency and city	Million rupiahs
3	X2	Total management costs per regency and city	People
4	X3	Human development index (HDI) per regency and city	Per cent

The followings are the model specifications adopting the spatial econometrics model [8] through three spatial processes:
1. Spatial Lag Independent (SLX)

$$y_i = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \theta_1 W X_1 + \theta_2 W X_2 + \theta_3 W X_3 + \varepsilon_i \qquad (1)$$

2. Spatial Autoregressive Model (SAR)

$$y_i = \rho W y + \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \varepsilon_i \qquad (2)$$

3. Spatial Error Model (SEM)

$$y_i = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + u_i$$
$$u_i = \lambda W u_i + \varepsilon_i \qquad (3)$$

The data used in this study were obtained from 35 districts/cities in Central Java from the education office and BPS, for the School Operating Assistance data sample is a 3-month data that is processed for 1 year. Data validation is done by going to agencies to match data with data in the field.

3. Result and discussion

The estimation of the models of SLX, SAR and SEM resulted in the parameters that affected the BOS value in Central Java Province. The parameter estimation results are presented in table 2 as follows:

Table 2. Parameter estimation test results of the models of SLX, SAR and SEM

Parameter	SLX coefficient (*P-value*)	SAR coefficient (*P-value*)	SEM coefficient (*P-value*)
Intercept	-0.015	-0.006	0.672
	(0.751)	(0.66)	(0.714)
Total Coaching Cost	0.629	0.618	0.611
	(0.000*)	(0.000*)	(0.000*)
Total Cost Management	0.36	0.364	0.372
	(0.000*)	(0.000*)	(0.000*)
Human Development Index	-0.026	-0.031	-0.031
	0.165	(0.033*)	(0.035*)
W * Total Coaching Cost.	0.043		
	(0.133)		
W * Total Management	-0.039		
	(0.146)		
W * Human Development Index	-0.001		
	(0.815)		
Rho		0.002	
		(0.794)	
Lambda			0.015
			(0.775)
AIC	-57.46	-60.33	-60.344

Note: *Significant at $\alpha = 5\%$ ** Significant at $\alpha = 10\%$

Based on the analysis of SLX, SAR and SEM models, it can be concluded that the SEM model is better to use because it has the smallest AIC value. Furthermore, the spatial parameters of *rho* and *lambda* have no significant effects. It indicates that the absence of spillover effects on the BOS funds in Central Java means that the BOS fund in a district/city is not affected by the BOS funds in the surrounding regencies/ cities. However, in SEM, it has a direct effect (global multiplier) but does not have an indirect effect (multiplier). The variables (total coaching cost, total management costs and human development index) which are not weighted by the matrix W (global multiplier) in SEM all have a significant effect on BOS value.

It proves that the allocation of BOS funds in Central Java is significantly determined by the need for coaching costs and management costs from each regency/ city which is indicated by a positive sign on both variables. In other hand, the human development index variable has a negative and significant sign indicating that the regencies/ cities with good human development index should have reduced school operational assistance because the basic idea of the budgeting for school operational assistance is to reduce disparity in human resources and to fulfill basic education needs of each city/regency, particularly the poor or disadvantaged groups, so that they can obtain adequate and quality education for compulsory education.

4. Conclusion

Currently, Central Java plays an important role in the development of large-scale human resources, while the schools in the regencies/ cities as the upstream sectors face severe challenges in school operational funding. Then, we used econometrics spatial modelling through three processes to analyze the factors that determined the school operational assistance funding in 35 regencies/ cities in Central Java. The conclusion of this paper is that the allocation of BOS funds in Central Java is significantly determined by the need for coaching costs, management costs and the human development index of each regency/city.

Acknowledgments

References

[1]   House of Representatives 1999 *Undang-undang No. 22 Tahun 1999 Tentang Pemerintahan Daerah. Local Government* Jakarta
[2]   Ho C Q and Hensher D A 2016 *Journal of Transport Geography* **51** 193.
[3]   Rahayu, S, Ludigdo U, Irianto G and Nurkholis 2015 *Procedia - Social and Behavioral Sciences* **211** 364.
[4]   Karim A and Alfiyah 2014 *Jurnal Statistika Universitas Muhammadiyah Semarang* **2.**
[5]   Kangjuan L Tao W and Siyi G 2012 *International Journal of Information and Education Technology* **2** 367.
[6]   Karim A and Wasono R 2017 *Advanced Science Letters* **23** 6530.
[7]   Karding A K 2008 *Evaluation of the Implementation of the School Middle School Operational Assistance Program (BOS) in Semarang City*. Diponegoro University of Semarang, Thesis Postgraduate Public Accountants.
[8]   LeSage J P and Pace R K 2009 *Introduction to spatial econometrics* (London: CRC Press).

Budgeting school operational assistance in Central Java using three spatial process modelling

Budgeting school operational assistance in Central Java using three spatial process modelling

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5