

Education Efficiency Analysis on Sulawesi Provinces

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Abstract

Sulawesi Island is one of the big islands and located in middle of Indonesia. Education is an important pillar of development and can be demonstrated by the Human Development Index. In 2015, Sulawesi Island has average Human Development Index about 67.31 that still below the national average of 69.55. The average Human Development Index of Sulawesi Island is also below the average of the Java Human Development Index of 72.3. All the provinces in Sulawesi had make the education become priorities and allocated more budget for education. With more budgets, the government can increase the education quality in Sulawesi. This paper has two objectives. The first objective is to estimate efficiency score of education spending in all provinces in Sulawesi. The second is to analyze the environmental factors that have an impact to increase the efficiency score of education in all provinces in Sulawesi. This study calculates score of education efficiency using Data Envelopment Analysis (DEA) method and using the Tobit for environmental factors analyzing. This study calculates and compares the efficiency score of education spending in 6 provinces in Sulawesi from 2013 to 2015. The DEA method uses the education spending of provinces as Input and uses Net Enrollment Ratio of Junior High School, Net Enrollment Ratio of Senior High School, and Human Development Index (HDI) as Output. While the Tobit uses Number of Junior High School, Number of Senior High School, Number of Junior High School Teacher, and Number of Senior High School Teacher. DEA shows that West Sulawesi with the lowest budget has the highest average of efficiency score. West Sulawesi reaches about 1 efficiency score. With the highest average of education spending, the South Sulawesi has the lowest average of efficiency score with 0.396897. The low efficiency score show that the government didn't optimal to use the education budget to create the education output. The Tobit shows that number of junior high school has negative marginal effect with -0.0012914 while number of senior high school has positive marginal effect with 0.0009504. The Tobit also shows that both numbers of teachers in junior/high school will give positive marginal effect to increase the education efficiency with 0.0000651 and 0.0000858.

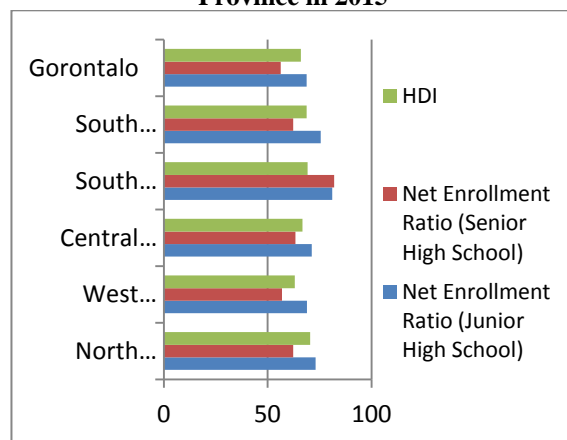
Key words: Efficiency, Education Spending, Data Envelopment Analysis, Tobit

1. INTRODUCTION

Education is an important foundation for creating the best quality of human resources. The Increasing of human resources quality will encourage the creation of creativity and innovation. This will ultimately have a good impact on the economy with increasing of GDP. The previous research found that high levels of GDP per capita were associated with high levels of primary school enrolment (Stevens & Weale, 2003). With higher education will increase the Human Development Index in the region because education is one of important pillar in Human Development Index (UNDP, 2015). There are still many education problems in Indonesia, including all the provinces in Sulawesi. The various problems faced in education sector, from whom manage education, how education is managed, and how regulations have been effectively implemented in schools and many districts (Hidayat, 2011).

In 2015, Sulawesi Island has average Human Development Index about 67.31 that still below the national average of 69.55. The average Human Development Index of Sulawesi Island is also below the average of the Java Human Development Index of 72.31 (Indonesian Bureau of Statistics, 2015). Many factors cause less HDI in Sulawesi. One of the factors is the educational problems in Sulawesi.

Figure 1. The Education Output of Sulawesi Province in 2015



Source: Indonesian Bureau of Statistics, 2015

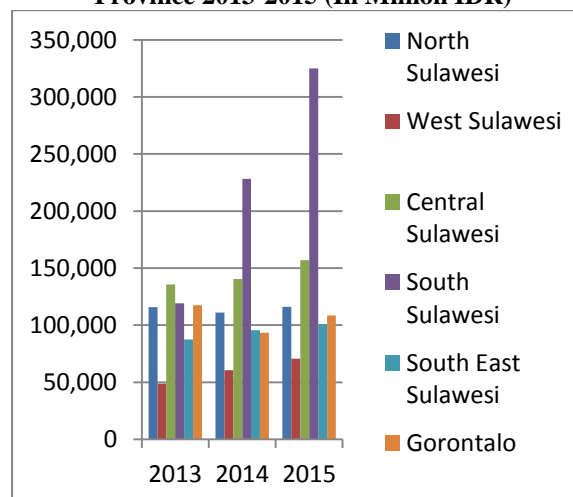
The different characteristics in each province in Sulawesi create the different education output. Figure 1 shows the output characteristic of education in Sulawesi provinces.

The figure shows North Sulawesi has the highest HDI about 70.39 followed by South Sulawesi at 69.15. The province with the lowest HDI by 2015 is Gorontalo province with 62.96. Data show that actually all provinces have increasing HDI values from 2013 to 2015. But there are provinces that have not significantly increased.

The figure also shows about the net enrollment ratio of junior high school and net enrollment ratio of senior high school. In 2015, almost all provinces have lower net enrollment ratio of junior high school than in senior high school. South Sulawesi was the only province with the different condition. If the government had optimal for the education sector, there will be no big different between the net enrollment ratio in junior high school and senior high school. The condition shows that the education output in senior high school was lower than junior high school. For the net enrollment ratio in junior high school and senior high school, South Sulawesi has the highest ratio among other Sulawesi provinces. Gorontalo has the lowest net enrollment ratio both in junior high school and senior high school.

The governments of Sulawesi provinces have realized that education is an important foundation for the economy. So the provinces government also makes education a priority program. One of the ways that the provincial government is doing is by increasing the education budget.

Figure 2. The Education Expenditure of Sulawesi Province 2013-2015 (In Million IDR)



Source: Ministry of Finance 2015

This education budget will be used to improve the output quality of education. From all provinces in Sulawesi, South Sulawesi Province has the higher budget compared to other provinces. South Sulawesi province also has a significant budget increase from year to year. While the province of West Sulawesi province which has the lowest budget compared to other provinces. West Sulawesi is the youngest province in Sulawesi and is still trying to increase the provincial budget. The government

2. DATA AND METHODS

2.1. Data Description

This research used secondary data from Indonesia Statistics Bureau 2013-2015 and Statistics Bureau of Sulawesi Provinces 2013-2015 and Directorate General of Fiscal Balance of Indonesia Finance Ministry 2013-2015. This research focuses on measuring the efficiency of education budget and analyzes the environmental factors that can increase the technical efficiency score in 6 provinces in Sulawesi Islands. This study uses the period of 2013-2015. This research uses local government budget of education, human development index, net enrollment ratio of junior high school, net enrollment ratio of senior high school to analyze the education efficiency score. This research uses number of junior high school, number of senior high school, number of junior high school teacher, and number of high school teacher that can affect the efficiency scores.

2.2. Data Envelopment Analysis

Data Envelopment Analysis (DEA) is one form of measurement analysis that creates and evaluates the relative efficiency of a set of decision making unit (DMU). The DEA can help us how to understand how the resources (inputs) can create the maximum result (output). The DEA will compare the input and output from one DMU relative to other DMU in the same year. For data processing, the selected regencies-cities are classified into DMU (Decision Making Unit). DMU would reflect both its own priorities over its outputs and the environment in which it operates" (Thanassoulis, 1996). DMU will be compared by comparing the input and output for each period.

must try to allocate the entire education budget and create the optimal output. A high education budget may not necessarily produce maximum output. The government must implement various strategies to use the budget efficiently and appropriately. The Differences in how to use the education budget, creates the different output like level of human development index and net enrollment ratio both in junior high school and senior high school.

The optimal and the most efficient DMU will used become the benchmark for the inefficient DMU. To use the DEA Analysis, the input and the output can be have many variety of form but still have the same characteristics. This study also used the multiple input and output with similar characteristics. The impact of the input to create the various level of output which seen as the success indicator of education development. This research used STATA 12 for DEA process.

2.3. Tobit Analysis

"Tobit analysis, a model devised by Tobin (1958) in which it is assumed that the dependent variable has a number of its values clustered at a limiting value" (McDonald & Moffitt, 1980). "The use of censored regression techniques is appropriate for this two-step analysis since the efficiency scores, the dependent variable, are observed in only a certain range: in our case assuming a maximum value of 1" (Ruggiero, 2004). Tobit regression can use data with zero value (discrete) and continuous data. Afonso and Fernandes evaluate the importance of environmental or non-discretionary inputs by Tobit estimations by regressing the output efficiency scores on a set of possible explanatory variables" (Afonso & Fernandes, 2008)

3. RESULT

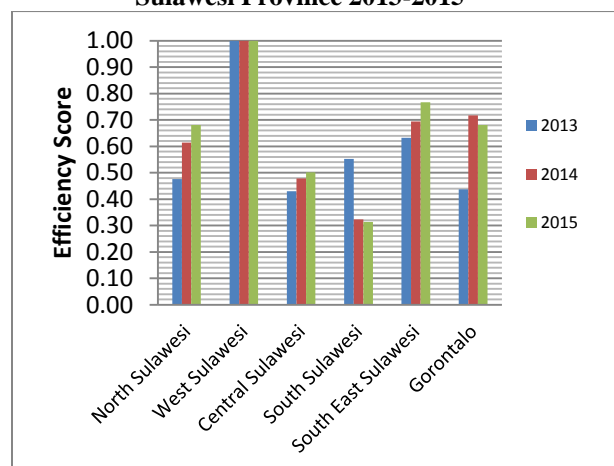
3.1. Dea Result

DEA results show that the score of the efficiency of education spending almost in all provinces in Sulawesi have positive trend from

2013 until 2015. In 2013, West Sulawesi province had the highest educational score about 1.000000, while Central Sulawesi province had the lowest efficiency score about 0.429413. In 2014, West Sulawesi province is also the province with the highest efficiency score about 1.000000 while South Sulawesi province has the lowest efficiency score about 0.323687.

By 2013, almost all provinces in Sulawesi have improved efficiency scores compared to the previous year except South Sulawesi province. This can be achieved because with the increase of education budget is not accompanied by an increase in education output. West Sulawesi province has the highest efficiency score again about 1.000000 in 2015 while South Sulawesi province has the lowest efficiency score with 0.314247. In 2015, only South Sulawesi province experienced a decrease in efficiency score while other provinces experienced an increase in efficiency scores.

Figure 3. The Education Efficiency Score of Sulawesi Province 2013-2015



Source: Indonesian Bureau of Statistics 2015 and Ministry of Finance 2015, STATA 12

The DEA result show that West Sulawesi Province has a constant value of efficiency score from 2013 until 2015. The efficiency score of West Sulawesi Province show that with lower expenditure, West Sulawesi Province was more efficient than other provinces in optimization of education spending and can create more optimal output. While the South Sulawesi Province has the highest budget for education, but the government can't use the

budget to produce optimum education output. The DEA compared the input and output of all provinces in Sulawesi per year and generated the different level of efficiency every year.

DEA shows that the average efficiency score in Sulawesi provinces is increasing. Sulawesi provinces have an average education efficiency score of 0.587867 in 2013. The average efficiency score increased to 0.637842 in 2014 and increased again to 0.657462 in 2015. This indicates that there is an increase of education budget quality in Sulawesi provinces. In 3 years, West Sulawesi province has the highest average efficiency with 1.000000 followed by Southeast Sulawesi province with 0.697788. Gorontalo Province is in third position with an average efficiency about 0.611844, followed by North Sulawesi province with 0.589899. Central Sulawesi province is ranked fifth about 0.469912 followed by South Sulawesi province as the lowest with 0.469912.

3.2. Tobit Result

Tobit result shows the impact of environmental factors with marginal effect on efficiency score of education spending in Sulawesi provinces. There are many factors that can affect the improvement of education quality. One of the weaknesses of education in Indonesia is the lack of infrastructure. Improving the educational infrastructure like school building is important so everyone can have easy access to education. Nowadays there are still many society can't go to school because there is no school in their place.

The government must build many new schools building spread in all districts. The other weakness is about the lack of the teacher in the school. This weakness makes the ratio the teacher to student in many schools become low. Based on the Regulation of the Minister of Education and Culture of the Republic of Indonesia No 19 in 2016 about Indonesia Smart that support the implementation of compulsory education of 12 years, the local government also needs to pay attention to school facilities to senior high school.

Table 1. Tobit Result of Environmental Impact to Education Efficiency

Environmental	dy/dx	t	P> t
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Factors			
Num_Sch_Jun	-0.0012914	-2.53	0.024
Num_Teach_Jun	0.0000651	2.22	0.044
Num_Sch_Sen	0.0009504	1.02	0.325
Num_Teach_Sen	0.0000858	-1.90	0.078

Source: Indonesian Bureau of Statistics 2015 and Ministry of Finance 2015, STATA 12

The table shows that number of junior high school has negative marginal impact to education efficiency about -0.0012914. This is due to enough number of junior high school in Sulawesi provinces. But the provinces in Sulawesi still need the additional teacher in junior high school; the number of junior high school has positive marginal effect about 0.0000651. The provinces in Sulawesi also still need to build new senior high school. One additional of senior high school will have positive marginal effect to education efficiency about 0.0009504. Same as with needs of teacher in junior high school, the senior high school also still need teacher. One additional of senior high school will have positive marginal effect about 0.0000858.

4. CONCLUSION

DEA result shows that most of the provinces in Sulawesi not optimal to use the education budget to create the optimal education output. These proved by low human development index, low net enrollment ratio of junior high school and low net enrollment ratio of senior high school. With the higher budget, the local governments can't have significant increasing on HDI and net enrollment ratio. The Tobit also shows that the government must make the additional of teacher both in junior high school and senior high school become priorities. Tobit also shows that additional of new senior high school building are more important than new junior high school building.

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