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Technical Inefficiency and Human Capital Improvement in Indonesian Secondary Schools Across Regions

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Abstract

Starting from January 1, 2001, the provincial governments in Indonesia suddenly faced a huge problem in managing their public finance. The management of certain sectors and their budgeting were, including education, decentralized. Government regulation No. 25 in 2001 gave the local governments more freedom to establish a suitable education system for their respective regions. This paper will attempt to analyse the performance of secondary schools across regions. The production function theory will be used due to the government's intention to make the secondary school (years 7-12) the compulsory minimum level of education for the Indonesian people. The results show that the government budget cannot significantly affect the efficiency in the secondary school industry because the inputs that are financed are not significant for inducing efficiency. Instead, external factors like population and also the existence of financial loans is likely to be significant. The policy on loans has to be reconsidered to see the cost benefit or the comparison between returns on human capital improvement through secondary schools and the interest rate of the loan

Keywords: *Educational financing – Secondary school – Regional analysis - Indonesia*

1. INTRODUCTION

In 1999, the provincial governments in Indonesia suddenly faced a huge problem in managing their public finance. It started since the Indonesian decentralisation process moved rapidly after the government introduced two new laws related to autonomy and fiscal decentralisation. Through these two laws (Law No 22 and 25 year 1999), the central government tried to distribute the management authority of the regional budget to the provincial and municipal governments.

In the past, the amount of central government transfer to regional government accounted for roughly 70% of the regional government budget. However, approximately 60% of these transfers were specific transfers, meaning that the central government decided on the use of this budget. Only 9% of the transfer from the central government was general allocation grants, in which the regional government had freedom in deciding on the use of this budget. Starting from January 1, 2001 they had to manage and decide the public policy of the whole budget.

Education was also decentralised. Government regulation No. 25 in 2001 gave local governments more freedom to establish a suitable education system for each region. Therefore the education industry in each region has to be analysed to see the performance of the whole industry and the effect of the involvement of the people and the government in the education industry. However, it is important to note that empirical studies which have tried to measure the intensity of the impact of human capital improvement to income, came up with various results. Benhabib and Spiegel (1994) and Islam (1995) discovered an insignificant relationship between human capital and income per capita growth. This is a very important note since the cost for education improvement should not exceed the benefit.

This paper will attempt to analyse the secondary school education industry. The production function theory will be used due to the government intention to make the secondary school (years 7-12) the minimum level of education of Indonesian people. Until 1999 only approximately 20% of the total population could graduate from secondary school. The analysis utilises the stochastic production frontier technique, and decomposes the effect of population, government and financial institutions on the real stochastic movement. By this technique we can also measure the performance for each province and region from the efficiency estimation for each of them.

This essay will give an overview of the stochastic production function theory, including the definition and the techniques used. This will be followed by an explanation of the variable and the data set used. The result of the model and the discussion will be provided to lead us to the final interpretations and conclusion.

2. TECHNICAL FRAMEWORK

The production function is a conceptual function that represents the connection between a product (output) and several inputs. The formal form of the function is

$$q=f(X_i)\quad i=1,2,\ldots,n \qquad (1)$$

where q is the output and X is the various inputs used in the industry. It is important to note that the specific good q shows the maximum output that can be produced by a combination of inputs Xi (Nicholson 1996). That is why the model can also be called a production frontier since it characterizes the optimizing behavior of an efficient producer and put limits on the possible values of output.

Instead of the usual production function with the assumption that the producer shares the same frontier every time (deterministic frontier), Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977) came up with the concept of the stochastic production frontier. This concept gives the possibility of a different performance for the different time and condition the different producer has. It is done by decomposing the error term of the econometric estimation to the effect of inefficiency and the real error. So the model now can be changed to be:

$$q=f(X_i)\exp(v-u)\quad i=1,2,\ldots,n. \qquad (2)$$

where f(x)exp(v) is the stochastic production function. exp(-u) is one sided (truncated) error distribution, and the restriction $0 \leq u$ represent the technical inefficiency relative to the stochastic production function. The inefficiency effects then are assumed to be panelist specific since we use panel data in this paper. The condition that $0 \leq u$ will ensure that all the observations lie on or below the frontier.

The production function specification in this case is assuming that the number of students captured in one regional education system is a product from two factor inputs, which are the teacher and the school. The non-negative random variables are assumed to account for technical inefficiency in this education production function. Following Battese and Coelli (1995) we define the regional specific inefficiency distribution as

$$u_{it}=\delta_0+z_{it}\delta \qquad (3)$$

where z_{it} is a vector of regional specific effect that induces technical efficiency. The regional specific effect for education can be the result of the population, income per capita, financial institution, government involvement, belief or other regional specific effect. A trend can be introduced to capture the changes over time; some dummy variable can also be used to see the effect of specific groups of regions.

We follow Battese and Corra (1977) to replace σ_V^2 and σ_U^2 with $\sigma^2=\sigma_V^2+\sigma_U^2$ and $\gamma=\sigma_U^2/(\sigma_V^2+\sigma_U^2)$. The parameter, γ, must lie between 0 and 1 and this range can be searched to provide a good starting value for use in an iterative maximization process such as the Davidon-Fletcher-Powell (DFP) algorithm. It is very important to test whether any form of stochastic frontier production function is required at all by testing the significance of the γ parameter. If the null hypothesis, that γ equals zero, is accepted, this would indicate that σ_U^2 is zero, and so the u_{it} term should be removed from the model. Then we only need to see the parameters that can be consistently estimated using ordinary least squares (Coelli 1996). The technical efficiency measurement relative to the production frontier is defined as $TE_{it} = E(q_{it}^* \mid u_{it}, x_{it}) / E(q_{it}^* \mid u_{it}=0, x_{it})=\exp(-u_{it})$, where q_{it}^* is the production of the i-th region in the t-th year, which will be equal to q_{it} when the dependent variable is in original units and will be equal to $\exp(q_{it})$ when the dependent variable is in logs. TE_{it} will be equal to one when $\gamma=\sigma_U^2/(\sigma_V^2+\sigma_U^2)=0$ since we will remove u_{it} and there is no deviation due to technical inefficiency

3. DATA AND VARIABLES

This paper uses the panel data consisting of 26 provinces in Indonesia during the period 1993-1998. The total observation used is 156 without any missing data. The database established from various sources, including the Ministry of Education records, the Indonesian statistical bureau (BPS), government budget records and also Indonesian financial statistic records (SEKI) from the central bank.

The BPS provides us with the raw data on the population and investment. The SEKI have the data on the amount of loans, savings and the number of commercial banks in one region. The data consist of stock and flow data. The flow data count from the beginning of the year (January) till the end of it (December). The stock data are usually taken at the beginning of the year.

From the Department of Education we can have the raw data on the education industry, such as the number of students, teachers and schools in one province. From the government budget we can have the data on education expenditure. Both of these sources use the period from July to June. To pool all the data together, we have to adjust the period and this can be done by assuming the second semester data behavior would apply to the whole year. So the data used for the year starts with the second semester. **Table 1** shows a brief description of these variables and their sources.

Table 1
The Data Used and Its Source

MAIN DATA	DATA SOURCES	NOTE
Student	National Department of	Curriculum year
Teacher	Education Recor s	Curriculum year
School	National Department of	Curriculum year
Population	Education Records	
Loan per capita (million)	National Department of	Loan from commercial bank
Education expenditure share	Education Records	Budget year
	Indonesian Statistics +	
	SUSENAS (BPS)	
	Central Bank Record (SEKI)	
	National Department of	
	Finance Records	

From these data, the final model used will utilize the education industry data from the Ministry of Education, the population from the BPS (Central Agency for Statistics), loans per capita, education expenditure share, time and also dummy variables. Loans per capita are constructed from the data on loans from the SEKI divided by population from the BPS. This is used to show the proxy of the financial institution level in the region. The education expenditure share is the share of education expenditure for the whole provincial budget. We use this variable to show the concern of the government in regional education. The dummy can be used for special regions and time.

In 1993 there were more than 3.7 million students, which increased to 4.2 million in 1997. However, it dropped to 2.7 million in 1998. The same trend was found in the number of teachers. The number was increasing from 297 thousand to 322 thousand during 1993-1997 and then dramatically dropped to 209 thousand in 1998. Meanwhile the number of schools kept increasing from 10367 in 1993 to 11544 in 1998.

These numbers were not equally distributed around Indonesia, as nearly 50% was accounted by students studying in Java and Bali. It was not surprising since more than 60% of the population lives on these two islands. The percentage of students to the whole population is relatively high.

The population and loans per capita also recorded steadily increasing trends. The population increased from 188 million people in 1993 to 204 million people in 1998 while loans per capita increased from Rp 572 thousand per capita in 1993 to Rp 1.3 million in 1998. Interestingly the share of education expenditure was highest in 1996 at 2.7% and then dropped to 1.7% until 1998. More interesting is the fact that the higher percentage was in Jambi (in Sumatera) at 6% and the lowest was in Central Java and North Sulawesi at 0.8%. A summary of the key variables is shown in **Table 2.**

Table 2
The Summary of the Key Variables

YEARS	STUDENT (thousand)	TEACHER (thousand)	SCHOOL (thousand)	POPULATION (million)	GDP/ CAPITA	LOAN/ CAPITA	SHARE OF EDUCATION
1993	3751	298	10.367	188	1.94276	0.57169	0.02176
1994	3766	295	10.650	191	2.03223	0.69524	0.02298
1995	3912	303	10.961	194	2.13630	0.83413	0.02597
1996	4089	313	11.196	197	2.25003	1.01124	0.02795
1997	4296	322	11.413	201	2.30051	1.11469	0.02265
1998	2730	209	11.544	204	2.09938	1.29801	0.01776
REGION							
Sumatera	875	72.1	2.87	41.3	1.99522	0.46412	0.02587
Java-Bali	2230	165	5.95	118	1.93367	1.53011	0.01997
Kalimantan	178	14.5	0.647	10.6	3.21987	0.45477	0.02775
Sulawesi	280	23.1	0.959	13.9	1.13557	0.30778	0.01716
East Indonesia	193	15.1	0.599	11.4	1.30209	0.21159	0.02404

The basic Cobb-Douglas Production function used is based on pooled **equation (2)** in log linear form

$$\text{Ln } Y_{it} = \beta_0 + \beta_1 \ln \text{teacher}_{it} + \beta_2 \ln \text{school}_{it} + v_{it} - u_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

where Y_{it}, teacher_{it}, and school_{it} are the number of students, teachers and schools for specific regions and years. The pre-test is done for the basic Cobb-Douglas log linear equation. The result was adjusted R^2=98.7% with every variable being significant at the 95% confidence level with the value of β_0 is 2.5, β_1 is 0.9 and β_2 is 0.1. The full result of the pre-test is given in **Table 3.**

Table 3
The Pre Test Result

Regression Statistics	
R Square	0.987454
Adjusted R Square	0.98729
Standard Error	0.106413
Observations	156

ANOVA

	Df	SS	MS	F	Significance F
Regression	2	136.3571	68.17856	6020.899	3.4E-146
Residual	153	1.732519	0.011324		
Total	155	138.0896			

	Coefficients	Standard Error	T Stat	P-value
Intercept	2.548314	0.140172	18.1799	4.59E-40
Lnteacher	0.931807	0.041071	22.68775	8.15E-51
Lnschool	0.102291	0.042965	2.380777	0.018507

The technical inefficiency model use number of teachers, schools, population, value for per capita loan, and share of education expenditure as well as one dummy variable to represent Java and Bali. The regional specific inefficiency distribution is represented by

$$u_{it} = \delta_0 + \delta_1 teacher_{it} + \delta_2 school_{it} + \delta_3 population + \delta_4 loan/cap_{it} + \delta_5 edushare_{it} + \delta_6 dJB + \delta_7 T + w_{it} \quad \text{.......} \quad (5)$$

Teachers and schools have been included in the inefficiency model to see the effect of allocation policy. By seeing the sign of the result, we may try to determine whether replacing one by another is a reasonable choice. The dummy variable for regions in Java and Bali is established since they are considered to be relatively more developed than other regions, and they comprise more then half of the population and the education industry.

The two input allocations may not be significant for this model. Alternatively, the technical inefficiency model without input allocation could also be examined as the basic inefficiency effect

$$u_{it} = \delta_0 + \delta_1 population + \delta_2 loan/cap_{it} + \delta_3 edushare_{it} + \delta_4 dJB + w_{it} \quad \ldots\ldots \quad (6)$$

The program used to estimate the model is FRONTIER 4.1 (Coelli 1996) which follows a three-step procedure in estimating the maximum likelihood estimates of the parameters of a stochastic frontier production function. Based on that, we can use a large sample approximate test for the restriction on parameters. It compares the maximized likelihood functions under the alternative hypothesis ($L(H_1)$) and null hypothesis ($L(H_0)$). The likelihood ratio test then is based on

$$LR = -2\{\ln[L(H_0)/L(H_1)]\} = -2\{\ln[L(H_0)]-\ln[L(H_1)]\} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

For the critical value, the degree of freedom is set equal to the sum of the number of equality restrictions in the hypothesis. The critical value is taken from Kodde and Palm (1986) for the 5% level of significance.

4. RESULTS

The first model, which gives the null hypothesis of no time trend in inefficiency, is rejected. The same case resulted for the absence of technical inefficiency model ($\gamma=\delta_0=\delta_1=\delta_2=\delta_3=\delta_4=\delta_5=\delta_6=\delta_7=0$), the influence of the regional specific effect ($\delta_1=\delta_2=\delta_3=\delta_4=\delta_5=\delta_6=\delta_7=0$) and the possibility of the inefficiency model being stochastic ($\gamma=\sigma_U^2/(\sigma_V^2+\sigma_U^2)=0$).

Table 4

The Generalized Likelihood Ratio Test for Parameter Restriction (equation 4 and 5)

NULL HYPOTHESIS	χ2-STATISTIC	95% VALUE	DECISION
γ=δ0=δ1=δ2=δ3=δ4=δ5=δ6=δ7=0	63.34	16.27	Reject H0
γ=σU2/(σV2+σU2)=0	16.10	2.70	Reject H0
δ0=δ1=δ2=δ3=δ4=δ5=δ6=δ7=0	-73.33	14.85	Accept H0
δ1=δ2=δ3=δ4=δ5=δ6=δ7=0	63.33	13.40	Reject H0
No time trend	19.16	2.70	Reject H0

After the adjustment from the technical inefficiency model, the production frontier function parameters are changed. The number of schools is no longer significant in determining how many students can be accommodated. In this model the sum of input share coefficients is 0.995.

The result of the technical inefficiency model shows that the two inputs, teachers and schools are not significant. The results of other variable coefficients are also not satisfied. None of the variables proposed have enough confidence level except the dummy for Java and Bali. However, the value of $\gamma=\sigma_U^2/(\sigma_V^2+\sigma_U^2)=0.999$ and is significant.

The reduced version of the technical inefficiency model gives a better measure in terms of the confidence level. Like the first model, the absence of the technical inefficiency model ($\gamma=\delta_0=\delta_1=\delta_2=\delta_3=\delta_4=0$[a4]), the influence of the regional specific effect ($\delta_1=\delta_2=\delta_3=\delta_4=0$) and that the inefficiency model is stochastic ($\gamma=\sigma_U^2/(\sigma_V^2+\sigma_U^2)=0$) can all be rejected.

Table 5

The Generalized Likelihood Ratio Test for Parameter Restriction (equation 4 and 6)

NULL HYPOTHESIS	χ2-STATISTIC	95% VALUE	DECISION
γ=δ0=δ1=δ2=δ3=δ4=0	53.46	11.91	Reject H0
γ=σU2/(σV2+σU2)=0	6.93	2.70	Reject H0
δ0=δ1=δ2=δ3=δ4=0	-83.20	10.37	Accept H0
δ1=δ2=δ3=δ4=0	53.45	8.76	Reject H0

The production function in the reduced version still has an insignificant coefficient for the school input. The sum of the input share coefficient is 0.964 in this case. The technical inefficiency model has only one variable that is not significant which is the education expenditure share. The other variables are highly significant. Both population and loan per capita have negative signs and surprisingly the dummy variable for Java and Bali has a positive sign. The value of $\gamma=\sigma_U^2/(\sigma_V^2+\sigma_U^2)$ is 0.847 and is highly significant. A summary of this result is given in Table 6.

Table 6
Parameter of the Production Frontier and Technical Inefficiency Model

	COEFFICIENT	T-RATIO	COEFFICIENT	T-RATIO
β0	2.43988E+00	1.98387E+00*	0.29608E+01	0.18044E+02***
Ln teacher	1.10063E+00	2.36561E+00**	0.99712E+00	0.25471E+02***
Ln school	-1.05227E-01	-2.04920E-01	-0.33755E-01	-0.85926E+00
δ0	0.25686E+00	0.42951E+01***	0.30666E+00	0.79460E+01***
teacher	9.82661E-06	2.48147E-01		
school	-4.43885E-05	-4.99060E-02		
population	-1.72693E-08	-1.24527E+00	-0.10104E-07	-0.50632E+01***
loan/capita	-3.39623E-02	-1.42517E+00	-0.48633E-01	-0.51025E+01***
education share	2.79444E-01	4.09646E-01	0.22153E+00	0.36264E+00
Java Bali	1.08949E-01	2.46875E+00**	0.93124E-01	0.26660E+01***
Time	-2.33515E-03	-3.79250E-01		
sigma-squared	9.31285E-03	1.78952E+00	0.10051E-01	0.53695E+01***
gamma	9.99938E-01	7.22247E+03***	0.84679E+00	0.10251E+02***
	0.80695E+00		0.80028E+00	

5. INTERPRETATION

The production function results confirm the important role of teachers in this industry. The share coefficient of more than 90% implies that the proportion of expenditure in the regional education production function should be allocated to teachers. If the expenditure allocation is less than that proportion it shows that teachers during that period were underpaid.

From the first technical inefficiency model, the insignificance of the two input allocations can be the basis for saying that the proportion of the number of school and teacher is not the main problem in achieving an efficient education industry at the provincial level in Indonesia. More interpretation can be drawn from the reduced technical inefficiency model, since it came out with most of the variables significant.

The negative sign shown for the population coefficient shows that a larger population will lead us to a more efficient industry in secondary education. It makes sense since the students come from the population. When the schools and teachers can be used by more people, they become more efficient. Furthermore, a larger population can mean that there are more people with enough wealth to go to school if equal distribution is assumed among regions and along time.

Per capita loans available also show a negative coefficient. This tells us that the existence of loans in society will help to achieve an efficient education industry. That can happen in two ways; firstly, loans can be used to directly finance schools. Secondly, with more loans available, the parents will not push their children to rush to the labor market in order to help finance the family life.

The coefficient for education expenditure share is not significant. Moreover it is positively signed. Knowing how this expenditure is allocated may give us the answer. The education budget is usually allocated for school maintenance and building new schools. Since the number of schools is not the problem in achieving efficient education industry, it is not surprising to find this result. In addition, the model can be interpreted further to see that the main problem in secondary education is not the number of schools but the ability of society to go to school or send their children to school. To analyze that factor we can build the model further by including the income distribution or the security dummy variable in the region.

The surprise comes from the result of the dummy variable for Java and Bali. It is positively signed even though the mean of technical efficiency is very high. The only reason for these phenomena is the fact that the efficiency in Jogjakarta and Bali is very low while any other variable that induces efficiency is very high.

The technical efficiencies themselves vary from 0.61 to 0.99 with an average of 0.80. As can be expected the highest efficiency is achieved in Jakarta; nevertheless the lowest come from Southeast Sulawesi (Celebes). However, it is also important to notice that Yogyakarta and Bali, two provinces in the Java-Bali region with high tourism activities, are among the lowest. With the addition of Aceh, the least four technically efficient provinces are Southeast Sulawesi, Bali, Aceh and Yogyakarta.

Although it appeared that there was a slight increase in the technical efficiency trend during 1993-1998, a closer look shows a fluctuating path. After increasing a bit in 1994, the trend dropped back to 0.789 in 1995. The trend enjoyed a gradual increase again until 1997 at 0.817 and dropped again to 0.810 in 1998.

Approximately 38% of all technical efficiency lies between 0.70-0.80. Nearly the same proportion, 37%, is in the 0.80-0.90 range. Above 0.90 there is a 13% proportion and 12% below 0.70. Most of the provinces in Java and Bali provinces (about 50%) can achieve above 0.90 technical efficiency. Sumatera, considered as the second developed big island, achieved that proportion for 0.70-0.80 technical efficiency. Kalimantan and East Indonesia have that proportion for under 0.70 technical efficiency.

Table 7
The Distribution of Technical Efficiency across Regions (%)

	1993	1994	1995	1996	1997	1998	average
Aceh	0.666	0.643	0.652	0.664	0.717	0.792	0.689
North Sumatera	0.831	0.822	0.810	0.801	0.809	0.829	0.817
West Sumatera	0.839	0.784	0.745	0.752	0.771	0.777	0.778
Riau	0.888	0.845	0.839	0.822	0.858	0.892	0.857
Jambi	0.816	0.713	0.714	0.751	0.803	0.846	0.774
South Sumatera	0.849	0.833	0.849	0.845	0.881	0.920	0.863
Bengkulu	0.695	0.709	0.727	0.753	0.814	0.839	0.756
Lampung	0.718	0.804	0.760	0.763	0.779	0.717	0.757
Jakarta	0.978	0.970	0.987	0.990	0.984	0.984	0.982
West Java	0.890	0.970	0.978	0.979	0.982	0.976	0.962
Central Java	0.905	0.932	0.952	0.957	0.971	0.968	0.947
Jogjakarta	0.658	0.666	0.675	0.690	0.702	0.690	0.680
East Java	0.845	0.838	0.859	0.896	0.921	0.885	0.874
Bali	0.710	0.714	0.698	0.704	0.715	0.732	0.712
West Nusa Tenggara	0.724	0.752	0.739	0.729	0.782	0.783	0.752
East Nusa Tenggara	0.740	0.741	0.763	0.773	0.807	0.741	0.761
West Kalimantan	0.783	0.814	0.829	0.793	0.826	0.780	0.804
Central Kalimantan	0.737	0.752	0.714	0.690	0.698	0.697	0.715
South Kalimantan	0.736	0.742	0.741	0.727	0.745	0.781	0.745
East Kalimantan	0.845	0.827	0.779	0.816	0.820	0.728	0.803
North Sulawesi	0.761	0.779	0.796	0.814	0.842	0.842	0.809
Central Sulawesi	0.701	0.675	0.651	0.629	0.653	0.615	0.654
South Sulawesi	0.810	0.788	0.768	0.792	0.800	0.778	0.789
South East Sulawesi	0.717	0.828	0.828	0.837	0.886	0.900	0.833
Maluku	0.880	0.870	0.853	0.866	0.862	0.827	0.860
Papua	0.885	0.913	0.812	0.821	0.824	0.754	0.835
Average	0.793	0.797	0.789	0.794	0.817	0.810	0.800

6. A NOTE ON LOANS

It seems that providing a loan is a way to increase the secondary school efficiency and hence growth of income. The question is whether this income improvement is high enough to pay for the cost of the loan. The question whether human capital improvement has a significant impact on income is yet to be concluded. Instead, the significant positive result from the work by Mankiw et al.'s (1992), show that there are insignificant relation from the well known Benhabib and Spiegel's (1994) and also Islam (1995) results. Even if it is significant how high it will be represented in the increase of the wages is still questionable (Krueger and Lindahl, 2000). As a result, the policy on loans for secondary school education is a very risky policy. This will be the case if the wages or overall income after the school term do not increase as much the interest rate of the loan. Although loans help raise school efficiency, it may lead the debtor to a credit trap. A special case study on the returns of secondary school education in Indonesia needs to be done. Temple (2001) argues that the more coherent the studies, the closer the results to the result of labor economists.

7. CONCLUSION

By the 1st of January 2001, the management of the provincial budget was transferred fully to provincial governments, with 56-61% of it transferred with specific allocation purposes from the central government. Education was among the decentralised authorities. Using a technical efficiency model of the production function, this paper attempted to analyse the performance of the whole industry and the effect of involvement of the people and the government on the education industry.

The results show that the government budget cannot significantly affect the efficiency in the secondary school industry because the inputs that are financed are not significant for promoting efficiency. Instead, external factors like population and also the availability of financial loans are likely to be significant. Yet, the policy on loans have to be reconsidered once more to see the cost benefit or the comparison between returns on human capital improvement through secondary school education and the interest rate of the loan. It is also probably the sign that the government should evaluate their budget allocation in inducing a more efficient education industry.

From the distribution of the technical efficiency index, it can be seen that more development in the region can also induce efficiency. However, looking at the case of Yogyakarta, Bali and Aceh, further research can be done by including other factors, such as culture, economic sector, or even the degree of security.

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