

MEASUREMENT EFFICIENCY OF LOCAL GOVERNMENT SPENDING ON POVERTY ALLEVIATION IN SUMATRA: OUTPUT ORIENTED APPROACH WITH DATA ENVELOPMENT ANALYSIS

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ABSTRACT

Purpose: This research aims to measure the efficiency of local government spending in poverty alleviation during the COVID-19 pandemic in Sumatra, Indonesia.

Methods: Data Envelopment Analysis was applied as a measurement efficiency method with output-oriented based on variable returns to scale approach.

Analysis data: The type of data used in this study is secondary data and implements descriptive analysis. The object of our observation in this study involves total local governments in Sumatra (154 regencies/cities). It used government education spending per capita, health spending per capita, economic spending per capita, and social security spending per capita as input. The Output that we used is the poverty rate.

Result and discussions: The results show that poverty alleviation through government spending efficiency policy only can achieve by eight local governments, i.e., Deli Serdang, Simalungun, Medan, Sawah Lunto, Pekanbaru, Lampung Tengah, Bangka Barat, and Batam. Pekanbaru is the relatively most efficient regency, while Meranti has the lowest efficiency.

Conclusion: 146 inefficient local governments should benchmark to their peer to improve their efficiency score. In addition, differences in the level of efficiency between local governments within one province also need to be inspected.

Keywords: government spending efficiency, poverty rate, DEA

INTRODUCTION

The government runs its government to increase the society wellness in their area. Through policy and government programs, reflecting from spending, the government has a strategy role in economic development, including the rise of people who are not poor. The plummet in poverty rate is an indicator of the growth of society prosperity.

During the Covid-19 pandemic, most countries went into lockdown as a broken chain of virus transmission, so the fallen victims could be stopped. The Indonesian government does a similar thing called large-scale social restrictions (LSSR). In LSSR, half of the social economy activity that shows the crowded effects should be discontinued, such as work from offices, factories, and shopping centers. People did their job by working from a home method. Likewise, it lasted quite a while, affecting society's economic matters. Almost all areas in Indonesia went through negative economic growth. Another impact of this condition is the leap of poverty. The government allocated every spending to anticipate the destructive effects of a pandemic, such as health, social security, education, and economic spending. Every local government focuses on spending allocation to push the poverty growth from the

Covid-19 pandemic. These four types of spending reach the biggest portion of the total spending in every local government.

Even though the portion of these four types of spending is large, the success of the local government in suppressing poverty in regencies/cities during the covid-19 pandemic situation is adequately varied. The poverty rate in some areas shows a slight decrease, but others still have a high poverty rate. The average regencies/city poverty rate in Sumatra was 10.62%, which is sufficiently high. The comparison with other areas, in Indonesia, in Sumatra, in 2020 presents some regencies with the lowest poverty rate of about 2.16%, it was in Sawah Lunto regency (North Sumatra Province), 2.7% in North Bangka regency, Bangka Belitung province. Nevertheless, it also had a dramatically high rate of poverty in some regencies, 25.69% in North Nias regency (North Sumatra Province), 23.38% in Meranti island (Riau Province), where a contracting, Pekanbaru city in Riau province had the lowest rate of poverty (2.62%). These conditions indicate the local government is not efficient in spending; thus, it needs measurement of government efficiency spending to reduce the poverty in Sumatra's regencies and cities. Based on this introduction, this research aims to measure the efficiency of government spending in regencies/cities to deteriorate poverty during the Covid-19 pandemic in Sumatra.

THEORETICAL BASIS

Efficiency is a critical issue in government performance. The efficiency concept is related to the optimal resource utilization for extravagance avoided (Cyrek, 2019). Government efficiency spending is essential in finance management, affecting public service quality (Albassam, 2020). Efficiency measurement uses an output/input ratio.

a. Input in efficiency measurement

The literature review tells there is a combination of some spending types allocated with a particular purpose, like relieving poverty. For this purpose, the government allocates most of the spending to social security spending (Fonayet et al., 2020). Other spending combinations are education and health, and social security (Taruno, 2019). It also had applied the economy spending, education, health, and social security (Purmini & Rambe, 2021). Another review found the combination of health and education spending (Adeosun & Tabash, 2021; Wandeda et al., 2021). In conclusion, some spending is usually used in combination with education spending, health, economy, and social security.

Furthermore, the four types of spending used to measure government efficiency are education spending, health, economy, and social security. Next, the spending that will be used in efficiency measurement is spending/capita for four types of spending. The utilization of spending per capita is chosen as one aspect of total spending is the total population. With a small population, the government has small spending, and vice versa; with a big population, the government has large spending. So, the spending measure used in this research is spending/capita for four types of spending.

b. Output in efficiency measurement

Literature review that used some output to measure the efficiency of government spending was education (Dufrechou, 2016; Gavurova et al., 2017; Ouertani et al., 2018; Rambe, 2020), health (Guo et al., 2021; Olanubi & Osode, 2017; Samut & Cafri, 2016). Education and health are used as output because these two indicators are public services that

very essential for society. Another review is used output that is related to economic development. Halaskova et al. (2018) measure the government efficiency in compressing the GDP/capita growth and job field, while Tirtosuharto (2022) is used output GRDP growth to measure government efficiency.

On another side, a study used the poverty rate as output (Ambarkhane et al., 2020; Fonayet et al., 2020; Yang et al., 2021). This research measures how government will allocate the spending to drop poverty efficiently.

METHOD

The data used in this research is secondary data from 2020 in Sumatra. The source is the Central Bureau of Statistics and Finance Ministry in Indonesia. Input that is used from the four types of spending is government spending, education spending per capita, health spending per capita, economy spending per capita, and social security spending per capita. An output that is used is the success of poverty relief. The people who measure the success of declining poverty are not poor percentage, which is measured by the following formula: $100\% - \text{Poverty Rate}$.

The analysis method applied is Data Envelopment Analysis (DEA) with approach in Variable Return to Scale (VRS) with an oriented output model (Coelli et al., 2005).

Efficiency Model:

Objective function:

$$\text{Max } E = \mu_1 Y + \mu_0 \dots\dots\dots (1)$$

Subject to:

$$v_1 X_1 + v_2 X_2 + v_3 X_3 + v_4 X_4 = 1 \dots\dots\dots (2)$$

$$\mu_1 Y + \mu_0 - (v_1 X_1 + v_2 X_2 + v_3 X_3 + v_4 X_4) \leq 0 \dots\dots\dots (3)$$

$$\mu_1, v_{1,2,3,4} \geq 0 \dots\dots\dots (4)$$

Information:

Y = people are not poor percentage

X₁ = education spending/capita

X₂ = Health spending/capita

X₃ = Economy spending/capita

X₄ = Social security spending/capita

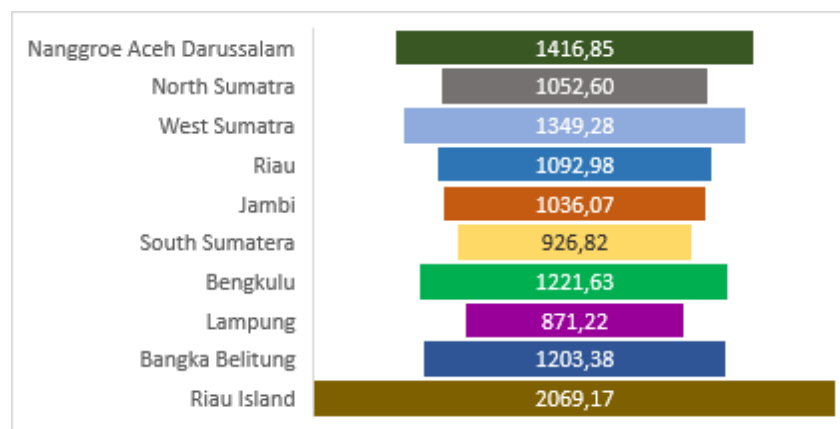
That efficiency model resulted in the efficiency score. The range efficiency score is from 0-1. For the score of E=1 shows the local government is efficient. Score <1 shows the local government is not efficient

RESULTS AND DISCUSSION

Poverty is a multidimensional problem of economic development. Therefore, efforts to eradicate poverty cannot only focus on one side, but there must be synergy from all supporting aspects. Over time, thinking about poverty has changed, but it is related to the inability to meet basic needs.

The World Bank argues that poverty alleviation strategies have developed every decade, from creating job opportunities, increasing income, developing health and education, and protecting and empowering the poor. The implementation of the strategy in poverty alleviation will have a great chance of success if the government supports it. The government has great authority and resources to create poverty alleviation programs or strategies. The government can conduct a strategy that is categorized into two major parts, (1) protecting families and community groups who experience temporary poverty, (2) helping people who

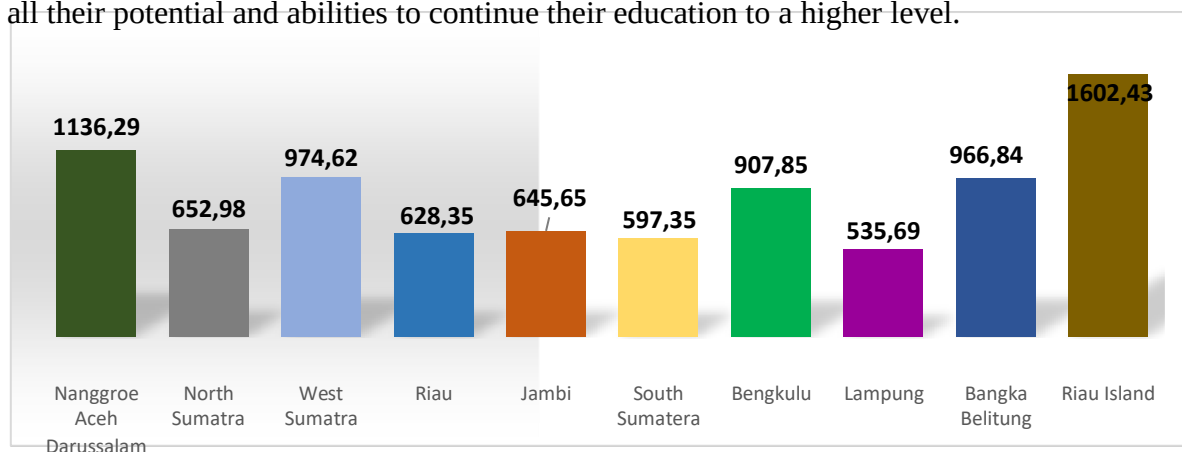
experience chronic poverty by empowering and preventing new poverty from occurring. This government strategy can be implemented through budgetary policies in the form of government spending on education, health, economics, and social security.



Graph. 1.1. Average government spending on education per capita (In thousand rupiah), 2020

The average provincial government spending in Sumatra in 2020 for the Education sector is allocated more in the Riau Archipelago Province (16.90%) compared to 9 other Provinces. Anambas Regency is the enormous education spending in the Riau Archipelago (Rp 4,522,705 per capita). Furthermore, the subsequent biggest average spending on education is the province of Nanggroe Aceh Darussalam (11.57%), with the largest per capita education spending in Sabang Regency (Rp 3,387,300).

Education is one of the factors that can encourage people to get out of the poverty line. Through education, self-quality and skill will increase. Sachs (2005) in his view argues that one of the mechanisms for reducing poverty is the development of human capital, one of which is education. Primary education plays a big and decisive role in preparing children to develop all their potential and abilities to continue their education to a higher level.



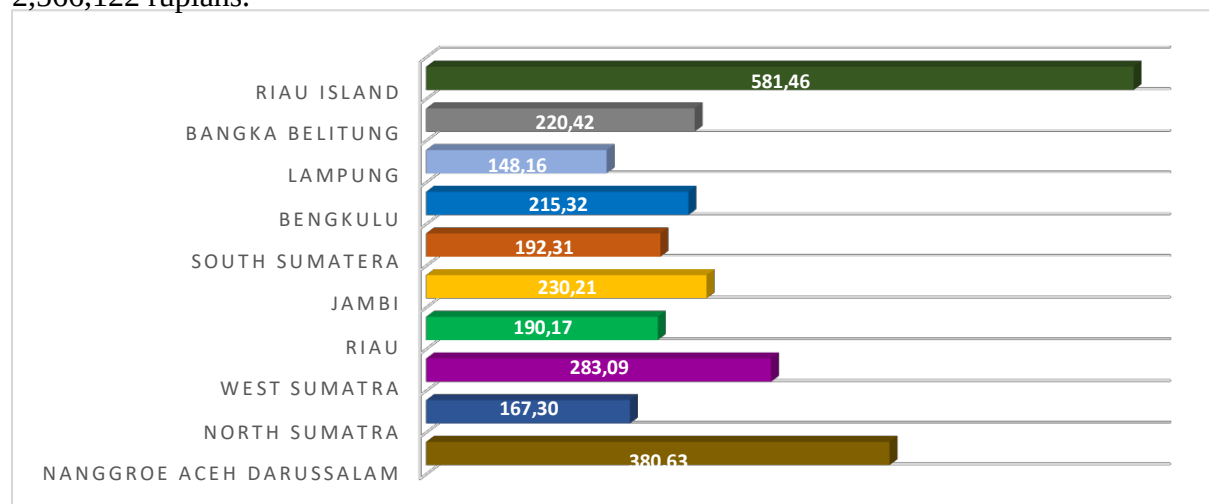
Graph. 1.2. Average government spending on health per capita (In thousand rupiah), 2020

Meanwhile, health is inseparable from alleviating poverty. Health is an investment supporting economic development and contributes to poverty eradication. Poverty is a multidimensional problem that is not sufficiently understood from the economic dimension alone but also as an inability to access fundamental rights such as education, health, and the

right to express opinions. The correlation between poverty and health is not a simple relationship but a reciprocal one that cannot be separated from the two. Poor health can cause poverty; otherwise, poverty has great potential to cause low quality of health.

The proportion of health spending per capita in 10 provinces in Sumatra in 2020 has increased from the previous year, due to efforts to restore public health due to the Covid-19 pandemic that has hit the world. Although when compared with spending per capita, education is still lower. The governments with the largest health spending in 2020 in Sumatra are the Riau Islands, Nanggroe Aceh Darussalam, and West Sumatra. Riau Archipelago has the largest health spending among other provinces in Sumatra (18.52%). This province's biggest health spending contribution is from Anambas Islands Regency (Rp 4,522,704 per capita).

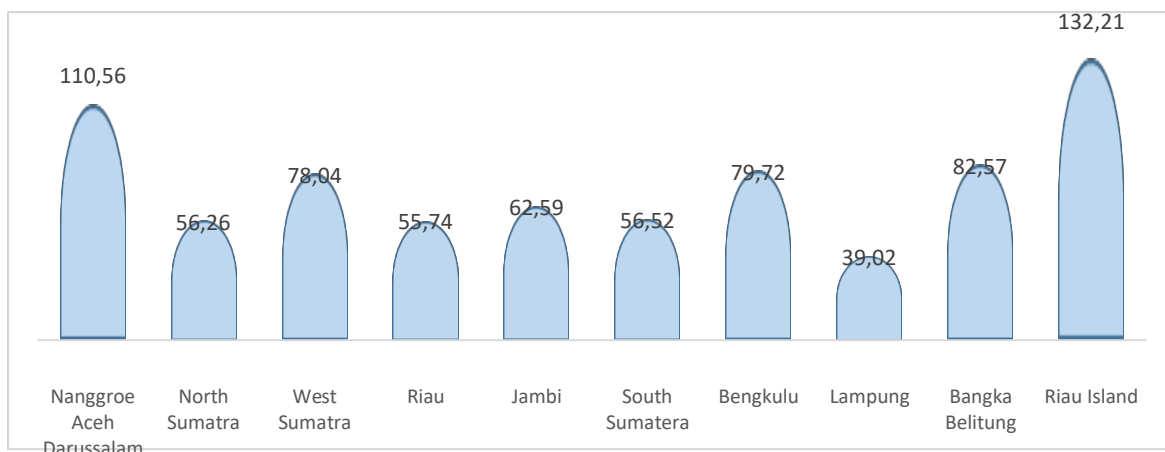
Furthermore, the Province of Nanggroe Aceh Darussalam also provides a large portion of its health spending (13.13%), with Sabang District as the district with the largest allocation of health spending per capita (Rp 2,757,140). West Sumatra itself has a proportion of 11.26 percent for health expenditure allocation. Padang Panjang Regency is the government with the largest health spending per capita in West Sumatra Province, with a budget value of 2,566,122 rupiahs.



Graph. 1.3. Average government spending on the economy per capita (in thousand rupiahs), 2020

In 2020, the total economic spending per capita for all provinces in Sumatra was 2,609,074 rupiah. The Riau Islands Province has the largest allocation of economic spending (22.28%), while Anambas Islands is the district with the highest proportion of economic spending, namely 35.76 percent. The following provinces with a large economic expenditure value are the NAD provinces (14.58%) and West Sumatra (10.85%).

Keynesian thinking proves that when the economy is experiencing a recession, government intervention through its spending activities effectively overcome past crises. When a country is in a crisis, government spending will be the main tool for recovering aggregate demand and supply, including creating economic stabilization. Government spending on economic functions is one of the tools used to become a parachute for the regional and national economy so that it does not plunge into a deep recession.



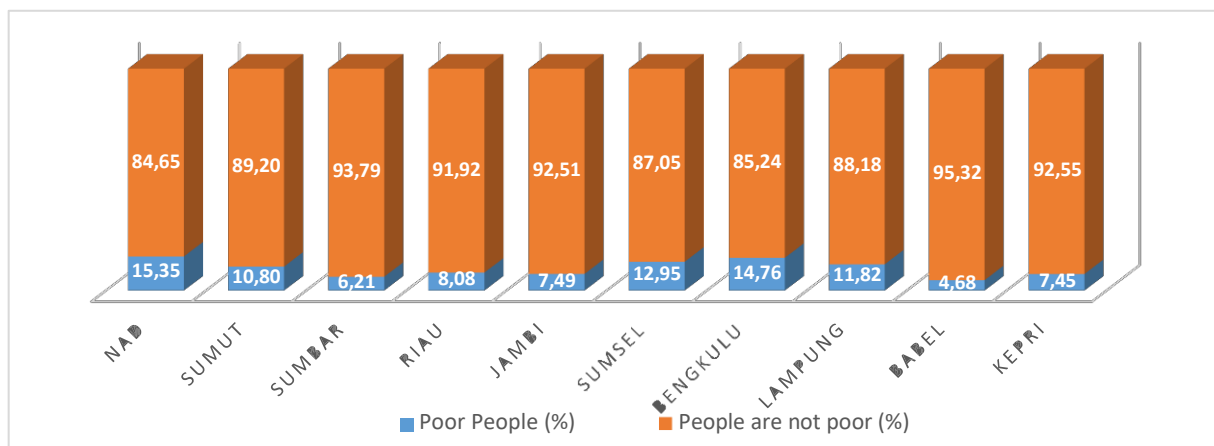
Graph. 1.4. Average government spending on protection per capita
(In thousand rupiah), 2020

The government, through spending allocations for the social security function, is trying to restore the regional economy in the context of handling the Covid-19 pandemic, also various threats that endanger the regional economy. Government spending on social security includes; (1) funds for health protection in the form of social security, (2) funds for social assistance in the form of Smart Indonesia Cards (KIP), Social security Cards (KPS), Family Hope Program (PKH), and Rastra or Raskin.

Conceptually, social security is public action to be accepted to reduce poverty, vulnerability, and inequality (UNESCAP, 2012). On the other concept, social security can be interpreted as a series of government initiatives designed to provide social assistance, social services, social insurance, and labor market policies. Social security policies are part of economic development policies aimed at reducing risk, deprivation and encouraging sustainable growth. It provides space for the poor to be more productive in their economic activities and contributes to social stability, extensively creating overall benefits for society.

Social security spending is aimed at suppressing the increase in poor people. The realization of spending by local governments in each province in Sumatra varies quite a bit. Social security spending is only 3.10 percent of the total of the four governments spending used in this study. The provincial governments of the Riau Islands, Nanggroe Aceh Darussalam Province, and Bangka Belitung Province are the 3rd provinces with the highest amount of social security spending. The Riau Island disbursed social security funds per capita of 132,207 rupiahs. Natuna is Riau Island's largest social security spending district (24.62%). Nanggroe Aceh Darussalam amounted to 110,564 rupiahs, with Aceh Jaya as the top contributor to protection spending (12%) and Bangka Belitung to 82,567 rupiahs with West Bangka Regency as the largest contributor in social security financing (18.67%).

Moreover, Graph 1.5 inform that Nanggroe Aceh Darussalam Province is the highest percentage province of poor people on the island of Sumatra in 2020. Based on a report from the Central Statistics Agency (BPS), the percentage of poor people in this province is 15.35 percent. The three districts with the poorest population are Gayo Lues (19.32%), Pidie (19.23%), and Pidie Jaya (19.19%). The Covid-19 pandemic that hit in 2020 had an impact on increasing the percentage of poor people in Aceh. This condition was due to an economic contraction, which caused economic activity and employment slowdown. It was recorded that as of August 2020, the open unemployment rate in Aceh had risen to 6.59%, higher than in February 2020 (5.42%).



Graph. 1.5. Average poverty rate of District/City of Each Province in Sumatera in 2020

Bengkulu is ranked second with the highest percentage of poor people in Sumatra. The percentage of poor people in Bengkulu Province is 14.76 percent. Regencies with the highest percentage of poor people in Bengkulu Province are Seluma (18.56%), Kaur (18.47%), and South Bengkulu (17.82%). Poverty in Bengkulu Province is more dominantly contributed by food commodities in urban and rural areas. Rice still provides the largest contribution, with 19.99 percent in urban areas and 23.58 percent in rural areas.

South Sumatra and Lampung recorded the percentage of poor people at 12.95 percent and 11.82 percent, respectively. The percentage of poor people in North Sumatra is 10.80%, followed by Riau (8.08%), Jambi (7.49%), Riau Islands (7.45%), and West Sumatra (6.21%).

Meanwhile, the lowest percentage of poor people in Sumatra is in the Bangka Belitung Islands (4.68%). The district with the lowest poverty rate is West Bangka (2.7%). The poverty rate in the Bangka Belitung Islands Province is the fourth lowest in Indonesia. A good synergy between the government, legislature, forkopimda, and society supports the low percentage of poor people in Bangka Belitung Province. In addition, this condition is also caused by the Bangka Belitung Poverty Line (GK) is very high, even the highest in Indonesia, which is above 700,000 rupiahs, while the national GK is around 400,000 rupiah.

Efficiency Measurement Result

The relief of poverty with the government spending policy applied by the local government in Sumatra was only partially successful. However, by the DEA method, from 154 local governments in Sumatra, eight local governments are relatively efficient in alleviating poverty in their region by using the four types of spending per capita.

Table 1. Relative efficiency of local government spending in Sumatra in 2020.

Efficient score	Total	Descriptions
E = 1 (efficient)	8	Medan, Pekanbaru, Batam (cities) Deli Serdang, Simalungun, Sawah Lunto, Mid-Lampung, West Bangka (districts)
0.900 – 0.999	96	
0.800 – 0.899	47	
0.700 – 0.799	3	North Nias, West Nias, Meranti Island
Mean score = 0.922		
Minimum score = 0.767 (Meranti Island)		

The mean efficiency score in local government is 0.922. This information explains the relative inefficiency of the average of about 7.8% of local government to run the poverty alleviation program.

The local government that can (3 cities and five sub-villages) can work relatively efficiently in reducing poverty. Seeing from the location, local governments can work relatively efficiently in North Sumatra Province (Medan, Deli Serdang, Simalungun), Riau (Pekan Baru), West Sumatra (Sawah Lunto), Lampung (Mid-Lampung), Riau Island (Batam), and Bangka Belitung (West Bangka). So, from 10 provinces in Sumatra, the ability of local government to work relatively efficiently is uneven. No one of the regencies and cities that relatively efficient in Aceh Province, Bengkulu, South Sumatra, and Jambi.

Furthermore, a description of the relative efficient of the local government can be a peer for the relatively inefficient local government in Sumatra, which is explained in table 2. Of 8 local governments that are relatively efficient in Sumatra, only some governments can be the peer and referenced by inefficient local government. Next, the local government of Pekanbaru city is the peer to 139 inefficient local governments. Pekanbaru city government is the peer for 95% of 146 relatively inefficient local governments; thus, it can be said Pekanbaru city government is the most relatively efficient in Sumatra.

Table 2. Relative efficient of local government and being peer

Local Government	Peer count
Deli Serdang	87
Simalungun	3
Medan	-
Sawah Lunto	59
Pekan Baru	139
Mid-Lampung	-
West Bangka	99
Batam	-

Even though there is efficient local government in North Sumatra Province and Riau, the higher inefficient score is also in that province. Meranti island, with the lowest efficiency score in Sumatra, was in Riau Province. The meaning efficiency score of 0,767 is occurred the higher inefficiency in using government spending, is 23.3%. Even in the province of North Sumatra, with three efficient local governments, it turns out that there are two local governments with the second lowest efficiency (0.768 (West Nias)) and third (0.775 (North Nias)). The low-efficiency score means two regional governments highly-inefficiency, 23.2% (West Nias) and 22.5% (North Nias). This description illustrates the uneven ability of local governments to allocate spending in these two provinces.

Different conditions occur in the province of Bangka Belitung. In this province, some are relatively efficient. The province's average efficiency score is 0.98, which means a 2% level of inefficiency in government spending. Indeed, the local government with the lowest efficiency score in this province is also pretty high compared to other provinces. In addition, there are provinces where only some local governments are relatively efficient Sumatra. A description of efficiency per province is displayed in Table 3.

Table 3. Description Efficiency of local government in each province

Provinsi	Mean efisiensi	Mean inefisiensi	Minimum		Maximum	
			score	Pemerintah daerah	score	Pemerintah daerah
Aceh	0.869	0.131	0.817	Aceh Singkil	0.995	Banda Aceh
Sumatra Utara	0.925	0.075	0.768	Nias Barat	1	Medan, Deli Serdang, Simalungun
Sumatra Barat	0.966	0.034	0.877	Kep Mentawai	1	Sawah Lunto
Riau	0.947	0.053	0.767	Kep Meranti	1	Pekan Baru
Jambi	0.953	0.047	0.914	Tanjung Jabung Timur	0.995	Muaro Jambi
Sumatra Selatan	0.898	0.102	0.826	Musi Banyuasin	0.933	Pagar Alam
Bengkulu	0.876	0.124	0.836	Kaur	0.930	Bengkulu Tengah
Lampung	0.918	0.982	0.836	Lampung Utara	1	Lampung Tengah
Bangka	0.980	0.020	0.958	Belitung Timur	1	Bangka Barat
Belitung						
Kepulauan Riau	0.951	0.049	0.881	Lingga	1	Batam

From Table 3, this study classifies provinces based on the efficiency of local government spending into four groups. The groups of provinces are described as follows:

- Group 1. Several provincial criteria for group 1 are: (1) there is a relatively efficient local government within the province, (2) the average efficiency score ranges from 0.951 – 0.99, and (3) the minimum efficiency score for local government is 0.90. With this criterion, there is only Bangka Belitung province in group 1. This group is the best at alleviating poverty during the Covid-19 pandemic.
- Group 2. The provincial criteria used are: (1) there is a relatively efficient local government within the province, (2) the average efficiency score ranges from 0.951 – 0.99, and (3) the minimum efficiency score is 0.80. The provinces of West Sumatra and Riau Islands are included in group 2.
- Group 3. The criteria for provinces in group 3 are: (1) there is a relatively efficient local government within the province, (2) the average efficiency score $E < 0.95$, ranging from 0.90 – 0.99, and (3) the minimum efficiency score is lower than 0.80. There are three provinces in group 3, namely North Sumatra, Riau, Lampung.
- Group 4. Some of the criteria for this group are: (1) there is no relatively efficient local government within the province, (2) the average efficiency score is low, $E < 0.90$. Four provinces are classified into groups four: Aceh, Bengkulu, Jambi, and South Sumatra.

CONCLUSION

Using Data Envelopment Analysis, eight local governments are relatively efficient, such as Deli Serdang, Medan, Simalungun, Pekanbaru, Sawah Lunto, Mid-Lampung, West Bangka, and Batam. The eight local governments are in some provinces: North Sumatra Province, West Sumatra, Riau, Bangka Belitung, Lampung, and Riau Islands. These five regions from 8 local governments, which is relatively efficient, could be a peer for local government, which is not efficient. Five local governments that be peer are Deli Serdang, Simalungun, Pekanbaru, Sawah Lunto, and West Bangka. Additionally, of the five local governments that were the peer, the most efficient local government was Pekanbaru.

This research implication is that 146 local governments that are relatively inefficient should use the four types of spending better, so the efficiency rate is higher in the future. Besides that, they should also learn (benchmarking) to local government that is relatively efficient, which is each peer. They need to benchmark the local government's ability to

properly allocate four types of spending to decrease poverty. They also need to learn what kind of programs and government activities the efficient local government runs. which is relatively efficient in reducing poverty; if they do not do benchmarking, the difference in spending efficiency of local government will probably be bigger between the relatively efficient and inefficient government.

The differences in efficiency rates between local governments in one province need to be scrutinized. Likewise, the local government in Pekanbaru, Riau Province, being the local government, which is the most relatively efficient in Sumatra. Vice versa, the most relative is inefficient in Sumatra and this province. This condition shows the uneven local government's ability in the province to allocate the government spending in poverty decrease in efficiency. So, the high government (Riau province government) should coordinate the program and local government activity in regencies and cities in Riau province. Thus, local government efficiency can increase, and the poverty rate in Riau province will go down. A similar condition is also happening in North Sumatra province.

In Bangka Belitung Province, the relatively efficient local government is West Bangka. Even though other local governments are relatively not efficient, the efficiency rate is high even. Even the efficiency rate in this province sees from the poverty rate lower than in the other province. As a result, it can be said that the local government in Bangka Belitung Province is the best local government in deteriorating the province's poverty. For that, the local government in another province could learn from Bangka Belitung Province to help them solve the problem and reduce poverty.

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