

# Efficiency of Public Expenditure in Sumatera before Covid-19 Pandemic Era

Ihsanul Ikhwan<sup>1</sup>

<sup>1</sup>IUM University, Malaysia

This study will analyze the efficiency of local government expenditure towards the Human Development Index (HDI) indicators achievement. To see the realization, this study will conduct an efficiency analysis of local government expenditures in Indonesian's 34 provinces at 2015-2018 periods. Furthermore, this study tries to find out which sectors are affect efficiency, and conducts a descriptive analysis of the effect of the covid 19 pandemic on these sectors. Based on the study result, it can be suggested to the local government as follows; Provinces that have reached maximum efficiency levels must be able to maintain government performance by maintaining a large portion of inputs, and continue to work to increase output. So that the level of community welfare can be maintained, or even increased in the following year. In general, its necessary to optimize in terms of the effectiveness of the budget for education, health and public services on the input side for all provinces. Meanwhile, from the output side, the target Life expectancy and Expected Years of Schooling need to be improved.

**Keywords:** Public expenditure, HDI, Pandemic, DEA

## OPEN ACCESS

\*Correspondence:  
Ikhsanul Ikhwan

[Ihsanulikhwan1997@gmail.com](mailto:Ihsanulikhwan1997@gmail.com)

Received: 17 August 2023

Accepted: 25 November 2023

Published: 31 December 2023

Citation:

(2023) Efficiency of Public Expenditure in  
Sumatera before Covid-19 Pandemic  
Era.  
Finance and Sustainability  
1.1.

## INTRODUCTION

In the Indonesian's reform era, there has been a paradigm shift in national development from the growth paradigm to an equitable distribution of sustainable development paradigm (Pamula 2012). This new paradigm demand to added the success indicators of national development which is not only about the growth rate of Gross Domestic Product (GDP), but also an increase in the Human Development Index (HDI). This chance was realized through a policy of regional autonomy and central-regional financial balance which began on January 1, 2001

The implementation of regional autonomy policy begins with the ratification of Law number 22 of 1999 about regional government, and Law number 25 of 1999 about regional and central financial balance. To date, these two regulations has undergone several revisions until the last is Law Number 33 of 2004 about regional and central financial balance, and Law number 23 of 2014 about regional government. These ratified regulation aims to create independence aspect in the region, in order to accelerate the realization of community welfare trough improving services, empowerment, and participation.

Indonesia consists of 33 provinces and 6 islands, one of them is Sumatra. Sumatra has 10 provinces in it, with different natural potentials and uses of technology. These differences are among them in the characteristics of natural, social, economic and natural resources, which are distributed differently in each region. This differences can be an obstacle to equitable development due to the concentration of economic activities in several provinces that have abundant natural resources. This natural wealth should be an added value in

economic development. In this current era of regional autonomy, each region is required to properly manage its own regional potential so as to encourage a development process with a good level of equity and good economic growth as well. This is based on the assumption that local governments have a better understanding of the community needs and aspiration than the central government, so they are able to mobilize and use existing economic resources for the provision of public goods and services (Hermawan, 2013).

Besides the availability of financial resources and fiscal capacity, there are other aspects that affect economic growth and human development in a regions, that is the efficiency of the use of income owned by the region (Totalia and Rusydi 2015) Professional and efficient management of regional revenues will strengthen the regional economic base. The ability of local governments to manage regional income, if it is not accompanied by efficient use can make the expected goals will be hampered, and various economic problems will still occur.

We set the Human Development Index (HDI) as the government target output as we believe that this index is a better measure than a mere economic indicator, such as GDP growth. The HDI is a composite measure of health, education and income that was introduced by United Nation Development Program (UNDP) in the first Human Development Report in 1990. HDI explain how residents can access the result of development in obtaining income, health, and education. The education component of the HDI is measured by mean of years of schooling for adults aged 25 years and expected years of schooling for children of school entering age. The health component is measured by life expectancy at birth, and the living standard is measured by per capita expenditures.

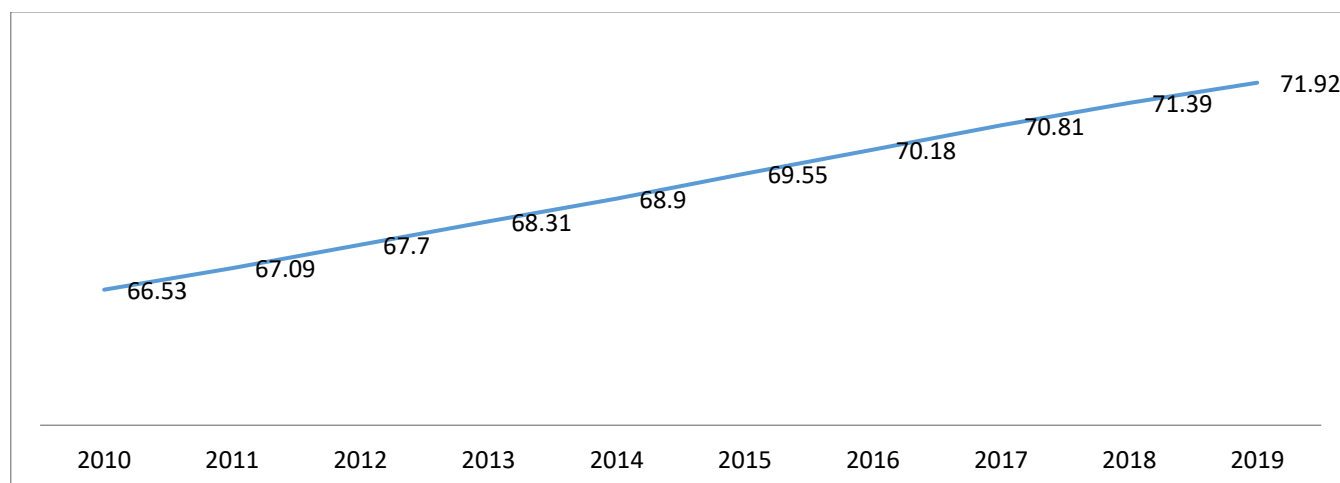


Figure 1. Indonesian's Human Development Index (BPS, 2020)

Indonesian's Human Development Index increased from 66.53 in 2010 to 71.39 in 2018. During that period, HDI score grew by an average 0.6 percent per years. Based on the international scale, the achievement of HDI can be categorized into four: high category ( $HDI > 80$ ), upper middle category ( $66 < HDI < 80$ ), lower category ( $50 < HDI < 66$ ), and low category ( $HDI < 50$ ). Adhere to International standards, Indonesian Human Development Index (HDI) statistically belongs the middle to upper category, even close to high category.

However, this achievement has not reached the national target as stated on the National Medium Term Development Plan 2015-2019 (RPJMN), which is 71.98. Indonesian's HDI is expected increase to 75.54 in 2024, which indicates an improvement in the quality of human resources. (Bappenas, 2019). These targets will be even more difficult to achieve considering that in the early 2020 the covid 19 pandemic began come to Indonesia. This outbreak indirectly affects the achievement of the Human Development Index targets. The number of patients died from the virus affects the health sector's achievements. Then, reduced population participation rate in education programs will certainly have a significant impact on the education sector. As well as economic instability accompanied by many layoffs will have an impact on the HDI economic sector

This study will analyze the efficiency of local government expenditure towards the Human Development Index (HDI) indicators achievement. To see the realization, this study will conduct an efficiency

analysis of local government expenditures in Indonesian's 34 provinces at 2015-2018 periods. Furthermore, this study tries to find out which sectors are affect efficiency, and conducts a descriptive analysis of the effect of the covid 19 pandemic on these sectors. Hopefully this can help provide recommendations to the government, especially during the covid 19 outbreak.

## LITERATURE REVIEW

The main problem in the economy is limited resources that available to fulfill a relatively unlimited desire. So, one of the focus in economics discussion is to learn the allocation of resources to be efficient. Without efficiency, various economic problems will be created, such as gaps and misdirected allocations. According to KBBI, efficiency is the accuracy of the way (business, work) in carrying out something (by not wasting time, effort, and costs). Efficiency can be formulated with output per input. In conventional management theory, organizational performance is judged by how well an organization is able to minimize costs and create maximum profits.

The Efficiency concept comes from the micro-economic concept, namely the producer theory. Producer theory tries to maximize profits or minimize costs from the manufacturer's perspective. In the producer theory there is a production frontier curve that describes the relationship between input and output of the production process (Ascarya & Yumanita 2007). The Production Frontier Curve is described as follows;

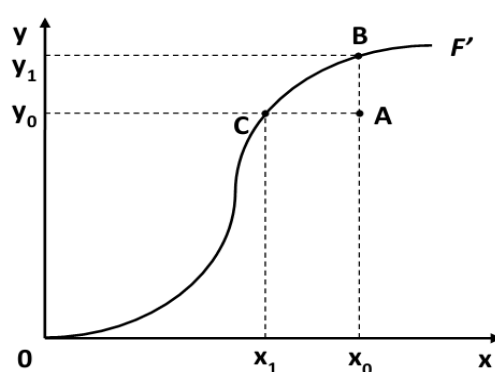


Figure 2. Production Frontier Curve

In the local government expenditure context, efficiency means condition when it is no longer possible to reallocate resources that can improve the welfare of the community (Stiglitz 2000). In other words, the efficiency of local government expenditure is a condition when every rupiah spent by the government produces the most optimal level of welfare. When these

conditions are met, it can be said that government spending has reached an efficient level.

As time goes by, the model of frontier efficiency measurement has increased, both in theory and practice concepts. The following is a general overview of the development of a successful frontier efficiency measurement model based on Rusydiana (2018).

Table 1. Development of Frontier Efficiency Measurement Analysis

| NO | MODEL                              | YEAR | AUTHORS                            | TYPE          |
|----|------------------------------------|------|------------------------------------|---------------|
| 1  | Stochastic Frontier Approach als77 | 1977 | Aigner, Lovell, Schmidt            | Parametric    |
| 2  | SFA Model mvb77                    | 1977 | Meeusen & van den Broeck           | Parametric    |
| 3  | Data Envelopment Analysis CCR      | 1978 | Charnes, Cooper, Rhodes            | NonParametric |
| 4  | SFA Model stev80                   | 1980 | Stevenson                          | Parametric    |
| 5  | SFA Model mlti                     | 1981 | Pitt & Lee                         | Parametric    |
| 6  | Malmquist Productivity Index       | 1982 | Caves, Christensen, Diewert        | NonParametric |
| 7  | DEA Model BCC                      | 1984 | Banker, Charnes, Cooper            | NonParametric |
| 8  | Free Disposal Hull [FDH]           | 1984 | Deprins, Simar, Tulkens            | NonParametric |
| 9  | SFA Model fe                       | 1984 | Schmidt & Sickles                  | Parametric    |
| 10 | SFA Model regls                    | 1984 | Schmidt & Sickles                  | Parametric    |
| 11 | DEA Additive Model                 | 1985 | Charnes, Cooper, Golany, Seiford   | NonParametric |
| 12 | DEA Window Analysis                | 1985 | Charnes, Clarke, Cooper, Golany    | NonParametric |
| 13 | DEA Assurance Region [DEA-AR]      | 1986 | Thompson, Singleton, Thrall, Smith | NonParametric |
| 14 | DEA Cross Efficiency               | 1986 | Sexton, Silkman, Hogan             | NonParametric |
| 15 | DEA Facet Model                    | 1988 | Bessent, Bessent, Elam, Clark      | NonParametric |
| 16 | SFA Model mlti                     | 1988 | Battese & Coelli                   | Parametric    |
| 17 | SFA Model fecss                    | 1990 | Cornwell, Schmidt, Sickles         | Parametric    |
| 18 | SFA Model kumb90                   | 1990 | Kumbhakar                          | Parametric    |
| 19 | DEA Cone Ratio                     | 1990 | Charnes, Cooper, Huang, Sun        | NonParametric |
| 20 | TFA [Thick Frontier Approach]      | 1991 | Berger & Humphrey                  | Parametric    |
| 21 | SFA Model bc92                     | 1992 | Battese & Coelli                   | Parametric    |
| 22 | Fuzzy DEA                          | 1992 | Sengupta                           | NonParametric |
| 23 | DFA [Distribution Free Approach]   | 1993 | Berger                             | Parametric    |
| 24 | SFA Model fels                     | 1993 | Lee & Schmidt                      | Parametric    |
| 25 | DEA Super Efficiency               | 1993 | Andersen & Peterson                | NonParametric |
| 26 | SFA Model bc95                     | 1995 | Battese & Coelli                   | Parametric    |
| 27 | Network DEA                        | 1996 | Fare & Grosskopf                   | NonParametric |
| 28 | Hierarchical/Nested Model DEA      | 1998 | Cook, Chai, Doyle, Green           | NonParametric |
| 29 | Bootstrapped DEA                   | 1998 | Simar & Wilson                     | Parametric    |
| 30 | DEA Russell Measure [ERM]          | 1999 | Pastor, Ruiz, Sirvent              | NonParametric |
| 31 | Imprecise Data [IDEA]              | 1999 | Cooper, Park, Yu                   | NonParametric |
| 32 | Parallel Model DEA                 | 2000 | Cook, Hababou, Tuenter             | NonParametric |
| 33 | Dynamic DEA                        | 2000 | Fare & Grosskopf                   | NonParametric |
| 34 | DEA Slack Based Measure [SBM]      | 2001 | Tone                               | NonParametric |
| 35 | Meta Frontier                      | 2003 | Rao, O'Donnel, Battese             | NonParametric |
| 36 | Context-Dependent DEA              | 2003 | Seiford & Zhu                      | NonParametric |
| 37 | SFA Model gre03                    | 2003 | Greene                             | Parametric    |
| 38 | SFA Model tfe                      | 2005 | Greene                             | Parametric    |
| 39 | SFA Model tre                      | 2005 | Greene                             | Parametric    |
| 40 | Game Cross Efficiency              | 2008 | Liang, Wu, Cook, Zhu               | NonParametric |

## Government Expenditure

Government expenditure can be interpreted as the use of a country's resources to finance a state activity, in the context of carrying out its functions in maintaining and realizing prosperity (Mangkoesoebroto 2001). In Indonesia, government expenditure is compiled in the State Budget and Regional Government Budget. Government expenditure is one element of aggregate demand. Based on Keynes's Theory, the calculation of national income with the public expenditure approach states that;

$$Y = C + I + G + (X - M)$$

This formula is known as national income identity which was first introduced by Keynes's. The variable on the right side is aggregate demand. G variable is government expenditure. By comparing the value of Y, it can be seen how much the contribution of government spending in determining aggregate demand or national income. With this formula, it can be analyzed how much influence government spending, especially in

the state expenditure sector has on the economy. Government expenditure reflects government policy. If the government has established a policy to buy goods and services, government expenditure "reflects the costs that must be incurred by the government to implement the policy

In this research, measuring the efficiency of government expenditure is also related to the issue of decentralization. [Morizov \(2016\)](#) describes decentralization as a transfer by the central government to local governments (states, regions, or cities) in the form of special functions, with administrative authorities. Explained in Law Number 22 of 1999 article, that decentralization is the surrender of governmental authority by the central government to autonomous regions. The success of fiscal decentralization can be found in the quality of regional budgets and budget management. The allocation of regional budgets to improve public services and infrastructure development will increase regional economic capacity. Increasing in regional economic capacity encourages improvement in community welfare ([Ida, et al 2018](#)).

Decentralization in Indonesia was implemented in the regional autonomy policy. According to Law Number 32 Year 2004, regional autonomy is the right, authority, and obligation of autonomous regions to regulate and manage their own government affairs and the interests of the local community in accordance with the laws and regulations ([Hanif 2007](#)). The implementation of the regional autonomy policy is expected to give more authority to local government to regulate their territories in accordance with the wishes of their people.

## PREVIOUS RESEARCH

Research on the efficiency of government spending, has been carried out by several previous researchers. Among them, [Gupta \(1997\)](#) that analyzed the efficiency of government spending in education in his research entitled "The Efficiency of Government Expenditure: Experience from Africa". The results of this study show that in education sectors, the countries in Africa are relatively less efficient than Asian countries. This research also shows that an increase in funding for education will result in increased output. Research related to the government spending in education was also carried out by [Alfonso and Miguel \(2005\)](#) entitled "Cross-Country Efficiency of the Provision of Secondary Education: A Semi-Parametric Analysis with Nondiscretionary Input". This study found that the most efficient countries in education sector are Finland,

South Korea, and Sweden. The results of the analysis also show that good education condition reflected from the ratio of teachers per student and duration of study as variables that has a positive influence on the formation of student performance.

[Ouertani, et al \(2017\)](#) in their research entitled "Assesing government spending efficiency and explaining inefficiency scores", which measured the efficiency of public sector in public sectors found that the unemployment and broad money negatively impact government expenditure mainly in the case of infrastructure and health. Next, [Sabermahani et.al's research \(2012\)](#) entitled "Provincial Human Development Index, A Guide for Efficiency Level Analysis: The Case of Iran" measures the public sector efficiency in Iran. This research founds that the distribution of HDI status across provinces was highly varied and the difference between high- and low-developed provinces increased in 2009. The government needs to revise policies concerning distribution of resources among the provinces. Research about expenditure efficiency of a country also carried out by [Sekiguci \(2019\)](#) which measured efficiency of Vietnam's local government expenditure at 57 Provinces and 5 Major Cities.

On a national scale, the research about efficiency analysis of local government expenditure incline to analyze efficiency on a provincial scale. Among them are [Pertiwi \(2007\)](#) which analyzed government spending of 35 districts / cities in Central Java in the education and health sectors, [Rapiudin & Rusydi \(2017\)](#) that measured health and education efficiency 24 districts / cities in South Sulawesi, and [Sihaloho, et al \(2019\)](#) analyzed health expenditure efficiency in Maluku. Research that has same topic with this paper, wich analyze island efficiency is authored by [Yunan \(2004\)](#). [Yunan \(2004\)](#) measures Java's Government efficiency in education and health sectors.

In terms of methods, non-paramethic methods with DEA models in recent years are increasingly being used in order to analyze efficiency. In the application of DEA method to measure the efficiency of government spending, the author refers to research conducted by [Verhoven, et al \(2007\)](#), [Afonso & Miguel \(2005\)](#), [Pertiwi \(2007\)](#), [Sihaloho et al \(2019\)](#), [Rapiudin & Rusydi \(2017\)](#), and [Yunan \(2004\)](#). Next, SFA method is used by [Sekiguci \(2019\)](#) to measured Vietnam's local government efficiency. The other method used in measuring expenditure efficiency is the Free Disposable Hull (FDH). This method is used by [Kurnia \(2006\)](#) in his research "Model of Performance Measurement and

Efficiency of the Public Sector", with a district / city case study in Central Java, and [Gupta \(1997\)](#) about the efficiency of government spending in the education sector in Africa

## METHOD

This study aims to analyze the efficiency of government expenditure in Sumatera's 10 Provinces in 2015-2018 and give recommendation to local government in managing budget to deal with the covid 19 pandemic. Data related to provincial government expenditure is derived from the realization of provincial government expenditure per function obtained from Directorate-General of Regional Fiscal Balance (Ministry of Finance). Data related to the Human Development Index Indicators, derived from the Central Bureau of Statistic

The selection of a combination of input and output variables is based on indicators that represent the achievement of the Human Development Index. The input variable used in this study is the realization of local government spending based on function, namely economic, education health, living environment, tourism and culture, order and security, housing and public facilities, social protection, and public services functions. While the output variables are indicators that develop the Human Development Index that are Life expectancy, Mean Years of Schooling, Expected Years of Schooling, and Per capita expenditure.

### Data Envelopment Analysis (DEA)

This research uses quantitative non-parametric approach. Non-parametric approach uses Data Envelopment Analysis (DEA) method to measure the efficiency of the Decision Making Unit (DMU). This method constructs an envelopment frontier over the data points such that all observed points lie on or below the production frontier ([Coelli 1996](#)). This method, however, does not generate general relationship and only rely on the input-output ratio optimization. It firstly introduced by [Farrell \(1957\)](#) and then extended by [Banker, Charnes, and Cooper \(1984\)](#) to accommodate when the decision making units (DMUs) are operating at the non optimal scale environment. These non-optimal scales might be caused by imperfect competition, constraint on resources, etc. DEA can be used to determine the relative efficiency level of several Decision Making Unit (DMU), and can use many outputs and inputs with different units. DEA method can also provide information about Decision Making Unit (DMU) that do not use efficient inputs and causes

of inefficiencies, both in input and output variables. Last, this method can generate information how much input and output must be adjusted to have a maximum relative efficiency value.

There are two types of efficiency, namely economic efficiency and technical efficiency. Economic efficiency has a macroeconomic picture, while technical efficiency has a microeconomic picture. Technical efficiency measurements are used to measure operational relationships in the process of using inputs into output. The DEA Term refers more to the definition of technical efficiency, namely the relationship between input and output in a business unit ([Rusydiana 2013](#)). To measuring the efficiency of a Decision Making Unit (DMU) there are two approaches can be used ([Rusydiana 2013:16](#)), these are:

#### 1. Input Approach

The input side approach is used to answer how much input quantity can be reduced proportionally to produce the same output quantity.

#### 2. Output Approach

The output side approach is used to answer how much the output quantity can be increased in proportion to the same input quantity.

In DEA there are two basic models that can be used, namely Charnes, Choper, and Rhodes (CCR) models and Banker, Charnes and Rhodes (BCR) Models. The CCR model is used with the assumption that changes in the value of output produced by DMU will always be equal to the proportion of adding a certain output value. This is in line with the Constant Return to Scale (CRS) assumption that the production function is fixed. Whereas the BCR model assumes changes in the output value generated by DMU are different for each proportion of change in the value of a particular input. This is in line with Variable Return to Scale (VRS), which means that each input does not necessarily produce the same output

In this study, we used DEA by using input oriented with assuming Variable Return to Scale (VRS). The assumption of this model is that the ratio between input and output increment is different, which mean that the addition of input x times will not cause output to increase by x times, it can be smaller or larger. The VRS model is used to determine the level of efficiency in each regional expenditure. Uses of Input oriented mean that DEA results will be oriented to what percentage of inputs can be reduced by a fixed level of output.

## RESULTS AND DISCUSSION

The efficiency level of Sumatera's Government expenditure will be displayed during 2015-2018 period using Data Envelopment Analysis (DEA) method. Results of DEA measurements will be displayed through efficiency scores ranging from 1-100%. A score of 100% illustrates the ability of local governments to manage their owned funds optimally. Whereas if the efficiency

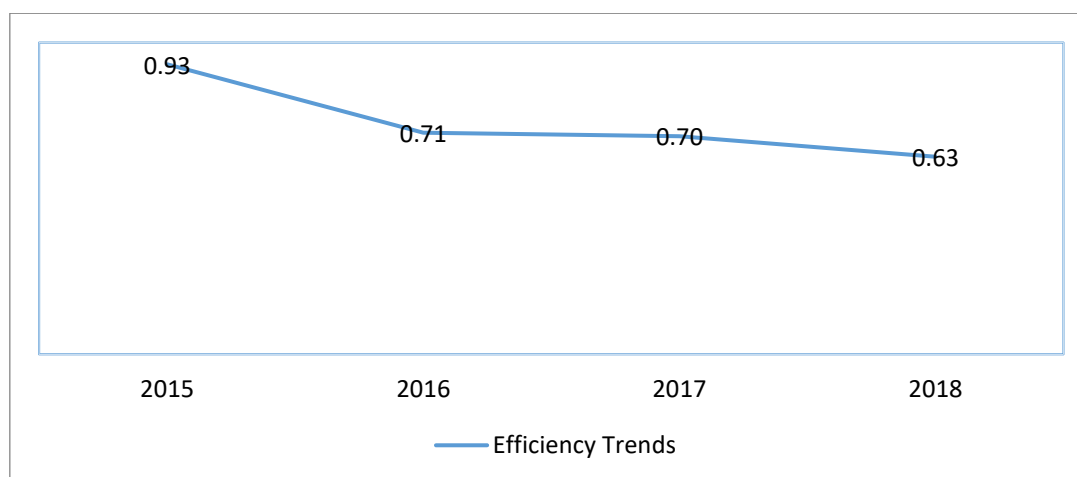
score keeps away from the 100%, it can be indicated that a local government is inefficient or has not managed its funds optimally. Based on DEA result with Constant Return to Scale (CRS) used input oriented, it can be seen the level of efficiency of regional government expenditure in 10 provinces in Sumatera. The results illustrate the achievement of efficiency values of each provincial government in managing regional expenditure.

**Table 2. Efficiency Score**

| Province        | 2015 | 2016 | 2017 | 2018 | Mean per DMU |
|-----------------|------|------|------|------|--------------|
| Aceh            | 0.90 | 0.31 | 0.76 | 0.70 | 0.67         |
| North Sumatera  | 0.83 | 1    | 0.24 | 0.32 | 0.60         |
| West Sumatera   | 1    | 0.68 | 0.61 | 0.47 | 0.69         |
| Riau            | 0.59 | 0.39 | 0.47 | 0.48 | 0.48         |
| Jambi           | 1.00 | 0.85 | 1    | 0.59 | 0.86         |
| South Sumatera  | 0.97 | 0.92 | 0.81 | 0.66 | 0.84         |
| Bengkulu        | 1    | 0.86 | 0.82 | 0.64 | 0.83         |
| Lampung         | 1    | 0.53 | 0.50 | 0.59 | 0.66         |
| Bangka Belitung | 1    | 1    | 0.93 | 1    | 0.98         |
| Riau Island     | 1    | 0.57 | 0.87 | 0.88 | 0.83         |
| Mean per Years  | 0.93 | 0.71 | 0.70 | 0.63 | 0.74         |

Efficiency scores can be classified into 4 groups based on their efficiency scale, namely Fully Efficient (100%), Highly Efficient (80-99%), Medium Efficient (50-79%), and Low Efficient (less than 50%) (Rusydiana 2017). Of the total 40 DMU analyzed, there were 10 DMU which reached a maximum efficiency value of 100%, while the other 30 DMU did not reach maximum efficiency (100%), with details; Classified as Highly Efficient by 11 DMU, Medium Efficient by 12 DMU, and Low Efficient by 7 DMU, in the period 2015-2018.

There are 5 Provinces that efficient in 2015, 2 Provinces in 2016, and each 1 province in 2017 and 2018. Based on Table 1, the most efficient province in Sumatera is Bangka Belitung with an average efficiency at 0.98. Bangka Belitung reach maximum efficiency in 2015, 2016, and 2018. While the province with lowest average efficiency is Riau with score at 0.48. The average efficiency trends of 10 provinces in 2015-2018 are as follows.



**Figure 3. Efficiency trends**

Total average of Sumatera's regional government expenditure during research period is 0.74, but it has decreased every year. 2015 was the highest efficiency achievement, which average efficiency was 0.98, and 5 out of 10 provinces at the maximum efficiency level. But, it was decreased to 0.71 in 2016, 0.70 in 2017, to 0.63 in 2018. This is quite worrying because at the end 2019, covid pandemic began appear in China and spread to Indonesia in early 2020. This covid pandemic was disturbing the economic stability in every country, and the government must think the best solution to deal with this.

### Potential Improvement and Input-Output Contribution

In addition to producing efficiency scores, DEA can also produce potential improvement and Input-

output contribution. Potential Improvement analysis is used to determine the causes of inefficiency and provide recommendation to the local government, which variables need to be increased and reduced to reaches maximum level efficiency. Meanwhile input output contribution analysis is used to find out which variable has the most dominant effect on efficiency. Potential improvement and input output contribution analysis were carried out using 2018 data. The uses of this last year is an effort to explain the amount of real value that must be achieved. The results of these two measurements can be seen in the following graph. This table show the result of potential improvement and input output contribution analysis in each input and output variables.

**Table 3. Potential Improvement and Input Output Contribution**

| Province        | Input Variable |        |          |                  |             |                   |                 |                   |                             |
|-----------------|----------------|--------|----------|------------------|-------------|-------------------|-----------------|-------------------|-----------------------------|
|                 | Education      | Health | Economic | Order & Security | Environment | Culture & Tourism | Public Services | Social Protection | Housing & Public Facilities |
| Aceh            |                |        |          |                  |             |                   |                 |                   |                             |
| North Sumatera  |                |        |          |                  |             |                   |                 |                   |                             |
| West Sumatera   |                |        |          |                  |             |                   |                 |                   |                             |
| Riau            |                |        |          |                  |             |                   |                 |                   |                             |
| Jambi           |                |        |          |                  |             |                   |                 |                   |                             |
| South Sumatera  |                |        |          |                  |             |                   |                 |                   |                             |
| Bengkulu        |                |        |          |                  |             |                   |                 |                   |                             |
| Lampung         |                |        |          |                  |             |                   |                 |                   |                             |
| Bangka Belitung |                |        |          |                  |             |                   |                 |                   |                             |
| Riau Island     |                |        |          |                  |             |                   |                 |                   |                             |

| Province        | Output Variable |                         |                             |                        |
|-----------------|-----------------|-------------------------|-----------------------------|------------------------|
|                 | Life Expectancy | Mean Years of Schooling | Expected Years of Schooling | Per capita Expenditure |
| Aceh            |                 |                         |                             |                        |
| North Sumatera  |                 |                         |                             |                        |
| West Sumatera   |                 |                         |                             |                        |
| Riau            |                 |                         |                             |                        |
| Jambi           |                 |                         |                             |                        |
| South Sumatera  |                 |                         |                             |                        |
| Bengkulu        |                 |                         |                             |                        |
| Lampung         |                 |                         |                             |                        |
| Bangka Belitung |                 |                         |                             |                        |
| Riau Island     |                 |                         |                             |                        |

The green column shows the variables that being contributors to DMU's efficiency achievement. This variable must be maintained its achievement in subsequent periods. Furthermore, the yellow column shows the variables that has a low contribution to the efficiency achievement. This variables must be a concern for local government, so it can contribute significantly to efficiency achievement in the future. While the red column means the variables that caused inefficiency. The government must pay more attention to this variables so that it can doesn't cause inefficiency in the next period. This can be done by reducing budget allocations or increasing the achievement of HDI by changing the strategy or finding more appropriate policies.

Based on table 2, the best province in terms of equally contributing each variable to efficiency achievement is Bangka Belitung. The potential improvement and input output contributions result show that there is no red column, which means that none of the input and output variables causes inefficiency. The expenditures that have great contribution to efficiency achievement in Bangka Belitung are spending on economic functions, order and security functions, tourism and cultural functions, and social protection functions. Meanwhile, in terms of Human Development Index achievement, an indicator that has a major contribution to efficiency achievement is per capita expenditure indicator. In effort to maintain efficiency achievement, Bangka Belitung Government can pay more attention to the variables in the yellow column, that's are spending on education, environment, public services, and housing and public facilities. Also with a focus on increasing the attainment of life expectancy, Mean Years of Schooling, and Expected Years of Schooling

Meanwhile Aceh is the province with the lowest potential improvement and input output contribution achievement, which is indicated by 12 red columns and only 2 green columns. The sectors that have well contribution to Aceh efficiency are spending on environment functions and the achievement of Mean Years of Schooling, while other variables are the causes of inefficiency. This is in line with [Andhiani et al \(2018\)](#) research entitled "Analysis of economic growth and development inequality in Sumatra". The results of this research found that Aceh is an area with the lowest economic growth rate compared to another province in Sumatera. According to Andhiani, The economic weakness of Aceh can be mapped into three main weaknesses, namely; 1) Does not have a downstream industry that processes raw materials into semi-finished

and finished materials. 2) Lack of synchronization in development between provinces and districts and between districts and other districts. 3) Low investment because the image as a former conflict and disaster prone area has not been able to be restored.

As for the overall average of potential improvement and input output contributors, spending on the order and security function and the achievement of percapita expenditure population is already good. Meanwhile, spending on education, health, and public services function is the cause of inefficiency so that it requires more attention in the following years. This will be a challenge for local governments considering the Covid 19 outbreak is spreading rapidly in Indonesia and affecting the achievement of HDI, both in the health, education and economic sectors.

## FINDINGS

From the results of efficiency measurements, show that Riau province is a province with an average efficiency of 0.48. Judging from the potential improvement results obtained on the input side, the ones that contribute to Riau's efficiency are the order and security. Different results of research conducted by [Sajiah and Saputra \(2019\)](#), Riau is one of the five provinces that is relatively efficient in allocating health spending in 34 provinces in Indonesia. Meanwhile, this research shows that the health sector is experiencing inefficiency in the total potential improvement obtained.

Another finding of a source of inefficiency in the health sector occurs in Jambi, which can be seen from the potential improvement above which shows a red column. Although the overall efficiency in Jambi is quite high, this is contributed by input orders and security as well as on the output per capita expenditure side. However, one source of inefficiency in Jambi province is the health sector. This condition indicates that the use of health budget allocations is not optimal for optimal output. Where the expenditure allocation has not been fully allocated to focus on improving the quality of health services, but tends to be allocated for routine expenses such as wages and salaries ([Fajri & Siaga, 2020](#)). This is also in line with the results of research conducted by [Sajiah and Saputra \(2019\)](#), that Jambi in the health sector as a whole is not efficient overall.

In addition, this study shows that West Sumatra during the study period continued to experience a decrease in the level of efficiency. In line with the research of [Trisyandi et al. \(2016\)](#), the potential improvement results obtained in this study, from the input side of the education sector, experience

inefficiency. Based on the research results of Trisyandi et al. that the source of inefficiencies in government spending on the education sector in West Sumatra in 2013 and 2014 was the output obtained, namely the average length of schooling and the literacy rate in each region in West Sumatra. However, to achieve greater educational output and increase in efficiency, it is necessary to balance the increase in the number of inputs in the form of School Operational Assistance (BOS) funds and the ratio of teachers to students in West Sumatra.

Furthermore, based on potential improvement, Aceh is a province with the lowest potential improvement with 12 red columns and only 2 green columns. However, these results differ from the findings of a study conducted by Widodo (2019), which shows that Aceh is a province that is relatively efficient in managing education spending and has an efficiency value of spending on public services and public services above the average efficiency value of the province nationally.

## CONCLUSION

Total average of Sumatera's regional government expenditure has decreased every year, from 2015 until 2018. The most efficient province in Sumatera is Bangka Belitung with an average efficiency at 0.98. Bangka Belitung reach maximum efficiency in 2015, 2016, and 2018. While the province with lowest average efficiency is Riau with score at 0.48.

Based on overall average potential improvement and input output contributors analysis, government expenditure on order and security functions and the achievement of expenditure per capita of the population is already classified as good. Meanwhile government expenditure on education, health, and public services is the cause of inefficiency so that it requires more attention in the following years

Based on the study result, it can be suggested to the local government as follows; Provinces that have reached maximum efficiency levels must be able to maintain government performance by maintaining a large portion of inputs, and continue to work to increase output. So that the level of community welfare can be maintained, or even increased in the following year.

Provinces that have not yet reached the maximum efficiency level should further optimize the use of their regional expenditures, by choosing the right strategy in using their regional income allocations. Expenditures should be oriented towards the public interest,

preventing corruption, overspending, and misdirection in allocating budgets to areas that are not a priority.

In general, its necessary to optimize in terms of the effectiveness of the budget for education, health and public services on the input side for all provinces. Meanwhile, from the output side, the target Life expectancy and Expected Years of Schooling need to be improved.

## REFERENCES

- Afonso, A. & Miguel St. Aubyn. (2005). Cross Country Efficiency of Secondary Education Provision : A Semi Parametric Analysis with Nondiscretionary Inputs. European Central Bank: Working Paper. No 494.
- Andhiani, K, D., Erfit, & Bhakti, A. (2018). Analisis pertumbuhan ekonomi dan ketimpangan pembangunan di wilayah sumatera, E Jurnal Prespektif Ekonomi dan Pembangunan Daerah, Vol. 7. No.1. ISSN: 2303-1255 (online)
- Ascarya & Yumanita, D. (2007). Analisis efisiensi perbankan syariah di indonesia dengan data envelopment analysis (DEA). TAZKIA Islamic Finance and Business Review. Vol.1. No.2. pp: 1-32
- Badan Pusat Statistik. (2020). Indeks Pembanguna Manusia 2019. No. 21/02/Th. XXIII, 17 Februari 2020
- Banker, R, D, A., Charnes, W, W., Cooper. (1984). Some models for estimating technical and scales inefficiencies in data envelopment analysis. Management Science, Vol. 30, pp: 1078-1092
- Bappenas. (2020). Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2020-20204
- Coelli, T, J. (1996). A Guide to DEAP Version 2.1: A Data Envelopment Analysis (Computer) Program. CEPA Working Paper. Department of Econometrics: University of New England
- Fajri, M., & Siaga, R. (2020). Analisis Efisiensi Pengeluaran Kesehatan Provinsi Jambi. Akuntabel, 17(1). 115-121
- Farrel, M, J. (1957). The measurement of productive efficiency. Journal of the Royal Statistical Society. Vol.120 (3), pp: 253-290
- Gupta, S, B., Clements, E., & Tiongson. (1998). Public spending on human development. Finance & Development, Vol. 35 (3), pp. 10-13
- Gupta, S, et.al. (1997). The Efficiency of Government Expenditure: Experiences from Africa. IMF Working Paper. No.153.

- Hanif, N. (2007). Teori dan Praktik Pemerintahan dan Otonomi Daerah. Jakarta : PT Grasindo
- Hermawan, P & Ananda, C.F. (2013). Desentralisasi Fiskal dan Efisiensi Belanja Pemerintah Sektor Publik (Studi Kasus ; 38 Kabupaten/Kota di Jawa Timur Tahun Anggaran 2006-2010)". Jurnal of Faculty and Bussines University of Brawijaya Malang
- Ida B, P., Maryunani., Candra F, A., & Dwi, B, S. (2018). "The implications of fiskal decentralization and budget governance on economic capacity and community welfare". Foresight
- Kurnia, A, S. (2005). Model pengukuran kinerja dan efisiensi sektor publik metode Free Disposable Hull (FDH). Jurnal Ekonomi Pembangunan, Vol.10. No.3, 203-213
- Mangkoesoebroto, G. (2001). Ekonomi Pubilk. Yogyakarta: FE UGM
- Morizov, B. (2016). Decentralization: Operationalization and measurement model. International Journal of Organization Theory & Behavior. Vol. 19 Issue: 3, pp.275-307
- Ouertani, M, N., Naifar, N., & Haddad, H. (2018). Assessing government spending efficiency and explaining inefficiency scores: DEA-bootstrap analysis in the case of Saudi Arabia. Cogent economic and Finance. Vol.6
- Pamula. (2012). Efiseinsi Sektor Publik Pendekatan Data Envelopment Analysis Indonesia 2001-2008. Undergraduate Thesis. Fakultas Ekonomika dan Bisnis
- Pertiwi, L, D. (2007). Efisiensi belanja pemerintah daerah di provinsi jawa tengah. Ekonomi Pembangunan : Kajian Ekonomi Negara Berkembang. Vol. 12 No.2, pp:123-139
- Rapiuddin & Rusydi, B, U. (2017). Efisiensi belanja pemerintah sektor pendidikan dan kesehatan di Provinsi Sulawesi Selatan. Economic, Social, and Development Studies. Vol.4. No.1
- Rusydiana, A, S. (2013). Mengukur Tingkat Efisiensi dengan Metode Data Envelopment Analysis (DEA). Tim SMART Consulting: Katulampa Bogor
- Rusydiana, A. S. (2018). Perubahan Teknologi dan Efisiensi pada Organisasi Pengelola Zakat di Indonesia. *Liquidity: Jurnal Riset Akuntansi dan Manajemen*, 7(2), 124-136.
- Sabermahani, A., Barouni, M., Seyedin, H., & Aryankhesal, A. (2013). Provincial human development index, a guide for efficiency level analysis: the case of iran. *Iranian journal of public health*. 42. 149-57.
- Sajiah, F. S., & Saputra, D. (2019). Efisiensi Belanja Kesehatan di Indonesia: Pendekatan Two-Stage Network DEA. *Jurnal Anggaran dan Keuangan Negara Indonesia (AKURASI)*, 1(2).
- Sekiguci, S. (2019). An analysis of the efficiency of local government expenditure and the minimum efficient scale in Vietnam. *Urban Science*.
- Sihaloho, E, D., Siregar, A,Y, M., Rijoly, J,C, D. (2019). Analisis efisiensi belanja kesehatan provinsi maluku. 4. 58-67. 10.29407/jae.v4i2.12702.
- Stiglitz, E, J. (2000). Economics of Public Sector. WW. Norton & Company
- Totalia S, A., Wardani., & Rusydi. (2015). Analisis efisiensi relatif penggunaan pendapatan daerah dalam meningkatkan kesejahteraan pada kabupaten / kota provinsi jawa tengah tahun 2007 – 2012. *Jurnal Pendidikan UNS*
- Trisyandi, R. A., Aimon, H., & Putri, D. Z. (2016). Analisis Efisiensi Pengeluaran Pemerintah Sektor Pendidikan di Propinsi Sumatera Barat. *Jurnal Ecosains*, 5(1). 17-30.
- Verhoeven, M., Victoria G., & Carcillo, S. (2007). Education in Health in G7 Countries: Achieving Better Outcomes with Less Spending. IMF Working Paper. No.26.
- Widodo, B. T. (2019). Evaluasi Dinamis Dampak Fiskal Otonomi Khusus terhadap Efisiensi Layanan Publik dan Pertumbuhan Ekonomi di Provinsi Papua, Papua Barat dan Aceh tahun 2011-2017. *Kajian Ekonomi Keuangan*, 3(1). <https://doi.org/10.31685/kek.v3i1.463>
- Yunan, Z, Y. (2014). Tingkat efisiensi pengeluaran pemerintah daerah di pulau jawa. *Signifikan*. Vol.3, No.1. doi:10.15408/sigf.v3i1.2053.