



## Regional split and local government spending efficiency in Indonesia

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**Abstract:** The research objectives are to (1) measure the efficiency of local governments in every province in Indonesia and (2) analyse the impact of regional splitting, GRDP per capita, population density, and fiscal capacity on the efficiency of local governments. This study employed per capita personnel spending, per capita spending on goods and services, and per capita capital spending. The output used in the dataset is the human development index. The first objective (local government efficiency) is measured by Data Envelopment Analysis (DEA), with VRS and an output-oriented model. DMUs are 34 provinces from 2013-to 2018. The second objective (the impact of regional splitting, GRDP per capita, population density, and fiscal capacity on efficiency) is measured by panel data regression with a random effect model. Results show that the always efficient provinces for 2013-2018 were Jakarta, Yogyakarta, and Banten. The study revealed 29 inefficient provinces in 2013, and this number increased to 31 inefficient provinces in 2018. Another finding is that regional splitting, GRDP per capita, population density, and fiscal capacity significantly impact local governments' efficiency. As inefficient provinces need to improve their efficiency, this study recommends that local governments focus on these four independent variables to strengthen their efficiency.

**Keywords:** government spending, human development index, DEA, regional splitting, GRDP per capita, fiscal capacity



## 1. Introduction

In Indonesia, provincial governments coordinate spending with all the local governments residing in each province. Apart from this coordination, the provincial government also has its spending to finance government administration in the region. Since the regional split was widely implemented in Indonesia in 2004, more than 50% of all provinces have experienced an increase in municipalities. Consequently, there was an increase in total local government spending for one area. This increase in spending should be used to improve the welfare of the people in the said province. The government is deemed efficient when an increase follows an increase in spending in the interest of its people; therefore, it is essential to evaluate the efficiency of government spending in all local governments in each province in Indonesia.

Previous studies evaluated government efficiency using government spending as input (Boetti et al., 2012; Rambe et al., 2020; Sihaloho, 2015), and per capita government spending as input (Yusfany, 2015). Other studies use spendings per category, such as social spending (Antonelli & De Bonis, 2018) and education and health spending (Fonchamnyo & Sama, 2016). There is also an efficiency measurement based on personnel, capital, and goods and services spending (Rambe et al., 2020; Sihaloho, 2015).

In this study, the efficiency of local governments in Indonesia is measured using three types of government spending: capital spending, goods and services spending, and operational personnel spending (Rambe et al., 2020; Sihaloho, 2015). These three types are operational spending that can be used to run government welfare programs. However, as the number of new autonomous local governments in Indonesia has increased, it turns out that total personnel spending (consisting of fixed and operational personnel spending) in each province has also increased significantly. This increase seems to be related to population density, which varies in each area; more densely populated areas have higher government spending than provinces with lower viscosity. Therefore, in measuring the efficiency of local government spending in each region in Indonesia, we consider that these three types of spending are appropriate for measuring efficiency.

The output produced by the local government represents an increase in the welfare of the people in each province. Several previous studies have highlighted government output in education (such as years of schooling (Dufrechou, 2016; Rambe et al., 2020) and health, such as life expectancy (Adam et al., 2011). Achievement of a specific output in one area does not necessarily reflect an increase in social welfare. Without good output in the health sector, good output in education results in a slow improvement in the quality of human resources. Therefore, this study uses work to achieve the quality of human resources, as indicated by the human development index (HDI). In other words, the output in measuring the efficiency of local governments is in the form of HDI. Not many previous studies have revealed the efficiency of using government spending to achieve HDI. Through policies, programs, and activities reflected in government spending, the government has a vital role in increasing HDI in its region. Is government spending appropriately and efficiently used to increase HDI? This research aims to use HDI output to evaluate local government efficiency.

The next stage of this research will analyse the factors that affect the level of efficiency of local governments. Several previous studies have revealed these factors, such as GDP per capita (Antonelli & De Bonis, 2018; Brini & Jemmali, 2016), population density (Doumpos & Cohen, 2014), and fiscal capacity (Rambe, 2020b).

Regional splitting is also considered a variable in this research. Indonesia has implemented regional splitting since 2004. Division within the province means the number of local governments in the province increases; as such, the area of public services for each local government has decreased, but the provincial government continues to coordinate with all local governments within the province. This decrease in a service area should logically increase each local government's ability to provide better public services as one of the objectives of regional splitting outlined in Indonesia No. 32 in 2004: regional splitting aims to improve welfare in each region.

This study is driven by a research question motivated by the dynamic role of regional splitting that might determine local government efficiency in Indonesia. The previous empirical literature has shown a propensity where many nations are willing to merge (Moisio & Uusitalo, 2013; Reiljan et al., 2013; Slack & Bird, 2013). However, previous research only describes how regional splitting in Indonesia came to be; they have not yet explained the quantitative impact of regional splitting on government efficiency in Indonesia.

As such, the aims of this research are to (1) measure the efficiency of local government in each province in Indonesia and (2) analyse the effect of gross regional domestic product per capita, population density, fiscal capacity, and regional splitting to local government efficiency in each province of Indonesia.

This paper is organised as follows. Section 1 describes the background and the literature review on the efficiency of government spending and the determinants of its efficiency. Section 2

describes the materials and methods used. The results of the research and discussion are presented in Section 3. Section 4 is the conclusion.

### 1.1. Government efficiency

The issue of government efficiency in Indonesia is essential. The regional splitting policy in 2004 has encouraged an increase in the number of autonomous regions in almost all provinces, which resulted in a rapid rise in government spending in each area. This condition increase in government spending does not automatically improve welfare in each section. It depends on local government programs and activities reflected in sub-national expenditure. Therefore, it is essential to evaluate the efficiency level in the use of government spending in Indonesia.

Efficiency relates to the relationship between the output (in goods or services) produced and the input (resources) used to have that output. Mathematically, efficiency can be measured as the ratio of work to input. An organisation is efficient if it can produce specific outputs with the lowest possible input. Certain inputs can produce maximum output (spending well) (Bogetoft & Otto, 2011; Coelli et al., 2005). The input and output combination cannot be further increased in an efficient condition because it achieves the best results.

In running a government, the essence of efficiency is optimising the spending related to the value of money, which includes efficient value and economic and practical use. Efficient here is an aspect of benefits or optimal results that must be achieved at a relatively smaller cost. So the government can increase efficiency if, at a relatively small cost, it can reach the targets that have been determined or at the same cost can increase the results achieved.

In government administration, government spending (input for the government) produces valuable outputs for people in the regions. Thus, if existing public money can produce maximum or efficient output, it is said that the use of public funds is efficient.

There are two types of efficiency: input efficiency and output efficiency (Pindyck & Rubinfeld, 2013). In input efficiency, the allocation of specific inputs used in the production process will be technically efficient if the output of one item cannot be increased without reducing other outputs. As for output efficiency, it's deemed efficient when a given number of inputs (given input) can result in the highest amount of output.

One of the most common approaches to measure efficiency is Data Envelopment Analysis (DEA). DEA is a nonparametric method to measure the efficiency of a unit such as corporations or public sector agencies (Ray, 2004). DEA applies a linear programming model to calculate the ratio of multi-output to multi-input and measure the relative efficiency of all compared units.

There are various advantages of DEA. First, in DEA, the functional correlation between output and input is not required (Deng et al., 2013; Nannyonjo & Okot, 2013; Zhang & Garvey, 2008). DEA calculates the relative ratio by comparing the total value of multiple outputs and the total value of multiple inputs of each unit without requiring a functional correlation between output and input (Bogetoft & Otto, 2011; Hsu et al., 2008). The second advantage is that the DEA can measure multiple outputs' efficiency to multiple inputs (Bogetoft & Otto, 2011; Huguenin, 2012; Nannyonjo & Okot, 2013).

DEA is also capable of benchmarking. Benchmarking or relative performance evaluation is a comparison system between one corporation. DEA also explicitly identifies actual peer units for each evaluated unit. DEA also identifies sources of inefficiency and the number of inefficient inputs (or outputs) in each unit. In other words, DEA can determine the number of inputs to decrease or the number of outputs to reach the best efficiency level.

The most common input variable in measuring government efficiency is government spending. One government spending proxy used to measure government efficiency is spending per capita, researched by Yusufany (2015), which evaluates the efficiency of local government in Indonesia, and Afonso & Fernandes (2008), which measures the efficiency of municipalities in Portugal. Both studies used the DEA method. Meanwhile, Prasetyo & Pudjiono (2013) used the ratio of government spending to GDP as input to measure the efficiency of local governments in 82 countries with the DEA & Malmquist index.

While several previous studies used per capita spending per category as input using the DEA method. One example is Hsu (2013), who only calculated health spending per capita to measure the efficiency of governments in European and Central Asian countries, whereas Dufrechou (2016) used per capita education spending to measure the efficiency of government in Latin America. Rambe (2020) also assessed government efficiency in North Sumatra, Indonesia, using per capita education spending. Meanwhile, Atmanti (2016) applied per capita education and health spending to analyse government efficiency in Central Java, Indonesia.

Research on efficiency in government spending per category has a few precedents. Several studies inspected government spending of specific sectors to measure government efficiency with

the DEA method, such as the use of health spending in 180 WHO member countries (Sinimole, 2012), education and health spending in Cameroon, Chad, and the Central African Republic (Fonchamnyo & Sama, 2016). In addition, Antonelli & De Bonis (2018) used government social spending in 22 European countries using the FDH and DEA methods.

Several other researchers use more types of spending as input, including Brini & Jemmali (2016) and Halaskova et al. (2018). Brini & Jemmali used four types of spending (administration, health, education, and infrastructure) in 11 Middle East and North African countries. Halaskova et al. used government spending in 5 areas of public services (general public services, health, education, social protection, recreation areas, culture, and religion) in European Union countries.

Meanwhile, Ouertani et al. (2018) assessed the efficiency of the government in Saudi Arabia based on spending on education, health, and infrastructure using DEA-bootstrap analysis. Another study was conducted by Prasetyo & Zuhdi (2013). Using the DEA & Malmquist index method, they used spending on education, health, subsidies, and government transfers to measure government efficiency in 81 countries using the DEA & Malmquist index method.

In addition, previous research also used other spending components as input, such as Rambe et al. (2020). Rambe et al. used per capita personnel expenditure, per capita goods and services expenditure, and per capita capital expenditure to measure the efficiency of local governments in Sumatra (Indonesia) using the DEA method. Likewise, Sihaloho (2015) used the same three types of spending to measure government efficiency in West Java (Indonesia) using the DEA method.

Meanwhile, Cordero et al. (2017) used to input personnel expenditure, operational expenditure, and capital expenditure in Portuguese municipalities using the conditional FDH method. It is slightly different from Balaguer-Coll et al. (2019), who used salaries and wages, spending on goods and services, transfers, and public investment to measure the efficiency of municipalities in Spain using the OLS regression method. D'Inverno et al. (2018) used spending on social services, education services, road infrastructure, and the police as input in measuring the efficiency of the government in Tuscan municipalities.

There is a difference between the one used to measure the efficiency of corporations and governments for output. The outputs of corporations are generally more quantifiable, as corporations are profit-oriented. Meanwhile, as public organisations are non-profit-oriented, they aim to improve the economic and social aspects of the general public. In turn, in the public sector, the output used in efficiency measurement tends to be broader than the output concept of corporations. The efficiency of local government spending can be interpreted as the effort of the local government to optimise costs in an attempt to improve the economy and public welfare.

In conclusion, the output used inefficiency is the variable that represents the quality of public welfare. For the education sector, several outputs are commonly used as government efficiency indicators using DEA, such as Rambe et al. (2020), Dufrechou (2016), and Hsu (2013). Rambe et al. measured the efficiency of local government in Indonesia, using years of schooling and life expectancy as output; Dufrechou used years of schooling and residents with secondary education in Latin America. Hsu (2013) used life expectancy at birth, mortality rate, and immunisation & measurements in European and Central Asian countries. Similar to Sinimole (2012), which measured the efficiency of governments in 180 WHO member countries, this study also used mortality rate and immunisation as output.

As previously explained, the output that shows the human development index reflects people's welfare. However, there have not been many previous studies using HDI as output. Several previous studies have used the human development index as output in measuring the efficiency of the government in Indonesia, especially in Central Java Province (Atmanti, 2016) and West Java Province (Sihaloho, 2015). Both used the DEA method.

Another study conducted by Prasetyo & Zuhdi (2013) used HDI as an output to measure government efficiency in 81 countries using the DEA & Malmquist index method. Another slightly different study by Prasetyo & Pudjiono (2013) used the peace index and HDI as output to measure the efficiency of local governments in 82 countries with the DEA & Malmquist index. Meanwhile, Vierstraete (2012) used HDI's non-income output to measure government efficiency in 146 countries using the DEA method.

## 1.2. The determinants of local government's efficiency

The impact of regional splitting on local government efficiency is observed in this research. Booth (2011) elaborated that regional splitting in Indonesia has caused a decrease in the number of citizens served by the government in a region. Unfortunately, it was followed by a reduced technical and administrative capacity (such as facility and government personnel). As such, it is rather difficult to fulfill the people's needs, proving that regional splitting has a negative impact on public service. This argument was supported by Fitriani et al. (2005), which all researched regional splitting in

Indonesia. Years after regional splitting occurred, it was found that the quality of welfare has decreased since regional splitting occurred, the indicators of analysing welfare being society's spending per capita, poverty rate, and education. Despite the argued negative impact of regional splitting on public service, this research attempts to observe the effects of regional splitting on local government efficiency.

The research hypothesis: regional splitting positively affects the local government efficiency.

Gross regional domestic product also determines the rate of government efficiency. A few researchers have found that gross regional domestic products (GRDP) per capita positively affect government efficiency, such as Antonelli & De Bonis (2018), who researched Europe with the censored Tobit regression method. Brini & Jemmali (2016) found similar results by using the Tobit regression method in 11 Middle East and North African countries. Oliveira (2012), with the multiple regression method, revealed the effect of GRDP per capita on government efficiency in 208 countries.

However, several studies have found that per capita GRDP has no significant effect on government efficiency. This is explained by Rambe (2020), whose study inspected local government in Indonesia with the logit regression method; Hsu (2013), whose research in Europe and Central Asia used the Tobit regression method; and Deng et al. (2013), whose study examined the efficiency of local governments in China, using the Tobit regression method.

Gross domestic products have also positively affected government efficiency. Dufrechou (2016) revealed this, who conducted research in Latin America using the panel bootstrapped truncated regression method. Fonchamnyo & Sama (2016), using the fractional logit regression method, also stated that GDP has a positive effect on government efficiency in Cameroon, Chad, and the Central African Republic. On the other hand, Yusufany (2015) found a negative impact of GDP on government efficiency with the Tobit regression method. Ouertani et al. (2018), with the DEA-bootstrap approach, also found a negative effect of GDP growth on government efficiency in Saudi Arabia.

The hypothesis of the research: gross regional domestic product per capita positively affects the local government efficiency.

Besides GDP, population density is inspected as the determinant for government efficiency. Various research found that population density has a significant negative effect on government efficiency. Antonelli & De Bonis (2018) also showed a similar result by doing research in European countries with the censored Tobit regression method; Becerra-Ornelas & Nuñez (2019)'s study, which examined the efficiency of municipalities in Mexico with the Stochastic Frontier estimation, and Doumpos & Cohen (2014)'s study which, with the truncated regression method, examined the efficiency of local government in Greece.

On the contrary, some findings revealed the positive effects of population density on government efficiency. Moreno-Enguix & Bayona (2017) examined 35 developed countries with the multiple regression method, and Fogarty & Mugeru (2013), who conducted research in Australia, found a positive effect on government efficiency. Yusufany (2015) found similar results using Tobit regression in his research on local government in Indonesia. Likewise, Afonso & Fernandes (2008) arrived at a similar conclusion for their research in municipalities in the Norte Region (Portugal) using the Tobit regression method. Geys & Moesen (2009), using the Cobb-Douglas method, also found a positive effect of population density on government efficiency in municipalities in Germany.

A few studies have found no significant effect on population density using the Tobit regression method, as Afonso & Fernandes (2008) found in municipalities in Portugal. Similar results were found by Deng et al. (2013), who examined the efficiency of local governments in China. Likewise, Hsu (2013) stated that population density has no effect on government efficiency in Europe and Central Asia.

The hypothesis of the research: population density positively affects the local government efficiency.

Another variable that influences the efficiency of local governments is fiscal capacity. In their research, Borge et al. (2008) stated an adverse effect of fiscal capacity on government efficiency in Norway. The higher the fiscal capacity, the less efficient the government will be. On the contrary, Rambe (2020) found that fiscal capacity positively impacts the efficiency of local governments in Indonesia

This research hypothesises that fiscal capacity positively affects the local government's efficiency.

## **2. Materials and methods**

This study employs three types of government spending variables to measure efficiency: personnel spending, services and goods expenditures, and capital spending. The purchasing power

parity values of these three variables were utilised as input variables to measure the efficiency. At the same time, the output variable employed in the dataset is the human development index (HDI).

Farrell (1957) defined several forms of efficiency: technical efficiency, price efficiency, and overall efficiency. This study, in particular, measures technical efficiency. The local government efficiency is measured by Data Envelopment Analysis (DEA). The efficiency model approach in DEA applied is a variable return to scale (VRS) based on the relationship between input and output. In addition, the DEA model applies to the dataset as an output-oriented model. The main objective of the output-oriented model is to assess how many additional outputs can be achieved with given input variables.

The efficiency model in study.

Objective function

$$mae = \mu_1 Y + \mu_0 \quad (1)$$

Subject to

$$U_1 X_1 + U_2 X_2 + U_3 X_3 = 1 \quad (2)$$

$$\mu_1 Y - (U_1 X_1 + U_2 X_2 + U_3 X_3) \leq 0 \quad (3)$$

$$\mu_1, U_{1,2,3} \gg 0 \quad (4)$$

Where Y is HDI; X<sub>1</sub> is per capita personnel spending using PPP; X<sub>2</sub> is per capita spending on goods and services using PPP; X<sub>3</sub> is per capita capital spending using PPP; E is efficiency score;  $\mu_1$  is the weight of output Y;  $u_{1,2,3}$  is the weight of input X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>,  $\mu_0$  is a constant value, which can be positive or negative.

In DEA, DMU (*decision-making unit*) is the unit that will be evaluated in terms of its capability to transform input into output. In this case, the unit (DMU) is all local governments in every province in Indonesia. Evaluating the local governments in each area as one unit of DMU is necessary for some reasons. First, people's welfare that would be achieved in one province results from the performances of many parties involved, such as the government, private sector, and household. However, the government is the only institution with programs to improve people's welfare. Second, in conducting local government administration, every municipality and city in one province interact. Hence the people's welfare in one area is the work of all municipalities and cities in the province. Some items of government spending given to one region aim to improve the province's welfare even though the projects might be located in some municipalities or cities in that province. Therefore, it is imperative for all local governments in one area to work together to achieve development goals.

After determining the value of government efficiency, the next step is to analyse four hypothesised factors affecting local government efficiency. The data used in this research is from 34 provinces from 2013-to 2018. The method of analysis used is Panel data regression. The regression model applied is:

$$E_{it} = \alpha + \alpha_1 + \beta_1 DRS_{it} + \beta_2 GRDP_{pci} - \beta_3 \ln PD_{it} + \beta_4 \ln FC_{it} + e_{it} \quad (5)$$

In which E = efficiency score; D<sub>RS</sub> is the dummy variable of regional splitting (D = 1 means split, D = 0 means other); GRDP<sub>pc</sub> is Gross Regional Domestic Product per capita; PD is population density; FC is Fiscal capacity; i is a cross-section (provinces); t is period (years); e is the error term

### 3. Results and discussions

#### 3.1. Efficiency of local government

The study results indicate that, on average, per capita, personnel spending among provinces is not much different. Of the three items of spending examined, local governments in Indonesia spent most on personnel spending, and they spent least on goods and services each year. Capital spending among provinces varies significantly.

Based on DEA measurement, in 2013, five provinces were efficient, while the remaining 29 provinces were categorised as inefficient. In the last six years of the period examined, the number of efficient areas does not vary. The data suggests that most provinces in Indonesia are not operating efficiently (Table 1).

**Table 1: Province's local government efficiency in Indonesia, 2013-2018**

Year	E < 1	The number of inefficient provinces	%	Efficient provinces (E = 1)	Average
2013	0.831 – 0.887	5	14.7	Jakarta, West Java, Banten,	0.941
	0.888 – 0.993	23	67.7	Yogyakarta, Central Java	
	0.994 – 0.999	1	2.9	(5 provinces (14.7%))	
2014	0.831 – 0.887	3	8.8	Jakarta, West Java, Banten,	0.947
	0.888 – 0.993	24	70.7	Yogyakarta, (4 provinces (11.7%))	
	0.994 – 0.999	3	8.8		
2015	0.831 – 0.887	2	5.8	Jakarta, West Java, Banten,	0.948
	0.888 – 0.993	26	76.5	Yogyakarta, (4 provinces (11.7%))	
2016	0.831 – 0.887	2	5.9	Jakarta, West Java, Banten,	0.947
	0.888 – 0.993	27	79.4	Yogyakarta, South Kalimantan (5 provinces (14.7%))	
2017	0.831 – 0.887	1	2.9	Jakarta, West Java, Banten,	0.952
	0.888 – 0.993	26	76.6	Yogyakarta	
	0.994 – 0.999	3	8.8	(4 provinces (11.7%))	
2018	0.831 – 0.887	1	2.9	Jakarta, Banten, Yogyakarta,	0.952
	0.888 – 0.993	26	76.5	(3 provinces (8.8%))	
	0.994 – 0.999	4	11.8		

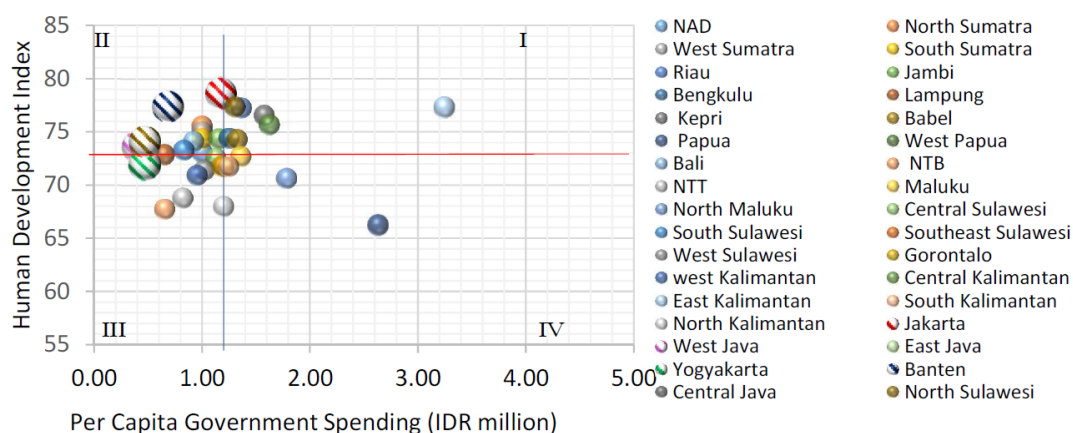
Source: Author's work

In this section, bubble charts explain per capita government spending, HDI, and efficiency levels (Figure 1 and Figure 2). The figures reveal that average government spending on personnel, goods, and services and capital spending was IDR 1.25 million in 2013, and it became IDR 1.56 million in 2018.

The average HDI for 2013 was 73.21, and it decreased to 70.39 in 2018. There are four quadrants in the bubble chart that explain the pattern of the perceptual map of HDI (vertical axis) and the local government spending (horizontal axis).

The figures also portray that of the five efficient provinces in spending, four provinces were in Quadrant II (Jakarta, West Java, Central Java, and Banten), and one province (Yogyakarta) lay in Quadrant III in 2013 (Figure 1). In 2018, all three efficient provinces belonged to Quadrant II (Jakarta, Yogyakarta, and Banten). Meanwhile, there was a shift in the movement of the quadrant membership for inefficient provinces from 2013-to 2018. North Sulawesi moved from quadrant II to quadrant I, South Kalimantan moved from quadrant III to quadrant IV, South Sulawesi moved from quadrant IV to quadrant III, and Riau, Kepri, and Bangka Belitung moved from quadrant I to quadrant II. Four provinces, namely Riau, Kepri, Bangka Belitung, and Southeast Sulawesi, moved to a better quadrant, even though they were not fully efficient in 2018.

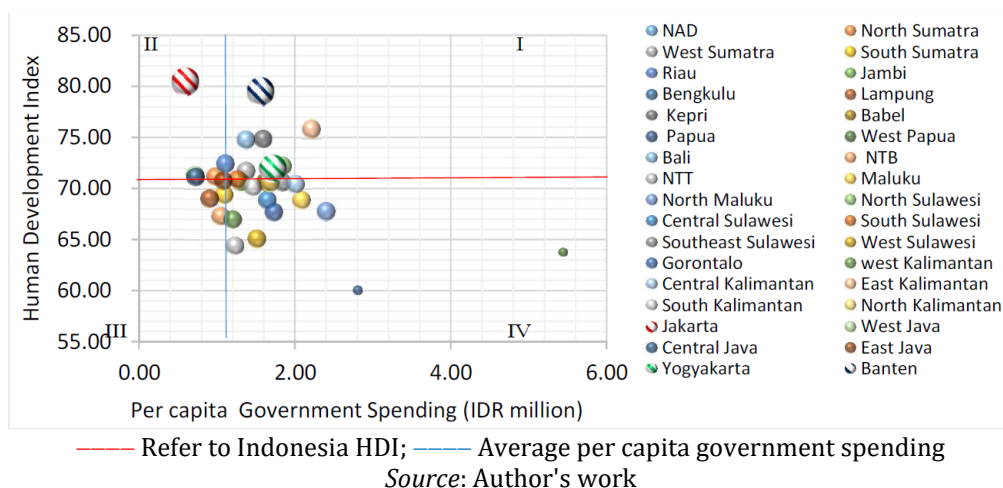
As mentioned earlier, five provinces were efficient in 2013, and 4 provinces were efficient in 2014-2015. The number increased to 5 efficient provinces in 2016 but decreased to only three efficient provinces in 2018. Interestingly, all efficient provinces were from Java Island.

**Figure 1: Average government spending, HDI, and Efficiency level of the 34 provinces, 2013**

— Refer to Indonesia HDI; — Average per capita government spending

Source: Author's work

**Figure 2: Average government spending, HDI, and Efficiency level of the 34 provinces, 2013**



The more giant bubbles portray efficient provinces, while the smaller bubbles refer to inefficient provinces.

### 3.2. Panel regression model

After determining the efficiency score of each local government, the next step would be to analyse the factors. A classic assumption test is conducted and then proven. Chow test, Hausman test, and LM test have also been performed. These tests show that the appropriate panel regression model is the random effect model. Therefore, research can proceed with the hypothesis test.

Based on the F test, with  $\alpha = 5\%$ , knowing that the probability is 0.000,  $H_0$  is rejected. It implies that the entirety of all four independent variables significantly affects the efficiency of local governments. Meanwhile, for the t-test, these four independent variables positively and significantly affect the efficiency of local governments. Proceed with the hypothesis test is completed with information test and panel regression model as shown in Table 2.

Table 3 elaborates on the determinant coefficient. Adjusted  $R^2$  in the panel regression model shows that these four independent variables can only explain 38.25% of the varying fluctuation of the efficiency value of local governments per province. Out of four significant independent variables affecting the local government efficiency, the variable that most affects local government efficiency is population density, followed by the GRDP variable per capita.

**Table 2: Random effect model**

	C	DRS	Ln GRDPpc	Ln PD	Ln FC
Coefficient	63.41208	0.426081	1.006564	1.353560	0.468895
T statistic	9.430163	3.405938	2.108641	4.628788	3.053358
Significant level	***	***	**	***	***
$R^2$	0.382574				
F Statistic	29.89707				
Prob	0,0000				

Source: Author's work

Note: \*\*\* denotes significance at 1% level. \*\* at 5%, and \* at 10%

On the other hand, the regression model also shows the elasticity of each significant variable. Efficiency will improve most elastically if population density increases. In this study, the variable with the most excellent elasticity is population density, followed by GRDP per capita. In other words, apart from population density, the efficiency of local government is also elastic to changes in GRDP per capita. However, the efficiency of local government does not elastically change if there are changes in fiscal capacity and regional expansion.

The variables that significantly affect government efficiency are described as follows. The population density variable positively affects local government efficiency. The results of this study contradict research by Boetti et al. (2012); Geys & Moesen (2009); Porcelli (2014); Yusufy (2015), which state that population density negatively affects government efficiency. However, this study parallels Rambe's (2020) and Deng et al.'s (2013) research. So why, in this study, is there a positive effect of population density on the local government efficiency? The personnel spending and the



number of civil servants are generally the same for each province. The local governments can work more efficiently if they have a higher population density. The higher the population density, the more efficient the government, and the more public activities and services can be provided. There is less free time for civil servants in working hours in more densely populated provinces. This suggests that government spending on public services has become more efficient. Some provinces are more populous than others, for example, West Java and Jakarta provinces.

It is different in provinces with low population density, for example, Papua and West Papua provinces. With a less dense population, the civil servants in the area work to serve a smaller number of people. In other words, there is more free time for civil servants in sparsely populated provinces, even though government spending on government activities (including paying civil servant salaries) is almost the same as for densely populated provinces. This condition makes local governments in areas with a low population density less efficient.

The variable with the second biggest influence after population density is GRDP per capita. This research shows that GRDP per capita positively affects local government efficiency, supported by preceding studies (Dufrechou, 2016; Rambe, 2020; Sinimole, 2012). The impact of GRDP per capita will be further elaborated as follows. Citizens of an area with high income will have higher expectations of their local government. On average, citizens with higher GRDP per capita have a higher rate of education and knowledge than poor citizens. With higher education and knowledge comes a higher expectation towards their government performance. Their demands thus increase as well. This situation motivates the government to perform better to meet the needs and expectations of its people.

The more financially well-off citizens are the main contributors to tax - a huge source of income for the local government. From the perspective of a taxpayer, citizens tend to supervise the cash flow of their local government. Does government spending align with the planned programs? Do these programs and events significantly improve welfare? These questions, with the supervision which generates them, motivate the government to perform more efficiently.

The contrary applies to citizens with lower GRDP per capita. With low income, their focus is almost entirely on the urgent need to meet ends. Because of this, they generally have lower awareness of their government performance. With little to no criticism and supervision against them, the government continues to perform moderately and inefficiently.

The following variable is fiscal capacity. This study found a positive effect of fiscal capacity on increasing the efficiency of local government in each province. This finding is not in line with research conducted by Borge et al. (2008), but it is parallel to Rambe's (2020) research. In this study, fiscal increases have a positive effect on increasing the efficiency of local governments even though they are inelastic (regression coefficient is 0.57). In Indonesia, the provincial government uses its fiscal capacity to support government programs and activities to improve public welfare, such as education and health, increasing HDI.

The last variable is the dummy variable of regional splitting. The efficiency level of the overall spending of provinces with split regions is higher on average than provinces without split areas. The results of this study are different from previous studies such as Fitriani et al. (2005) and Booth (2011), who revealed a decrease in the welfare of society after expansion. There are several logical reasons to explain the condition of Indonesia where local governments in provinces with new-split regions experience increased efficiency. First, government officials in the autonomous regions generally know more about the people in their areas, so they better understand the needs of the people in their parts. Local governments are also given the authority to create revenue sources and create new public service sectors by the uniqueness of their respective regions. Thus, local governments can plan more appropriate activities to solve problems in the regions and provide public services more effectively and efficiently.

In addition, too large an area and too large a population providing public services can also cause local government programs and activities to be ineffective and inefficient. Therefore, with the new autonomous regions, local government activities only focus on a smaller area (and with a smaller population than before). It allows public services for the people in their regions to be of higher quality. Thus, the results achieved by regional governments are more likely to achieve the goal, namely to improve the welfare of the community (HDI).

From this explanation, it can be said that the division of districts/cities within provinces in Indonesia is still in a favourable condition because the increase in public welfare (HDI) obtained is still higher than the increase in spending that has occurred. In other words, the division of districts/cities within a province in Indonesia increased the overall efficiency of the provincial government's spending in the period 2013 to 2018.

## 4. Conclusions

This research aims to (1) measure the efficiency of local government in each province in Indonesia, and (2) analyse the effect of gross regional domestic product per capita, population density, fiscal capacity, and regional splitting on local government efficiency in each province in Indonesia.

The study results conclude that there were five efficient provinces in government spending in 2013, namely Jakarta, West Java, Central Java, Banten, and Yogyakarta. In 2018, DEA concluded that only three efficient provinces were Jakarta, Banten, and Yogyakarta. However, the numbers of inefficient provinces in 2013 were 29, and the number of inefficient provinces increased to 31 in 2018. It is interesting to note that all efficient provinces come from Java Islands. It could be because the HDI of provinces in Java is better than others. In general terms, provinces with a better HDI generally have a better quality of human resources and, therefore, can design more effective and efficient programs. Therefore, the inefficient provinces must learn from their peer reviews. They should learn from their peers how to improve their target HDI. For an inefficient local government, learning public finance management and spending administration is imperative since it could eventually strengthen its planning and implementation of the government administration. Adopting e-government is one way to improve government spending management. By applying e-planning, e-budgeting, and e-procurement, a local government will boost its position to spend wisely and eventually attain a better HDI.

On the other hand, using panel data regression with a random effect model, it is found that regional splitting, GRDP per capita, population density, and fiscal capacity have a significant positive effect on local government efficiency. Therefore, efficiency can improve if GRDP per capita, population density, and fiscal capacity increase. Likewise, with regional splitting, provinces that experience regional splitting are becoming more efficient. In other words, Indonesia still benefits from doing regional splitting as it can increase the efficiency of local government.

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## Conflicts of interest

The author declares no conflict of interest.

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