



## REGIONAL GOVERNMENT SPENDING EFFICIENCY ON HEALTH AND EDUCATION IN DECENTRALIZATION ERA: EVIDENCE FROM INDONESIA (PERIOD OF 2010 TO 2017)

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### ABSTRAK

*This paper is to evaluate spending efficiency of regional governments on health and education in Indonesia during the fiscal decentralization period year of 2010-2017. Employing a sample of 33 provinces, this paper computed efficiency scores adopting nonparametric frontier that estimated by Data Envelopment Analysis (DEA) and analyzed those scores qualitatively. Results of this paper show that among west regions' provinces: Bali, Bangka Belitung, DI Yogyakarta, Central Java, and Kepulauan Riau had relatively the most efficient public spending, both on health and education in the period of study. DKI Jakarta and West Java had efficient spending only on health, and Bengkulu had efficient score on only education. On the other hand, among east regions' provinces: Gorontalo, Central Kalimantan, East Kalimantan and North Sulawesi had the most efficient public spending on health and education services. Maluku and Southeast Sulawesi had efficient expenditure only on health, while South Kalimantan, North Maluku, West Nusa Tenggara, and West Sulawesi was efficient on education spending. It is concluded that provinces in east region of Indonesia were relatively more efficient in public spending both on health and education for promoting equal distribution of income than provinces in west region.*

Penelitian ini bertujuan untuk menganalisis tingkat efisiensi belanja pemerintah provinsi di bidang kesehatan dan pendidikan selama periode desentralisasi fiskal tahun 2010-2017. Dengan menggunakan 33 provinsi sebagai sampel, penelitian ini menghitung *score* efisiensi belanja pemerintah dengan menggunakan pendekatan teknik *nonparametric frontier* yang diestimasi dengan metode *Data Envelopment Analysis (DEA)*. Hasil penelitian menemukan bahwa di Indonesia Bagian Barat, provinsi Bali, Bangka Belitung, DI Yogyakarta, Jawa Tengah, dan Kepulauan Riau secara relatif memiliki tingkat efisiensi belanja tertinggi di bidang kesehatan dan pendidikan. DKI Jakarta dan Jawa Barat hanya efisien pada belanja kesehatan, sedangkan Bengkulu efisien terkait belanja pendidikan saja. Di sisi lain, di Indonesia Bagian Timur, provinsi Gorontalo, Kalimantan Tengah, Kalimantan Timur and Sulawesi Utara memiliki tingkat efisiensi belanja tertinggi di bidang pelayanan kesehatan dan pendidikan. Sementara itu, provinsi Maluku dan Sulawesi Tenggara memiliki tingkat efisiensi belanja yang baik di bidang kesehatan, dan provinsi Kalimantan Selatan, Maluku Utara, Nusa Tenggara Barat, dan Sulawesi Barat memiliki tingkat efisiensi belanja yang baik di bidang pendidikan. Hasil ini menunjukkan bahwa provinsi-provinsi di Indonesia Bagian Timur secara umum memiliki tingkat efisiensi belanja yang lebih baik dibandingkan provinsi-provinsi di Indonesia Bagian Barat.

## 1. INTRODUCTION

One of the implications of the reform era after 1998 was a “big bang” approach to wide-ranging decentralization by giving both greater political power and budgets to local governments. It is a uniform system under which all subnational governments in Indonesia operate. This democratic and autonomous system replaced the previous system of centralized government and development planning. Laws No. 22/1999 and No. 25/1999 decentralized political and economic powers away from the central government after decades of highly centralized and autocratic rule. These laws give authority to local governments to execute a wide range of responsibilities in areas such as health, education, public works, environment, communication, transport, agriculture, manufacturing industry and trade, capital investment, land, cooperatives, labor force, and infrastructure services (Nasution, 2016).

From theoretical framework, fiscal decentralization can improve the efficiency of public service delivery through preference matching and allocate efficiency. Local governments possess better access to local preferences and, consequently, have an informational advantage over the central government in deciding which provision of goods and services would best satisfy citizens’ needs (Musgrave, 1969). When provided by the jurisdiction that has the control over the minimum geographic area, costs and benefits of public services are fully internalized, which is expected to improve allocate efficiency (Oates, 1972). Fiscal decentralization can also ameliorate efficiencies by fostering stronger accountability. Geographical closeness of public institutions to the local population (final beneficiaries) fosters accountability and can improve public service outcomes, particularly in social sectors such as education and health (Ahmad, Brosio, and Tanzi, 2008; Cantarero and Pacual Sanchez, 2006). Accountability can foster larger spending in public investment and in growth-enhancing sectors, such as education and health (Keen and Marchand, 1997; Arze del Granado and others, 2005; Bénassy-Quéré and others, 2007; Kappeler and Valila, 2008; Fredriksen, 2013).

However, fiscal decentralization can worsen public service delivery if scale economy becomes consideration. Devolution of public service delivery to a small-scale local government can decrease efficiency and increase costs if economies of scale are important in the process of production and provision of some specific public goods. For instance, shifting the production and provision of public services to a municipality with a small size of government officials (producers and providers) and a small population (beneficiaries) can reduce efficiency. Fiscal decentralization can also obstruct the redistribution role of the central government. To guarantee a minimum level of public service and basic needs (or standard of living) for the entire population (regardless of their geographical location), the central government often carries out equalization transfers,

which would be disrupted in cases of insufficient leverage on resources (Ter-Minassian, 1997). When a large share of revenue and expenditure is shifted to local governments, the central government does not possess sufficient resources to ensure a minimum equity across the entire territory. Fiscal decentralization can also hinder public service delivery if accountability is loose. If accountability is not broadly anchored in a local democratic process, but instead is based on rent-seeking political behavior, local governments would be tempted to allocate higher decentralized expenditure to non-productive expenditure items (such as wages and goods and services instead of capital expenditure). This can hinder efficiency, economic growth, and overall macroeconomic performance (Davoodi and Zou, 1998; Zhang and Zou, 1998; Gonzalez Alegre, 2010; Grisorio and Prota, 2011).

The decentralization of government functions, however (especially for Indonesia), was not followed up with equipping sub-national governments’ capacity to produce public goods, increase productivity and employment, and promote economic growth in their jurisdictions. Prior to reform, sub-national governments had mainly functioned as implementing agencies of national policies and programs. For the long periods of centralization, local governments never built the necessary capacity for economic planning or to take initiatives to promote economic growth in their jurisdictions. The rising revenues of local governments do not follow their increasing government functions to promote economic development that could potentially cause fiscal imbalances. On the other hand, the central government lacks the capability to monitor the implementation of the government functions transferred to the sub-national level, to monitor sub-national governments’ spending patterns and efforts (Nasution, 2016).

Increasing fiscal decentralization implies a better alignment between spending and funding responsibilities and, as suggested by economists, a potential improvement of the efficiency (as well as of the effectiveness) of public services provided to citizens. Public spending efficiency is defined as the ability of the government to maximize its economic activities given a level of spending, or the ability of the government to minimize its spending given a level of economic activity. Hence, public spending efficiency could be used as an indicator to evaluate the effectiveness of government policy implementation on administration, education, health, income distribution, and economic stability. It is crucial for the government to spend the money collected from taxpayers efficiently, as it is accountable to its citizens. The fundamental question of economics is concerned with the efficient use of scarce resources. In this context the concept of efficiency provides an evaluation of a country’s allocation of resources in promoting economic growth.

Indonesia is a unitary country comprising central, provincial and local (district) levels of government. Throughout most of its history, Indonesia's public sector was counted among the most centralized in the world. In 2001, however, Indonesia initiated a very ambitious programme of administrative, fiscal and political decentralization (Lewis, 2014). The Indonesian decentralization effort had its genesis in two laws, both promulgated in May 1999, one on administrative matters (Law 22/1999) and the other on fiscal and finance issues (Law 25/1999). In December 2000, the national parliament (Dewan Perwakilan Rakyat – DPR) passed an additional and essential piece of decentralization legislation on sub-national government taxation (Law 34/2000). The three laws all began implementation in 2001. The legislative framework outlines major service responsibilities of sub-national governments and the resources to which they have access. District service assignments focus on education, health and infrastructure functions and also include tasks related to social protection, environment, low-income housing, security and law and order, and support for economic development, among others. Sub-national government responsibility for service delivery is considerable. Provincial and local government expenditure makes up about half of total public sector spending net of subsidies and interest payments; local government expenditure comprises about 75% of the subnational total (Lewis, 2014).

Local governments manage their fiscal resources rather poorly, in general. Efficiency is a critical issue for many in Indonesia. At every government level, whether central, provincial and district and city, the policy instruments in the management of public finances has been widely applied and implemented, but there is still a lot of waste and irregularities found against the use of public resources. Indications of this issue is reinforced by the results of the examination of Audit Agency Board (BPK) to report information accountability of local governments in 2016, where from 537 audited local governments' financial statements, 375 with a qualified opinion (WDP), and 23 area given disclaimer opinion. Thus, it is necessary to evaluate the performance of local governments (Pamungkas, 2018).

This research is related to the issues about how the provincial government in Indonesia allocated the budget. There are some provinces that have big budget but just have smaller output than other provinces with smaller budget. The efficiency of public spending can be measured as a difference between the actual spending and the theoretically possible minimum spending that is sufficient to produce the same level of actual output (Esanov, 2009). The purpose of this paper is to evaluate spending efficiency of regional governments on health and education in Indonesia during the fiscal decentralization period year of 2010-2017. Relying on a sample of 33 provinces as regional government, this paper firstly compute efficiency

scores adopting nonparametric frontier that estimated by Data Envelopment Analysis (DEA).

In the recent years there are increasing interests of researchers to analyze the government spending efficiency in Indonesian case. Most of them established at regencies and municipalities as subprovincial level in Indonesian context such as Fahriant and Carolina (2012); Lestari (2013); Yatiman and Pujiyono (2013); Indriati (2014); and Puspitasari and Pujiati (2017). Studies at province level as regional government term are still very rare found. Whereas the provincial governments in recent decentralization context have double roles as autonomous regional governments and as regional representatives of the national government. They are responsible for supervisory functions and are supposed to intervene in matters that require cross-jurisdictional cooperation. As the regional representatives of the central government, the provincial governments are expected to oversee and closely supervise, making decentralization work more effectively (Nasution, 2016). Consequently, this study fills a gap in the literature by analysing the government spending efficiency in the case of regional governments (provinces) in Indonesia. Results from this study enable policy makers to identify sectors where government spending is inefficient so that governments can reallocate their resources efficiently.

This paper chose the health and education services as the object of assessment because Lewis (2016) found an inverted U-shaped relationship between local government spending and education, health and infrastructure outcomes. That is, local government spending positively influences service delivery –but only up to a point, after which the relationship turns negative. The critical point in the association between local government expenditure and public service access –in health, education and infrastructure– is reached at about the 75th percentile of spending. In addition, Law no. 20 of 2003 on the National Education System states that the government is responsible for provision of a nine-year basic education, and both central and local governments must allocate 20% of their budget to education.

Law no. 32 of 2004 and Government Regulation no. 38 of 2007, which set out the overall framework for decentralization in Indonesia, state that the provision of primary and secondary education is shifted to the local government at the district level. This law was recently amended by Law no. 23 of 2014, which established the authority of district local governments on primary and junior secondary education and the authority of provincial local governments on senior secondary education 89.5% and 60.4% of schools at the primary and junior secondary levels are public schools, respectively<sup>1</sup>. Therefore, the role of government spending in basic

1 Statistic of Education 2016, Ministry of Education and Culture of Indonesia.

education, which is under the authority of the district government, is imperative.

In addition, many district governments, relying on their relative autonomy, designed local health care financing schemes. Collectively known as Jamkesda (Jaminan Kesehatan Daerah—Regional Health Insurance), these schemes typically aim to address the non-insured population. However, despite the common institutional background, motivation and objectives, the Jamkesda schemes show a great deal of variation in the design, such as coverage, benefit packages and provider contracting (Gani et al., 2008, 2009). The empirical evidence on health care financing schemes in Indonesia generally shows that targeted fee waivers and subsidized health insurance schemes for the informal sector are associated with an increase in health care utilization for the poor but have little effects on out-of-pocket spending (e.g. Sparrow et al., 2013). However, there is no evidence on the effects of sub-national health care financing. Potentially, on one hand, decentralization of health spending to sub-national level can improve the performance of health systems and service delivery, as local governments are closer to the target population and better placed to identify local needs. On the other hand, service delivery may suffer as local governments may be more limited in terms of resources, and technical and administrative capacity as compared with the national government Sparrow et al., 2016). Thus, it is necessary to evaluate the efficiency of local governments spending on health and education.

The remainder of the paper is organized as follows: Section 2 presents literature review and highlights the fiscal decentralization experiences in Indonesia. Section 3 describes empirical methodology. Section 4 reports empirical findings and results discussion. Section 5, the article ends with a conclusion.

## 2. LITERATURE REVIEW

In public finance literature, public spending on investment, consumption, social welfare or redistribution enhances economic growth and overcomes the stage of stagnation in an economy (Afonso, Ebert, Schuknecht and Thöne, 2005). This is particularly true as public spending leads to an increase in human capital, which enhances research and innovation activity (Afonso, Schuknecht and Tanzi, 2006). In addition, research and innovation is crucial for a country to sustain its competitiveness. Government spending, particularly on education, increases human capital and hence brings technological progress, which in turn leads to efficiency in the economy.

Most of the empirical research on efficiency focuses mainly on bank, insurance, hospital, education, etc. However, there are only few studies that focus on government spending efficiency in the case of emerging markets. Furthermore, most of efficiency studies

focused principally on measuring public expenditures in the case of cross-country level and/or panel data, with a limited number of studies conducting a time series analysis (i.e., Rouselle et al. 2015, among others). Gupta and Verhoeven (2001) assess the efficiency of government expenditure in the case of 37 African countries over the period 1984–1995 using the non-parametric approach Free Disposal Hull (FDH). Their main findings stress that, on average, the spending of these countries towards education and health are inefficient. They show that the relationship between efficiency scores and public expenditure is negative, implying that higher educational attainment and health output requires efficiency improvement more than increased budgetary allocations.

Jarasuriya and Woodon (2003) assess the public spending efficiency in the case of 76 developing countries over the period 1990–1998. They have separately constructed two efficiency frontiers: the first one considers three inputs (per capita GDP, spending per capita and the adult literacy rate) to produce a single output (the net primary enrolment). The second one considers the same inputs, but to construct a health output indicator (life expectancy). They find no relationship between spending and the two outputs when they take account the per capita GDP. These findings imply that an increase in public spending does not guarantee an improvement in education or health.

Greene (2005) use the SFA in the case of WHO panel data to estimate and explain inefficiency scores variation across a sample of counties. The main contribution of this paper to the frontier efficiency literature is the novel model “True-random effect” proposed for the first time by the author. The idea behind this model is to distinguish between efficiency and heterogeneity. In a first step, the author estimates a production frontier using expenditure and education as inputs to produce one output (health). In the second step, the author explains the expenditure on health by examining the inefficiency score on a set of explanatory variables by using linear regression. The author stressed that only the income inequality measure, GDP per capita and a dummy variable for tropical location were significant.

Greene (2005a) analyze the public spending efficiency in a sample of 232 countries over the period 1975–2002 using a variety of econometric models developed in the stochastic frontier methodology. He argues that the stochastic frontier is more suitable than the non-parametric approach (DEA). Greene (2005b) re-examines a study from the World Health Organization dealing with the public spending efficiency on healthcare and education attainment. He presents a variety of estimation comprising the single input–output case by estimating a production function, and the multi-output–input case but using the parametric distance function.

Afonso and Aubyn (2004) use the non-parametric approaches DEA and FDH to analyze the efficiency of expenditure in education and health in the case of a sample comprising some OECD countries. The authors present the different results obtained by input-oriented and output-oriented efficiency estimations. Their main findings exhibit a very low spending and low education attainment results; hence, it can be considered as the “origin” of the efficiency frontier.

Carosi et al. (2014) study the global public spending efficiency in Tuscan municipalities by according a particular interest for the impact of the municipal size by adopting the non-parametric methodology. Moreover, they adopt a second-stage analysis in order to explain the inefficiency scores using a Tobit regression. Their main findings either by the DEA methodology or by the Tobit regression seem to be consistent, meaning that it can be considered as a very usefulness tool to the decision makers in order to correct the spending policies adopted by the inefficient municipalities. Furthermore, they find that municipal has a real effect on the efficiency of the public spending (i.e., the bigger is a municipality and the greater is their efficiency level).

Fonchamnyo and Sama (2016) analyse the efficiency of public expenditure on education and health and their determinants in three CEMAC countries (Cameroon, Chad and Central African Republic) using non-parametric DEA method over the period 2000–2012. Furthermore, the authors examine the impact of some non-discretionary variables (institutional and economic factors) that might influence inefficiency by the means of Tobit and Logit regression techniques. The empirical results show that Cameroon is the best in term of efficiency in spending on education and health, and Chad is the worst regarding public spending on education, despite it spends more on education than the other. Central African Republic is the least efficient in public spending on health. Based on the second regression, the authors stated that decision makers should fight against corruption and assess the quality of budgetary and financial management.

Afonso and Kazemi (2017) have conducted an analysis dealing with public spending efficiency of 20 OECD countries over the period 2009–2013. Their main contribution to the underlying literature consists in the construction of two indices to gauge Public Sector Performance (PSP) and Public Sector Efficiency (PSE). The main objective of their work is to evaluate performance and efficiency on the basis of inputs and outputs. In a first step, they have constructed two indicators, PSP and PSE. In a second step, they used the non-parametric approach (DEA) by considering six different models. The first two models assess efficiency of government at the aggregate level, but the other four models assess the efficiency of public spending in four main sectors: administration, education, health

and infrastructure. The assessment of the PSP scores raises that Switzerland is the best practice over the whole period followed by Luxembourg, Norway and Canada. But the worst are Greece, Italy, Portugal and Spain. Furthermore, authors point out that France, Denmark, Belgium, Finland, Sweden and Austria could improve their efficiency by using less of total expenditure regarding the actual level. The authors raised that countries that spend more are less efficient and vice versa.

### Decentralization Experience in Indonesia

Unlike in many developing and transitioning countries, the decentralization program in Indonesia did not cause major political or economic problems. Only the former Province of East Timor seceded to establish the Democratic Republic of Timor-Leste in 1989. Supported by the West during the Cold War, Indonesia had absorbed Timor-Leste in 1976 after a coup d'état led by the communist-leaning military in Portugal. The region was not part of the original Indonesia as it had been a colony of Portugal until 1976.

To preserve the unity of the country and end the sporadic rebellious independent movements, Aceh and Papua were granted more autonomous powers in local decision making in four areas: (i) religious affairs, (ii) local customs and institutions, (iii) education and (iv) local development policy. Law No. 4/2001 splits Papua into two provinces, namely, Papua and West Papua. Under the Helsinki Accord, peace agreement was signed with the Aceh Free Movement (*Gerakan Aceh Merdeka* [GAM]) on 15 August 2015. Law No. 11/2006 establishes the province *Nangroe Aceh Darussalam* (NAD) that uses Islamic shariah law.

At present, local governments in Indonesia are given significant control over expenditure, which reduces the control exerted by the central government. On the other hand, the power of local governments to collect tax and borrow remains very limited. The central government collects major taxes and can borrow from domestic and international financial markets. The central government retains five functions that affect the nation and devolved 11 obligatory functions to local governments, districts, and municipalities. Now, the power of central government is limited to six broad areas—finance, foreign affairs, defense, security, religion, and state administration and justice. These functions include international policies and implementation of treaties with foreign countries, citizenship and immigration, judicature, external trade, national monetary and fiscal policy, national planning, macroeconomic national development control, currency, banking and insurance, financial balance fund, state administration and state economic institutional systems, human resources development, natural resources utilization, strategic high technology, conservation, and national standardization.

Decentralization in Indonesia only gives autonomy to the local government to determine the size and structure of their budget expenditure. Taxing power remains with the central government, while local governments are only given the right to collect minor taxes such as taxes on land and building, motor vehicles, hotels, restaurants, entertainment, base metal and mineral extraction, and water. Local governments do not have the power to impose and collect customs and excise, corporate tax, personal income tax, and sales tax. Many affluent local governments, particularly in the urban sectors, sell or lease their land to private developers for commercial uses. Some public parks, playgrounds, and sport fields have been converted into shopping malls and hotels, and other commercial buildings. Those in rural areas can raise funds from issuing licenses for opening up virgin forest for small operators of commercial logging, plantation, and mining that could damage the environment.

Since the introduction of Law No. 17/2003, local governments have been allowed to borrow from both domestic and foreign markets. Local governments, however, require permission from the Ministry of Finance for issuing local debts. The law adopts the fiscal and debt rules of the European Union by limiting the budget deficits of central and local governments to 3% of their respective annual GDP or regional GDP. The ratio of debt to GDP or regional GDP is set at a maximum of 60%. So far, nearly 40% of central government expenditure has been transferred to the regional governments. The high transfer to subnational governments does not cause fiscal strain in the national public sector or deficits that pose a major threat to macroeconomic stability. At present, the budget deficit of the central government is below the limit of 3% of annual GDP and the ratio of public debt is about 27%, much lower than the maximum limit of 60%. There are three main sources of revenue for local governments: (i) local governments' own source of revenue (*Pendapatan Asli Daerah*), which includes local retribution and small amounts of revenue from profits of public enterprises owned by local governments, and revenue from their privatization and lease; (ii) tax and revenue sharing from income, corporate tax, and tax on natural resources; and (iii) transfers from the central government.

The grant from the central government to the local governments, in this decentralization framework, has two components. The first component is a minimum allocation known as the General Allocation Fund (*Dana Alokasi Umum* [DAU]). DAU is a lump sum given to all local governments regardless of their fiscal gap and is mainly intended to cover the salaries of civil servants. The second portion of DAU is a fiscal gap component, which is the difference between own fiscal capacity and fiscal needs. Most local government financing comes from DAU, which accounted for more than 60% of their total revenue. This indicates the high dependency of

local government budgets on grants from the central government to finance local service provision. Law No. 22/1999 establishes a floor of 25.5% of domestic revenue (including oil and gas revenue) for transfer to subnational levels through DAU or a general block grant that equalizes regional needs and revenue capacities. Equalization Grant (*Dana Bagi Hasil* [DBH]) is the second transfer from central to subnational governments. This DBH is the revenue sharing or tax sharing from the general tax revenue and revenue from the exploitation of natural resources, including mining, oil, and gas revenue. This exacerbates horizontal imbalances between provinces and districts. Some areas receive revenue sharing for reforestation.

The third transfer is the Special Allocation Funds (*Dana Alokasi Khusus* [DAK]) provided to finance central government initiatives implemented by the region, particularly in remote and less developed areas. This is a special purpose grant similar to a capital-financing program. As it is given to all local governments, there is competition between the recipients for effective implementation of the programs. Also, there is neither a bonus scheme nor an incentive scheme to encourage local governments to compete for improvements in the implementation of the programs. At the provincial level, the DAK grants are used for provincial road improvements, development of regional art and culture, and rural extension services. At the district level, the DAK grants are used for basic education and preventive health care, district road development, basic infrastructure, district markets, and small-scale industry development. The block grant can only be used for development purposes, primarily infrastructure. On top of these, the central government provides emergency financing to cover budget deficits of subnational governments due to natural disasters, and to restore their solvability.

The expenditure needs of local governments are estimated by using the most important needs of a regional government. Each regional government has five main categories of expenditure needs: (i) education; (ii) health and social welfare; (iii) government administration; (iv) infrastructure and public works; and (v) economic development, including transport, agriculture, industry and trade, capital investment, land, cooperatives, labor force, and environment. The expenditure needs for education are estimated by the number of school-age children and average years of education. At present, it is compulsory for children to finish 9 years of schooling. Expenditure for health and social welfare is calculated by using information on population numbers, the proportion of the old-age population, average life expectancy, and infant mortality. The government provides free medical services and contraception for its birth control program to control population growth. The needs of the general government administration are estimated from population numbers and the percentage of

urban population. The expenses for infrastructure are estimated using the length of local roads, the share of poor roads in the total length of local roads, and population density. The expenditure needs for economic development, including for agriculture, trade, industry, and telecommunications are calculated based on population numbers, per capita GDP, and a poverty head count ratio.

Under the centralized system before, the minimum standards for the public services were set by the central government. Local government workers, such as teachers, medical workers, workers building and maintaining infrastructure, and agriculture extension services workers, were assigned by the central government to the region. In a large and diverse country like Indonesia, the cost of producing public services greatly varies from one region to another. Because of the transfer of civil servants to the jurisdiction of local governments, local budgets are heavily skewed toward operating expenditure, particularly to cover personnel expenses including salaries of teachers, and personnel in health care and public works. This reduces the budget for maintenance and rehabilitation of infrastructure, school buildings, and medical equipment.

Under the local autonomy program, public services must be provided by staff employed by local governments. It is not easy to transfer the civil servants of the central government to lower-level administrations. There are many reasons for this, including the reluctance of civil servants to move to other districts with different ethnic backgrounds, with which they have few ties, and with fewer amenities. Because of these problems, the central government continues to finance all civil servants' expenditure even if they work for local governments. The quality of spending is limited by the inadequacy of qualified teachers, health workers, and technicians to produce the public goods and financial managers to manage the state funds.

### 3. METHODOLOGY

In measuring efficiency, it is important to correctly define the inputs and outputs. This study applies public spending of the provincial government in opportunity indicators consist of spending on health and education. They are used to reflect the quality of interaction between fiscal policies and market processes. Expenditure or spending on education is believed to increase the proportion of knowledge and skilled workers in the economy, which contributes to the development of human capital. In addition, Zagler and Dürnecker (2003) highlighted the importance of government spending on health care, which reduces illness and absenteeism, and hence increases the quantity of labour as well as its productivity in a country's economy. As a result, the opportunity indicators are important as they contribute directly to

economic growth (Devarajan, Swaroop and Zou, 1996).

This paper investigates the efficiency of regional government spending on health and education. Following the scant empirical literature on productive efficiency of municipalities (e.g., De Borger and Kerstens, 1996; Balaguer-Coll *et al.*, 2007; Giménez and Prior, 2007), this paper selected output indicators as proxies for services provided by regional governments in their most fundamental competencies, both for their budget and for their own citizens. Specifically, the output proxies are: life expectancy (*Angka Harapan Hidup*), human development index, expected years of schooling, and Net School Enrollment Ratio (NSER)<sup>22</sup>. Inputs are represented by *disaggregated* regional government expenditures or spending on health and education function. The samples are unbalanced panel data of 33 provinces excluding Province of Kalimantan Utara since data is not available during the period of study (2010-2017). Data are taken from various sources such as Central Bureau of Statistics of Indonesia (*Badan Pusat Statistik*), *Directorate General of Fiscal Balance of Ministry of Finance of Indonesia*, among others. Table 1 presents the variables employed as inputs and outputs.

Table 1 here

The methodology of this study is stochastic frontier techniques. These techniques provide time-varying coefficients that measure the distance of the public services in a specific unit at a specific year to the best public services provided using similar inputs in the sample of units considered in this analysis. Methodologies on efficiency estimates can be grouped in two main approaches: (i) a parametric approach (Battese and Coelli, 1988; Jayasuriya and Wodon, 2003; Grigoli and Kapsoli, 2013) and (ii) a non-parametric approach (Gupta and Verhoeven, 2001; Herrera and Pang, 2005; Gupta *et al.*, 2007). Each methodology actually presents advantages and disadvantages, but the literature has not been able so far to establish when a technique is strictly superior to the other (Coelli *et al.*, 2005).

This study used non-parametric approach with Data Envelopment Analysis (DEA) used both software of MaxDEA Ultra (8-core) 7.0.0 version and DEA Solver in Microsoft Excel to estimate efficiency score of public spending because this technique is extensively used in empirical application which means that it is a competing methodology to Stochastic Frontier Approach (SFA) and exhibits many advantages comparing with SFA, such that: (i) unlike SFA, the main feature of DEA is that it does not require specifying a functional form for production technology; (ii) DEA can be applied easily and no distributional assumptions required; (iii) in the case of production function, the DEA approach can be used in the case of multi-inputs multi-outputs.

2 Since 2007 and over NSER include non formal education (Package A equal SD/MI, Package B equal SMP/MTs and Package C equal SM/SMK/MA)

The DEA approach to efficiency measurement, first proposed in Charnes *et al.* (1978) seminal work, assumes the existence of a convex production set. The corresponding frontier is then built using a linear programming technique, given specific assumptions on the returns to scale. Let us define:  $q_i$  as the column vector of the outputs and  $x_i$  as the column vector of the inputs for the  $i$ -th province;  $X$  as the  $(4 \times n)$  input matrix and  $Q$  as the  $(4 \times n)$  output matrix, with  $n$  the number of provinces included in the sample. The DEA model is then specified as the solution to the mathematical programming problem in [1], for each of the  $n$  provinces:

$$\begin{aligned} & \text{Min}_{(\theta, \lambda)} \theta \\ \text{s.t. } & -q_i + Q\lambda \geq 0 \\ & \theta x_i - X\lambda \geq 0 \\ & N1' \lambda = 1 \\ & \lambda \geq 0 \end{aligned} \tag{1}$$

In problem [1],  $\theta$  is a scalar (that satisfies  $\theta \leq 1$ ); more specifically, it is the score that assesses technical efficiency of unit  $(x_i, q_i)$ . It measures the distance between a province and the efficient frontier, the latter being defined as the linear combination of *best-practice* observations; when  $\theta < 1$ , the province lies inside the frontier (i.e., it is inefficient), while  $\theta = 1$  implies that the province belongs to the frontier (i.e., it is fully efficient). The vector  $\lambda$  is a  $(n \times 1)$  vector of constants to be estimated, representing the peers' weights used to project an inefficient unit onto the efficient frontier; the peers are other municipalities that belongs to the best-practice frontier, and are therefore used as benchmarks for the inefficient units.  $N1$  is a  $n$ -dimensional vector of ones: the restriction  $N1' \lambda = 1$  imposes the convexity of the frontier, accounting for *Variable Returns to Scale* (the so-called DEA-VRS model); dropping this restriction would amount to assume *Constant Returns to Scale* (the so-called DEA-CRS model).

Once no price variability across the  $n$  observations is assumed, as we do, following De Borger and Kerstens (1996), the measure of *spending* efficiency can be obtained as follows:

$$\begin{aligned} & \text{Min}_{\lambda, x_i^*} (\omega_i' x_i^*) \\ \text{s.t. } & -q_i + Q\lambda \geq 0 \\ & x_i^* - X\lambda \geq 0 \\ & N1' \lambda = 1 \\ & \lambda \geq 0 \end{aligned} \tag{2}$$

where  $w_i$  is a vector of unitary input prices and  $x_i^*$  are the levels of inputs (here expenditure) – computed according to the DEA-VRS model – that a province should employ to be technically efficient.

#### 4. RESULT AND DISCUSSION

Table 2 presents statistics of average regional government spending on health, life expectancy at birth and human development index for the period

2010 to 2017. The table illustrates that Gorontalo spent the lowest amount of government expenditures on health yet was able to improve the level of health with an increase life expectancy at birth from 66.41 in 2010 to 67.14 in 2017. DI Yogyakarta relatively has highest of life expectancy and human development index in the period of study with government spending relatively low. In DKI Jakarta, the life expectancy and human development index are high but a substantial amount was spent in those area, so DI Yogyakarta and Gorontalo has relatively efficient public spending on health.

Table 2 here

Table 3 shows the statistic description of government spending on education, expected years of schooling and school enrollment such as elementary, secondary, and tertiary level for the regional governments in the period 2010 to 2017. The statistics description indicates that West Sulawesi spent the least amount on education spending but was able to achieve relatively the level of the school enrollment ratio about 70.35 in average from 2010 to 2017. This table also shows that DKI Jakarta spent large amount of spending to achieve high school enrollment ratio (average for three-level) and expected years of schooling. This demonstrates DKI Jakarta relatively inefficient in its public spending on education.

Table 3 here

Table 4 shows the average efficiency scores of each regional government's economic sector for the period 2010 to 2017. In west regions, Bali, Bangka Belitung, DI Yogyakarta, Central Java, and Kep. Riau are relatively the most efficient in public spending, both on health and education in the period of study. DKI Jakarta and West Java have efficient score on health, while Bengkulu has efficient score on education. On the other hand, in east regions, Gorontalo, Central Kalimantan, East Kalimantan and North Sulawesi were the most efficient provinces in public health and education services' spending. Maluku and Southeast Sulawesi have efficient score on health, and South Kalimantan, North Maluku, West Nusa Tenggara, and West Sulawesi have efficient score on education spending. The results show that provinces in east regions of Indonesia were relatively more efficient in public spending both on health and education for promoting equal distribution of income.

Table 4 here

Table 5 here

#### 5. CONCLUSION

This paper analyzes spending efficiency of regional governments in Indonesia on health and education during the fiscal decentralization period year of 2010-2017. By employing Data Envelopment Analysis (DEA) technique, the study shows that in west region,

Bali, Bangka Belitung, DI Yogyakarta, West Java, and Kepulauan Riau were relatively the most efficient provinces in public spending both on health and education in period of study. DKI Jakarta and West Java had the most efficient score on health, and Bengkulu had the most efficient score on education. On the other hand, in east regions, Gorontalo, Central Kalimantan, East Kalimantan, and North Sulawesi were also the most efficient provinces in health and education services. Maluku and Southeast Sulawesi had efficient scores on health, while South Kalimantan, North Maluku, West Nusa Tenggara, and West Sulawesi had efficient scores on education. The results show that provinces in east regions of Indonesia were relatively more efficient in public spending both on health and education for promoting equal distribution of income. On the health service, the relative efficiency of Gorontalo can be demonstrated by the fact that Gorontalo spent the least amount on health from its income but was able to improve the level of health with an increase life expectancy at birth. DI Yogyakarta relatively has the highest of life expectancy and human development index in the period of study with government spending relatively low. While on the education side, West Sulawesi spent the least amount on education but was relatively able to achieve the high level of the school enrollment ratio. On the other hand, DKI Jakarta spent high expenditure to achieve high school enrollment ratio (average for three level) and expected years of schooling. This demonstrates DKI Jakarta was relatively inefficient in public spending on education. The results also show that provinces in East Region are relatively more efficient in public spending for promoting equal income distribution.

## REFERENCES

- Afonso, A., St Aubyn, M. (2004). Non-parametric approaches to education and health expenditure efficiency in OECD countries. Working Papers Department of Economics 2004/01, ISEG – Lisbon School of Economics and Management, Department of Economics, Universidade de Lisboa, Portugal.
- Afonso, A., Ebert, W., Schuknecht, & L., Thöne, M. (2005). Quality of Public Finances and Growth. Working Paper 438, European Central Bank.
- Afonso, A., Kazemi, M. (2017). Assessing public spending efficiency in 20 OECD countries. In B. Bökemeier & A. Greiner (Eds.), *Inequality and finance in macrodynamics. Dynamic modeling and econometrics in economics and finance* (Vol. 23). Cham: Springer.
- Afonso, A., Schuknecht, L., & Tanzi, V. (2010). Public sector efficiency: Evidence for the new EU member states and emerging markets. *Applied Economics*, 42(17), 2147–2164.
- doi:10.1080/00036840701765460
- Ahmad, E., Brosio, G. and Tanzi, V. (2008). Local Service Provision in Selected OECD Countries: Do Decentralized Operations Work Better?". *IMF Working Paper*, 08/67.
- Arze del Granado, F.A., Martinez-Vazquez, J., & McNab, R. (2005). Fiscal Decentralization and The Functional Composition of Public Expenditures. *International Center for Public Policy Working Paper Series*.
- Balaguer-Coll, M.T., Tortosa-Ausina, E., & Prior, D. (2007). On the determinants of local government performance: A two stage nonparametric approach. *European Economic Review*, 51(2), 425-451.
- Battese, G.E., Coelli, T.J. (1995). A model for technical inefficiency effects in a stochastic frontier production function for panel data. *Empirical Economics*, 20, 325-232.
- Bénassy-Quéré A., Gopalraja, N., & Trannoy, A. (2007). Tax and Public Input Competition. *Economic Policy*, CEPR & CES & MSH, 22(4), pp. 385-430.
- Borger, B.D., Kertens, K. (1996). Cost Efficiency of Belgian Local Governments: A comparative Analysis of FDH, DEA, and Econometric Approaches. *Regional Science and Urban Economics*, 26, pp. 145-170.
- Cantarero, P.D., Sanchez, M.P. (2006). Decentralization and Health Care Outcomes: An Empirical Analysis within the European Union. *Working Paper*, University of Cantabria, Spain.
- Carosi, L., Inverno, G.D., & Ravagli, L. (2014). Global public spending efficiency in Tuscan municipalities. *Discussion Papers 2014/175*, Dipartimento di Economia e Management (DEM), University of Pisa, Pisa, Italy.
- Charnes, A., Cooper, W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2(6), 429–444.
- Coelli, T.J., Prasada Rao, D.S., O'Donnell, C.J., & Battese, G.E. (2005). *An introduction to efficiency and productivity analysis*, 2nd edition, Springer, New York.
- Davoodi, H. and Zou, H. F. (1998). Fiscal Decentralization and Economic Growth: A Cross-country Study. *Journal of Urban Economics*, 43(2), pp. 244-257.
- Devarajan, S., Swaroop, V., & Zou, H.F. (1996). The Composition of Public Expenditures and Economic Growth. *Journal of Monetary Economics*, 37, pp.313-344.
- Esanov, A. (2009). *Efficiency of public spending in resource-rich post-Soviet states*. Revenue Watch Institute

- Fahriant, F.Y. dan Carolina, F. (2012). Analisis Efisiensi Anggaran Belanja Dinas Pendidikan Kabupaten Kapuas. *Jurnal Manajemen dan Akuntansi*, Volume 13, Nomor 1
- Fonchamnyo, D. C., Sama, M. C. (2016). Determinants of public spending efficiency in education and health: Evidence from selected CEMAC countries. *Journal of Economic Finance*, 40, 199–210. doi:10.1007/s12197-014-9310-6
- Fredriksen, K. (2013). Decentralization and Economic Growth-Part 3: Decentralization, Infrastructure Investment and Educational Performance. *OECD Working Papers on Fiscal Federalism*, 16.
- Gani A, Pujiyanto, Yanuar F, Weichers T, Dunlop D. (2009). *Good Practices of Local Health Financing Schemes in Indonesia: Its Contribution Toward Universal Coverage of Health Insurance*. Jakarta, Depok: University of Indonesia.
- Giménez, V. and Prior, D. (2007). Long-and short-term cost efficiency frontier evaluation: Evidence from Spanish local governments. *Fiscal Studies*, 28(1), 121-139.
- Gonzalez-Alegre, J. (2010). Decentralization and the Composition of Public Expenditure in Spain. *Regional Studies*, 44(8), pp. 1067-1083.
- Greene, W.H. (2005). Efficiency of Public Spending in Developing Countries: A Stochastic Frontier Approach. World Bank.
- Grigoli, F., Kapsoli, J. (2013). Waste Not, Want Not: The Efficiency of Health Expenditure in Emerging and Developing Economies. *IMF Working Papers*, 13/187.
- Grisorio, M.J., Prota, F. (2011). The Impact of Fiscal Decentralization on the Composition of Public Expenditure: Panel Data Evidence from Italy. *Societa italiana degli economisti*, 52.
- Gupta, S., Schwartz, G., Tareq, S., Allen, R., Adenauer, I., Fletcher, K., & Last D. (2007). Fiscal Management of Scale-Up Aid. *IMF Working Paper*, No. 07/222.
- Gupta, S., Verhoeven, M. (2001). The Efficiency of Government Expenditure. Experiences from Africa. *Journal of Policy Modelling*, 23, pp. 433–467.
- Herrera, S., Pang, G. (2005). Efficiency of Public Spending in Developing Countries: An Efficiency Frontier Approach. *World Bank Policy Research Working Paper*, 3645.
- Indriati, N.E. (2014). Analisis Efisien Belanja Daerah di Kabupaten Sumbawa (Studi Kasus Bidang Pendidikan dan Kesehatan). *Jurnal Ekonomi Studi Pembangunan*, 6 (2): 192-205
- Jayasuriya, R., Wodon, Q. (2003). Efficiency in Reaching the Millennium Development Goals. *World Bank Working Paper*, 9.
- Kappeler, A., Valila, T. (2008). Fiscal Federalism and the Composition of Public Investment in Europe. *European Journal of Political Economy*, 24(3), pp. 562-570.
- Keen, M., Marchand, M. (1997). Fiscal Competition and the Pattern of Public Spending. *Journal of Public Economics*, Elsevier, 66(1), pp. 33-53.
- Lestari, T. (2013). Analisis Efisiensi Belanja Daerah di Jawa Timur (Studi Kasus Bidang Pendidikan dan Kesehatan Tahun 2009-2011). *Jurnal Ilmiah*, Universitas Brawijaya Malang
- Lewis, B. (2014). Twelve years of fiscal decentralisation: A balance sheet. In H. Hill (Ed.), *Regional dynamics in a decentralised Indonesia* (pp.135–155). Singapore: Institute of South East Asia Studies.
- Lewis, B. (2016): Local government spending and service delivery in Indonesia: the perverse effects of substantial fiscal resources. *Regional Studies*, 2016.
- Musgrave, R. (1969). Theories of Fiscal Federalism. *Public Finance*, 24(4), 521–32.
- Nasution, A. 2016. Government Decentralization Program in Indonesia. *ADBI Working Paper*, 601, Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/government-decentralization-program-indonesia/>
- Oates, W. E. (1972). *Fiscal Federalism*, Harcourt Brace, New York.
- Pamungkas, B., Ibtida, R., and Avrian, C. (2018). Factors influencing audit opinion of the Indonesian municipal governments' financial statements. *Cogent Business & Management* (2018), 5: 1540256
- Puspitasari, E.D., Pujiati, A. (2017). Analisis Efisiensi Pengeluaran Pemerintah Sektor Kesehatan di Provinsi Jawa Tengah. *Economics Development Analysis Journal*, Volume 6, Nomor 1.
- Sparrow, R., Budiayati, S., Yumna, A., Warda, N., Suryahadi, A., and Bedi, A.S. (2017). Sub-national health care financing reforms in Indonesia. *Health Policy and Planning*, 32, 2017, 91–101.
- Sparrow, R., Suryahadi, A., Widyanti, W. (2013). Social health insurance for the poor: targeting and impact of Indonesia's Askeskin program. *Social Science & Medicine*, 96 : 264–71.
- Ter-Minassian, T. (1997). Decentralization and Macroeconomic Management. *IMF Working Paper*, 97/155.

- 
- Yatiman N. , & Pujiyono A. (2013). "Analisis Efisiensi Teknis Anggaran Belanja Sektor Kesehatan Pemerintah Daerah Kabupaten/Kota di Privinsi Daerah Istimewa Yogyakarta Tahun 2008-2010". *Jurnal of Economics*. Volume 2, Nomor 1, Halaman 1-13.
- Zagler, M. & Dürnecker, G. (2003). Fiscal Policy and Economic Growth. *Journal of Economic Survey*, 17, pp. 397-418.
- Zhang, T. and Zou, H. (1998). Fiscal Decentralization, Public Spending, and Economic Growth in China. *Journal of Public Economics*, 67(2), pp. 221-240.

## APPENDICES

Table 1. Inputs and Outputs on Public Spending Efficiency

Sectors	Input	Output
Health	Regional government spending on health function	life expectancy (year) human development index
Education	Regional government spending on education function	net school enrollment ratio for : • elementary school enrolment • secondary school enrolment • tertiary school enrolment expected years of schooling (year)

## APPENDICES

Table 2. Average Regional Government Spending on Health and Life Expectancy for Regional Government (2010-2017)

Province	Health Spending (million rupiahs)	Life Expectancy	Human Index Development
Aceh	1,271,219.36	69.33	68.69
Bali	447,333.18	71.11	72.30
Bangka Belitung	154,444.04	69.63	68.08
Banten	373,303.67	69.07	69.59
Bengkulu	288,092.43	68.29	67.67
DI Yogyakarta	161,935.02	74.48	76.95
DKI Jakarta	4,831,959.60	72.19	78.24
Gorontalo	135,726.27	66.88	64.92
Jambi	460,214.61	70.37	67.87
Jawa Barat	659,973.83	72.04	68.43
Jawa Tengah	1,360,057.04	73.49	68.34
Jawa Timur	2,630,965.34	70.38	67.85
Kalimantan Barat	365,181.89	69.61	64.33
Kalimantan Selatan	908,936.83	67.40	67.46
Kalimantan Tengah	188,915.49	69.33	67.70
Kalimantan Timur	900,427.79	73.44	73.36
Kep. Riau	268,938.14	69.06	72.96
Lampung	442,028.34	69.55	65.97
Maluku	157,880.63	64.98	66.27
Maluku Utara	162,335.09	67.21	64.95
Nusa Tenggara Barat	407,122.87	64.80	63.99
Nusa Tenggara Timur	263,473.18	65.77	61.72
Papua	763,654.14	64.79	56.55
Papua Barat	166,553.63	65.03	61.12
Riau	653,523.49	70.66	70.10
Sulawesi Barat	146,063.66	63.57	62.00
Sulawesi Selatan	385,769.11	69.49	68.20
Sulawesi Tengah	256,943.85	66.91	65.89
Sulawesi Tenggara	204,985.19	70.20	67.89
Sulawesi Utara	222,327.90	70.81	69.72
Sumatera Barat	496,537.80	68.26	69.21
Sumatera Selatan	313,647.82	68.85	66.60
Sumatera Utara	397,132.46	67.98	68.69

Source : Author's Calculation

## APPENDICES

Table 3. Average Government Spending on Education, Expected Years of Schooling and School Enrollment Rate for Regional Government (2010-2017)

Province	Education Spending (million rupiahs)	Expected Years of Schooling	Net 1st School Enrollment	Net 2nd School Enrollment	Net 3rd School Enrollment
Aceh	1,533,671.93	13.47	96.68	82.69	66.54
Bali	505,535.29	12.45	94.00	80.62	68.08
Bangka Belitung	160,327.31	13.19	95.44	68.29	52.07
Banten	533,608.41	12.34	95.82	77.56	54.50
Bengkulu	226,327.79	12.17	96.72	74.58	60.30
DI Yogyakarta	314,226.57	11.68	97.66	78.42	66.19
DKI Jakarta	7,578,656.42	12.70	95.03	76.62	56.60
Gorontalo	152,686.15	11.81	95.22	65.74	52.05
Jambi	397,049.72	11.16	96.28	74.59	55.12
Jawa Barat	592,159.26	12.23	96.27	77.01	53.33
Jawa Tengah	273,712.44	12.32	94.96	76.09	54.88
Jawa Timur	688,746.26	11.70	95.79	78.36	56.79
Kalimantan Barat	360,396.49	11.89	94.90	62.42	45.84
Kalimantan Selatan	603,768.12	14.83	96.26	70.55	52.35
Kalimantan Tengah	356,312.18	12.28	97.12	71.87	49.21
Kalimantan Timur	782,746.24	12.05	95.78	77.03	64.30
Kep. Riau	437,685.00	12.59	97.01	81.68	67.62
Lampung	459,447.37	12.24	96.62	75.41	54.22
Maluku	198,422.74	11.66	92.68	70.01	58.77
Maluku Utara	171,613.27	11.76	94.93	71.93	60.28
Nusa Tenggara Barat	486,283.80	11.77	96.34	80.87	60.74
Nusa Tenggara Timur	276,152.20	12.80	93.97	62.51	48.10
Papua	527,052.00	12.55	75.34	50.30	38.54
Papua Barat	214,073.46	12.04	91.23	64.21	56.74
Riau	1,148,038.63	12.35	95.21	74.85	59.40
Sulawesi Barat	136,004.75	12.54	93.60	66.04	53.31
Sulawesi Selatan	681,027.18	12.73	94.78	71.44	56.38
Sulawesi Tengah	295,435.39	12.22	91.50	67.76	59.00
Sulawesi Tenggara	257,500.38	11.67	94.46	72.14	58.14
Sulawesi Utara	259,970.25	13.31	91.61	68.61	58.26
Sumatera Barat	738,288.71	12.63	97.03	73.53	62.76
Sumatera Selatan	509,126.48	11.76	94.82	72.87	54.38
Sumatera Utara	870,594.12	9.61	95.31	75.32	63.76

Source : Author's Calculation

## APPENDICES

Table 4. Average of Variable Return to Scale (Input-Oriented) Efficiency of Public Spending on Health and Education For West and East Regions of Indonesia (2010-2017)

**West Regions : Jawa, Sumatera, and Bali**

Province	Health	Education
Aceh	0.132	1.000
Bali	1.000	1.000
Bangka Belitung	1.000	1.000
Banten	0.506	0.590
Bengkulu	0.536	1.000
DI Yogyakarta	1.000	1.000
DKI Jakarta	1.000	0.043
Jambi	0.653	0.571
Jawa Barat	1.000	0.500
Jawa Tengah	1.000	1.000
Jawa Timur	0.115	0.455
Kep. Riau	1.000	1.000
Lampung	0.349	0.550
Riau	0.549	0.217
Sumatera Barat	0.357	0.840
Sumatera Selatan	0.492	0.409
Sumatera Utara	0.413	0.319
<b>Average</b>	0.653	0.676

**East Regions : Sulawesi, Kalimantan, Maluku, Papua, Nusa Tenggara Barat dan Nusa Tenggara Timur**

Province	Health	Education
Gorontalo	1.000	1.000
Kalimantan Barat	0.528	0.414
Kalimantan Selatan	0.198	1.000
Kalimantan Tengah	1.000	1.000
Kalimantan Timur	1.000	1.000
Maluku	1.000	0.826
Maluku Utara	0.878	1.000
Nusa Tenggara Barat	0.333	1.000
Nusa Tenggara Timur	0.515	0.706
Papua	0.178	0.261
Papua Barat	0.815	0.717
Sulawesi Barat	0.929	1.000
Sulawesi Selatan	0.505	0.440
Sulawesi Tengah	0.594	0.639
Sulawesi Tenggara	1.000	0.695
Sulawesi Utara	1.000	1.000
<b>Average</b>	0.717	0.794

Source : Author's Calculation

**APPENDICES**

Table 5. Efficiency Category for West and Esat Regions in Health and Education Spending

Category	Health		Education	
	West Regions	East Regions	West Regions	East Regions
More efficient	<ul style="list-style-type: none"> <li>• Bali</li> <li>• Bangka Belitung</li> <li>• DI Yogyakarta</li> <li>• Jawa Tengah</li> <li>• Kep. Riau</li> <li>• DKI Jakarta</li> <li>• Jawa Barat</li> </ul>	<ul style="list-style-type: none"> <li>• Gorontalo</li> <li>• Kalimantan Tengah</li> <li>• Kalimantan Timur</li> <li>• Sulawesi Utara</li> <li>• Maluku</li> <li>• Sulawesi Tenggara</li> </ul>	<ul style="list-style-type: none"> <li>• Bali</li> <li>• Bangka Belitung</li> <li>• DI Yogyakarta</li> <li>• Jawa Tengah</li> <li>• Kep. Riau</li> <li>• Bengkulu</li> </ul>	<ul style="list-style-type: none"> <li>• Gorontalo</li> <li>• Kalimantan Tengah</li> <li>• Kalimantan Timur</li> <li>• Sulawesi Utara</li> <li>• Kalimantan Selatan</li> <li>• Maluku Utara</li> <li>• Nusa Tenggara Barat</li> <li>• Sulawesi Barat</li> </ul>
Less efficient	<ul style="list-style-type: none"> <li>• Aceh</li> <li>• Banten</li> <li>• Bengkulu</li> <li>• Jambi</li> <li>• Jawa Timur</li> <li>• Lampung</li> <li>• Riau</li> <li>• Sumatera Barat</li> <li>• Sumatera Selatan</li> <li>• Sumatera Utara</li> </ul>	<ul style="list-style-type: none"> <li>• Kalimantan Barat</li> <li>• Kalimantan Selatan</li> <li>• Maluku Utara</li> <li>• Nusa Tenggara Barat</li> <li>• Nusa Tenggara Timur</li> <li>• Papua</li> <li>• Papua Barat</li> <li>• Sulawesi Barat</li> <li>• Sulawesi Selatan</li> <li>• Sulawesi Tengah</li> </ul>	<ul style="list-style-type: none"> <li>• Banten</li> <li>• DKI Jakarta</li> <li>• Jambi</li> <li>• Jawa Barat</li> <li>• Jawa Timur</li> <li>• Lampung</li> <li>• Riau</li> <li>• Sumatera Barat</li> <li>• Sumatera Selatan</li> <li>• Sumatera Utara</li> </ul>	<ul style="list-style-type: none"> <li>• Kalimantan Barat</li> <li>• Maluku</li> <li>• Nusa Tenggara Timur</li> <li>• Papua</li> <li>• Papua Barat</li> <li>• Sulawesi Selatan</li> <li>• Sulawesi Tengah</li> <li>• Sulawesi Tenggara</li> </ul>

Source : Author's Calculation