



The Level Efficiency of Health Spending in East Java Province

¹Eli Masfufah, ^{2✉}Yozi Aulia Rahman

^{1,2}Economics Faculty, Universitas Negeri Semarang

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Abstract

This study aims to determine and analyze the level of technical cost efficiency, technical systems and improvement strategies that need to be done for inefficient areas in 30 districts / cities in East Java Province. This study uses secondary data from 30 districts / cities in East Java Province. The variables used include APBD expenditure variables according to health function as input, variable total of puskesmas, posyandu, puskesmas medical personnel, and government hospitals as intermediate outputs, as well as life expectancy, Maternal Mortality Rate (MMR), Infant Mortality Rate (IMR), and Morbidity Rate variables as outcomes. The research method uses Data Envelopment Analysis (DEA) with the assumption of Variable Return to Scale (VRS) and input-oriented. The results obtained on average technical efficiency costs during 2012-2016 were only 26.67%, while for technical efficiency the system reached 53.34% which was already efficient so that there were indications of waste in the allocation of health spending and an improvement strategy based on potential improvement for the regions was needed. which is still inefficient so that the proportion of inputs and outputs can be efficient according to the needs in each of these regions.

Key words : Health Spending, DEA, Cost Technical Efficiency, System Technical Efficiency, Potential Improvement.

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✉ Corresponding author : Yozi Aulia Rahman
Address: Campus Sekaran Gunungpati Semarang, Jawa Tengah, Indonesia 50229
E-mail: yoziaulia@mail.unnes.ac.id

INTRODUCTION

Investment in human resources has an important role for the welfare of a country. According to Hardiyansyah (2011), health is one of the main assets for a country to achieve prosperity in society and quality human resources. Meanwhile, according to Law Number 36 Year 2009, health is a healthy state, both physically mentally, spiritually, and socially that allows everyone to live productively socially and economically. Based on the goals contained in the SDGs, the purpose of the third SDGs explains that the importance of health and welfare for a country. Health is one indicator of the success of human development in the country of Indonesia. According to Asandului et al.,(2014) efforts from the health sector in terms of human resource development play an important role in labor productivity.

The government is currently pursuing development in the health sector by increasing government spending on health which is used to finance every health activity allocated to all provinces in Indonesia. Health expenditure budget is used as a source of health financing funds that are used to ensure an improvement in the health status of the community. This health expenditure is allocated to provide quality facilities and services in the health sector such as; the number of health centers, hospitals, medical personnel, social security, insurance and so on to improve the health status of the population. An increase in health spending should be used effectively and efficiently for the provision of good health facilities and services so that the achievement of health status is also optimal for each population.

Table 1. APBD Spending by Health Function of Four Provinces in Java in 2012-2016
(millions of rupiah)

Province	2012	2013	2014	2015	2016
Banten	268.731	382.842	395.490	363.991	300.096
Central Java	1.065.239	1.248.836	1.625.097	1.931.665	684.291
DIY	94.993	169.184	160.130	201.172	201.299
East Java	2.071.695	2.070.310	2.256.644	2.958.318	3.344.147

Source: Directorate General of Fiscal Balance, 2018.

Based on table 1. in general APBD expenditure by health function of the four provinces in Java for the period 2012-2016 shows an increasing trend. In 2012, the highest health expenditure was East Java Province with 2 trillion rupiah. The province with the lowest health expenditure was DIY Province with 94 billion rupiah. The magnitude of the comparison of the allocation of health spending in East Java Province with other provinces is influenced by the high proportion of the population which is bigger than other provinces. This causes the need for health spending is far greater than other provinces.

In 2016, the highest health expenditure was East Java Province which reached 3.3 trillion rupiah and the province of DIY with the lowest health expenditure of 201 billion rupiah. Broadly speaking, health spending in East Java Province experienced a significant increase. This shows the government's attention in the development of the health sector is very high. This health expenditure allocation can be used as efficiently as possible so that the resulting output is adequate and on target. An activity can be said to be efficient if it can be completed economically, quickly and on time using low costs.

This study uses three reference variables, namely input, intermediate and outcome variables. The input variable as input is in the form of health expenditure which is reflected in the APBD expenditure according to the health function, while the intermediate output variable is an intermediate output in the form of health facilities and services and an outcome as an output or final outcome in the form of public health status. According to (Rambe & Syahputra, 2017) efficiency can be interpreted as savings in using resources in an organization's activities or programs. This efficiency refers to how resources are used properly to produce output. In using health expenditure, it is necessary to save funds where the costs incurred are as small as possible compared to the results obtained. This was done in order to achieve the highest level of government expenditure efficiency. At present, health development in various regions is highly prioritized when seen from the percentage of total health expenditure in the East Java Province Regional Budget in table 2.

Based on table 2., the percentage of APBD expenditure by health function in East Java Province shows that in 2012 total health expenditure was 15.3 trillion rupiah or 13.53%. Furthermore, in 2013-2015 the percentage of health spending continued to decline but in 2016 it increased to 14.01% or as much as 3.3 trillion rupiah of the total APBD of East Java Province, which amounted to 23.8 trillion rupiah. This shows that the allocation of health spending in East Java Province in the last 5 years has reached the target stated in Law No. 36 of 2009, which is a minimum of 10% of the APBD excluding salaries. In the last five years the proportion of health spending that tends to rise indicates that the

health sector is a sector that receives priority development from the regional government of East Java Province compared to other sectors.

Table 2. Percentage of APBD Spending by Health Function in East Java Province 2012-2016 (billion rupiah)

Year	APBD Total (billion)	Health Expenditures (billion)	Percentage (%)
2012	15.311	2.071	13,53
2013	15.356	2.070	13,48
2014	17.811	2.256	12,67
2015	23.720	2.958	12,47
2016	23.874	3.344	14,01

Source: Directorate General of Fiscal Balance 2018, processed

The existence of this large health expenditure is expected by the regional government to be able to manage and optimize to fulfill the basic needs of public health. It can be realized to provide health facilities or facilities so that they can bridge the allocation of the health budget to improve the degree of public health in each region. It is known that total of health facilities both posyandu, total of puskesmas, total of puskesmas medical personnel and government hospitals in 2012-2016 in East Java Province is in fact not experiencing significant changes. In 2016, total of posyandu was 46,016 units, total of puskesmas 960 units, total of puskesmas medical personnel 2,765 units and the number of government hospitals 56 units. Since 2012-2016 the number of facilities has been almost the same and has not increased. This indicates that the lack of role of local government in providing health facilities.

Can be seen in the ratio table of the number of facilities and health services in East Java Province to measure the availability and distribution for the community.

Table 3. Average Ratio of Number of Health Service Facilities in East Java Province 2012-2016 (unit)

Indicator	2012	2013	2014	2015	2016
Posyandu	120,52	119,90	119,01	118,28	117,59
Puskesmas	2,71	2,69	2,67	2,65	2,64
Puskesmas Medical Personnel	9,18	9,11	9,04	8,98	8,92
Government Hospital	0,20	0,20	0,21	0,20	0,20

Source: BPS East Java Province 2018, processed.

Based on table 3., it can be seen that the average ratio of the number of health facilities from posyandu, puskesmas, puskesmas medical personnel and government hospitals in 2012-2016 experienced a declining trend. This means that the availability of health facilities and services for the population of East Java Province is still low and has even decreased. The increasing health expenditure should also be followed by the provision of increasing health infrastructure to achieve a high degree of public health. But the phenomenon that occurred was not in line with what was expected.

Judging from the comparison of the Human Development Index (HDI) comparison in Java, the average HDI of East Java Province is still below the national average and the lowest in all of Java. This HDI as a benchmark of success in order to build the quality of human life related to income, health and education aspects (BPS, 2019). Data from BPS shows that HDI from six provinces in Java in 2012-2016, the average HDI in Indonesia was 68.93% and DKI Jakarta was the province with the highest HDI of 78.51%. This shows that the development of the quality of life of the population in DKI Jakarta Province is far better than other provinces in Java. On the other hand, East Java Province had the lowest average HDI in 2012-2016 of 67.49%. This indicates that the quality of life of the

population in East Java Province is still relatively low.

The low HDI case is due to the high population health problems and the accessibility of the population to health facilities and services. In realizing the achievements of good human development in each region, the three aspects which include education, health and income must receive equal attention. Countries that are in low or medium HDI are very important and are needed to improve the efficiency of health services while countries with high HDI are required to guarantee high levels of efficiency and quality of health services (Asandului et al., 2014)

Based on the percentage of residents who have health complaints over the past month in East Java Province in 2012-2016 experiencing an increasing trend. The average percentage of health complaints in the province of East Java in 2012-2016 was 29.65%. This shows that the population who have complaints of illness is still high both physical disruption, and accidents during the last month before enumeration by the Central Bureau of Statistics of East Java Province.

The high percentage of population who have health complaints will certainly increase the need for affordable and quality health facilities and services such as; hospitals, puskesmas, doctors, medical personnel, health insurance, BPJS, insurance and so on. Lack of accessibility and good health services causes a lack of health care so that the health complaints of the population of East Java Province will be

even higher. This will only cause the health level in East Java Province to be even lower.

Reviewed based on the number of health degrees in East Java Province in 2012-2016, the average amount of Life Expectancy during 2012-2016 is 70.66 years. Overall in five years the average age of the population ranges from 70 years shows life expectancy has not changed and reflects the conditions of quality of life and health status of the population of East Java Province still. The magnitude of the average Morbidity Rates for 2012-2016, in general the trend has increased. The high morbidity shows that the majority of the population is still experiencing health problems or suffering from diseases so they are unable to carry out activities.

Whereas the average Infant Mortality Rate (IMR) in 2012-2016 experienced a downward trend indicating that the health of the baby was getting better but had not reached the target SDGs target of 12 per 1,000 live birth. Maternal Mortality Rate (MMR) in 2012-2016 tends to fluctuate. In 2013-2015 it decreased by 17.02 per 100,000 live birth. This condition indicates that the MMR has experienced an improvement despite the high number. Whereas in 2012 it increased by 2 per 100,000 live birth and 2016 by 11.14 per 100,000 live birth. The increase illustrates that the MMR problem has not yet been completely resolved and is still classified as very high, namely in 2016 reaching 105.92 per 100,000 live birth. The MMR is still very far from the target SDGs, which is the MMR less than 70 per 100,000 live birth.

Based on indicators of IMR, MMR, Life Expectancy and Morbidity Rates for 2012-2016 can illustrate that East Java Province is still experiencing health problems. The health status indicator can also present the level of public health status in East Java

Province in 2012-2016 that has not reached the efficiency of the use of the health expenditure budget which results in a high degree of public health.

The tendency to increase government spending through the health expenditure budget in East Java Province during 2012-2016 should be able to achieve a much better improvement in the level of public health in the districts / cities of East Java Province. However, the conditions that occur indicate the allocation of the use of government spending in the health sector is still not optimal and is not in accordance with the increase in the health budget of East Java Province. In addition, the distribution of facilities and access to health services is still lacking, causing inequality in several areas in East Java Province. The case reflects the inefficient conditions in the management of the regional government health expenditure in East Java Province.

METHOD

This research is a quantitative descriptive study using quantitative data types. The data source comes from secondary data of 30 regencies / cities in East Java Province. Data was obtained from the Directorate General of Fiscal Balance, BPS of East Java Province and the publication of the East Java Provincial Health Service in the form of East Java Province Health Profile 2012-2016. There are three variables used, namely APBD expenditure by health function 30 East Java Province in 2012-2016 as input variables, intermediate output variables include total of puskesmas, total of posyandu, total of puskesmas medical personnel and total of government hospitals as well as the outcome variable which includes the Maternal Mortality

Rate (MMR), Infant Mortality Rate (IMR), Life Expectancy, and Morbidity Rates.

This data collection method is obtained through the documentation method which is a technique to collect data from written and electronic documents in the form of financial reports, government publications, official websites, journals, literature, and other supporting references (Sanusi, 2011). While the data analysis method uses the Data Envelopment Analysis (DEA) analysis instrument.

According to Asandului et al. (2014) DEA is often used as an analytical tool to calculate or assess the efficiency of a set of Decision Making Units (DMU) units. Meanwhile according to Amirillah (2014), DEA is a procedure specifically designed to measure the value of efficiency using multi-input and multi-output, where the merging of inputs and outputs cannot be carried out. In addition, DEA produces relative efficiency as a planning technique and makes decisions in managing limited resources to achieve goals (Yanti & Kustiani, 2016). The DEA analysis method is designed for a unit of economic activity (UKE) in measuring efficiency using multi-input multi-output.

According to (Putri, 2015), the relative efficiency of UKE is defined as the ratio of the total weighted output divided by the total weighted output (total weighted output). Furthermore, UKE can be said to be efficient if the efficiency value is 100 percent and inefficient if the value is less than 100 percent. The basic concept of using DEA according to Cooper, et al (2002) in (Budi, 2010) is (1) assuming that variables are numeric data and have positive values and

(2) the results of the efficiency values will be very good if more input and output are used.

According to Purwantoro (2003) in Budi (2010) the advantages possessed by DEA include: (1) being able to measure many inputs and outputs, (2) correlation between variables is not required, (3) direct comparisons can be made between similar UKEs, and (4) the variables used have different units. While the shortcomings that are owned are: (1) only sample selection, (2) incorrect measurements cause fatal errors, (3) measurement of efficiency is relative not absolute, and (4) because it is non parametric it is difficult to test the hypothesis of the results DEA.

This study uses calculations on intermediate input and output variables that produce technical efficiency costs aimed at knowing the allocation of health expenditure to provide a number of health facilities and services. Then the calculation of intermediate output variables and outcomes will result in a technical efficiency of the system to determine the use of health service facilities to produce the health status of the population. The calculation of system technical efficiency and technical costs is mathematically formulated by:

$$\text{Maximization } Z_k : \sum_r^s = 1 U_{rk} Y_{rk}$$

Constraints:

$$\sum_r^s = 1 U_{rk} Y_{rk} - \sum_i^m = 1 V_{ik} X_{ik} \leq 0 \dots (1)$$

$$k = 1, 2, \dots, n,$$

$$\sum_i^m = 1 V_{ik} X_{ik} = 1$$

$$U_{rk} \geq 0 ; r = 1, 2, \dots, s$$

$$V_{ik} \geq 0 ; i = 1, 2, \dots, m$$

The formula above to find out the level of efficiency of government spending in the health sector by calculating the relative efficiency of health spending in East Java Province is Z_k (the relative efficiency of districts / cities observed),

k (regencies / cities in the analysis of 30 districts / cities in East Java Province)), Y_{rk} (number of output r generated by UKE k), X_{ik} (number of inputs i used by UKE k), s_k (number of outputs produced (facilities and health services & health status), m_k (number of inputs used (health expenditure) district / city), U_{rk} (weighted weight of output r generated by UKE k), V_{ik} (weighted weight of input i generated by UKE k).

This study uses a Variable Return to Scale (VRS) model, the same as a study from Susanto (2015) that uses the DEA analysis method and the VRS assumption. In addition, the assumptions used are input-oriented both for calculating the technical efficiency of costs and the technical efficiency of the system. The VRS model assumes that the ratios for adding inputs and outputs are not the same. As for the Input-Oriented assumption, it is more intended to minimize the use of inputs so as to produce a certain number of outputs. Determination of efficiency improvement strategies both technical costs and systems that are still inefficient using the results of potential improvement based on the acquisition of efficiency calculations using the Banxia Frontier Analysis (BFA) version 3.2.2.

RESULTS AND DISCUSSION

This research yields the value of the relative technical efficiency of the economic activity unit (UKE) studied. The value of technical efficiency can be said to be efficient if the value is 100% while the value is less than 100% then the coefficient is inefficient. UKE in this study covers 30 regions consisting of 24 districts and 6 cities in East Java Province in the 2012-2016 time period. The calculation includes the level of

technical efficiency of the costs of health expenditure and the technical efficiency of the system of health services. The model used is Variable Return to Scale (VRS) while the assumptions used are input-oriented (input minimization).

The value of technical cost efficiency is obtained from a comparison between input variables and intermediate output variables assuming input-oriented Variable Return to Scale (VRS). The input variable used in 30 districts / cities in East Java Province is in the form of total APBD expenditure according to the health function of each region with units of millions of rupiah. While indicators in the form of health facilities and services as an intermediate output variable include total of puskesmas, total of posyandu, total of puskesmas medical personnel and total of government hospitals in a certain area per 100,000 population. Based on the variables that contain health facilities and services show how the level of success of the local government in East Java Province in seeking and providing various facilities and good health services for each community. The result of the value of the technical efficiency of these costs is to find out how efficient the input issued by the government is in using health expenditure so that it can produce health facilities and services to achieve the highest level of health.

Based on table 4., it is known that in 2012, the results of the technical efficiency of health expenditure costs in 30 regions showed that there were 11 regions that reached 100% or efficient. While the remaining 19 regions experienced inefficiency or less than 100%. This shows that the use or management of health spending in the area is still not optimal, in other words there is still waste. In 2013, it showed that the regions that could achieve efficiency decreased to 9 regions. This shows that the government's management of health spending has declined, which in 2012

has reached an efficient level which has actually become inefficient.

In 2014, the achievement of efficiency was achieved by Pacitan Regency, Bondowoso Regency, Situbondo Regency, Madiun Regency, Bojonegoro Regency, Lamongan Regency, Pamekasan Regency, Blitar City and Mojokerto City while there were 21 regions that were inefficient. In 2015 and 2016, of 30 regions there were 10 regions that were efficient. This means that there are only 10 regions that have allocated health spending optimally to produce health facilities and services so as to produce cost-efficient technical efficiency. The remaining 20 regions have efficiency values not much different from the previous year. Reviewed based on the results of the average achievement of the level of technical efficiency of the cost of the VRS model with input-oriented during the years 2012-2016 in 30 regions in East Java Province only 26.67% or 8 regions that have consistently allocated health spending with a level of technical efficiency costs already achieve 100% efficiency.

These areas are Pacitan Regency, Bondowoso Regency, Situbondo Regency, Madiun Regency, Bojonegoro Regency, Lamongan Regency, Blitar City and Mojokerto City. While the remaining 22 districts / cities still experience inefficiencies in managing and allocating their health

expenditures for the provision of basic public health facilities and services. Regions where the results of the measurement of the level of technical efficiency of cost reach 100% perfect value indicate that the region has been efficient in allocating the amount of health expenditure to be spent in accordance with government needs in the health sector. The health expenditure is allocated to provide output in the form of health facilities and services. In this research, the output is in the form of providing total of puskesmas, total of posyandu, total of puskesmas medical personnel and total of government hospital. Areas with the achievement of efficiency levels that are less than 100%, then these areas are included in areas that are inefficient on technical costs of health expenditure. If the value of efficiency decreases, it can be said that the management or use of health spending is increasingly inefficient. Existing conditions indicate that many regions in East Java Province are experiencing wasteful spending on large health spending, but this has not been accompanied by an increase in the number of health facilities and services provided to their residents. The following is a table of the results of the level of technical efficiency of health expenditure for the VRS (Variable Return to Scale) model with input-oriented assumptions in 30 Regencies / Cities in East Java Province 2012-2016:

Table 4. Results of Calculation of Technical Efficiency Level of Health Spending Costs for VRS Models in 30 Regencies / Cities in East Java Province 2012-2016 (percent)

Regency / City	Technical Efficiency Costs					Average Efficiency
	2012	2013	2014	2015	2016	
Pacitan Regency	100	100	100	100	100	100
Ponorogo Regency	65,13	69,76	53,45	57,76	57,76	60,77
Trenggalek Regency	81,82	79,84	76,85	78	78	78,90
Tulungagung Regency	49,68	72,62	59,17	57,39	57,39	59,25
Kediri Regency	76,61	45,74	38,80	49,88	49,88	52,18
Malang Regency	51,80	59,69	48,45	45,62	45,62	50,24
Lumajang Regency	88,32	70,90	64,93	67,41	67,36	71,78
Jember Regency	38,49	36,96	27,42	28,82	28,82	32,10
Bondowoso Regency	100	100	100	100	100	100
Situbondo Regency	100	100	100	100	100	100

Probolinggo Regency	76,77	72,62	61,34	59,50	59,50	65,95
Pasuruan Regency	63,73	53,25	45,61	47,71	47,71	51,60
Sidoarjo Regency	39,82	28,62	21,77	31,04	31,02	30,45
Mojokerto Regency	100	85,07	62,33	71,47	71,45	78,06
Jombang Regency	49,17	56,69	58,51	60,94	60,93	57,25
Nganjuk Regency	53,05	58,41	60,28	62,31	62,32	59,27
Madiun Regency	100	100	100	100	100	100
Bojonegoro Regency	100	100	100	100	100	100
Tuban Regency	65,59	81,02	87,53	78,85	78,84	78,37
Lamongan Regency	100	100	100	100	100	100
Gresik Regency	49,55	45,38	50,77	49,92	49,89	49,10
Bangkalan Regency	61,94	68,26	46,09	66,51	66,50	61,86
Sampang Regency	95,69	100	81,17	100	100	95,37
Pamekasan Regency	74,49	91,72	100	79,40	79,38	85
Kediri City	54,84	46,71	48,30	60,66	60,65	54,23
Blitar City	100	100	100	100	100	100
Malang City	100	67,12	65,27	100	100	86,48
Probolinggo City	100	96,68	90,52	95,60	95,43	95,65
Mojokerto City	100	100	100	100	100	100
Surabaya City	12,47	12,43	12,04	12,75	12,79	12,50
Average	74,97	73,32	68,69	72,05	72,04	72,21

Source: Secondary Data Processed, 2019.

Based on the results of the study, it is known that the results of data processing proved that the average efficiency value during 2012-2016 was only 8 districts / cities or around 26.67% which were already efficient. The inefficiency that occurred in 30 regions of East Java Province in terms of technical costs was quite large. These conditions indicate that there is waste in the management of the health expenditure budget. This research is similar to (Puspitasari & Pujiati, 2017) found that waste of budget with the results of technical cost efficiency from 35 regions in Central Java, only 5 regions have reached 100% and prove that the majority of regions are less than optimal in using their health spending. In line with Putri (2015), regions in West Java Province that have not reached 100% or even less than 50% reflect the phenomenon that is still inefficient in allocating the health budget even though there is no addition of services or health facilities.

According to research from Asandului et al. (2014), it is evident that developed countries that produce high GDP per capita are technically inefficient and that precisely with limited input resources it has been efficiently used. The statement is in line with this research that the higher the government's expenditure on health does not guarantee efficient budget allocation.

According to the theory on Rambe & Syahputra (2017), mentioning efficiency is a form of savings in using resources in an activity or organization, but the phenomenon that occurs in many regions that have large input resources is inefficient and the resulting output is low as in Surabaya. The average level of technical efficiency in the cost of Surabaya City during 2012-2016 shows an inefficient of 12.50%. Whereas in terms of health expenditure input which is greater than other regions such as Pacitan Regency and Blitar City, the resulting input is much smaller this indicates that there is

a waste of health spending resulting in inefficiency.

Based on the results of the level of technical efficiency the cost shows that regions with large health spending tend to be inefficient. In line with Indriati (2014), which states that regions with lower health sector spending tend to be more efficient than regions with large health sector expenditures. But contrary to the statement from the Report of the National Commission on Macroeconomics and Health (NCMH) in Hooda (2015), that countries with high health spending have achieved better health outcomes compared to countries with low health spending.

Research conducted by Behr (2017), said that some countries can reduce financial inputs without having to reduce output. In line with the results of this study, it is necessary to take steps to reduce input on health spending but not necessarily reduce the output of health service facilities. This can be seen in the potential improvement for regions that are still inefficient in technical costs.

Measurement of the value of the technical efficiency level of this system is obtained by comparing intermediate output variables that are used as input (input) in the form of health facilities and services including the number of puskesmas, the number of posyandu, the number of puskesmas medical personnel and the number of government hospitals per 100,000 population. The input is compared with the outcome variable in the form of health status as output, including the total infant mortality rate (IMR) per 1,000 population, maternal mortality rate (MMR) per 100,000 population, life expectancy (AHH), and the percentage of Morbidity Rate (AHH morbidity rate)

The level of technical efficiency of this system shows how efficient the regional government of East Java Province is in seeking the number of puskesmas, the number of posyandu, the number of medical personnel available at the puskesmas and the number of government-owned hospitals as inputs in order to be able to produce a high degree of population health. The technical measurement of the system uses the assumption of a Variable Return to Scale (VRS) model while the orientation used is input-oriented.

Judging from the results of the value of the technical efficiency of this system is obtained from the calculation of intermediate output variables and outcome variables with the assumption of input-oriented Variable Return to Scale (VRS). Based on table 5., the results show that in 2012, 2013, and 2014, the value of the technical efficiency of the facility and health service system was only 8 regions which were not yet efficient or a value of less than 100% and 22 regions were already efficient. This shows that the use of existing health facilities and services in the area to achieve public health is good.

In 2013, a decrease in efficiency occurred in Pamekasan Regency and Blitar Regency to 99.28% and 85.57%. While the City of Kediri and Mojokerto City increased to 100%. Whereas in 2014, Ponorogo Regency and Blitar City increased to 100% while Mojokerto Regency actually decreased to 85.93% while Mojokerto City fell to 59.94%. Although efficiency inconsistencies still occur in some areas, it shows that the use and utilization of health service facilities is still lacking, but the majority of regions have achieved efficiency, although still up and down.

In 2015, the level of technical efficiency of the system was very good, with 24 regions experiencing 100% efficiency. Whereas in 2016, from 30 regions there were 22 regions that had reached 100% efficiency level and the remaining 8 regions were still not efficient. The low level of efficiency and inconsistency in some regions shows that the use and utilization of health service facilities is still lacking, but some regions also have proven improvements with an increase in the value of the technical efficiency of the system.

The increase shows that the area has improved both in terms of the number and use of health service facilities for each population. While the area which is still below the efficient value can be said that the area is the number of health facilities is still small and the utilization is less so that the degree of public health as the output achieved is also lacking. Reviewed based on the average achievement of the level of technical efficiency of the facility and health service system during 2012-2016 using input-oriented VRS models in 30 regions in East Java Province reached 53.34% or 16 regions that have consistently added the number of facilities and health services and used them effectively and optimally for the basic needs of public health.

The results of the technical efficiency value of the regional health service system which has reached 100% indicate that the area has reached the point where the number of available health facilities and services and their use have resulted in a fairly good degree of public health. The addition of the availability of health service facilities in each

region will also have an additional effect on the degree of public health. Achieving the level of efficiency in the technical system is far better than the technical efficiency of costs. This is supported by the resulting efficiency values which show that during the five years in the study period many regions experienced far less technical system inefficiency compared to technical costs whose inefficiency was very severe even only a few regions had reached an average of 100% for five year.

Based on the results of data processing, in the technical efficiency of the system there are 53.34% areas that are already efficient or there are 14 regions that are still inefficient. This phenomenon indicates that the level of technical efficiency of the system is far better than the technical costs. Judging from the value of efficiency, achieving the value of the level of technical efficiency of the system is higher than the value of the technical efficiency of costs, although there are still many areas that are not efficient, but the value is not as low as technical costs. Regions that are technically efficient indicate that the region has provided an output of good health compared to those that have not been efficient.

Achieving the technical efficiency of the system in line with the research Cetin & Bahce (2016), it was detected that 15 countries out of 34 OECD countries still experienced technical inefficiencies and found that these countries provided good health output but used their resources inefficiently. In line with Yuliansyah (2015), the average results of the technical efficiency of the system are far greater than the technical efficiency of costs so that it shows the greatest inefficiency occurs in the wasteful use of health spending to produce health services

for the community while for the distribution and use of health facilities and services is far more well.

However, it is not in line with the research of (Asandului et al., 2014), which found empirical results with the VRS model there were only 23.34% of the 30 countries in Europe that had reached efficiency. The statement is contrary to the results of this study which showed the results of around 53.34% of 30 regions in East Java

Province had reached 100% efficient. This means that the achievement of the level of efficiency with the assumption of VRS is quite high and indicates that these areas have used health facilities and services evenly for each region so that the output of the degree of public health can be achieved optimally. The following table shows the results of the technical efficiency of the healthcare system VRS model input-oriented assumptions in 30 districts/cities in East Java Province:

Table 5. Results of Calculation of Technical Efficiency Level of VRS Model Health Service Facility System in 30 Regencies / Cities in East Java Province 2012-2016 (*percent*)

Regency / City	Technical Efficiency System					Average Efficiency
	2012	2013	2014	2015	2016	
Pacitan Regency	75,94	80,24	83,39	89,69	100	85,85
Ponorogo Regency	85,31	85,73	100	88,31	90,83	90,04
Trenggalek Regency	94,38	94,44	97,87	97,99	95,20	95,98
Tulungagung Regency	100	100	100	100	100	100
Kediri Regency	100	100	100	100	100	100
Malang Regency	100	100	100	100	100	100
Lumajang Regency	90,03	98,20	94,84	100	98,17	96,25
Jember Regency	100	100	100	100	100	100
Bondowoso Regency	100	100	100	100	100	100
Situbondo Regency	100	100	100	100	100	100
Probolinggo Regency	100	100	100	100	100	100
Pasuruan Regency	100	100	100	100	100	100
Sidoarjo Regency	100	100	100	100	100	100
Mojokerto Regency	100	100	85,93	100	100	97,19
Jombang Regency	100	100	100	100	88,82	97,76
Nganjuk Regency	100	100	100	85,95	90,60	95,31
Madiun Regency	79,46	79,78	70,73	69,94	79,02	75,79
Bojonegoro Regency	86,56	79,39	73,94	100	100	87,98
Tuban Regency	100	100	100	100	100	100
Lamongan Regency	100	100	100	100	100	100
Gresik Regency	100	100	100	100	82,41	96,48
Bangkalan Regency	100	100	100	100	100	100
Sampang Regency	100	100	100	100	100	100
Pamekasan Regency	100	99,28	99,61	100	100	99,78
Kediri City	64,08	100	100	100	100	92,82
Blitar City	100	85,57	100	100	100	97,11

Malang City	100	100	100	100	100	100
Probolinggo City	100	100	100	100	100	100
Mojokerto City	60,19	100	59,94	66,71	71,30	71,63
Surabaya City	100	100	100	100	100	100
Average	94,53	96,75	95,54	96,62	96,55	96

Source: Secondary Data Processed, 2019.

Based on the results in table 5. Other studies conducted by Yatiman & Pujiyono (2013)), there is only one area that is technically inefficient in the system in Yogyakarta Province because it is caused by greater input than other regions but the output produced is relatively the same. In addition, research by Rapiudin & Rusydi (2017) said that although it has reached 100% and the input of health services is ideal, with a large area can complicate health services so that output is low. Some of these statements indicate that even though they have reached 100% efficiency, it does not rule out the use and equitable distribution of health facilities and services that are less than optimal. Using inputs that are too excessive and too insignificant will have an effect on the output produced, so the input is expected to be used optimally and in accordance with the needs of each region for the welfare of the community.

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According to Indriati (2014), regions have different input needs to achieve the same output depending on the area, population density and economic development of the area. For example, the Mojokerto City, even though it is 100% technically cost efficient, the technical system is still with the lowest average during 2012-2016 at 71.63%. This condition is due to health service facilities that produce AHH, MMR, IMR, and Morbidity Rates are still low. Judging from the population density Mojokerto City is very high at 6471.6 people / km². This situation makes it difficult to provide facilities and provide health services to all regions and communities so that the resulting output is low.

Regions that are not yet efficient either in terms of technical cost efficiency or system technical efficiency can be followed up by making improvements to each input and output. Improvements to health costs can be done by increasing or reducing the allocation of health spending to provide health care facilities and use them according to the proportions and needs of each region. In addition, improvements to the health service facility system can be done by increasing the number of health facilities and services taking into account

the number and needs of the population. So that later it can be used and utilized as well as possible to improve the distribution of health services that are easy and affordable for the community so that the highest degree of health can be implemented in each region.

In general, the average achievement of the level of technical cost efficiency and system technicality between 2012-2016 can be concluded that only 3 districts experienced efficient conditions, namely Bondowoso Regency, Situbondo Regency and Lamongan Regency. The remaining 27 districts / cities have not yet reached efficiency. Therefore, it is necessary to obtain an improvement strategy that must be carried out by the local government to achieve efficient spending on health.

Based on the results of the calculation of the level of efficiency, inefficient improvement measures were taken from 22 regions that have not been efficient both in terms of technical costs and systems in East Java Province in 2016. These improvements can be done through adding or reducing the use of inputs and outputs using the results of the potential improvement produced in data processing both technical efficiency costs and system technical efficiency. Conducting improvement strategies using the results of potential improvement has been used by several previous studies. As is the case with Puspitasari & Pujiati (2017) and Yatiman & Pujiyono (2013) using potential improvement as an identification of the target steps for improving output and input in order to achieve efficiency.

Based on table 5 in appendix. Technically the cost of Jember Regency is still inefficient by 28.82%, it is necessary to reduce health spending by 71.18% (360 billion rupiah) to 146 billion rupiah, increasing total

of puskesmas by 113.73% (2.32 units) to 4.36 units, total of posyandu by 24.12% (28.35 units) to 145.92 units, total of puskesmas medical personnel by 71.43% (3.34 medical) to 7.99 medical and total of government hospitals by 45.62% (0.06 units) to 0.18 units per 100,000 population.

Technically the system, Mojokerto City is still inefficient with a value of 71.3% so it needs to reduce total of puskesmas by 48.08% (1.9 units) to 2.06 units, total of posyandu by 28.7% (37.24 units) to 95.5 units, total of medical personnel by 43.13% (9.21 medical) to 12.15 medical, and total of government hospitals by 79.19% (0.63) to 0.06 units per 100,000 population, and increasing Life Expectancy of 1.05% (0.77 years) to 73.55 years, MMR of 64.19% (30.37 per 100,000 live birth) to 77.67 per 100,000 live birth, and morbidity rate of 14.58% (1 53 percent) to 11.76 percent.

While Lumajang Regency technically costs and technical systems are still inefficient with values of 67.36% and 98.17%, so it is necessary to reduce health expenditure by 32.64% (75 billion rupiah) to 154 billion rupiah, increasing total of puskesmas by 73.42% (1.02 units) to 4.2 units, total of posyandu by 16.12% (22.03 units) to 145.57 units, total of puskesmas medical personnel by 0.13% (0.01 medical) to 7.97 medical and total of government hospitals by 25.17% (0.04 units) to 0.18 units per 100,000 population.

As for the technical system review, Lumajang Regency needs to reduce total of puskesmas by 1.83% (0.4 units) to 2.38, total of posyandu by 1.83% (2.28 units) to 122.03 units, total of puskesmas medical personnel by 19.41% (1.62 medical) to 6.70, total of government hospitals by 1.83% (0.01 units) to 0.09 and increasing Life Expectancy by 0.1% (0.07 years) to 69.45 years, IMR was 11.91% (3.85 per 1,000 lb) to 36.14 per 1,000 lb and the morbidity rate was 19.93% (2.91 percent) to 17.50 percent.

The calculation results show that the City of Probolinggo technically the cost is still in an inefficient condition with an efficiency value of 95.43% but has reached a technically efficient system. So Probolinggo City needs to reduce health spending by 4.57% (6 billion rupiah) to 126 billion rupiah, increasing total of posyandu by 8.37% (7.89 units) to 102.22 units, and total of government hospitals by 5.52% (0.03 units) to 0.46 units per 100,000 population. Based on the proportion of health expenditure, Probolinggo City has the lowest health expenditure from 30 other provinces, but technically the cost and technical results of the efficiency system obtained are far better than other regions with large health spending. Like the city of Surabaya.

The city of Surabaya, which technically has reached 100% for five years in a row, but technically the cost only reaches an average efficiency of 12.50%. In 2016 it reached a value of 12.79%. In fact, if seen from the health expenditure of Surabaya City has the largest proportion of the 30 other regions, but it has the lowest cost of technical efficiency. This can be influenced by external factors such as overcrowding so that the needs of the health sector are also very large. Then it is necessary to make corrective steps by reducing health expenditure input by 87.21% or 778 billion rupiah and by increasing the number of puskesmas medical personnel by 17.08% or 2.33 medical personnel and total of government hospitals by 144.38% or 0.26 the units.

There is an improvement by reducing or increasing the input output so that health facilities and services can be used optimally for certain health status results so that they

can achieve efficiency. The use of excessive input will also have a low output effect so that it will affect the results of efficiency. However, the results of the level of efficiency are also relative so that it can be influenced by external factors as well as not only the input-output factors contained in this study.

Overall, the technical conditions of costs and systems in 30 districts / cities in East Java Province are still said to be inefficient. This shows the inefficiency of health spending that has not been allocated optimally. Optimization of the expenditure budget in the health sector is needed so that there is no waste in its use. So to achieve 100% efficient levels can use input as effectively as possible according to the needs of each region.

CONCLUSION

Based on the results of the level of efficiency of government spending on the health sector in East Java Province in 2012-2016, obtained the level of technical efficiency of health expenditure costs reached 26.67% or only 8 regions that have reached 100% efficiency value while for technical facilities and health service systems amounted to 53.34% or only 14 regions that have not reached efficiency. In general, both in terms of technical costs and systems, both are still in an inefficient condition so that shows that the majority of regions in East Java Province have not yet allocated their health expenditure optimally and there is an indication of waste in the use of the health budget, especially in efforts to provide health facilities and services. Step improvement strategies that can be done for regions that are still indicated inefficiencies using the results of potential improvement to help improve the proportion of inputs and outputs needed by an area according to their needs in order to achieve

a value-efficient technically the cost and technical system.

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APPENDIX

Table 6. Potential Improvement Strategies Results for Technical Efficiency Costs and Technical Costs of the Health Sector Expenditure System in East Java Province in 2016

Regency/ City	Input / Output Variable	Actual	Target	Potential Improvement
Jember Regency	Health Spending	Rp.506.494	Rp.145.980	-71,18%
	Puskesmas	2,04 units	4,36 units	113,73%
	Posyandu	117,57 units	145,92 units	24,12%
	Puskesmas Personnel	4,65 medical	7,99 medical	71,63%
	Government Hospital	0,12 units	0,18 units	45,62%
Mojokerto City	Puskesmas	3,96 units	2,06 units	-48,08%
	Posyandu	129,74 units	92,50 units	-28,70%
	Puskesmas Personnel	21,36 medical	12,15 medical	-43,13%
	Government Hospital	0,79 units	0,16 units	-79,90%
	Life Expectancy	72,78 years	73,55 years	1,05%
	MMR	47,30/ 100.000 lb	77,67/100.000 lb	64,19%
	IMR	18,87/1.000 lb	18,87/1.000 lb	0
Morbidity Rate	13,05 percent	14,58 percent	11,76%	
Lumajang Regency	Health Spending	Rp.229.108	Rp.154.333,99	-32,64%
	Puskesmas	3,18 units	4,20 units	73,42%
	Posyandu	123,54 units	145,57 units	16,12%
	Puskesmas Personnel	7,96 medical	7,97 medical	0,13%

	Government Hospital	0,14 units	0,18 units	25,17%
	Health Spending	2,42 units	2,38 units	-1,83%
	Puskesmas	124,31 units	122,03 units	-1,83%
	Posyandu	8,32 medical	6,70 medical	-19,41%
	Puskesmas Medical	0,10 units	0,09 units	-1,83%
	Personnel			
	Life Expectancy	69,38 years old	69,45 years old	0,10%
	MMR	118,28/100.000 lb	118,28/100.000 lb	0
	IMR	32,29/ 1.000 lb	36,14/ 1.000 lb	11,91%
	Morbidity Rate	14,59 percent	17,50 percent	19,93%
Surabaya	Health Spending	Rp.892.090	Rp.114.059	-87,21%
City	Puskesmas	2,17 units	2,17 units	0
	Posyandu	98,41 units	98,41 units	0
	Puskesmas Medical	13,62 medical	15,95 medical	17,08%
	Personnel			
	Government Hospital	0,17 units	0,43 units	144,38%
Probolinggo	Health Spending	Rp.131.967	Rp.125.930	-4,57%
City	Puskesmas	2,60 units	2,6 units	0
	Posyandu	94,33 units	102,22 units	8,37%
	Puskesmas Medical	15,58 medical	15,58 medical	0
	Personnel			
	Government Hospital	0,43 units	0,46 units	5,52%

Source: Secondary Data Processed, 2019.