Jurnal Ekonomi dan Studi Pembangunan, 9 (2), 2017
ISSN 2086-1575 E-ISSN 2502-7115

Technical Efficiency Analysis of Public Centre In Mataram Regency in 2016

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Received: June 25, 2017; Accepted: September 4, 2017; Published: November 3, 2017
Permalink/DOI: http://dx.doi.org/10.17977/um002v9i22017p236

Abstract

The focus of this study is measuring relative efficiency of 11 public health centers in Mataram regency in 2016, by using nonparametric approach Data Envelopment Analysis (DEA). DEA is chosen because it is able to handle more input and output variables. This study uses output-oriented model. Input variables of health medical labors and other health labors, cost of salary and health operational supporting fund. Output variables of confinement scope that is helped by health labors, the scope of children under five pneumonia, the scope of lung TB BTA, the scope of basic immunization, the scope of early detecting cervix cancer and breast cancer (CA mamae). The results are seven public health centers classified as technically efficient and the remaining classified as technically inefficient in 2016 for the public health centers which are technically inefficient can be improved by increasing output variable based on DEA.

Keywords: Relative efficiency, Public health center, DEA
JEL Classification: G31, I15

INTRODUCTION

One of the factors which influence the productivity of human resource is depending on their own health. The low level of nutrient and calorie for the young inhabitants will produce fewer productive laborers and approximately under-developed mental level. Furthermore, it is able to cause less productivity and depleted output level based on economics perspective. The important side of health factors for human will be related to the quality of human resource itself.

Besides the priority aim, health is also a central input in the economy development and it is capable of decreasing the poverty. Budi (2010:2) states that central input is intended if there is an increasing of country expense investment in the health sector, so it will be producing an income upgrading in low-income countries.

Investment in the health sector or health expense is one of the development expenses which is an expending with a purpose as funding in alteration process and it has a characteristic to increase the people's financial capital, not only physical development but also nonphysical development, according to Putri (2015:2). Kurnia (2006:4) enlightens that efficiency of region expense expending is

interpreted when each rupiah is spent by the regional government to produce the people's finest prosperity.

There have been various institution forms of public health service in Indonesia, for example, hospital, polyclinic, and public health center. From those three institutions, the public health center is the most excellent establishment because it provides appropriate health service with health approach. This is not only caused by operating a curative function, but also public health center also plays an important role in preventive and promotional activities (Trisnantoro, 2009:40).

The increasing health service to enhance public health level is the purpose of health development in Mataram city accomplished by programs and activities. Health development is directed to increase public health level and amplify the quality and the ease of health service that is more accessible for all people (health profile in Mataram city, 2016).

The public health center is one of the public health institutions and it is the easiest way to be reached by all people from different economic levels to get a principle in the health sector and the government in Mataram city prepares 11 facilities of the public health center to actualize the programs and the activities to intensify the public health level there.

The scoop quantity of public health center service in Mataram is countable by comparing actual service activities executed by public health center with output indicators reflecting achievement level from each health service activity program. In national level, accomplishment rank is decided in the rule of Indonesia health ministry No.741/MENKES/PER/VII/2008 about minimal service standard of the health sector in Regency/ city.

The public health service which acquires service target means that it is able to manage resources well; therefore it is able to operate activity programs maximally. The ability of public health center in managing resource can reflect the efficiency level of the public health center. Efficiency is the ratio between input and output. Generally, a unit is called efficient if it uses some inputs that are less than other unit inputs, but it is capable of producing the same output. In other words, a unit is identified efficiently if the unit implies the same input with other units, but it produces a bigger output. The input of public health center is the resource of accessibility, while the output is health service activities organized by the public health center. The ratio between input and output shows the efficiency level of public health centers in Mataram.

Management performance of public health service is known to be measured by two main concepts. They are efficiency and effectiveness (Handoko, 2003: 7). If the efficiency focuses more on the utilization process, thrift process, and input empowerment of power resources, the effectiveness concentrates on output and outcome or expected performance result of the public health center. Efficiency is related to the relationship between health service output with power resources used to create output and outcome (Handoko, 2003:7).

Referring to Osei et al. (2005) in fund consideration, comparatively great extent to public health center does not always able to help. In getting the proficient condition, health strategy and health promotion must be increased to get an efficient score. Therefore, it is genuinely required to make a policy which investigates the efficiency of public health center in reaching result level. There, more various arrangements with oriented result are exceedingly needed. A benchmark is also

essential to the efficiency percentages of the public health center to be put in the right order. It means that the public health center having the best efficiency will be the fundamental reference to calculate the aptitude percentage of each public health center with other health centers.

Many types of research of the efficiency of public health service have been carried out by a number of experts all around the world, e.g. researchers completed by Alkazili (2008); Alvarado (2006); Osei (2005). They implemented different input and output variables and different research objects quantity. Connected with the background and the explanation above, the writer formulates some problem cases. They are: (1) How is the relative efficiency degree at public health center in Mataram in 2016?, (2) How does the contribution of each input and output variable result in reaching efficient condition?

LITERATURE REVIEW

Production Theory

In reference to Sukirno (1994: 6), common production is interpreted as an optimized activity from production factors, for instance, employee, capital, and the others by the company to put up some products in goods and services form. Technically, production activity is completed by combining several inputs to obtain some outputs. Sukirno (1994:9) explains in economy meaning that production is a human effort to create and to add the power or the usage of a certain product or thing to fulfill the human needs.

In regard to the producers' importance, the purpose of production is to produce a quantity of profitable products. That purpose is achieved if the produced products or services are appropriate for the people necessaries. Therefore, it is described that the aim of production activity is to serve the people requirements or normally, to fulfill their life necessaries (Boediono, 2013;2).

Production activity involves two variables which have a functional connection or influence each other (Boediono, 2013: 63). They are: how many outputs must be produced, and how many inputs will be used.

Thus, the production function is a functional connection or cause-effect between input and output. In this case, input as a cause and output as an effect, or input is free variable and output is not. Production input is known as production factors, in addition, production output is known as production quantity.

The production function is a function or an equality which clarifies a connection between output level and inputs utilizing level. The connection involving output quantity (Q) and using input quantity in production (X1, X2, X3, … Xn), mathematically written as the following (Boediono, 2013: 64):

$$Q = f(X1, X2, X3, \dots Xn)$$

Q= output
X= input

When production inputs consist of capital, labor, resources, and technology, the production equality becomes as the following (Sukirno, 1994; 194):

$$Q = f(C, L, R, T)$$

Q= Quantity, or produced product quantity
f= function, or functional equality symbol

C= Capital, or used capital or tool
L= Labor
R= Resources, natural resources
T= Technology and entrepreneurship

That equality explains that output from a production is a function or influence or cause of input. It implies that each produced product from a production will depend on the kind/ type of used input. The change happens at the input can cause the change at the output.

Coelli et al. (1998) define the productivity as a ratio of some outputs that is produced based on some used inputs. The two concepts are usually used to measure a performance and utilization resources are productivity and efficiency.

Sukirno (1994: 193) states that production concepts in short period while the company has constant input, so the entrepreneur must decide how many variable inputs should be instigated to produce output. The entrepreneurs will calculate how many effects of variable input increase the total production. Short period refers to the stage of time which one or more production factors cannot be modified. According to Sukirno (1994: 197), total product is all produced products quantity from some production factors. Marginal product is escalating product quantity as an increasing effect of one production factor unit. Average product is an average of formed product number for each reached production factor unit.

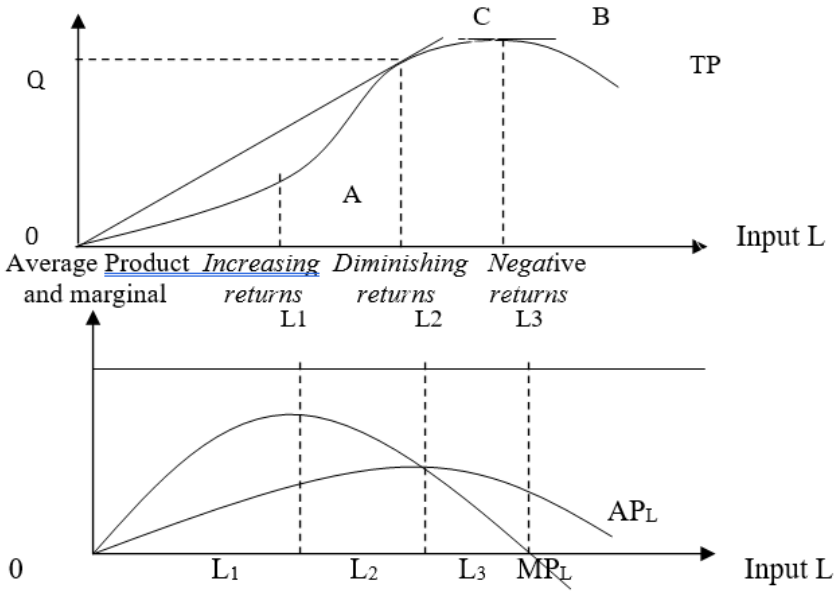


Figure 1. Total product curve, Average and Marginal
(Nicholson, 1995:219)

a. From the labor productivity curve above, the slope of total production curve shows that the condition of total production, marginal production, total production will step up if there is labor increasing.
b. In marginal production curve MPL, reaching a maximum point on A' point, and it will decline if there is labor increasing "Diminishing returns". MPL= 0 when total production is reaching C maximum point, and it will be negative if there is labor increasing for the second time.

c. Average production curve APL equals marginal production MPL on B' point, and APL reaches a maximum point on B', because of one increasing labor from L1 to L2 will increase average production of all labors, so that average production equals marginal production.

Sukirno (1994: 193) emphasizes that production process in long period is a production process where all inputs or used production factors having a variable characteristic or in other words, there is no constant input in extended period production. Based on McEachern (2001:67), long period means extending time quantity to make all inputs become different output variables among industries. Utilizing a combination of various variable inputs can be described with a curve that is termed isoquant curve.

Isoquant is a curve describing a combination of two kinds of inputs (production factor) to produce output/ production with same quantity McEachern (2001: 89). Isoquant curve form is various. Based on Nicholson & Nordhaus (1995: 231) it can be linear if the combination between the inputs will give a proportional change when one of them is changed, and it can be convex from the origin point (like an indifference curve). The most important thing is that isoquant is not a vertical line or horizontal line because regularly, it is impractical to produce products in unlimited quantity or zero by using limited creation factor quantity.

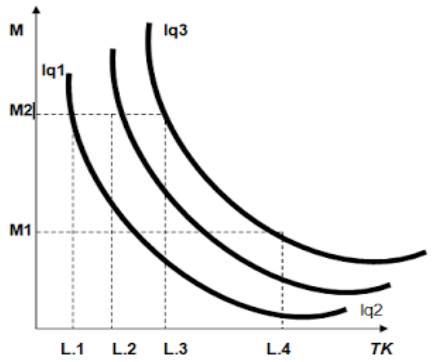
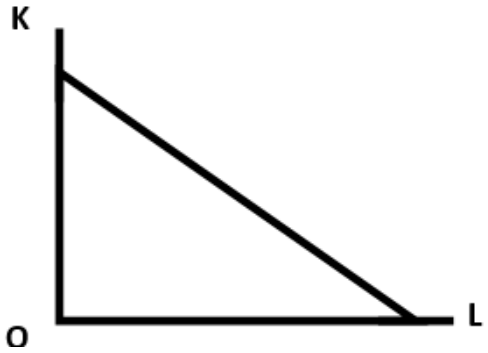


Figure 2. Isoquant curve picture
(McEachern, 2001)

As the figure 2 above, it can be simply explained as following: each isoquant curve above shows production quantity produced for each input combinations, certainly the production quantity in curve Iq3 is bigger than in Iq2 and Iq1 or Iq3> Iq2> Iq1. Look at the using capital as much as M2, it shows that it can be combined with a number of labors to produce products as many as in Iq1 until in Iq3. For example, if the company decreases a sum of capital as much as M1, for a number of production in Iq3, the company increases the labors quantity become L4 and obviously the combination M2L3= M1L4. Then, what thing distinguishes Iq1, Iq2, and Iq3? Definitely, it is fund factor /cost factor. The spent fund I n production in Iq3 is assuredly bigger than in Iq2 and the fund in Iq2 is bigger than Iq1.

This is an incredibly undemanding theory argumentation explanation that each increasing of input factors without decreasing of other input factors will initiate the company to increase a sum of fund to sign it. Accurately, the problem is not only on the different cost for each isoquant curve (Iq1) but also in one kind of Iq curve consists of various different cost and "it's Great" there is just only one

place (Mathematically) where the produced production quantity has the most optimum condition on the budgeted cost. An economy unit tries to minimize the cost, thus the production must adjust it. McEachern (2001: 90) suggested that some combinations of labor and capital that burden the company with the similar cost quantity is called Isokost.



Picture 3. Isocost curve
(McEachern, 2001)

To minimize the production cost with the similar certain output, economy activity unit ought to choose input combination that burden minimum cost (least cost combination). McEachern (2001: 92) states that this combination happens when isocost line touches isoquant curve or same with the creator of balance curve.

Pindyck (2008: 316) empathizes that the producer balance is reached if technical ability and economical ability are same. Isoquant describes producer's ability (obstacle) technically and isocost describes producer's ability (obstacle) economically, so the producer's balance can be reached through the combination of technical ability and economical ability.

These two concepts are often used as a comparison to say that A company is more productive than B company, then it can be trusted that A company is more efficient. Thus, productivity is a descriptive measurement of performance, whereas efficiency is a normative measurement. By using the analysis basic above, it can be realized that production function of public health center shows technical connection which combines input or production factor is related to public health center resources and the production result or output which is related to public health center service. Those activities need a process inefficient condition.

Efficiency Theory

Suswandi (2007) & Razali (2012) states there are three factors of efficiency. They are by the similar input produces bigger output, by smaller input produces the similar output, and by big input produces bigger output anymore.

In economic theory, there are two efficiency meanings; they are technical efficiency and economy efficiency. Economy efficiency has macro point of view which has wider scope than technical efficiency which has micro point of view. The technical efficiency measuring is disposed of limited to the technical and operational connection in input conversion process become output.

Finally, an effort to increase technical efficiency just requires micro policy which has internal characteristic; it is by optimal resource control and its allocation.

Wulansari (2010: 42) explains in economic efficiency that price cannot be considered constant because price can be influenced by macro policy.

Samuelson (1996: 35-36) argues that efficiency means that economy has been used as efficiently as possible to accomplish the people necessary and pretention. Whereas Sukirno (1994: 254) insists that resources are used efficiently if the entire provided resources are exploited completely. The resources utilizing is in such a way, so there is no other utilizing features which will increase the people prosperity.

Sukirno (1994: 254-255) divides the efficiency meaning into two parts, they are productive efficiency and allocative efficiency. To reach productive efficiency, there are two conditions must be fulfilled. They are: first, for each production levels, the spent cost is the most minimum. To produce a production level, various production factors are used. The combination of the most efficient production factor is a combination causing least cost spending. The second condition is the company must be able to achieve production in the lowest average cost in the industry. In this condition, it is concluded that the company reaches production efficiency level which is the most negligible, whereas allocative efficiency is related to resources allocation to some economy and production activities. Assessment of this efficiency includes of whether the resources allocation has reached maximum level or not. This reached efficiency is completed by condition providing the cost of each product is the same as the marginal cost to produce that cost.

Nicholson (2003: 311- 327) explains that efficiency can be divided into two meanings. The first is technical efficiency. This is production process choice which will turn out a certain output by minimizing the resource. This technical efficiency condition is described by dots along isoquant curve. Secondly, cost efficiency is whatever the choice, the technique is used in production activity must reduce the cost. In economical efficiency, the company's activity will be limited by calculation line that is owned by the company (isocost). The chosen production efficiency is efficiency consists of technical efficiency and economy efficiency.

Razali (2012) explains that economy efficiency consists of technical efficiency and allocation efficiency. Technical efficiency is combination of capacity and ability of the economy unit to produce until the maximum output level from input and technology quantity. Allocation efficiency is an ability and economy unit inclination to operate to the score level of the marginal product equals marginal cost, MP= MC.

As regards some exceeding meanings, the efficiency is divided into (1) technical efficiency. This efficiency is related to the utilizing of labor, capital, and machine as inputs to produce maximum output. By applying the similar technology in all units, it is expected there will not be useless input in producing certain output quantity. An operating organization which is better than all other organizations in the sample can be declared that it has been technically efficient. (2) Allocative efficiency is related to minimizing the production cost with correct input choice to generate a certain output level by considering input cost level, with an assumption that examined organization has been absolutely theoretically efficient. Allocative efficiency is explained as percentage score, where 100 percent score shows that the organization has used its input in a proportion which will cut the cost. An organization operating in the best practice technically, still can be said inefficient allocative because it does not use an input in a proportion which minimizes the cost,

in a certain relative input cost. (3) Cost efficiency/ totally is related to combination of technical efficiency and allocative efficiency. An organization is called doing cost-efficient if it can be efficient not only allocative but also technically. Cost efficiency is counted as product of technical efficiency score and allocative efficiency (it's showed in percentage), so the organization just can reach 100 percent cost efficiency score if it has reached 100 percent efficiency either technical or allocative.

Data Envelopment Analysis (DEA)

DEA is a method to optimize the mathematics program that is used to measure technical efficiency of a unit that is labeled Decision-making units (DMUs) and compared relatively to other DMU (Charnes et al., 1984). Firstly, DEA method is used by Farrel (1957) to compare relative efficiency with a farmer as a sample by using cross-section method and limited to an output that is produced by each sample unit. In its development, DEA is an analysis tool used to calculate relative efficiency in education research, health research, transportation research, factory research, or banking research. DEA is non parametric approach which is often chosen for many types of research because of some reasons, include:

Relative efficiency of UKE in DEA is also defined as ratio of total weighted output divided by total weighted input. The content of DEA is deciding weight (weighted) for each UKE input and output. Each UKE is assumed free to decide the weight for each variable either available input or output, as long as it is able to fulfill two conditions required (Rusydiana, 2003).

According to Ramanathan (2003; 20), DEA is developing linear program that is based on measurement of relative performance from unit cluster of input and output. DEA is able to resolve the limitation had by partial ratio analysis or doubled regression. DEA is a procedure that is particularly designed to measure relative efficiency of a decision-making unit (DMU) using various inputs and outputs. In DEA, relative efficiency of DMU is defined as a ratio of total weighted input divided by total weighted output.

DEA approach emphasizes on doing an evaluation to DMU performance. The analysis is executed as concerns evaluation to relative efficiency from proportional DMU. Then, those efficient DMUs will form frontier line. If the DMU is on frontier line, the DMU can be said relative efficient that other DMUs in its group. Besides produce efficiency score of each DMU, DEA also shows the units which are being referenced for inefficient units.

The productivity of each DMU is measured by comparing input and output that is used with a dot on the line that is called efficient frontier. That line will round or envelop data from related organization. This efficient frontier line is obtained from full efficient unit. Some different units in this line is considered having the similar productivity score equals one (=1), while the unit which is under the efficient frontier line has smaller productivity score than one (<1) and it is an inefficient unit.

Ramanathan (2003) mentions that there are two factors influencing in DMU choosing, they are: DMU must be homogeny units. The units do the same task, and they have similar objects. Input and output which sign the performance of DMU must be identical, except they are different only in their intensity and magnitude.

The connection between the quantity of DMU to input and output quantity, sometimes it is decided away from "rule of thumb", it is the quantity of expected DMU more than input and output quantity and sample magnitude must be twice or three times more than the total quantity of input and output.

DEA model at least has three superiorities more than other models, they are: DEA model can determine many input variables and output variable, assumption of functional connection is not needed among measured variables, input, and output variables that can have different measurement unit (Nugroho, 2004).

Makmun (2002) believes that, although DEA analysis has much superiority than partial ratio analysis and regression analysis, DEA has some inadequacies, they are: DEA requires all inputs and outputs must be specific and measurable (such ratio analysis and regression analysis). Accidentally in entering input and output will offer the refraction result. DEA assumes that each input and output units must be indistinguishable with other units in the same type. Without able to identify the differences, DEA will give refraction result. In the basic form, DEA assumes constant return to scale (CRS). CRS explains that the proportional change in all input levels will produce the similar proportional change in output level. Input and output quality that is produced by DEA cannot be interpreted in economy percentage.

The first time, CCR model was found by Charnes, Cooper, and Rhodes in 1978. In this model, it is introduced an efficiency standard for each decision-making units (DMU) which is the maximum ratio between weighted output with weighted input. Each weight percentage that is used in the ratio is decided by the limitation that the same ratio for each DMU must has less percentage less or same with another.

CCR model is known with constant return to scale (CRS), it is the comparison of output and input percentage that has a constant characteristic, increasing of input and output is comparable. In CCR model, convexity constraint condition is not available, different with Banker-Charnes-Cooper (BCC) model where convexity constraint condition is available. A mathematical model of DEA-CCR is by using nonlinear program for DMU to k from a number of n DMU is as the following:

Objective function :

efficient $= \frac{\sum_{r=1}^{s} U \ .Yr0}{\sum_{i=1}^{m} vi \ Xi0} \leq 1$

Subject to :

$= \frac{\sum_{r=1}^{s} Ur \ Yrj}{\sum_{i=1}^{m} Vi \ Xij} \leq 1$; j = 1,2,3,…n

Where :

j : DMU, j = 1…,n
i : input, I = 1…,n
r: output, r = 1…,n

Data :

y_{rj} : Output score -r from DMU to-j
x_{rj} : Input score -I from DMU to-j

Variable :

Z_k : DMUk relative efficiency
U_r : weight for r output
V_i : weight for i input

There are two approaches in CRS model:
Model input oriented
Objective function: Min θ
Subject to :

$$\sum_{j=1}^{n} \lambda j\, Yrj - Ybk \geq 0 \; ; \; r = 1,2,\ldots s$$
$$\theta x_{ik} - \sum_{j=1}^{n} \lambda j\, Xij \geq 0 \; ; \; i = 1,2,\ldots m$$
$$\sum_{i=1}^{n} \lambda j = 1$$
$$\lambda_j \geq 0; \; j = 1,2,\ldots$$

BCC model (*Banker, Charnes, and Cooper*) is used if we assume that the comparison to input or output of a company will influence the productivity that is possible to reach, it is VRS (Variable Returns to Scale). Variable Return to Scale (VRS) model is bused because of unperfected competition, fund limitation, and others. It causes DMU cannot operate optimally. Therefore, Banker, Charnes, and Cooper in 1984 suggested in order DEA-CRS model which have used assumption that all optimized operated DMU are developed in VRS situation. DEA-CRS model can be easily developed in DEA-VRS model by only increasing convexity constrain, it is:

$$\sum_{j=1}^{n} \lambda j = 1$$

The model will be:
DEA VRS output oriented

Objective function : Min θ
Subject to :

$$\sum_{j=1}^{n} \lambda j\, Yrj - Ybk \geq 0 \; ; \; r = 1,2,\ldots s$$
$$\theta x_{ik} - \sum_{j=1}^{n} \lambda j\, Xij \geq 0 \; ; \; i = 1,2,\ldots m$$
$$\sum_{i=1}^{n} \lambda j = 1$$
$$\lambda_j \geq 0; \; j = 1,2,\ldots$$

METHOD

This research is quantitative research by using Data Envelopment Analysis (DEA). DEA is an analysis instrument used to measure relative efficiency of each unit of the research sample. The research location is some public health centers in Mataram. Mataram city is made to research location due to the background above; health indicator achievement in Mataram city is incredibly diverse. Populations in this research are eleven public health centers found in Mataram city.

Scope, Data Accumulation Method and Research Variable

Data type that is needed in this research is secondary data. Secondary data for variable input includes quantity of medical health labor, and other health labors that is reflected in labors data of public health center and non constant employee (PTT) per public health center in 2016, health operational supporting fund (BOK) which is reflected in realization data of health operational supporting fund (BOK) Mataram region in 2016, salary cost that is reflected in the data of salary payment and every month subsidy. Then output variable consists of confinement scope that

is facilitated by health labors, children under five pneumonia scope, lung TB BTA scope, basic immunization scope, the scope of early detection of cervix cancer and breast cancer that are included in health profile in Mataram in 2016. Data of Input and output variable is formulated in *constant return to scale* assumption which orients to output (*output maximization*).

Input variable includes of: (1) quantity of medical health labors which consists of specialist doctor, general doctor and dentist, (2) the quantity of other health labors are other health labors in public health centers in Mataram city, they are midwife (S1 midwife, DIII midwife, midwife), nurse (S1 nurse, DIII nurse), (SPK graduates), pharmacy labors (pharmacist, pharmacist assistant), sanitarian, medical technician (laboratory analyst, everyone put X-ray in order, everyone puts anesthesia in order), physiotherapist, and nutrient elucidator. (3) the quantity of health operational supporting fund is a supporting fund from the government through the health ministry in helping regency government/the regency implements health service based on Minimal Service Standard (SPM) of health sector to be Millennium Development Goals (MDGs) of health sector 2016 by the increasing performance of public health center and its network and village health post and integrated service post in implementing health service which have to promote and preventive characteristic. (4) Salary cost is needed cost for getting the human resource to operate operationally; a salary is a payment form to a person by company or office.

Output variable consists of: (1) confinement scope helped by health labor is a percentage of confinement help by health labors which have obstetrics competency. This score shows the implementation success of safe motherhood program and complication prevention, (2) basic immunization scope is one of programs in KIA effort (Kids and Moms Health) and families' plan. This immunization program is a complete basic program (LIL/five complete basic immunizations) for baby through one dosage of BCG, three dosages of DPT 4, four polio dosages, four hepatitis B dosages, and one measles dosage (3) scope of lung TB BTA is a percentage of new patient discovery of TB. BTA (positive) or Case Detection Rate (CDR TB) is one of the indicators decided based on SPM of Health Sector. The discovery of lung TB patients is also a prevention effort and elimination attempt of spread diseases, (4) scope of pneumonia for children under five years old shows an achievement in the health program, one of them is percentage of supporting health for children under five. This pneumonia is a spontaneous disease (acute) less than two weeks which attack lung networks of children under five years old, (5) scope of detected cervix and breast cancer are patients who are detected of cervix and breast cancer in the age of 30 years old until 50 years old.

Data Envelopment Analysis

DEA is developed by Charnes, et al. (1978) and use programming linear to evaluate the comparative efficiency of DMUs. The purpose of DEA is to compare a number of DMUs in doing similar tasks and differentiate them in input quantity that is used and output that is produced. Basically, there are two classic models of DEA: Constant Return Scale (CRS) model that is also known as CCR (Charnes, et al, 1978) and Variable Return Scale (VRS) model that is also popular as BCC (Banker, et al, 1984). The first model considers constant output scale. The second model assumes variable output scale where is no proportionality between input and

output. In using DEA of public health center analysis, the used assumption is Constant Return Scale. DMUs, k= 1, …, n, is considered as production unit using input r x_{ik}, I= 1, …,r, to produce output s y_{jk}, J= 1, …, s. CCR model which is explained by (1) maximize the ratio between linear combination from the output and linear combination from the input, with the obstacle that for each DMUs ratio that is not bigger than one. So, especially for DMUs h_o is efficiency: x_{io} and y_{jo} are input and output and v_i and u_{ij} are counted as score for input and output to maximize goal function:

$$\text{Max } h_o = \frac{\sum_{j=1}^{s} U_j Y_{jo}}{\sum_{i=1}^{r} V_j X_{jo}}$$

With impediment:

$$\frac{\sum_{j=1}^{s} U_j Y_{jk}}{\sum_{i=1}^{r} V_j X_{jk}} \leq 1,\ k = 1, \ldots\ldots,n$$

$$u_j, v_i \geq 0 \quad V_{i,\,j}$$

After some mathematic procedures, the models can be rewritten, produce a linear programming such in (2). Maximize the goal function.

$$\max ho = \sum_{j=1}^{s} u_j y_{jo}$$

With impediment (2)

$$\sum_{i=1}^{r} v_i x_{io} = 1$$

$$\sum_{j=1}^{s} u_j y_{jk} - \sum_{i=1}^{r} v_i x_{ik} \leq 0,\ k = 1, \ldots\ldots n$$

$$u_j, v_i \geq 0 \quad V_{i,\,j}$$

As linear programming for each DMUs, if we have n DMUs, n linear programming must be solved, with r + s decision variable. Model is merely served as the basic for all other DEA models. Beside efficiency index, DEA model produces for each DMUs: weight variable, measuring rod, and target for inefficient DMUs.

RESULT AND DISCUSSION

Technical efficiency measurement of DEA model is performed by output oriented method by using CRS scale (*Constant Return to Scale*). Connected with theory explanation in the previous chapter, the choice of CRS scale (*Constant Return to Scale*) is DEA-CCR model developed by Charnes et al., (1978). This model considers that the company doesn't operate or is not yet in optimal scale by assuming that the increasing ratio between input and output are same.

Output oriented model is a model where each DMU are expected to create a number of biggest outputs which enable a number of certain input (maximize output). Thus, DEA output is oriented to focus the analysis to maximize the output on input level and certain social economy challenges.

Based on table 1, it is seen the results of efficiency measurement by using DEA along 2016 at public health center in Mataram city is as the following: as many as 7 public health centers (63. 63%) which become research objects and they have 100% score and which have efficiency score under 100% as many as 4 public health centers (36. 37%). They are public health center in Cakranegara is 87.76%, in Mataram is 88.08%, in Dasan Cermen is 91. 15 %, in Karang Taliwang is 94. 48%.

The public health center which has the lowest efficiency score is public health center in Cakranegara with 87. 76% score.

Table 1. Score Efficiency 11 Public Health Centers in Mataram Regency in 2016

Public Health Centers	Score Efficiency
Cakranegara	83.76
Mataram	88.08
Dasancermen	91.15
Karangtaliwang	94.48
Ampenan	100
Dasanagung	100
Krpule	100
Pegesangan	100
Pejeruk	100
Selaparang	100
Tjkarang	100

Source: Result of DEA Procces, Secondary Data, Proccesed

Inefficiency Source of Public Health Service in 2016

Table 2 shows inefficiency source of public health centers in Cakranegara in 2016 (83. 76% score). The factors which cause the public health center in Cakranegara have not been achieved yet the maximum efficiency score can be seen in using input variable and output variable achievement which have not pulled off 100 %. The achievement of each input variable includes medical health labors with an achievement 88. 70% is not able to achieve efficient score as calculation result of DEA showing that there is surplus in allocating input, quantity of other health labors with an achievement 79. 1% is not able to accomplish efficient score because calculation result of DEA shows that there is surplus in allocating input, salary cost with an achievement 78. 80% is not able to achieve efficient score because calculation result of DEA shows that there is surplus in allocating input. Whereas the using of output variable have not achieved 100% yet. It is all output variables consist of: confinement scope is helped by health labors, scope of pneumonia for children under five years old, scope of lung TB BTA, scope of basic immunization, scope of early discovery of cervix and breast cancer. In summary, output variable is not able to attain efficient score for the reason that calculation result of DEA shows that there is output achievement which has not been maximal.

The score of public health center in Mataram in 2016 is 88. 08%. The factors which cause public health center in Mataram has not achieved maximum efficiency score can be seen in using input variable and output variable achievement which have not been achieved 100% yet. The achievement of each input variables consists of medical health labor with an achievement 83. 70% is not able to achieve efficient score because calculation result of DEA shows that there is surplus in allocating input, health operational supporting fund (BOK) is 94. 50% unable to achieve efficient score since calculation result of DEA shows that there is surplus in allocating input, salary cost with achievement 92. 60% is not able to achieve efficient score given that calculation result of DEA shows that there is surplus in allocating input. Whereas using output variable has not achieved 100% yet is all output variables consist of: confinement scope is assisted by health labors (Linakes), scope of pneumonia for children under five years old (cakupanpne),

scope of lung TB BTA (BTA), scope of basic immunization (imunisaid), scope of early discovery of cervix and breast cancer (deteksikan). In brief, output variables are not able to reach efficient score as calculation result of DEA shows that there is output achievement which has not been maximal.

The score of public health center in Dasan Cermen in 2016 is 91. 15%. The factors which cause public health center in Dasan Cermen has not achieved maximum efficiency score can be perceived in using input variable and output variable achievement which has not achieved 100% yet. The achievement of each input variables consist of: medical health labor with an achievement 84% is not able to achieve efficient score because of calculation result of DEA, it shows that there is surplus in allocating input, the quantity of other health labors (tenakeslain) with an achievement 95% is not able to achieve efficient score as calculation result of DEA shows that there is surplus in allocating input. Whereas using output variable has not achieved 100% yet is all output variables consist of: confinement scope is supported by health labors (Linakes), scope of pneumonia for children under five years old (cakupanpne), scope of lung TB BTA (BTA), scope of basic immunization (imunisaid), scope of early discovery of cervix and breast cancer (deteksikan). Concisely, output variables are not able to achieve efficient score because of calculation result of DEA shows that there is output achievement which has not been maximal.

The score of public health center in Karang Taliwang in 2016 is 83. 76%. The factors which cause public health center in Karang Taliwang has not achieved maximum efficiency score can be observed in using input variable and output variable achievement which has not achieved 100% yet. The achievement of each input variables consist of: the quantity of other health labors (tenakeslain) with an achievement 97% is not able to achieve efficient score because of calculation result of DEA, it shows that there is surplus in allocating input. Whereas using output variable has not achieved 100% yet is all output variables consist of: confinement scope is helped by health labors (Linakes), scope of pneumonia for children under five years old (cakupanpne), scope of lung TB BTA (BTA), scope of basic immunization (imunisaid), scope of early discovery of cervix and breast cancer (deteksikan). To sum up, output variables are not able to achieve efficient score because of calculation result of DEA shows that there is output achievement which has not been maximal.

Table 2. Table of inefficiency source of public health center in 2016

Public Health Center Cakranegara	
VARIABLE	**ACHIEVED**
Tenagamedi	88.70%
Tenakeslai	79.10%
Danabok	100.00%
Gaj	78.80%
Linakes	80.40%
Cakupanpne	51.80%
Imunisasid	83.80%
Tbparubta	83.80%
Deteksikan	12.70%

Public Health Center Mataram	
VARIABLE	**ACHIEVED**
Tenagamedi	83.70%
Tenakeslai	100.00%
Danabok	94.50%
Gaji	92.60%
Linakes	88.10%
Cakupanpne	88.10%
Imunisasid	88.10%
Tbparubta	73.10%
Deteksikan	35.00%

Public Health Center Dasancermen	
VARIABLE	**ACHIEVED**
Tenagamedi	84.00%
Tenakeslai	95.00%
Danabok	100.00%
Gaji	95.10%
Linakes	91.20%
Cakupanpne	56.70%
Imunisasid	91.20%
Tbparubta	37.70%
Deteksikan	91.20%

Public Health Center Karangtaliwang	
VARIABLE	**ACHIEVED**
Tenagamedi	100.00%
Tenakeslai	97.00%
Danabok	100.00%
Gaji	100.00%
Linakes	94.50%
Cakupanpne	61.30%
Imunisasid	93.70%
Tbparubta	80.40%
Deteksikan	94.50%

Source: The result of DEA process, secondary data, processed

Input and Output Variable Contribution in Achieving Efficient Condition.

Based on table 3, all output variables do not achieve 100% maximum efficiency score. To increase efficiency score of public health center in Cakranegara, they must increase output variable which its quantity can be seen in "to gain" column. "Target" column shows the quantity of adjustment from each variable which are explained in each unit. For example, for output variable, the scope of confinement is helped by health labors (linakes) must be increased as much as 24. 40% x actual score= 20. 57%. Thus, the target score is 104. 9% (84. 3% + 20. 57%). It means that to achieve efficiency score, the visit quantity must be increased as much as 24. 40%. The similar calculation happens to the other output variables as well.

Beside output variables, the adjustment to input variable needs to be implemented in order to achieve the maximum efficiency score in public health center in Cakranegara. For example, for input variable of salary cost from calculation result of DEA is perceived that there is surplus in its allocating so that the decreasing must be done as much as 21. 20% x actual score= 486. 351. 779. Thus, the target score is 1. 808. 742. 080 (2294112168 – 486. 351.779). It means that to attain efficiency score of salary cost must be decreased as much as 21. 20%. The similar calculation happens to the other input variables too.

Based on table 3, all output variables do not achieve maximum efficiency score 100%. To increase efficiency score of public health center in Mataram, it must increase output variable which its quantity can be spotted in "to gain" column. "Target" column illustrates the quantity of adjustment from each variable which is explained in each unit. For example, for output variable, the scope of lung TB BTA (TBPARUBTA) must be increased as much as 36. 80% x actual score= 4. 71%. Thus, the target score is 17. 6% (12,8% + 4. 71%). It means that to achieve efficiency score, the visit quantity must be increased as much as 36. 80%. The similar calculation happens to the other output variables too.

Beside output variables, the adjustment to input variable needs to be completed in order to achieve the maximum efficiency score in public health center in Mataram. For example, for input variable of health operational supporting fund (BOK) from the calculation result of DEA is seen that there is surplus in its allocating so that the decreasing must be done as much as 5. 50% x actual score= 11. 579. 425. Thus, the target score is 119. 037. 800. (210. 535. 000 – 11. 579.425).

It means that to achieve efficiency score of salary cost must be decreased as much as 5. 50%. The similar calculation happens to the other input variables too.

Based on table 3, all output variables do not achieve maximum efficiency score 100%. To increase efficiency score of public health center in Dasan Cermen must increase output variable which its quantity can be noticed in "to gain" column. "Target" column shows the quantity of adjustment from each variables which are explained in each units. For example, for output variable, the scope of confinement is helped by health labors (linakes) must be increased as much as 9. 70% x actual score= 8. 36%. Thus, the target score is 94, 5% (86. 2% + 8. 36%). It means that to achieve efficiency score, the visit quantity must be increased as much as 9. 70%. The similar calculation also happens to the other output variables.

Beside output variables, the adjustment to input variable need to be done in order to achieve the maximum efficiency score in public health center in Dasan Cermen. For example, for input variable of other health labors from calculation result of DEA is seen that there is surplus in its allocating so that the decreasing must be done as much as 5% x actual score= 1. 5. Thus, the target score is 28. 5 people (30 – 486. 1. 5). It means that to get efficiency score of other health labors must be decreased as much as 5%. The similar calculation happens to the other input variables too.

Based on table 3, all output variables do not achieve maximum efficiency score 100%. To increase efficiency score of public health center in Karang Taliwang must increase output variable which its quantity can be seen in "to gain" column. "Target" column shows the quantity of adjustment from each variable which are explained in each unit. For example, for output variable, the scope of confinement is helped by health labors (linakes) must be increased as much as 5. 80% x actual score= 5. 5%. Thus, the target score is 98. 4% (92. 9% + 5. 5%). It means that to achieve efficiency score, the visit quantity must be increased as much as 5. 80%. Moreover, the similar calculation happens to the other output variables.

Beside output variables, the adjustment to input variable need to be done in order to achieve the maximum efficiency score in public health center in Karang Taliwang. For example, for input variable of other health labors from the calculation result of DEA is spotted that there is surplus in its allocating so that the decreasing must be done as much as 3% x actual score = 1. Thus, the target score is 26 people (27 – 1). It means that to achieve efficiency score of other health labors must be decreased as much as 5%. In addition, the similar calculation happens to the other input variables.

Tabel 3. Contribtion Input & Output Variable Achieve Efficient Conditions

Public Health Center	Variable	Actual	Target	To Gain
Cakranegara	Tenagamedi	2	1.8	11.30%
	Tenakeslai	38	30.1	20.90%
	Danabok	223584000	223584000	0.00%
	Gaji	2294112168	1808742080	21.20%
	Linakes	84.3	104.9	24.40%
	Cakupanpne	7.3	14.1	93.00%
	Imunisasid	99.8	119.2	19.40%
	Tbparubta	23.7	28.3	19.40%
	Deteksikan	1.3	10.5	689.20%

Public Health Center	Variable	Actual	Target	To Gain
Mataram	Tenagamedi	3	2.5	16.30%
	Tenakeslai	26	26	0.00%
	Danabok	210535000	199037800	5.50%
	Gaji	1646817300	1524416695	7.40%
	Linakes	84.5	95.9	13.50%
	Cakupanpne	9.7	11	13.50%
	Imunisasid	102.4	116.3	13.50%
	Tbparubta	12.8	17.6	36.80%
	Deteksikan	3.6	10.2	185.40%
Public Health Center	**Variable**	**Actual**	**Target**	**To Gain**
Dasan Cermen	Tenagamedi	2	1.7	16.00%
	Tenakeslai	30	28.5	5.00%
	Danabok	196452000	196452000	0.00%
	Gaji	1826374512	1737331258	4.90%
	Linakes	86.2	94.5	9.70%
	Cakupanpne	8.2	14.5	76.30%
	Imunisasid	107	117.4	9.70%
	Tbparubta	7.6	20.1	165.30%
	Deteksikan	4	4.4	9.70%
Public Health Center	**Variable**	**Actual**	**Target**	**To Gain**
Karang Taliwang	Tenagamedi	2	2	0.00%
	Tenakeslai	27	26	3.00%
	Danabok	211800000	211800000	0.00%
	Gaji	1540999404	1540999404	0.00%
	Linakes	92.9	98.4	5.80%
	Cakupanpne	5.8	9.5	63.10%
	Imunisasid	97.4	103.9	6.70%
	Tbparubta	21.6	26.9	24.40%
	Deteksikan	16.4	17.3	5.80%

Source: Result of DEA Process, Secondary Data, Processed

Proceeding from the explanation above, the conclusion is that relative efficiency measurement can be decided by work unit ability in maximizing the output and minimize the input. The result of the research is appropriate to Akazili's opinion (2002) in Ghana, inefficient happens beside because the output is not maximal and also because there is over using resource that is not needed. Alvarado (2007) believes that efficiency will be achieved by increasing/ maximizing the output. Then, Osei (2000) thinks that calculation that is relatively much in public health center cannot always assist public health center in achieving efficient condition, health strategy, and promotion intended for increasing efficient score. Therefore, a policy which reviews the efficiency of public health center in achieving result level is needed, a more combinative arrangement in oriented the result is entailed. To optimize the output, even more, it needs to additionally increase service of public health center which does not only focus on curative service but also must do promotive and preventive efforts.

In the effort of increasing service quality in public health center, Health Department has strategic position as a facilitator. As a facilitator, Health Department is expected to facilitate all necessaries of public health center in its effort to improve service quality that is not able to be fulfilled by public health

center itself, such as needs of labors, physical medium, instrument, health supply, and consultation. Each activity in Health Department is strived to support all efforts done by public health centers.

CONCLUSION

From calculating of efficiency analysis by DEA in BCC model (CRS assumption) output orientation is achieved from 11 public health centers in Mataram in 2064 which consist of 7 efficient public health centers (63, 63%), while efficiency score of 4 other public health centers (36, 37%) is under 100% or not efficient. The causes of inefficiency of public health centers which their efficiency scores under 100% are all output units/ output variables include of the scope of confinement that is helped by health labors, the scope of pneumonia for children under five years old, scope of lung TB BTA, scope of basic immunization, scope of early discovery of cervix and breast cancer (CA mamae). Besides that, surplus of expenditure/ fund and health labors in input variable include medical health labors, other health labors, salary cost, and health operational supporting fund also become inefficiency sources in the public health centers. Output variable contributes to achieving efficient condition by doing output variable adjustment until achieving the target. Input variable contributes to achieving efficient condition by doing adjustment to the surplus in input variable until achieving the target.

For Health Department in Mataram and the leader of public health center must pay more attention based on technical instruction of health operational supporting fund (BOK) of Indonesia Health Ministry in 2012 that especially the fund is intended to increase the performance of public health center and its connection, and health village post (*poskesdes*) and integrated service post (*Posyandu*). BOK supports the public health center to be able to indicate health problems in its work area through the simple workshop, and then activity planning is arranged to solve the problems. The increasing of

Public health center performance, health village post, and integrated service post surely will give positive effects for served people. For Health Department in Mataram needs to attend the placement of health labors in public health center based on Health Ministry Rules in 2014 about public health centers where each of them must have 2 general doctors and 1 dentist to serve the people in their scope area. For public health center, don't only focus on curative service, but also must do promotive and preventive effort, because exactly the most important thing is how to build the public independency to avoid the diseases.

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