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Determinants of Spending Efficiency for Education and Health Functions

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Abstract

Government spending on education and health is mandated and regulated by law. The increase in education and health spending makes it necessary to study the analysis of the determinants of the efficiency of education and health expenditures in the districts and cities of the province of West Nusa Tenggara during 2012–2021. The approach used is in two stages. The first efficiency score is obtained by deployment Data Analysis (DEA) analysis, and the second stage is using Tobit to analyze the determinants of efficiency in each expenditure. The results of the first stage show that the average technical efficiency score for education spending is inefficient, while the technical efficiency score for health spending is efficient. Furthermore, for the second stage, the results show that the government's ability to finance development expenditures, population density, income inequality of the population, the ratio of junior high school student teachers, and the ratio of high school student teachers affect the efficiency of spending on the education function. Furthermore, the determinants of the efficiency of health spending based on Tobit's results are population density, income inequality of the population, and the ratio of health workers affecting spending on health functions.

Keywords : Education Spending, Health Spending, Data Envelepment Analysis, Tobit

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INTRODUCTION

Measuring the economic performance of each level of government remains an issue that is still relevant today in both European and developing countries. At least the social and economic needs of the residents are met, such as the provision of public services. Evaluation of public perfo-rmance in the form of input and output controls in the provision of public services with public spending is also essential for decision-makers and policymakers (OECD, 1998; Owen, 2003; Osborne, 2006; Dunlea-

vy et al., 2006; Da Cruz & Marques, 2014; D'Inverno et al., 2017). Over the past few years, concerns about the efficiency of the public sector have become the focus of policymaker's attention. Government spending at the provincial and district levels accounts for half of total public sector spending, and each year tends to increase in education and health spending in Indonesia (Lewis, 2017).

Local government is an organization that is directly involved in the process of evaluating the efficiency of local government. Public function authorities that were originally national have become local, so it becomes important to study (Afonso & Fernandes, 2008; Afonso et al., 2016; Dunleavy et al., 2006; Lo Storto, 2016). There are an increasing number of studies discussing the evaluation of regional efficiency and identifying the determinants of environmental variables that affect efficiency, but this study looks at it from a different perspective, from the output side, and examines environmental factors that affect efficiency. The output of this study is related to issues that occur in the regions and cities of West Nusa Tenggara, which are located in Indonesia.

The rationale for this study stems from an increase in the government's spending budget for education and health functions. With this increase in spending, local governments are required to be more efficient in allocating resources (regional spending). In Wagner's expenditure theory, the governent, as an individual being, is free to increase or decrease resources (expenditure). The government is considered to be involved in the production of output by combining labor and other inputs, so that the government is seen as a producer (Hsu, 2013).

The transfer of central government spending to the regions for education and health is a mandatory spending regulated in the law aimed at managing the provision of public services in preparing human capital, especially in education and health. In general, there are regencies and cities in West Nusa Tenggara province that have achieved the mandate, namely education expenditure of 20% from APBD and health spending of 10% from APBD. Issues that are developing are increased income and access to better public services, making the average Indonesian healthier and more educated. This is evidenced by life expectancy rising from 66 to 69 years between 2000 and 2017, and infant mortality falling from 52 to 25 per 1000 births. Quality-measured education increases student performance as well, which is visible from the PISA score of Indonesian students Indonesia increase in all dimensions in reading, mathematics, and science (SEMEFPA, 2020).

Achievement target, which was obtained by Indonesia, is not yet equally Because there is still a gap in human resources and infrastructure, namely human resources, Indonesia is still below other developing countries. The human capital gap in health and education looks at the Indonesian people's ability to live 69 years less compared to China, Malaysia, Thailand, and Vietnam, but the Maternal Mortality Rate (MMR) remains high compared to other countries. Score results for Indonesia's PISA are also lower compared to Vietnam (SEMEFPA, 2020).

Province Nusa Southeast West, as a region part of Indonesia East, had a poverty severity rate of 0.73% in 2020, which decreased to 0.63% in 2021. This decline is not spread across all regions in the Province of West Nusa Tenggara, as urban areas have a poverty severity rate of 0.71%, while rural areas will reach 0.54% in 2020. Index severity poverty gives a description of deployment expenditure among the poor, which means the higher the index, the higher the inequality expenditure between poor residents. This poverty inequality will certainly have an impact on education and education health.

Issues that occur in urban districts in West Nusa Tenggara regarding health are the indicators of average life expectancy reaching 67.06 years, which is still below the national standard; high maternal mortality rates, which average 19.4 per 100,000 live births; and maternal mortality under five, which is as high as 140 per 1000 children under five. The achievement of educational indicators is also still below the national standard, namely the average length of community schooling is 7.34 years, which means that in the province of West Nusa Tenggara, the community only graduates from junior high school equivalent, and the net enrollment rate has not yet reached 100%, namely 92.10% for the net enrollment rate for junior high school and 85.9% for senior high school. The targets for education and health indicators have not been achieved, so it becomes interesting to conduct studies. This study refers to previous studies, namely (Mandl et al., 2008; Dufrechou, 2016; Herrera & Ouedraogo, 2018; Yun, 2020).

This type of study, like several previous studies, tried to analyze the relationship between local government performance as seen from the efficiency of local government spending and several important topics, such as environmental factors that shape efficiency. Synergy of government spending on education and health in each region with the regulationns made by the Indonesian government on government spending on health and education So government spending on education and health is used as mandatory spending, which is mandatory according to regulations in force in Indonesia. The existence of a regulation that stipulates that government spending on education is 20% and health is 10% of the total Regional Budget (APBD) is expected to overcome inefficiencies in regional spending. These conditions and issues are of concern for the efficiency of government spending on education and health, which will add new evidence to the existing literature (Doumpod & Cohen, 2014).

This study applies Data Employment Analysis (DEA) in determining the efficiency score as the first stage, and the second stage is the Tobit panel regression in analyzing the effect of the determining variables on efficiency. This study aims to analyze the technical efficiency of education and health spending and then the determinants of efficiency in urban districts in West Nusa Tenggara. The determinants are called environmental factors, such as GRDP per capita, government capacity, population density, income inequality of the population, the ratio of junior high school teacher students to high school student teachers, and the number of schools for the efficiency of education spending. (Mandl et al., 2008; Dufrechou, 2016; Herrera & Ouedraogo, 2018; Yun, 2020) Furthermore, for the efficiency of health spending, the determining factors are GRDP per capita, government capacity, population density, income inequality of the population, and the ratio of health workers (Baldacci et al., 2007; Fonchamnyo & Sama, 2016; Herrera & Ouedraogo, 2018; Yun, 2020).

This study contributes to the previous literature by increasing the analysis timeframe in education and health efficiency, namely 2012–2021, by including the period when the earthquake and the COVID-19 pandemic occurred. Different input and output perspectives are based on issues and phenomena in the study area. As well as the determinants of efficiency by identifying socio-economic factors, teaching staff, the number of schools, and health workers.

METHOD

The test used in this analytical study is a deterministic approach, namely the linear programming model, namely the DEA (Data Envelopment Analysis) model with output orientation, i.e., a number of outputs can be increased

proportionally and optimally without changing the number of inputs used. VRS model output orientation DEA (variable Return to Scala) assuming that the ratio of adding input and output is not the same thing This is because in shopping for government functions such as education and health, adding the proportion of input may not necessarily increase the proportion of output with the same value. Meanwhile, to identify the variables that influence the efficiency level, model panel Tobit.

The DEA model was chosen because it is able to answer the challenge of a difficult consequence model that refers 0 to theory, or, in other words, the DEA model does not depend on theory.he Tobit method is used because the data used in this study is censured, that is, the value of the dependent variable is limited and can only range in value between 0 and 1 (Gujarati & Porter, 2012). In this study, measurement of efficiency was used to use output orientation to measure the technical efficiency of spending on government function education. The health function objective is Max output. The following will explain the stages of analysis in this study.

In the DEA analysis, government spending functions such as education and health are used as inputs, while Net Enrollment Rate, Average Years of Schooling, Life Expectancy, Infant Mortality Rate, and maternal mortality rate in urban districts are outputs. Based on the theory of efficiency, namely the less use of inputs to produce a certain amount of output, the higher the efficiency of using these inputs (Nicholson and Snyder, 2007). The City District of West Nusa Tenggara Province in Indonesia is a Decision Making Unit (DMU), which will be evaluated for the value of efficiency. Efficiency measurement is used to use output orientation to measure the technical efficiency of spending government functions on education. The health function objective is maximum output. Efficiency scores vary from 0 to 1. If $\lambda_j = 1$ in equations (4) then it indicates an efficient DMU, and $\lambda_j \geq 0$ in equations (5) then it indicates an inefficient DMU, or $\lambda_j > 0$ is also inefficient because it is on the frontier line. This method identifies optimal performance in calculating efficiency in a sample, namely by taking the difference in efficiency scores between DMUs (districts and cities of West Nusa Tenggara province) with the objective function. Maximum output. For each urban district built with the following model:

Stage 1. Output-oriented DEA Data Method with the assumption of Variable Return to Scale (VRS) for education and health.
Objective function:

$$\boldsymbol{Max}\ \emptyset = \sum_{r=1}^{s} \boldsymbol{u_r y_{ro}} \quad (1)$$

Subject to:

$$\sum_{j=1}^{n} \boldsymbol{\lambda_j Yrj - \emptyset Y_{rj} \geq 0; r = 1, 2, 3 \ldots, s} \quad (2)$$

$$\boldsymbol{Xij - \sum_{j=1}^{n} \lambda_j Yrj - \emptyset Y_{rj} \geq 0; i = 1.2.3 \ldots, m} \quad (3)$$

$$\sum_{j=1}^{n} \boldsymbol{\lambda_j = 1} \quad (4)$$

$$\boldsymbol{\lambda_j \geq 0; j\ \varepsilon\ 1, 2, 3 \ldots . n} \quad (5)$$

Where i is the input variable for the realization of government spending on education and health functions, r is the output variable for high school pure enrollment rate, junior high school pure enrollment rate, average length of schooling, life expectancy rate, under-five mortality rate, maternal mortality rate, j is the district/city in West Nusa Tenggara, Yrj is the r-th output value of the j-th DMU, Xij is the r-th Input Value of the j-th DMU, ∅ is Efficiency, ur is the Weight for Output i, y_ro is the Weight for input i, s is the number of outputs, m is the Number of Inputs

Stage 2: Tobit estimation on panel data for the determinants of the efficiency of government spending on education and health.

$$YE\ \text{BFP}_{it} = \alpha + \beta_1 lnXPDRBp_{it} + \beta_2 XKP_{it} + \beta_3 lnXKPdd_{it} + \beta_4 XK\ \text{PP}_{it} + \beta_5 X\ \text{RGMSMP}_{it} + \beta_6 X\ \text{RGMSMA} + \beta_7 X\ \text{JS}_{it} + \mu_{it} \quad (6)$$

Where YEBFP is scorefficiency incy technical shopping government function educatin lnX$PDRBp$ is a logarithm natural PDRB, XKP ability government in financin education, $XKPdd$ is a logarithm natural denand population, XKPP is income inequality of the population (gini rasio), RGMSMP is the ratio of middle school student teachers, RGMSMA is the ratio of high school student teachers, JS is the number of schools, t is year (2012-2021), μ is Error term.

$$YE\ \text{BPK}_{it} = \alpha + \beta_1 lnXPDRBp_{it} + \beta_2 XKP_{it} + \beta_3 lnXKPdd_{it} + \beta_4 XK\ \text{PP}_{it} + \beta_4 X\text{Rnakes}_{it} + \mu_{it} \quad (7)$$

Where YEBFP is scorefficiency incy technical shopping government function educatin lnX$PDRBp$ is a logarithm natural PDRB, XKP ability government in financin education, $XKPdd$ is a logarithm natural denand population, XKPP is income inequality of the population (gini rasio), XRnakes is health workers (2012 -2021), μ is Error term.

The data used in this study is secondary data in the form of data panels (pooled data). This panel data is a combination of cross-sectional data and time series data, namely 10 regencies and cities of West Nusa Tenggara Province for the years 2012–2021. Data is secondary to getting through studies. References: BPS, djpk, NTB regional financial agency, NTB education office, NTB health office, which are related to the problem study. Data Inputs are sourced from djpk, like on education, which is Shopping government function education, whereas data output is sourced from BPS and others like Primary Pure Enrollment Rate (APMSD), Junior High School Pure Enrollment Rate (APMSMP), Number Participation Pure SMA (APMSMA), and average length of School (RRLS). Input data for health in the form of government spending on health functions and health output data, namely Life Expectancy (AHH), Mortality rate for toddlers (AKbalita), and maternal mortality rate (MMR). In study This only mentioned toddlers, with the assumption that babies are already included inside. The determination of input and output is based on previous empirical literature, such as Estache et al. (2007), Mandl et al. (2008), Herrera & Ouedraogo (2018), and Yun (2017).

Data environment, Which becomes the determining variable influencing spending efficiency government function education, health, And infrastructure road city district that is PDRB per capita, ability government, density resident, inequality in population income, ratio of teacher to junior high school students, ratio of teacher to high school students, number of schools, and health personnel during range time 2012–2021. Measurement data with use of percentage Because adapt between regions with proportion of residents in each district or city in Nusa province West Southeast. These variables were selected based on references (Griogoli, 2014; Carosi et al., 2014; Defrechou, 2016; Lewis, 2017; Afosnso & Kazemi, 2017; Herrera & Ouedrago, 2018; Quertani, 2018; Cruza & Silvi, 2020).

RESULTS AND DISCUSSION

Based on the results of the analysis, DEA efficiency scores in 10 regencies and cities of West Nusa Tenggara province during the 2012–2021 period were calculated based on DEAP software version 21. Efficiency scores between 0 and 1, and urban districts with a score equal to one are efficient. Table 1 shows the descriptive variables, and the Standard deviation determines the distribution of data, or how close the function spending data is to the mean value of input data, output, and environmental factors determining efficiency (Ghozali, 2016).

The results of the DEA estimate for the efficiency of education function expendi-ture (EBFP) in districts and cities in West Nusa Tenggara averaged 0.87 from 2012–2021. These results are explained in Table 2. Bima Regency's average value of education function expenditure efficiency (EBFP) reached 0.99; the City of Mataram had a BFP efficiency score of 0.96; West Sumbawa Regency reached 0.89; Bima Regency reached 0.89; and Dompu Regency had an EBFP score of 0.89. The lowest EBFP value is in West Lombok Regency, which is 0.78. In general, from 2012–2019, there was an increase in the EBFP value in West Nusa Tenggara (NTB) districts and cities, but starting in 2020–2021, there was a decline. If you look at the results of the calculation of the efficiency value from 2012–2021, districts and cities in West Nusa Tenggara have achieved an efficiency value of <1 (inefficient) in education function spending. The area or size of a large district city with a dense population determines the efficiency score (D'Inverno et al., 2017). Due to the dense population, the costs of providing educational services will be more numerous and complex. In contrast to the small size of the regency city with a small population, the cost of public services will be lower.

Overall efficiency has not been achieved as seen from the average city district for service targets as outlined in the mission, namely improving the quality of resources into programs to be achieved, especially for the Average Length of School (RRLS), where the target to achieve is 13.62 years for the province of West Nusa Tenggara (NTB) in 2020 (RKPD NTB, 2021). However, RRLS in districts and cities in West Nusa Tenggara reached 7.34 years, meaning it only reached the junior high school level. The net enrollment rate for SMP (APMSMP) and SMA (APMSMA) is the educational output in this study. According to the results of an analysis, the average APMSMP in districts and cities in West Nusa Tenggara ranges from 98–99%. The achievement of the APMSMP level in each district or city on average depends on the population of each district or city that is of junior high school age. APMSMA achievement has not reached 100% for high school level school age; the results of the analysis reach an average APMSMA in districts and cities in NTB of 85.90% during the 2012–2021 period. The decline in APMSMA in 2021 is related to the COVID-19 pandemic and an increase in the age of young marriage, resulting in dropouts at the high school level (RKPD NTB, 2021).

Table 1. Variable Descriptive Statistics

	Average	Min Value	Max Value	SD
Education Function Expenditures (BFP) (Rp billion)	394.68	71.41	953.32	222.48
Junior High Enrollment Rate (APMSMP) (percent)	93.52	60.76	131.22	11.68
High School Pure Enrollment Rate (APMSMA) (percent)	83.82	46.68	99.98	13.18
Average Length of Study (RRLS) (years)	7.34	4.63	10.65	1.15
Health Function Expenditures (BFK) (Rp billion)	206.03	97.77	650.51	119.78
Life Expectancy (AHH) (years)	66.66	63.61	71.88	2.07
Toddler Mortality Rate (Akbalita)(per 1000 children under five)	137	13	1282	127
Maternal Mortality Rate (MMR) (per 100,000 live births)	15	1	78	13

	Average	Min Value	Max Value	SD
Income Per Capita (GRDP) (Rp million)	24,302,687	10,211,210	97,494,446	16,188,847
Government Capacity (KP) (percent)	1.26	0.19	2.55	0.57
Population Density (KPdd) (people/km2)	1,152	63	8,086	2,212
Inequality of Population Income (KPP) (Gini Ratio)	0.2	0.25	0.39	0.05
Teacher Ratio Middle School Students (RGMSMP)	16.44	4.69	83.54	9.98
Teacher Ratio High School Students (RGMSMA)	16.48	7.43	31.91	5.33
Number of Schools (JS) (Units)	518	162	1675	351
Ratio of health workers (Rnakes)	23.3	5.86	85.27	16.59

Whether or not spending on the education function is synchronized is in line with what is mandated in the expenditure on the education function in accordance with Indonesian Law No. 20 of 2003, which has set 20% of the Regional Expenditure budget. The aim is to reduce regional social and economic inequality. Social inequality, such as education, is an issue in each region, and spending on the education function is expected to be spent to be able to optimize the output to be achieved. The result is that regions with large expenditures tend to experience inefficiencies, while regions with small expenditures tend to be efficient. This finding is in accordance with the study of Afonso & Kanzeme (2017). Lewis (2016) states that a country that spends more is less efficient, and conversely, if it spends less, efficiency is achieved. This is also supported by the research of Nuryadin et al. (2021).

When associated with the theory of technical efficiency as proposed by Colli et al. (2005), namely allocating inputs as efficiently as possible to avoid wasting resources or to produce certain outputs using minimal inputs, efficiency has been achieved in several areas, such as Mataram City, Bima City, which is in quadrant II, by allocating input expenditure for the education function as minimally as possible in achieving optimal output, meaning without changing the amount of education spending, namely below mandatory, it is able to achieve optimal output with an efficiency value (= 1). Explanation in Table 1: For districts with a mandatory or according to law spending of 20% but who have not yet achieved the efficiency of spending on the education function, they are included in quadrant III, namely Central Lombok Regency and East Lombok Regency. Likewise, quadrant IV spending on the education function under the mandate or under 20% has not yet reached an efficient value, namely in Sumbawa, Dompu, North Lombok, West Lombok, West Sumbawa, and Bima Regencies.

Quadrant III shows that the amount of spending spent by local governments has not reached an efficient value in maximizing output. Quadrant IV also explains that the output to be achieved is not yet maximal because spending on the education function is still under the mandate or still below 20%. The estimation results of the Data Envelopment Analysis (DEA) for spending on the health function on average have an efficient value of EBFK (= 1), namely 0.95, but there are still districts and cities in West Nusa Tenggara province that have an efficiency value of < 1 or are still inefficient. Bima Regency has the lowest health function spending efficiency (EBFK) value of 0.93 when compared to other districts and cities. The highest EBFK scores were

achieved in the City of Mataram and the City of Bima, reaching 0.99 (efficient).

The mission of the West Nusa Tenggara province in achieving the AHH target is 66.16 years in all districts or cities; the average district or city is above the target, namely 67.06 years. However, in each district or city, there were three districts that had not yet reached the target, namely East Lombok, Central Lombok, and Bima. Furthermore, for the target of reducing MMR and AKbalita, the three districts were able to reduce MMR and AKbalita. The important role of local government in achieving the target can be seen from the government's performance in using the realization of spending to achieve the mission or objectives with efficient use of spending. The increase in AHH and the decrease in MMR and AKbalita are based on the important role of local governments regarding activities or programs in achieving health output targets.

Table 2. Regional Typology According to the Average Technical Efficiency Value of Education Function Expenditure and Mandatory Education Function Expenditures in Regencies/Cities in West Nusa Tenggara Province During 2012- 2021

EBFP	**Mandatory Expenditures for the Education Function (BFP) (20%)**	
	BFPI >= BFP	**BFPi<BFP**
	Quadrant I	**Quadrant II**
EBFPi>=EBFP		Mataram City Bima City
EBFPi<EBFP	**Quadrant III**	**Quadrant IV**
	Central Lombok Regency (20%) Regency East Lombok (20%)	Sumbawa Regency Dompu Regency North Lombok regency West Lombok Regency West Sumbawa Regency Bima Regency

Expenditures for the health function are expenditures mandated according to Law No. 36 of 2009, which is 10% of the APBD, so that health issues become mandatory matters in regional services. Health Function Expenditure, which is input to health, and according to the law, the%age of realization has been determined to determine whether its use is efficient in achieving AHH, reducing MMR, and reducing IMR. It is explained in Table 2, namely the mapping between the average expenditure for the health function and the average technical efficiency of spending for the health function. The mapping shows harmony between spending according to the mandate, namely 10% of the Regional Revenue and Expenditure Budget, and achieving maximum output. Regencies and cities that are included in Quadrant I have health function spending according to the mandate, namely 10%, and achieve efficiency, in contrast to quadrant II regions, which have health function spending below 10% and achieve efficiency, but there are also districts that are in Quadrant III with health function spending of 10% but have not reached efficiency. Quadrant IV is spending on the health function, which is below 10%, and the average efficient value is below 1 (inefficient).

Based on the theory of efficiency, it shows that districts and cities use expenditure inputs for the health function optimally in producing output, with the assumption that VRS is output-oriented. The additional input of spending on the health function will affect the resulting change in

output, such as in the City of Mataram, East Lombok Regency, West Lombok Regency, and Sumbawa Regency (quadrant I). efficiently, as well as research from Lewis (2014), Iskandar, and Saragih (2019), which found that 75% of public spending in districts and cities focuses more on public services such as health, which is a duty and responsibility carried out by the government. In contrast to the findings from Fonchamnyo's research and Sama (2016), Carosi et al. (2014), and Afonso & Kazemi (2017), countries with lower public spending, such as health, are able to achieve optimal efficiency values.

Table 3. Regional Typology According to the Average Technical Efficiency Value of Health Function Expenditure and Mandatory Health Function Expenditures in Regencies/Cities in West Nusa Tenggara Province During 2012-2021

EBFP	Mandatory Health function spending (BFK) (10 %)	
	BFKi>= BFK	BFKi<BFK
	Quadrant I	**Quadrant II**
EBFKi>=EBFK	Mataram City (13%)	West Sumbawa Regency
	East Lombok Regency (10%)	Central Lombok Regency
	Sumbawa Regency (10%)	Bima City
EBFKi<EBFPK	**Quadrant III**	**Quadrant IV**
	West Lombok Regency (mandatory 10%)	North Lombok Regency
	Regency East Lombok (20%)	Bima Regency
		Dompu Regency

Environmental variables as independent variables in this study are per capita income (PDRBp), government capacity (KP), popularion density (KPdd), income inequality (KPP), ratio of junior high school students to teachers (RGMSMP), ratio of high school students to teachers (RGMSMA), and number of schools (JS) as a determinant of the efficiency of education infrastructure spending (EBFP). The results of the Likelihood Ratio (LR) on the determinant model of educational function spending efficiency (EBFP) in the Province of West Nusa Tenggara (NTB) show that the Wald Chi Square value is 96.82 with a p-value of 0.0000 (smaller than 0.01), indicating that significantly Simultaneously, the variables PDRBp, KP, KPdd, KPP, RGMSMP, RGMSMA, and JS have a significant effect on achieving efficient values in calculating technical efficiency values. District and city education function spending is explainned in Table 3.

Furthermore, the Wald test looks at the significance of the independent variables for the dependent variable. The results of the Wald test on the educational efficiency model partially show that by looking at the probability value (p value*ue*) of each variable, the statistical results of the PDRBp variable are partially insignificant to the efficiency of educational function spending because the probability value is greater than the critical value, namely 0.778 >0.01. Government capability variable (KP) with a valup - value *value*) of 0.077 is significantly positive with a degree of error of 10% and a marginal coefficie;t of 0.0329, inequality of population income (pP) value(*p - value*) of 0.005 is significantly positiveerror of a degree of error 1% and the marginal coe;ficient is 0.0101, population income inequapty valuevaofe0.000 is - *value*) is 0.000 significantly negatively related to the degree of error of 1% and the margina coefficient is 1.1638. The independent variable ratio of junior high school student ratio R-valuehas a value (- *value*) of 0.011 significant error ofrelaand a to the degree of error 1% and m;rginal coefficient of -0.0024, the ratio of high school student p-value (MSMA) has signific-

antly value of 0.000 significant ne-gatevely related to the degree of error of 1% a; andd a marginal coefficient of -0.0005, the variable p-value school (0.177) has a value significant value of 0.177 which is not significant.

Table 4. Estimation of Tobit Regression and Marginal Effects of District/City Educational Function Spending in West Nusa Tenggara Province

Variable	Hypothesis Test Statistics	Marginal Effects
GRDP per capita (PDRBP)	0.0052	0.0052
	(0.0182)	(0.0182)
Government Capacity (KP)	0.0329*	0.0329*
	(0.0186)	(0.0186)
Population density (KPdd)	0.0101***	0.0101***
	(0.0050)	(0.0050)
Income inequality resident (KPP)	1.1638***	1.1638***
	(0.3257)	(0.3257)
Middle School Student Teacher Ratio (RGMSMP)	-0.0024***	-0.0024***
	(0.0009)	(0.0009)
High School Student Teacher Ratio (RGMSMA)	-0.0065***	-0.0065***
	(0.0017)	(0.0017)
Number of Schools (JS)	0.0000	0.0000
	(0.000)	(0.000)
Constant	0.4429	
	(0.353)	
Number of observations	100	
Wald Chi Square	96.82	
Likelihood Ratio (LR)	118.067***	

Note: ***Significant at 1% alpha, **Significant at 5% alpha, *Significant at 10% alpha, () standard errors

Source: Stata 16.0

The population density coefficient (KP-dd) has a positive effect on the achievement of the technical efficiency value of education function spending (EBFP) with a coefficient value of 0.01, which means that a 1% increase in population density will increase the techn-ical efficiency score by 0.01% in all districts and cities in West Nusa Tenggara. That is, the denser the population in an area, the more likely it is to obtain the optimum efficiency value for the educational function spending on the ceteris paribus assumption. These results are in accordance with previous resea-rch, namely Nuryadin et al. (2020), Lionel (2015), and Grigoli (2014). A positive relation-nship is defined as the denser the population in a district or city area, the more efficient the spending on the education function issued by districts or cities in West Nusa Tenggara. Likew-ise, for the KPP variable, if the inequality is still high, educational attainment will be low, which causes a change in the efficiency value. In accord-ance with the opinion of Lewis (2017), there is an inverted U-shaped relationship when, at some point, the provision of spending will have a pos-itive effect on educational services, but with incr-easing length of time, it will become negative.

The Wald test in this research model shows partial population density (KPdd) with a value (p value*ue*) of 0.051, significant with a critical vlue (5%, of 5% and a marginal coefficient of 0The inequalityuality of population income

(KPP) is significant with a vpevalue *value*,f 0.015 with a degree 1%, error of 1% and a marginal coefficient vale of 0.150. Likewise, the variable health workers (Rnakes) value (*p - value*) of 0.008, significant with an eand degree of 1% with a marginal coeficient of 0.000. The PDRB variable (pvalue) of 0.148, *p–valu*e significant, which is not significant and government p-value has a value (*p - value*) 0278 which is not significant. Furthermore, the results of the Likelihood Ratio (LR) test on the determinant model of health function expenditure efficiency (EBFK) in West Nusa Tenggara Province show a Chi Squa andability value of 0.000 a significant level with = 1%, meaning that there is a simultaneous or joint effect of KPP, andvariables GRDP, KP, KPdd, KPP, Nakes on the value of efficiency in calculating the technical efficiency of spending city health function spending.

The results of the regression model of the determinants of the technical efficiency of spending on the health function using the Tobit method in Table 5.26 show the effect of the independent variables on the dependent variable, which is the value of the technical efficiency of spending on the health function. The population density variable (KPdd) has a positive effect on achieving optimum efficiency values in technical calculations of health function spending with a coefficient value of 0.0067, meaning that on average, if population density increases by 1%, it will increase efficiency values by 0.0067% in districts and cities in Nusa Tenggara West. This positive relationship is in line with research by Grigoli (2014), Lionel (2015), Hauner, and Kyobe (2010). The positive relationship means that the denser the population in the district or city, the greater the efficiency of spending on the health function optimally, with the ceteris paribus assumption. If viewed from the marginal effect perspective, the coefficient value is 0.0067, which means that changes in the value of population density change the value of the efficiency of spending on the health function when other variables are constant (ceteris paribus). The influence of popu-lation income inequality (KPdd) on the technical efficiency value of spending on health functions is significant and positive, with a coefficient value based on a marginal effect of 0.1504. The results of this study are in line with the research of Herrera & Pang (2005).

Theoretically, according to Adolf Wagner's theory, there is a tendency for government spending to increase every year (low of ever increasing state activity), which is referred to as the law of the increasing role of government. Increasing government spending every year will indicate an increase in economic activity. Based on the results of this study, it proves that government spending for education, government spending for health, and government spending for road infrastructure in regencies and cities in West Nusa Tenggara generally show an increase from year to year. Spending on education and health functions is capital in carrying out mandatory affairs that are prioritized by local governments because it is an effort to create investment in human capital (human capital) related to the quality of Human Resources (HR).

Mandatory Spending is a budget that is required by laws and regulations, including the fulfillment of the education budget and the health budget. The objective of this mandatory spending is to reduce the problem of regional social and economic inequality. If the community is healthy and well educated, it will increase consumption and increase labor productivity, thereby increasing economic growth. The increase in economic activity is also supported by the availability of road infrastructure because it is an important component in the implementation of the economy, as stated by Gibbons et al. (2019) and Donobaur et al. (2014). The findings in this study related to efficiency are that some regions or cities where spending increases or uses more

spending are less efficient, while those with less spending will achieve efficiency. This finding is in accordance with the opinions of Afonso & Kazemi (2017) and Fonchamnyo & Sama (2016).

Table 5. Results of Tobit Regression Estimation and Marginal Effects of District/ City Educational Function Spending in West Nusa Tenggara Province

Variable	Hypothesis Test Statistics	Marginal Effects
GRDP per capita (PDRBP)	0.0056	0.0056
	(0.0039)	(0.0039)
Government Capacity (KP)	0.0052	0.0052
	(0.0048)	(0.0048)
Population density (KPdd)	0.0067**	0.0067**
	(0.0034)	(0.0034)
Income inequality resident (KPP)	0.1504***	0.1504***
	(-0.0665)	(-0.0665)
Healthcare ratio (Rakes)	0.0003***	0.0003***
	(0.0008)	(0.0008)
Constant	0.7524	
	-0.0796)	
Number of observations	100	
Wald Chi Square	20.79	
Likelihood Ratio (LR)	261,320***	

Note: ***Significant at 1% alpha, **Significant at 5% alpha, *Significant at 10% alpha, () standard errors

Source: Stata 16.0

This study discusses the technical efficiency of spending on education, health, and road infrastructure functions as suggested by Colli et al. (2005), namely allocating inputs as efficiently as possible to avoid wasting resources or to produce certain outputs using minimal inputs. The findings in this study are for regencies and cities in West Nusa Tenggara that are able to maximize inputs in achieving certain outputs, namely expenditure on the education function and expenditure on the health function. Meanwhile, in spending on road infrastructure functions, only a few achieve efficiency, but in general, the value of efficiency is still low (inefficient), in the sense that it has not maximized the use of inputs to achieve certain outputs.

According to Romer (1996), the theory of human capital states that human capital is identified not only as a major contributor to growth and poverty alleviation but as a goal in development, so that the government's role in achieving these goals by realizing spending that leads to welfare such as education, health, and infrastructure becomes government attention. This study uses the input expenditure function of education, health, and road infrastructure. The findings in this study are that there are still districts or cities that are not efficient or inefficient; therefore, it is not only seen from how much investment in human capital has been realized but that the local government is making more efforts to achieve the maximum use of inputs. This finding also implies that different government regimes will result in efficiency not being able to improve due to the absence of an empirically appropriate mechanism for evaluating tenure and past performance; this is reinforced in Olanubi & Osode's research (2017).

This research took place in period 2 regimes in districts and cities in NTB.

CONCLUSION

The technical efficiency of spending on the education function in regencies and cities in West Nusa Tenggara, assuming the Variable Return to Scale (VRS) during the 2012–2021 period, is relatively inefficient, as is the average efficiency value, which is not yet efficient, reaching a value of 0.87. This is indicated by the fact that there are only 2 regions, namely the City of Mataram and the City of Bima, that consistently from year to year have an optimal efficiency value (= 1) among the 10 regencies or cities. In addition, it is marked by the diminishing value of efficiency from year to year in districts and cities. Dropping out of school, family income, and the young age of marriage in some areas are also causes for the efficiency score not reaching optimal. The technical efficiency of spending on the health function in districts and cities in West Nusa Tenggara with the assumption of Variable Return to Scale (VRS) during the 2012–2021 period is relatively close to efficient, as is the average efficiency value, which is close to the efficient value, reaching a value of 0.95. This is indicated by the fact that there are 6 regions that have achieved optimal efficiency values, namely Mataram City, Bima City, West Sumbawa, Sumbawa, East Lombok, and Central Lombok, which consistently from year to year have an efficiency value close to optimal (= 1) among the 10 regencies and cities. Simultaneously, per capita GRDP, government capacity, population density, income inequality, the ratio of junior high school student teachers to high school student teachers, and the number of schools affect the technical efficiency of spending on the education function. Partially, the capacity of the government, population density, and income inequality of the population have a significant positive effect on the technical efficiency of spending on the education function, while the ratio of junior high school student teachers and the ratio of high school student teachers have a significant negative effect on the efficiency of spending on the education function in districts and cities in West Nusa Tenggara. Simultaneously, per capita GRDP, government capacity, population density, income inequality of the population, and the ratio of health workers affect the technical efficiency of spending on the education function in districts and cities in West Nusa Tenggara. Partially, population density, income inequality, and the ratio of health workers have a significant positive effect on the efficiency of spending on health functions in districts and cities in West Nusa Tenggara.

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