Local Expenditure Efficiency and Poverty Eradication in Aceh Province

Asnawi[1], Irfan[2]

[1,2]*Universitas Malikussaleh*
[*]*Corresponding author. Email: irfan@unimal.ac.id*

ABSTRACT

This study aims to identify the special autonomy profit-sharing fund optimization, tax on revenue-sharing, social security expenditures, and their impact on the poverty threshold by 23 districts/cities in Aceh Province. The sample of this study uses a combination of regional (district/city) data and the period from 2015-2020. This study uses two analytical approaches: Data Envelopment Analysis (DEA) to measure efficiency output with a return to scale variable and Regression Panel using a Random Effect approach to analyze the effect on poverty. The result shows that only six districts, 26 percent of all existing regencies/cities, use the aid efficiently. Furthermore, the social security's random effect panel regression results on the Family Hope Program PKH and the human development index (IPM) show a significant negative impact on Aceh province's poverty level.

Keywords: *Special Autonomy Profit-Sharing Fund, Revenue-Sharing Tax, Social Assistance Program (PKH), Human Development Index (IPM), and Poverty***.**

1. INTRODUCTION

During the last three years, Aceh Province has been the province with the highest percentage of the poor at the Sumatra island at 15.21 percent, followed by Bengkulu province with 15.15 percent. The third place is South Sumatra Province, with an average percentage of the poor at 13.54 percent. One of the causes of the rising poverty rate in Aceh province is the increasing open unemployment rate (TPT) and the impact of the COVID-19 pandemic. In the last semester, the percentage of poor in rural and urban areas has increased. "In urban areas, the rate of poor people increased by 0.47 points from 9.84 percent to 10.31 percent. On the other hand, the number increased by 0.50 points or previously from 17.46 percent to 17.96 percent in the rural area".

An exciting issue on Aceh province with special autonomy funds from 2008 to 2015 until 2029 is in progress. Aceh has earned special autonomy funds of IDR 41.49 trillion. The special autonomy fund is the primary source of revenue for Aceh's economic development, with an average revenue increase of 11 percent per year and the 2015 Local Government Expenditure (APBA) budget amounted to Rp. 12.7 trillion, which part of the amount came from special autonomy funds (PPKD, 2015). Yet, the local government's significant special autonomy funds for poverty eradication seem less optimized, reflected by one of the public policies for social assistance spending for the Hope Family Program (PKH).

Table 1.1. The Percentage of The Poor at Sumatra Province in 2019-2021 (semester)

Province	2019		2020		2021	avarage
ACEH	15.32	15.01	14.99	15.43	15.33	15.21
NORTH SUMATERA	8.83	8.86	8.75	9.14	9.01	8.91
WEST SUMATERA	6.42	6.29	6.28	6.56	6.63	6.98
RIAU	8.42	8.82	7.98	7.67	7.78	8.01
JAMBI	8.86	9.12	8.41	8.37	8.19	8.48
SOUTH SUMATERA	14.25	13.77	13.54	13.39	13.19	13.54
BENGKULU	15.32	14.91	15.03	15.30	15.22	15.15
LAMPUNG	12.62	12.30	12.34	12.76	12.62	12.52
BANGKA BELITUNG ISLAND	5.4	4.83	5.22	5.04	5.2	5.17
RIAU ISLAND	6.24	5.78	5.98	5.84	6.06	6.01

Source: Central Bureau of Statistics (BPS), 2021 (processed)

Social security spending for the Family Hope Program (PKH) is a crucial instrument in Aceh province since it effectively pulls out poverty. It was followed by research conducted in Turkey using a long-term analysis approach with 26 regions, finding a short-term and long-term

negative relationship between regional education spending and poverty (Celikay & Gumus, 2017).

Likewise, propounded by(Sánchez & Navarro, 2021), the impact of social security does not directly affect the poverty level. Similarly, (Cammeraat, 2020), stated a similar argument according to his research. Based on these thoughts, the researchers identified which districts and cities have been efficient in regional expenditures for the Family Hope Program (PKH) comprehensively, human development index (IPM) effectiveness, and their effect on poverty levels in 23 regencies/cities at Aceh province. This study is distinguished from previous (D'Inverno et al., 2018; Prasetyo & Zuhdi, 2013). Researchers in this study reexamined the impact of poverty statuses on Aceh province's districts and cities whose regional expenditures and sustainable human development indexes were managed efficiently based on panel data.

2. LITERATURE REVIEW

Several studies have examined the relationship between local government budget on poverty levels, such as "analyzing the Effect of Local Own-Souce Revenue and Special Authonomy Grants Towards Aceh Province' Poverty Level in 2010-2017". The study result shows that some local own-source revenue and special autonomy funds do not influence deprivation in Aceh Province. At the same time, local own-source income, special autonomy funds, and general allocation funds hit the vulnerable people following the article (Taruno, 2019). The report examined 31 provinces from 2009 to 2018, using two regression equations with panel data application to analyze the effect of these two variables on poverty mitigation in urban and rural areas. The output pinpointed that the local funding in the health and education sectors has a slightly distinct effect on poverty alleviation in urban and rural areas.

The research by in ((D'Inverno et al., 2018) focused on the efficiency of public spending in Tuscan metropolia. The DEA analytical result and Tobit regression validated confirm local expenditure, a starting point for ineffectual municipal expenditures reallocation. In particular, the size of a city influences public spending effectiveness. The supported result studied by (Li & Dewan, 2017), the data from China through 116 cities resource-based, analyzed efficiency levels diversity among cities and discovered their main determinants in 2012. First, most of China's resource-based cities are inefficient for total-factor energy (TFE). Second, the service industry contributes to local GDP, and the size of the district built in the city produces three main determinants with a significant positive effect on efficiency. On the other side, consumer spending, local government expenditure, and availability of Chinese vocational schools are the three main determinants with a significant adverse effect on efficiency. Third, six determinations account for 79% of the efficiency difference between cities, but the contribution of the factors of TFE efficiency widely varies. Fourth, the TFE determinant alteration aligns with the city's efficiency level change.

(Juliansyah et al., 2019), measuring inequality in economic development, adopting the classic typological method of Williamson's Index and Theil's Index. Meanwhile, multiple panel regression was applied to investigate the effect of poverty and the income per capita of economic development imbalance in the region. The result demonstrates that poverty does not affect economic growth inequality, while revenue per capita affects economic development imbalance positively. This finding implies that to reduce more economic development imbalance across districts, the government should distribute equitable income to fulfill welfare distribution evenly.

(Prasetyo & Zuhdi, 2013) "research the government expenditure level efficiency per capita in health, education sectors, transfers, and subsidies in 81 countries towards human growth during 2006-2010, using the Data Envelopment Analysis (DEA) approach ". The result reveals that Armenia, Australia, Bangladesh, Chile, Georgia, Japan, Republic of Korea, Laos, Madagascar, Niger, Norway, Philippines, Sierra Leone, Singapore, USA, and Zambia were the countries that brought in the excellent result during the sample period. However, only Singapore and Zambia, among other listed countries, managed to maintain the efficiency towards positive improvements in government spending.

Another Analysis of Regional Health Expenditure Efficiency research using the Data Envelopment Analysis (DEA) method confirms Tanggerang and Cilegon were the districts with the highest health expenditure efficiency utilization. Furthermore, Tanggerang is obliged to improve the number of intermediate and final outputs to increase the efficiency of health spending (Yanti & Kustiani, 2016). Government can use the DEA method as a form of service to build an efficient climate budget tagging. A comparable result was identified in the (Paper, 2016) by examining the samples of three districts/cities: Banda Aceh city, Pidie and Pidie Jaya districts, as the output, Banda Aceh was technically and scale efficient for health expenditure utilization, Pidie regency was technically efficient but inefficient in terms of the scale, while Pidie Jaya regency was inefficient according to technical and scale. So, the City of Banda Aceh has effectively raised regional income by utilizing Land and Building Tax (PBB) as a local tax.

3. RESEARCH METHOD

This research type uses combined data (panels) from all regencies and cities in the Aceh province consisting of 18 districts and five towns, each district/city as object research called a Decision-Making Unit (DMU). The DMU technical term is also

known as the Economic Activity Unit (UKE). Then the following data source is time-series data acquired from several agencies related to this research, the Central Bureau of Statistics (BPS), Department of Social Services, and Aceh Development Planning Agency at Sub-National level (Bappeda) from 2015-2020.

The first study analytical model is the non-parametric statistical analysis using the Data Envelopment Analysis (DEA) approach. The consideration of choosing this DEA method is due to the method specification to accommodate many inputs and outputs in the calculation of the linear programming model to produce a single efficiency value for each observation. Furthermore, the DEA method can also answer how efficient each DMU at each district and city is in allocating regional expenditures of the Family Hope Program as the output variable, while DBH Otsus and DBH Tax as the input variables simultaneously. If the measurement is counterproductive, this program can also answer how many values are needed to make it efficient.

"The Variable Return to Scale (VRS), known as BCC model in 1984 as the development of the CCR model, was introduced by Banker, Charnes, and Cooper. This model deems the company operates at a less optimal scale. The limitation of this model is that the ratio between the additional input and output is dissimilar because increasing the input by x times will not change the x times increasing the output, which means it can be larger than x time or conversely. Return to scale (VRS) can be formulated" (Masita, 2015):

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

The equation BCC model is as follows:

Max (VRS Model DMU Efficiency)

$\sum_j^n$ 1xij ′ij ≥ xi 0 i = 1, 2, ..., m

$\sum_j^n$ 1yrj ′j ≥ yi 0 r = 1,2, ..., j

$\sum_j^n$ 1 ′j ≥ 1 (VRS)

$\sum_j^n$ 1 ′j ≥ 1 j = 1, 2, ..., n

Ɵ = technical efficiency (VRS)

N = the number of DMU

M = the number of input (DBH tax, DBH Otsus)

s = the number of output (The Local Budget of Family Hope Program (PKH))

xij = the number of inputs to-i from DMU to-j

yrj = the number of outputs to-r from DMU to-j

‘j = weight of DMU j for calculated DMU

The Panel Model

The next stage is the panel analysis model approach using a combination of cross-section (i) and time series (t). The dummy variable shows the uncertainty of the techniques used in estimating panel data through the FEM approach. So, a residual variable known as the random effect model (REM) method applies to deal with the issue. The basic idea of REM is to assume that the error is unexpected. REM is estimated using the Generalized Least Square (GLS) method (Astuti, 2010).

$$Y_{i,t} = a_0 + b_0 X_{i,\,t-1} + b_j X_{i,t-q} + b_0 DM_{i,\,t} + e$$

Where: $Y_{i,t}$ = Poverty rate

$X_{i,\,t}$ = PKH, IPM budget

$DM_{i,\,t}$ = Dummy, efficient (1) and inefficient (0)

e = Standard of error

4. RESULT AND DISCUSION

The output of the first analysis model uses the DEA program and uses the DEAP version2.1 software. The calculation in this study applies VRS (Variable Return to Scale), which is oriented towards the output model. Based on the results of efficiency calculations using DEA, the efficiency level of 23 Regencies and Cities can be seen in the table, as follows:

It demonstrates that 23 districts and cities in Aceh province during 2020 produced six efficient district outputs in terms of Family Hope Program (PKH) expenditure distribution. Only 26 percent of the regions were in good categorized (efficient), districts of Pidie, Bireun, North Aceh, Aceh Jaya, Bener Meriah, and Pidie Jaya giving a positive result for using their Family Hope Program (PKH) funding. In comparison, the remaining 74 percent of regencies/cities are still inefficient in the Family Hope Program (PKH) budget allocation. This issue is undoubted 'a critical note considering that there are still too many regencies/cities that are unproductive in terms of the PKH allocation, which have a systematical impact on fiscal policy in the stated area, especially in terms of poverty alleviation (Frenda et al., 2021)

Table 1 Results of Technical Efficiency Calculation of DEA 2020

	DEA Efficiency Score	
DMU	**Efficient**	**Inefficient**
Simeulue		0.38
Aceh Singkil		0.25
South Aceh		0.36
Southeast Aceh		0.85
East Aceh		0.67
Middle Aceh		0.22
West Aceh		0.25
Great Aceh		0.66
Pidie	1	
Bireuen	1	
North Aceh	1	
Southwest Aceh		0.54
Gayo Luwes		0.36
Aceh Tamiang		0.41
Nagan Raya		0.17
Aceh Jaya	1	
Bener Meriah	1	
Pidie Jaya	1	
Banda Aceh		0.16
Sabang		0.16
Langsa		0.16
Lhokseumawe		0.22
Subulussalam		0.42

Source: Data Processing Output 2021

Local expenditure on social protection is a fundamental part of individual welfare. It aims to assess the individual's well-being in terms of technical cost efficiency in the Italian Territory(Cristóbal et al., 2021). Additionally, countries with low and high incomes produce higher average efficiency in public expenditure and are more often assumed efficient, shown next to the DEA's efficiency. These findings highlight that lower-middle-income and upper-middle-income nations present an excellent strategy for enhancing public spending utilization.

Table 2 Calculation Results of Pooled Regression Model, Fixed Effect, Random Effect

			Pooled Regression			
Variable		Coefficient	Std.error	t-statistic	Prob	Obs
c		67.19556	7.526291	8.92811	0	115
log(fundofPKH)		-0.701076	0.269011	-2.606121	0.0104	115
IPM		-0.498024	0.05303	-9.391325	0	115
DMY		2.801176	0.593645	4.718603	0	115
			Fixed Effect			
Variable		Coefficient	Std.error	t-statistic	Prob	Obs
c		49.14012	6.533412	7.521357	0	115
log(funfofPKH)		-0.929286	0.19223	-4.834252	0	115
IPM		-0.154126	0.152057	-1.013608	0.3135	115
DMY		2.801176	0.593645	4.718603	0	115
			Random Effect			
Variable		Coefficient	Std.error	t-statistic	Prob	Obs

c		56.98561	4.319277	13.19332	0	115
log(fundofPKH)		-0.683673	0.127698	-5.353836	0	115
IPM		-0.358496	0.094921	-3.77679	0.0003	115
DMY		2.758483	1.346853	2.048095	0.0429	115

Source: Data Processing Output 2021

The result of table 2 reveals dissimilarity results acquired from each regression with the Pooled regression approach. Using the three-panel analysis approach, the output of independent variables has a significant negative effect. In contrast, the dummy variable explains that there are differences from districts that are efficient in regional expenditure (PKH) of 2.75 points compared to districts/cities, which are counterproductive in terms of local expense on PKH.

For the next step, selecting the best model between fixed effects and random effects is followed by using the Hausmant test to choose the model to be applied. The Hausments test indicates that the null hypothesis would show no significant distinction between the estimates of the fixed-effects model and the random-effects model. If the null hypothesis is rejected, a fixed-effects model should be applied. Then, the appropriate model used in this test is the random-effects model. The output shows in table 3.

Table 3 The Hausman Test

Test Summary		Chi-Sq. d.f.	Prob.		
Cross-section random	3.118518	2	0.2103		
	Fixed	Random	Var(Diff.)	Prob.	Obs
LOG(DANAPKH)	-0.929286	-0.683673	0.020645	0.0874	115
IPM	-0.154126	-0.358496	0.014111	0.0854	115

Source: Data Processing Output 2021

The table demonstrates the probability value is more significant than 0.05 or 0.21. Because the null hypothesis is not rejected, the random effect model is more appropriate for this study. From the output results, theoretically and statistically, local government spending on PKH has a negative impact on the poverty rate -0.68%, and this is significant in accordance with research (YU & LI, 2021), which shows that the social security expenditure elasticity of rural poverty is -0 .2255, which indicates that social security spending helps to reduce poverty altogether in the rural area. Based on these results, government policy involvement could lead to spending more on social security and providing social security systems equitably.

This strategy will be one of the main anti-poverty strategies after 2020 in China for declining the poverty level widespread (Ilkkaracan et al., 2021) notes the increasing social spending utilization for job creation programs can create many job opportunities in a gender-balanced manner, help lift the vulnerable out of deprivation and enhance gender equality. Also, the human development index (IPM) reveals a negative effect with -0.15 on the poverty level in the Aceh province and is also statistically significant. Its outcome is in line with previous research(Bariyah, Nurul, 2020), the analysis used is multiple regression with a fixed effect cross section-weights (EGLS) model. The result indicates that health, education, and purchasing power on poverty levels negatively and significantly impact, which means that an increase in this variable will accelerate diminishing poverty of the poor in Indonesia. On the other hand, unemployment has a positive and insignificant effect on the poverty level in Indonesia. Improving education and workforce capabilities, using sustainable land, and sustainable rural development can enhance the policy and decision-making for effectiveness in poverty reduction (Cheng et al., 2021).

Modified human development performance has a vital role in alleviating poverty and increasing community welfare in rural areas. This paper also reveals an empirical study that the human development index indicators significantly negatively impact poverty levels. (Amaluddin et al., 2018). Ad-Dien index indicates that a crime negatively influences the poverty level. Furthermore, an-Nafs index shows that the poverty level is not significantly impacted by life expectancy. The al-Nafs-'Aql index demonstrates that the schooling duration has a significant negative result on the poverty level. Likewise, the an-Nasl index reveals that the poverty rate is not indicated by the birth rate and population spending per capita, especially in Bireuen Regency (Reza et al., 2018).

5. CONCLUSION

This study examines the relationship between special autonomy profit-sharing and tax-sharing funds on social assistance spending efficiency of the Family Hope Program (PKH) and their impact on poverty levels in 23 districts/cities in Aceh province. The result confirms that Pidie, Bireun, North Aceh, Aceh Jaya, Bener Meriah, and Pidie Jaya spent on social security efficiently. Meanwhile, 17 other regencies/cities are inefficient in spending on social assistance on the Family Hope Program (PKH). The local government budget on PKH is essential to improve the fundamental component of community welfare because expense on the financing of the Family Hope Program m is one of the leading public policies indicators to pull poverty out of the poor in the province of Aceh. In the future, the efforts made by the government for social aid spending need to be evaluated more carefully since a large amount of data on recipients of social security is not in accordance with what it should be.

The human development index (IPM) component has the lowest impact on poverty mitigation. Investment in improving the quality of human resources takes a long time, mainly in education. It will not have an optimal effect on poverty reduction in the short term. The government can expand affordable and qualified education services scope (starting from elementary schools to universities).

This research deficiency is a lack of data series availability. As a result, researchers cannot apply the long-term analysis regression model and only use a static model approach. Both limitations of the sample data coverage are only limited in the Aceh province using district/city data. The range is not more evenly distributed with other areas existing in Indonesia.

The researcher's suggestion for the following research applies more extended data series to reduce assumption problems in statistical testing. Furthermore, this research only focuses on regencies/cities in Aceh province. It is hoped that further researchers can analyze other impoverished areas in Sumatra or even Indonesia.

AUTHORS' CONTRIBUTIONS

All of the authors listed have contribution to this paper.

ACKNOWLEDGMENTS

Thanks are conveyed to the Institute for Research and Community Service (LPPM) Universitas Malikussaleh for funding this research and to the Faculty Social dan Political Sciences Universitas Malikussaleh for the support.

REFERENCES

[1] Amaluddin, Payapo, R. W., Laitupa, A. A., & Serang, M. R. (2018). International Journal of Economics and Financial Issues A Modified Human Development Index and Poverty in the Villages of West Seram Regency, Maluku Province, Indonesia. *International Journal of Economics and Financial Issues*, *8*(2), 325–330.

[2] Astuti, A. M. (2010). Fixed Effect Model pada Regresi Data Panel. *Beta*, *3*(2), 134–145.

[3] Bariyah, Nurul, R. & H. W. E. (2020). *Human Development Index , Unemployment and Poverty Rate in Kalimantan Barat*. 12–23.

[4] Cammeraat, E. (2020). The relationship between different social expenditure schemes and poverty, inequality and economic growth. *International Social Security Review*, *73*(2), 101–123. https://doi.org/10.1111/issr.12236

[5] Celikay, F., & Gumus, E. (2017). The effect of social spending on reducing poverty. *International Journal of Social Economics*, *44*(5), 620–632. https://doi.org/10.1108/IJSE-10-2015-0274

[6] Cheng, X., Chen, J., Jiang, S., Dai, Y., Shuai, C., Li, W., Liu, Y., Wang, C., Zhou, M., Zou, L., Zhang, P., & Kang, X. (2021). The impact of rural land consolidation on household poverty alleviation: The moderating effects of human capital endowment. *Land Use Policy*, *109*(October 2020), 105692. https://doi.org/10.1016/j.landusepol.2021.105692

[7] Cristóbal, J., Ehrenstein, M., Domínguez-Ramos, A., Galán-Martín, Á., Pozo, C., Margallo, M., Aldaco, R., Jiménez, L., Irabien, Á., & Guillén-Gosálbez, G. (2021). Unraveling the links between public spending and Sustainable Development Goals: Insights from data envelopment analysis. *Science of the Total Environment*, *786*, 147459. https://doi.org/10.1016/j.scitotenv.2021.147459

[8] D'Inverno, G., Carosi, L., & Ravagli, L. (2018). Global public spending efficiency in Tuscan municipalities. *Socio-Economic Planning Sciences*, *61*, 102–113.

https://doi.org/10.1016/j.seps.2017.01.006

[9] Dana, D. A. N., Khusus, O., & Periode, A. (2020). *Jurnal Ekonomi Regional Unimal Volume 3 Nomor 2 Agustus 2020 E-ISSN : 2615-126X URL: http://ojs.unimal.ac.id/index.php/ekonomi_regional*. *3*, 23–31.

[10] Frenda, A., Sepe, E., & Scippacercola, S. (2021). Efficiency analysis of social protection expenditure in the Italian Regions. *Socio-Economic Planning Sciences*, *73*(November 2019), 100965. https://doi.org/10.1016/j.seps.2020.100965

[11] Ilkkaracan, I., Kim, K., Masterson, T., Memiş, E., & Zacharias, A. (2021). The impact of investing in social care on employment generation, time-, income-poverty by gender: A macro-micro policy simulation for Turkey. *World Development*, *144*. https://doi.org/10.1016/j.worlddev.2021.105476

[12] Juliansyah, H., Dharma, Y., Zulfa, A., Asnawi, A., Aprilla, D., Umaruddin, U., Anwar, K., Fuadi, F., & Abbas, T. (2019). *Analysis of Economic Development Disparity across Regencies in Aceh, Indonesia*. *292*(Agc), 677–682. https://doi.org/10.2991/agc-18.2019.101

[13] Li, B., & Dewan, H. (2017). Efficiency differences among China's resource-based cities and their determinants. *Resources Policy*, *51*(July 2016), 31–38. https://doi.org/10.1016/j.resourpol.2016.11.003

14] Masita, G. (2015). Determinan Efisiensi Perbankan Di Indonesia Berdasarkan Data Envelopment Analyis (Dea). *Dk*, *53*(9), 1689–1699.

[15] Paper, C. (2016). *Mengunakan Metode Data Envelopment Analysis (Dea)*. *February 2015*, 0–16.

[16] Prasetyo, A. D., & Zuhdi, U. (2013). The Government Expenditure Efficiency towards the Human Development. *Procedia Economics and Finance*, *5*(2012), 615–622. https://doi.org/10.1016/s2212-5671(13)00072-5

[17] Reza, M., Dharma, Y., & Juliansyah, H. (2018). *The Effect of Islamic Human Development Index*. *01*(02), 35–43.

[18] Sánchez, A., & Navarro, M. (2021). Public policies of welfare state and child poverty in the european union. *Sustainability (Switzerland)*, *13*(5), 1–17. https://doi.org/10.3390/su13052725

[19] Taruno, H. T. (2019). Public Spending and Poverty Reduction in Indonesia: The Effects of Economic Growth and Public Spending on Poverty Reduction in Indonesia 2009-2018. *The Indonesian Journal of Planning and Development*, *4*(2), 49–56. https://doi.org/10.14710/ijpd.4.2.49-56

[20] Yanti, P., & Kustiani, N. A. (2016). Analisis Efisiensi Belanja Daerah Urusan Kesehatan dengan Metode Data Envelopment Analysis (DEA): Studi Pada Pemerintah Kabupaten / Kota di Provinsi Banten. *Jurnal Info Artha*, *4*, 81–96. https://doi.org/10.31092/jia.v4i4.49

[21] YU, L. rong, & LI, X. yun. (2021). The effects of social security expenditure on reducing income inequality and rural poverty in China. *Journal of Integrative Agriculture*, *20*(4), 1060–1067. https://doi.org/10.1016/S2095-3119(20)63404-9