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Analysis of The Efficiency of Fiscal Policy on Economic Growth in 4 Asean Countries: Data Envelopment Analysis (DEA) Approach

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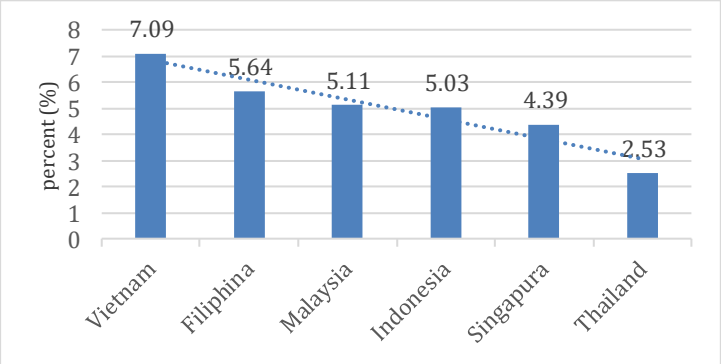
ABSTRACT
The purpose of this study is to investigate the effectiveness of fiscal policy on economic growth in four ASEAN countries, namely: Indonesia, Malaysia, the Philippines and Vietnam during 2014–2024. This study is inspired by the discrepancy of fiscal capacity and economic growth between its members within ASEAN, hence it is important to know more specifically how effective tax revenue in creating economic growth. The original contribution of this research is the use of DEA to measure the efficiency of fiscal policy for generating state revenue among ASEAN countries. It has not been researched well as a field. The primary contribution of this paper is to contribute to the empirics of efficiency performance in a quantitative manner as scale and technical efficiency comparisons between economies in ASEAN region. The research approach follows a descriptive quantitative dogma and relies on secondary data obtained from the World Bank and IMF. The input variables are tax revenue, tax ratio and VAT, the output is economic growth (GDP growth). The findings indicate that technical fiscal efficiencies in most of ASEAN countries are somewhat successful. Nevertheless, scale efficiency is still quite low, indicating the current fiscal policy is not yet optimal for economic growth. Finally, the result implies that public resource management should be emphasizing more on institutional capacity and the relevance of fiscal operations in designing budgetary policy as a means of ensuring sustainable economic growth.

Keywords: *fiscal efficiency, economic growth, ASEAN, taxes, DEA*

INTRODUCTION

Among the various tools of the government, the use of fiscal policy is the most effective means of achieving macro objectives like growth, stability, and income redistribution. While imbalances between development and macro stability can be alleviated with the use tax policies and government expenditures, the discussion surrounding the efficacy of fiscal policies to turn revenues accrued from taxes into economically sustainable output growth continues. In the case of the ASEAN countries, the disparities in income, organizational capacity regarding tax collection, and financial structures make such an approach more pertinent

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Source: GoodStats

Graph 1. Economic Growth Rate of ASEAN Countries in 2024

Data indicates variances in growth performance and fiscal capacity among the ASEAN nations. For the countries included in the study, GDP growth rates are as follows: Vietnam at 7.09%, the Philippines 5.64%, Malaysia 5.11%, and Indonesia 5.03%. Additionally, there is inconsistency in the ASEAN region fiscal data as recorded in the 10 years. According to the IMF, average tax ratios for Indonesia during 2014-2024 is projected to be between 8-11%, Malaysia 10-15%, the Philippines 13-15%, and Vietnam 12-15%. All countries experience fluctuating tax GDP ratios indicating fiscal imbalances which in turn, affects the overall discretionary spending potential for the country to promote economic growth. The 2020 Covid -19 pandemic recession exerted additional pressure on tax collection and exacerbated already widening fiscal deficits. This has made the efficiency of discretionary fiscal policies an urgent area for research and analysis.

Past research has highlighted differing perspectives on how tax policy impacts economic growth. While (Shaqiri et al., 2024) recognizes that both direct and indirect taxes have implications on economic growth for developed economies. However, growth implications depends on the structure and proportions of the tax system. (Puji Lestari et al., 2025) tax revenue growth in his research regarding five ASEAN countries does not necessarily correlate with growth in public welfare, indicative of a potential issue related to fiscal efficiency. Nga et al. (2020) addresses the need for tax reform to enhance productive investment and advance economic growth over a sustained period.

The inefficiency with which tax revenues are transformed into economic growth is the foremost issue for the ASEAN (Crispolti et al., 2022). stated that the success of a given fiscal policy depends largely on the government's ability to spend this revenue on productive activities. Conversely Kim et al., (2023) determined that the coordination between fiscal and monetary policies is an integral part of the effectiveness of an economic stimulus. In addition, Nga et al., (2020) explain that there is an optimal limit to tax revenue growth, beyond which excessive tax increases can stifle growth. Other challenges include disparities in tax administration and low fiscal bureaucratic efficiency in some ASEAN countries.

The COVID-19 pandemic has added to the complexity of fiscal issues. Wang et al., (2022) Stating that overly expansive fiscal policies without efficient planning can worsen public deficits and debt. Musa et al., (2025) Also found that governance quality is a determining factor in optimizing public budget use to

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support economic growth. This confirms the need for a quantitative analysis to measure the extent to which each country implements efficient fiscal policy.

Previous studies show that the efficiency of fiscal policy remains an underexplored empirical area in the ASEAN region. Most studies, such as (Soffan et al., 2025) and (Menescal & Alves, 2024), use Data Envelopment Analysis (DEA) to measure the efficiency of public institutions and the taxation system, but have not specifically linked it to macroeconomic growth. (Martínez et al., 2022) found that tax collection efficiency improved through decentralization and digitization, but these results have not been tested in a cross-country context in Southeast Asia. (Song et al., 2025) An analysis in China found that fiscal decentralization can boost growth, but its effects depend heavily on institutional capacity and governance.

The main gap in previous research is the lack of studies that specifically assess the efficiency of tax-based fiscal policy on economic growth at the ASEAN cross-country level. Most studies only highlight the direct relationship between fiscal policy and economic development through a regression approach or focus on the efficiency of public spending, rather than on the state revenue side. The novelty of this study lies in the application of the Data Envelopment Analysis (DEA) method to measure the efficiency of fiscal policy from the state revenue side in four ASEAN countries (Indonesia, Malaysia, Philippines, and Vietnam) during 2014-2024, as well as in the use of panel analysis to identify the most and least efficient countries and years.

Based on the above description, this study aims to analyze the efficiency of fiscal policy in promoting economic growth in four ASEAN countries Indonesia, Malaysia, the Philippines, and Vietnam, during the period 2014–2024 using the Data Envelopment Analysis (DEA) approach. This study also aims to identify the countries and years that achieved the highest efficiency (frontier) and the least efficient countries or years, and to determine the fiscal input factors that contributed to inefficiency. The purpose of this analysis is to provide evidence-based policy recommendations about budgetary management in relation to the management of the tax revenue function, with a view to increasing economic growth.

The Solow-Swan model (1956, as cited in Tesfatsion Leigh, 2024) is one of the basic frameworks used to explain a country's economic growth theory and declares that output is a function of labor and capital, as well as, allocation and technological advancement. From the fiscal policy perspective, government expenditure on productive investment will enhance the capital stock and the country's productivity. Economic efficiency is the degree to which capital (and labor) inputs transforms into sustainable outputs. This is consistent with the approach of Data Envelopment Analysis (DEA) used in the current study.

In line with economic theory, the International Monetary Fund (2015) showed that efficient fiscal policies enhance long-run economic growth through an improved quality of expenditure and refined tax structures. Thus, the Solow-Swan model presents a strong theoretical foundation when analyzing the correlation between economic growth and the efficiency of fiscal policies.

The theory of Keynesian fiscal policy (Schumpeter & Keynes, 1936) was originally developed in The General Theory of Employment, Interest and Money. The authors presented the idea that the government must play a crucial role in managing aggregate demand, which is the central mechanism for restoring equilibrium in the economy. Spending by the government, or the use of tax cuts,

will influence individual consumption and investment decisions and ultimately lead to increased aggregate demand and country output (Keynes, 1936). Fiscal policy is used as a macroeconomic stabilization policy to smooth out short-term fluctuations in the economy and help achieve full employment at its natural rate. This idea is supported by Abdon et.al., (2014) using data found in the ADB Economics Working Paper Series No. 412. It suggested that the structural composition of fiscal policy matters in terms of how to find the best balance for tax structure changes and shifts in public expenditures, and thus finding optimal composition of resources had an impact on economic growth in Asia. It is suggested that there will be optimal economic growth consequences from spending more on education, which was shown to have a greater impact, and switching spending from direct taxes to property taxes.

The Public Finance Theory proposed by Richard A. Musgrave and Peggy B. Musgrave, 1989, as cited in Boskin, (2012) emphasizes that fiscal policy has three main functions: allocation, distribution, and stabilization. The allocation function focuses on how the government allocates public resources efficiently to produce optimal economic output. The distribution function emphasizes the importance of an equitable distribution of development outcomes through taxation and social spending. In contrast, the stabilization function concerns efforts to maintain macroeconomic balance through the regulation of government spending and revenue.

In this study, Musgrave's theory provides a conceptual framework for assessing the extent to which fiscal policy is implemented efficiently in ASEAN countries. This efficiency reflects the government's ability to optimally convert fiscal inputs (taxes and public spending) into economic outputs (GDP growth). The Data Envelopment Analysis (DEA) approach used in this study aligns with Musgrave's principles, as both focus on evaluating the efficiency of public resource allocation. Thus, Musgrave's public finance theory bridges the gap between Keynesian theory, which focuses on the active role of government, and the Solow–Swan growth theory, which emphasizes long-term productivity.

RESEARCH METHOD

This research adopts a comparative descriptive quantitative technique to measure the efficiency of fiscal policies in Indonesia, Malaysia, Philippines, and Vietnam during the period of 2014 to 2024. This quantitative research employed secondary data of the World Bank and IMF in the panel of time series and cross-section (Apriliawan et al., 2013). The inputs variables include Tax Revenue, Tax Ratio and Value Added Tax (VAT) and the output variable is GDP Growth. The selection of variables is based on the effect of fiscal instruments on economic growth.

The analysis uses Data Envelopment Analysis (DEA) based on linear programming to measure the relative efficiency of 44 Decision Making Units (DMUs), which are combinations of countries and years. An input-oriented DEA model under the Variable Returns to Scale (VRS) assumption was chosen because the government has greater control over fiscal variables as inputs. At the same time, economic growth is the output of these policies. The VRS assumption from Banker, Charnes, and Cooper (1984) accommodates differences in capacity and economic scale between countries, given that the public sector does not always operate at Constant Returns to Scale (CRS). The VRS model is suitable when changes in inputs do not result in proportional

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changes in outputs. Mathematically, the input-oriented DEA model with the VRS assumption can be written as follows:

$$\sum_{j=i}^{n} \lambda_j x_{ij} \leq \theta x_{io,} \quad i = 1, 2, \ldots, m$$

$$\sum_{j=i}^{n} \lambda_j y_{rj} \geq y_{ro,} \quad r = 1, 2, \ldots, s$$

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

$$\lambda j \geq 0, \quad j = 1,2, \ldots, n$$

In this model, θ represents the efficiency score with a value between 0 and 1, λj Is the intensity weight of DMU j, xij is the i-th input of DMU j, and yrj Is the r-th output of DMU j. DMUs are considered efficient if θ = 1, i.e., they lie on the efficiency frontier. Conversely, if θ < 1, the DMU is considered inefficient because there is still potential for performance improvement. These results illustrate the relative ability of countries to optimize fiscal instruments for maximum economic growth (Kuah & Wong, 2011). Countries with an efficiency value of 1 have optimally managed their budgetary policies, while those with a value below 1 still have room for improvement.

This study also analyzes Returns to Scale (RTS) to determine the effect of changes in fiscal input scale on economic growth output. The RTS analysis uses the Banker and Thrall (1992) approach with the dual μ_0^* variable in the BCC model to identify the production scale characteristics of each DMU. The RTS conditions for the BCC model can be explained as follows:

i. Increasing Returns to Scale (IRS), applies when
$\mu_0^* > 0$ *for all optimal solutions,*
which means that an increase in fiscal input results in a proportionally greater increase in output.

ii. Decreasing Returns to Scale (DRS), applies when
$\mu_0^* > 0$ *for all optimal solutions,*
which means that an increase in fiscal input results in a proportionally smaller increase in output.

iii. Constant Returns to Scale (CRS) apply when
$\mu_0^* = 0$ *for at least one optimal solution,*
which means that changes in input and output are proportional or at the optimal level of scale efficiency.

This classification is used to determine whether a country's fiscal policy is still expanding (increasing returns), has reached optimal scale (constant returns), or is in decline (decreasing returns), in which additional fiscal input is no longer efficient at driving economic growth. (Banker et al., 2004).

The stages of analysis include: collection of secondary data for the period 2014-2024 from the World Bank and IMF, formation of DMUs based on country-year combinations, normalization of data to make it uniform and non-negative, calculation of technical efficiency using the input-oriented VRS DEA model,

identification of efficient and inefficient DMUs, RTS analysis using the value μ_0^* , and comparative descriptive analysis of efficiency levels and RTS characteristics between countries and periods using STATA 14. This study is expected to provide a comprehensive overview of fiscal policy efficiency in four ASEAN countries and the characteristics of economies of scale that influence differences in efficiency, thereby serving as a reference for the formulation of more effective and sustainable fiscal policies

RESULTS AND DISCUSSION

This study uses the Data Envelopment Analysis (DEA) method to assess the efficiency of fiscal policies in four ASEAN countries, Indonesia, Malaysia, the Philippines, and Vietnam, during the period 2014–2024. The variables examined in the analysis consist of tax revenue, tax ratio, value-added tax (VAT), and economic growth (GDP growth) as outputs. Efficiency values suggest the longest and most optimal way a country (DMU) can convert one or even multiple fiscal inputs into a degree of economic development or value-added.

Tabel 1 Data Input and Output of 4 ASEAN Countries

dmu	country	year	Input1	Input2	Input3	Output
			Tax Revenue	Tax Ratio	PPN	GDP Growth
1	Indonesia	2014	68811948	10,9	10	5
2		2015	74425134	10,8	10	4,9
3		2016	77098206	10,4	10	5
4		2017	80611788	9,9	10	5,1
5		2018	91127388	10,2	10	5,2
6		2019	92768460	9,8	10	5
7		2020	77108178	8,3	10	-2,1
8		2021	92870466	9,1	10	3,7
9		2022	122073144	10,4	11	5,3
10		2023	129252492	10,3	11	5
11		2024	133959960	10,1	11	5
12	Malaysia	2014	38801640000	14,8	6	6
13		2015	39093710000	14,1	6	5,1
14		2016	40015750000	13,6	6	4,4
15		2017	41980820000	12,9	6	5,8
16		2018	41130140000	12	6	4,8
17		2019	42675760000	11,9	6	4,4
18		2020	36470000000	10,9	6	-5,5
19		2021	41026000000	11,2	6	3,3
20		2022	49335000000	11,6	6	8,9
21		2023	54154000000	12,6	6	3,6
22		2024	43645000000	13,2	8	5,1
23	Philippines	2014	29498040000	13	12	6,3
24		2015	31145400000	13	12	6,3

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25		2016	33976800000	13,1	12	7,1
26		2017	38627160000	13,6	12	6,9
27		2018	44032560000	14	12	6,3
28		2019	48551000000	14,5	12	6,1
29		2020	42960000000	14	12	-9,5
30		2021	47089000000	14,1	12	5,7
31		2022	55255000000	14,6	12	7,6
32		2023	58823000000	14,1	12	5,5
33		2024	65246000000	14,1	12	5,7
34	Vietnam	2014	41287800000	14,5	10	6,4
35		2015	43022600000	14,7	10	7
36		2016	46296800000	14,3	10	6,7
37		2017	51019900000	14,8	10	6,9
38		2018	55847300000	14,6	10	7,5
39		2019	62800300000	14,6	10	7,4
40		2020	61199400000	12,1	10	2,9
41		2021	67375500000	12,4	10	2,6
42		2022	77354200000	12,8	10	8,5
43		2023	53944090900	11,6	10	5,1
44		2024	66700000000	11,4	10	7,1

Source: World Bank and International Monetary Fund (IMF)

RESULTS

Table 4.2 displays the results from the DEA data processing. The table provides values for CRS_TE, VRS_TE, and RTS for each DMU in the four ASEAN countries. The efficiency values in this table form the basis on which to analyze the efficiency level and scale characteristics of each country. Efficiency values will be between 0 and 1 with a value of 1 indicating relative efficiency and below 1 are label as inefficient.

Tabel 2. Results of DEA Data Analysis in 4 ASEAN Countries

Dmu	Country	CRS_TE	VRS_TE	RTS
1	Indonesia	0,106500	0,904079	1,000000
2		0,931200	0,833333	1,000000
3		0,660104	0,890869	1,000000
4		0,790595	0,833333	1,000000
5		0,611364	0,833333	1,000000
6		0,755889	0,875018	1,000000
7		0,000000	0,886973	1,000000
8		0,810138	0,833333	1,000000
9		0,094898	0,916667	1,000000
10		1,000000	0,949838	1,000000
11		0,591498	0,944554	1,000000

12	Malaysia	1,000000	1,000000	0,000000
13		0,014010	0,983119	1,000000
14		0,221822	0,982362	1,000000
15		0,207190	0,979607	1,000000
16		1,000000	0,978185	-1,000000
17		0,343884	0,980029	1,000000
18		1,000000	1,000000	0,000000
19		0,040332	0,979460	1,000000
20		1,000000	0,982061	-1,000000
21		0,374425	0,990997	1,000000
22		0,529534	0,982670	1,000000
23	Phillippines	1,000000	1,000000	0,000000
24		0,637483	1,000000	1,000000
25		0,372792	1,000000	1,000000
26		0,006686	1,000000	1,000000
27		0,989667	1,000000	-1,000000
28		0,011321	1,000000	1,000000
29		1,000000	1,000000	0,000000
30		0,812500	1,000000	-1,000000
31		0,013863	1,000000	1,000000
32		0,810206	1,000000	-1,000000
33		0,190849	1,000000	1,000000
34	Vietnam	0,026600	0,987982	1,000000
35		0,750349	1,000000	-1,000000
36		0,015281	0,987930	1,000000
37		0,755040	1,000000	-1,000000
38		0,005888	0,997115	1,000000
39		0,041428	1,000000	1,000000
40		0,918307	0,995948	1,000000
41		0,024827	1,000000	1,000000
42		0,005044	1,000000	1,000000
43		0,561894	0,988993	1,000000
44		0,349399	0,995485	1,000000

Source: Secondary data processed using DEA (2025)

The efficiency reports from the calculations indicate that the overall fiscal performance is relatively low when measured at the Constant Returns to Scale

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(CRS_TE) efficiency scores. Out of the 44 DMUs, only eight achieved a CRS efficiency equal to 1, indicating full efficiency classification (DMUs 10, 12, 16, 18, 20, 23, 29, and 35). This further implies that 36 DMUs were inefficient in converting fiscal inputs (the tax revenue, the tax ratios and the VAT rates) into economic growth outputs. In fact, some DMUs even had extremely low efficiency scores such as DMU 1 (0.1065), DMU 7 (0.0000), and DMU 19 (0.0403), which measured a large difference between the increases in the inputs and the corresponding economic outcomes. Overall, the results indicate that most fiscal DMUs were inefficient and did not obtain the optimal input/output relationship.

When viewed from the efficiency results under Variable Return to Scale (VRS_TE), performance is much better than under CRS. Most DMUs show efficiency values above 0.8, and 14 DMUs achieve a VRS value of 1, indicating full technical and managerial efficiency. This illustrates that most units have managed their fiscal resources effectively and that the inefficiency in the CRS model is mainly due to operational scale issues rather than technical weaknesses in management. In other words, most countries are managerially efficient, but the size of their fiscal operations is not yet in line with the optimal capacity of the economy.

The analysis of Returns to Scale (RTS) demonstrates differences in conditions across units. A total of 33 DMUs are situated in a context of Increasing Return to Scale (RTS = 1); this implies that increasing fiscal input can still yield, in proportion, greater economic growth. On the other hand, 7 DMUs are in a setting of Decreasing Returns to Scale (RTS = -1), which suggests that adding fiscal input yields less products. As for units of DMU 12, 18, and 23, they are in a Constant Return to Scale (RTS = 0) condition; suggesting they are operating at an economic scale that is deemed optimal.

Tabel 3 Average Efficiency per Country

Country	CRS_TE	VRS_TE	RTS_dominan
Indonesia	0,6	0,88	Increasing Return to Scale
Malaysia	0,58	0,98	Increasing Return to Scale (mayoritas)
Philippines	0,61	1	Increasing Return to Scale (mayoritas)
Vietnam	0,38	0,99	Increasing Return to Scale (dominan)

Source: Secondary data processed using DEA (2025)

All Decision-Making Units (DMUs) in Indonesia report a Return to Scale (RTS) value of 1, meaning that the conditions of Increasing Returns to Scale (IRS) prevail. This reflects that Indonesia's fiscal scale has not yet reached the optimum level and that any further increase in budgetary inputs, like government spending or tax revenue, might still give the economy more than proportionate output. Accordingly, Indonesia's room for fiscal expansion is healthy; however, at the same time, more efficiency in public budget allocation and management is warranted.

The RTS condition is mixed and shows Malaysia as having a majority of DMUs with Increasing Return to Scale (IRS), with a smaller number in Decreasing Return to Scale (DRS) and Constant Return to Scale (CRS). More

specifically, and interchanging these definitions with DMUs, of the 11 DMUs, 7 are at IRS; 3 (encapsulating Unit 16, Unit 20, and Unit 22, partly) are at DRS; 2 (encapsulating Unit 12 and Unit 18) are at CRS (the optimum length). This shows that while Malaysia exhibits a high level of technical efficiency, there remains some scale expansion of fiscal capacity; however, some DMUs have reached or exceeded their optimum length of capacity.

The RTS conditions in the Philippines further indicate the prevalence of Increasing Returns to Scale (IRS). Of the 11 DMUs, 6 DMUs (namely 23, 24, 25, 26, 28, 31, and 33) demonstrate IRS; 4 DMUs (27, 30, 32, and a minimal portion of 35) demonstrate Decreasing Returns to Scale (DRS); and 1 DMU (29) demonstrates Constant Returns to Scale (CRS). This demonstrates that the majority of fiscal units in the Philippines remain under an efficient period of growth whereby increasing fiscal inputs has a greater impact on economic output. Yet, the presence of some with DRS suggests that the location or fiscal period is nearing an optimal point.

Vietnam's RTS is similarly dominated by Increasing Returns to Scale (IRS), as of the 11 DMUs, 8 DMUs are in an IRS condition (which includes DMUs 34, 36, 38, 39, 41, 42, 43, and 44), while 3 DMUs are indicating DRS (namely DMUs 35, 37, and a marginally small portion of the others). There are no DMUs with a CRS condition in Vietnam. This suggests that, in general, the Vietnam fiscal unit economy is still acting at an under optimal scale so a fiscal input increase could yield some of the greatest possible multiplier effect of promoting economic growth.

All in all, these recent findings are indicative of an improvement in managerial efficiency in most countries, while total efficiency is still hindered by scale inefficiencies. Therefore, the policy needs to move towards adjusting fiscal capacity to align with economic reality. Reforming tax rates, improving public spending effectiveness, and reviewing the size of budgetary projects are needed to fit efficient economies of scale and in a more proportional economic growth.

DISCUSSION

The outcomes of an evaluation of fiscal efficiency using the Data Envelopment Analysis (DEA) method indicate clear differences in the fiscal performance of 4 ASEAN countries, specifically Indonesia, Malaysia, the Philippines, and Vietnam. In total, 44 Decision Making Units (DMUs) were analyzed, and the majority of them had a CRS_TE value of less than 1, demonstrating that fiscal policy to date with respect to fiscal inputs (tax revenue, tax ratio, and VAT) has not yet been optimized according to proportionate outputs in the form of economic growth- only 8 DMUs achieved a CRS_TE value of 1, indicating that differences in performance in fiscal policy persist between the four countries. In addition, the average Variable Return to Scale (VRS_TE) value is above the value of 0.8, indicating that technical and managerial efficiency is relatively good. However, the Constant Return to Scale (CRS_TE) value, which ranges from 0.6 or even below, demonstrates scale inefficiency, that is, a malalignment between fiscal capacity and the actual size of economic activity. Such demonstrates that at a technological basis, the four ASEAN countries are managing their fiscal capacity reasonably well within their respective economic structures, however, fiscal policy will need to continue to address scale and obtaing resource alignments to achieve optimal gastro-economic growth. The low CRS_TE score suggests that policy distortions occur because of a number of

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reasons, which could be related to differences in the taxation rates or excessive taxation exemptions on particular goods/services, in addition to an ineffective allocation of tax revenues in a productive sector. On the other hand, the high value of VRS_TE indicates that, as both a managerial and technical assessment, fiscal administration is already performing quite well, and can be simply enhanced by policy initiatives that consider increased economic scale. The significant number of DMUs satisfying the Increasing Return to Scale (IRS) condition, specifically with 11 DMUs in Indonesia, 7 in Malaysia, 6 in the Philippines and 8 in Vietnam, demonstrates that there is still an opportunity for additional fiscal inputs to yield greater economic growth output, providing fiscal policies are adequately administered.

This study's findings are consistent with earlier research done by Adhikari (2020) which implies that the introduction of Value Added Tax (VAT) has a positive effect on economic efficiency only in countries where the tax and institutional framework is strong (i.e., developed countries). In developing countries, the effect of VAT on efficiency is comparatively small as a consequence of ineffective law enforcement and tax administration frameworks alongside a larger informal sector economy. Fiscal efficiency is impacted by both the size of tax revenue raised in relative terms and the quality of the budgetary system, tax administration frameworks, and capabilities of the applicable institutions or government. Furthermore, the study's findings reinforce the results from Acosta-Ormaechea & Morozumi (2021), which note the importance of tax structure in facilitating economic growth. The findings from this study indicate that increasing C-efficiency of VAT can be achieved by different methods, such as increasing the tax base, reducing exemptions for certain goods/services, and simplifying tax rates. Complex and inconsistent tax designs can reduce economic efficiency (based on the DEA results, there are still many DMUs with CRS_TE values below 1), due to the complex tax structure in conjunction with a VAT refund policy that is less than optimal, resulting in distortions in production and investment activities. Therefore, improving tax design involves not only increasing tax revenue; improving tax policy design is also crucial to improving fiscal policy efficiency or efficiency in the four ASEAN countries. Sipayung et al. (2024) has also reviewed the VAT system's role in strengthening the fiscal capacity of the state, indicating that the VAT revenue ratio and VAT efficiency has a strong effect on the tax ratio in Indonesia. However, the study also highlights the need to reform VAT policy to balance budgetary and regulatory functions. This is in line with the DEA analysis, which shows that although technically the four ASEAN countries are pretty efficient in fiscal management (high VRS_TE), they have not yet achieved scale efficiency (low CRS_TE), which means that the increase in tax revenue has not been balanced with fiscal policies capable of managing inputs (tax revenue, tax ratio, and VAT) into outputs in the form of maximum economic growth.

The novelty of this study compared to previous studies is that it combines a cross-country DEA approach in ASEAN to assess the overall efficiency of fiscal policy. This approach provides an overview of tennis efficiency (VRS_TE) and scale efficiency (CRS_TE) in the four ASEAN countries, which has not been widely used in fiscal policy studies in ASEAN countries. The use of three leading fiscal indicators as outputs, namely tax revenue, tax ratio, and VAT, as well as economic growth output, has also been rarely studied because previous studies focused on only one or two variables, such as VAT and tax ratio, leaving a

significant gap to be filled by this study, which will provide a broader picture of the effectiveness of fiscal policy in promoting economic growth.

Given the outcomes of the research, the government may establish various policy recommendations. First, the government should adapt the scale of fiscal policy to each country's economic capacity, so that the increase in tax revenue could be used for productive expenditures (e.g., infrastructure, education, and technology) to support economic growth and stimulate a positive economic impact. Secondly, the government should strengthen institutional capacity and tax administration capacity, including by establishing a digital taxation system, enhancing oversight, and improving transparency so citizens can trust the government's management of tax revenues in achieving lower fiscal efficiency over the long run.

CONCLUSION

This study has established that the efficacy of fiscal policy in four ASEAN countries Indonesia, Malaysia, the Philippines, and Vietnam for the period of 2014–2024 generally produced mixed results. Based on a Data Envelopment Analysis (DEA), the majority of the countries analyzed have discovered that while they have been technically and managerially efficient, they still faced scale-efficiency issues. This finding suggests that increases in tax revenue, tax ratios, and VAT have not been fully transformed into effective economic growth, signaling a serious problem for fiscal policy and practice. The prominent aspects for them are classified as increasing returns to scale a scenario that signifies it has not fully taken into account other efficiency gains for improving fiscal policy. In plain terms, the state enjoys the cushion of still expanding some fiscal policy in years when economic output is not optimal, especially when analyzing institutional capacity or framing the quality of managing state revenue. Along with these empirics, the research has provided evidence that effective budgetary policy is contingent on numerous factors: the capability of governments to handle fiscal inputs in line with the capacity of the economy, regardless of the level of government revenues. In theoretical terms, this research contributes to the broader review of country-to-country fiscal efficiency through analyzing the efficiency of using another qualitative innovation through a DEA model. In terms of economic impact, this study provides a space to advance public policy in the form and understanding of tax revenue opportunities for optimizing their efficiency toward sustainable growth. A new empirical approach through this study is that we know more about the differences in efficiency and economies of scale in the selected countries, providing researchers another way to formulate evidence-based public fiscal policy in the ASEAN region.

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