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Government Policy Impact on the Development of the VAT Rates

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ABSTRACT

The relevance of the research topic is due to the Indonesian government's policy plan which will increase the VAT rate from 11% to 12% in early 2025, and has become a hot topic. **The aim** of this research is to provide the best alternative policy options by providing comprehensive solutions. The research **method** uses a system dynamics simulation model, employing qualitative and quantitative approaches facilitated by Powersim constructor software by considering three scenarios: pessimistic, moderate, and optimistic. This study uses six main variables and three additional variables. **The research results** reveal that, in a pessimistic simulation scenario, an increase in the VAT rate will reduce people's purchasing power and increase tax avoidance. In a moderate scenario simulation, there will be a balance in economic conditions, but in the future, this will reduce the potential for taxes and increase tax avoidance. In an optimistic scenario, reducing the VAT rate will reduce the tax burden, increase potential tax purchasing power, increase exports, and reduce imports, while decreasing tax avoidance and increase tax potential. This research **concludes** that, of the three scenarios, the best choice is to use the optimistic scenario because it will benefit overall economic conditions. It recommends that the government should reduce the tax avoidance ratio and simplify the supply chain, as supply chain complexity contributes to increased costs.

Keywords: government policy; tax policy; VAT rate; dynamic system; simulation; tax avoidance; tax evasion; tax gap; Indonesia

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ОРИГИНАЛЬНАЯ СТАТЬЯ

Влияние государственной политики на изменение ставок НДС

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АННОТАЦИЯ

Актуальность темы исследования обусловлена тем, что правительство Индонезии планировало в начале 2025 г. повысить ставку НДС с 11 до 12%, и эта тема стала одной из самых обсуждаемых. **Цель** данного исследования – предложить наилучшие альтернативные варианты политики, выработав комплексные решения. В работе применялись методы системной динамики. Использовалась имитационная модель, сочетающая качественные и количественные подходы. Моделирование проводилось с помощью программного обеспечения Power-sim. Рассмотрены три сценария: пессимистичный, умеренный и оптимистичный. В исследовании применяются шесть основных и три дополнительные переменные. **Результаты** показывают, что при пессимистичном сценарии моделирования повышение ставки НДС снизит покупательную способность населения и приведет к уклонению от уплаты налогов. При умеренном сценарии моделирования экономические условия будут сбалансированными, но в будущем это приведет к снижению потенциального объема налоговых поступлений и уклонению от уплаты налогов. При оптимистичном сценарии снижение ставки НДС уменьшит налоговое бремя, увеличит потенциальную покупательную способность населения, повысит экспорт и сократит импорт, снизив уровень уклонения от уплаты налогов и увеличив налоговый потенциал. Сделан **вывод**, что из трех сценариев лучше всего использовать оптимистичный, поскольку он благоприятно скажется на общей экономической ситуации. Авторы исследования рекомендуют правительству снизить коэффициент уклонения от уплаты налогов и упростить цепочку поставок, поскольку ее сложность приводит к увеличению затрат. **Ключевые слова:** государственная политика; налоговая политика; ставка НДС; динамическая система; моделирование; уклонение от уплаты налогов; налоговая лазейка; снижение налогов; Индонезия

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INTRODUCTION

After the COVID-19 pandemic, Indonesia's debt has increased. Data shows that in 2021, the state debt ratio reached its highest figure at 41% of GDP since the reform. This indicates that state debt has doubled, posing high risks for the future, especially with additional hidden debt from State-Owned Enterprises debt [1]. Although the government does not always bear all SOE losses directly, the government's debt may exceed US\$ 451.6 billion¹. In 2022, the state debt ratio decreased slightly to 38.65%, but in nominal terms, government debt has increased by US\$ 198.1 billion since the pandemic². In 2023, the state debt position began to decline every month. The government's debt position was US\$ 506.5 billion, with a debt-to-GDP ratio of 38.15%. In both nominal and ratio terms, Indonesia's debt decreased compared to March 31, 2023, when the debt ratio was 39.17% or US\$ 508.3 billion. The debt ratio also decreased compared to April 2022, when it was 39.09% of GDP, even though nominal debt increased from the previous year by US\$ 454.2 billion. The government has assessed that state debt remained within safe limits³.

Even though the debt ratio is still within safe limits, the Government is urged to remain vigilant about the rate of increase in debt in the medium term, especially given the recent economic situation due to the wars in Ukraine and Palestine. Therefore, the government has undertaken various efforts to manage high debt, including increasing the VAT rate from 10% to 11% on April 1, 2022⁴, and further increasing it from 11% to 12%, in early January 2025. Additionally, the government increased premium prices and Motor Vehicle Fuel Tax rates from 5% to 10%, plus VAT⁵. The government

also plans to increase several other taxes, such as the entertainment tax, which previously had a rate of 30%, now set to increase to 75%, and the land and building tax. On the other hand, prices have increased, especially for essentials such as rice, eggs and other necessities.

However, increasing the VAT rate will reduce people's purchasing power and increase resistance among small and medium-sized entrepreneurs, leading to higher rates of tax evasion. These entrepreneurs may try to hide their income to remain in the category of businesses earning below US\$ 300,000 per year, which exempts them from paying VAT and reporting it. VAT avoidance is likely to become more common, with consumers increasingly shopping at traditional markets and grocery stalls that are not subject to VAT. According to an online Jakpat survey with respondents from across Indonesia, the number of people shopping at traditional markets, grocery stalls, and e-commerce platforms is starting to increase, with 50.05% of respondents choosing traditional markets over supermarkets.

This research seeks to provide three comprehensive tax policy alternatives using a system dynamics simulation program. It aims to determine whether the government should increase the VAT rate to 12% in 2025, maintain the 11% rate applicable in 2024, or reduce the VAT rate to 10% as an alternative to a lower-rate policy scenario.

The distribution of respondents' monthly household shopping channels is presented in *Fig. 1*. The figure shows that supermarkets account for the largest share, followed by traditional markets, grocery stalls, hypermarkets, and e-commerce.

The hypothesis is:

Ha 1: An increase in the VAT rate can raise the price of goods and decrease people's purchasing power.

Ha 2: Increasing the VAT rate can lead to higher tax avoidance among lower-middle-class entrepreneurs.

LITERATURE REVIEW

In recent decades, VAT has become the most important single tax in most developing countries and countries in transition. The Government has implemented VAT using various models with distinct characteristics to address several critical fiscal issues related to VAT [2, 3].

Over the past 25 years, VAT has been introduced in several large developing countries and transition economies [4]. The IMF has indicated that VAT can effectively increase resources and modernize the

¹ Sayekti N. W. DPR RI notes on macroeconomic framework and fiscal policy 2024 [Internet]. Analysis Expertise Agency of DPR RI Expertise Agency of DPR RI. 2023. Center for Parliamentary Analysis. URL: https://berkas.dpr.go.id/puslit/files/info_singkat/Info_Singkat-XV-10-II-P3DI-Mei-2023-163-EN.pdf (accessed on 09.05.2024).

² Agnes T. Maintain Fiscal Strength, Debt Continues to Be Reduced. Kompas.com. 2023. URL: <https://www.kompas.id/baca/english/2023/09/23/en-utang-baru-ditekan-rasio-utang-ri-masih-jauh-dari-kondisi-prapandemi> (accessed on 09.05.2024).

³ Pratiwi D.R. Menilik Potensi Dampak Kenaikan PPN Menjadi 11 Persen di Tengah Ketidakpastian Global. *Budget Issue Brief Ekonomi dan Keuangan*. 2022;2(6):1–2. URL: <https://repositori.dpr.go.id/id/eprint/972/1/Budget%20Issue%20Brief%20Ekonomi%20dan%20Keuangan%20Vol%202%20Edisi%206%202022.pdf> (accessed on 09.05.2024). (In Indonesian).

⁴ PwC. Value-added tax (VAT). Jakarta, Indonesia; Price waterhouse Coopers. 2022. URL: <https://taxsummaries.pwc.com/indonesia/corporate/other-taxes> (accessed on 09.05.2024).

⁵ Fathoni M.I. VAT Rate Increase to 12 Percent in Indonesia: Challenges and Opportunities. Directorate General of

Taxes. 2024. URL: <https://pajak.go.id/en/artikel/vat-rate-increase-12-percent-indonesia-challenges-and-opportunities> (accessed on 09.05.2024); Muthiariny D.E. Jakarta Raises Motor Vehicle Fuel Tax to 10 Percent. *Tempo.co*. 2024 Jan 29. URL: <https://en.tempo.co/read/1827051/jakarta-raises-motor-vehicle-fuel-tax-to-10-percent> (accessed on 09.05.2024).

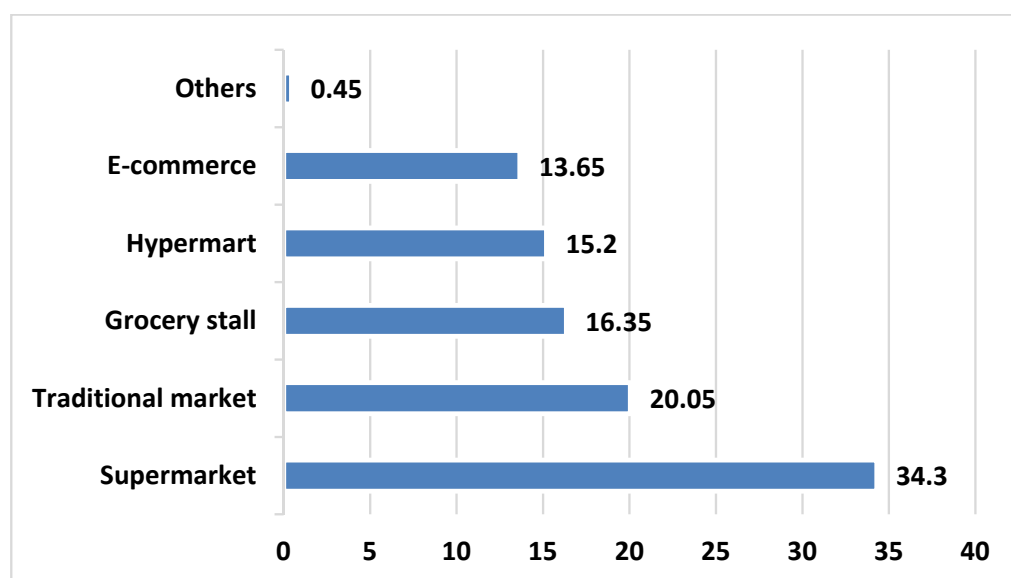


Fig. 1. Percentage of Respondents by Monthly Household Shopping Channel in Indonesia

Source: <https://databoks.katadata.co.id/datapublish/2022/06/09/survei-warga-yang-belanja-bulanan-di-e-commerce-masih-sedikit> (accessed on 09.05.2024).

tax system. However, this requires well-designed and properly implemented tax policies. A significant challenge for the future is the proper implementation and management of the financial sector, which is subject to VAT, and the reduction of losses due to varying rates and applications. Therefore, it is necessary to review the VAT system with a clear and consistent logic [5].

Regarding the increase in VAT rates, research conducted by Aaron, published by Ernst & Young, shows that a 1% increase in the VAT rate will impact the aggregate price level by 1%. The prices of goods will rise and service activities will increase by 34.4%. People's purchasing power and their intention to buy property will fall between 30 and 38%. However, Japan's experience with increasing VAT rates shows that such increases cannot boost consumption and instead lead to economic growth and inflation. In 2019, EU countries experienced a 12.2% decrease in VAT revenues after the increase in VAT rates. Specifically, VAT revenues decreased by 36% in Romania, 34% in Greece, 24% in Italy, 23% in Slovakia, and 11% in the UK [6].

Indonesia has had VAT since 1951, when it was first called Sales Tax. This is an indirect and general tax regulating the sales tax on both domestic and imported goods [7]. Indonesia experienced inflation due to VAT increases from 10% to 11% in 2022, resulting in a 5.51% inflation rate, and 2023, the inflation rate was 5.28%.

VAT in Indonesia

In Indonesia, VAT is a tax on value added by individuals and business entities at every stage of providing services or producing goods [8]. VAT taxpayers include individuals and entities who act as taxpayers,

withholding tax agents, and tax collectors with the rights and obligations to carry out taxation. The current VAT rate is set at 11% and it can change by up to 15% according to VAT Law No. 7 of 2021 [9]. The potential tax that the government can collect comes from the delivery of taxable goods and services of the Customs Area by entrepreneurs, the import of taxable goods, and the use of intangible taxable goods from inside and outside the Customs Area [10]. The law also regulates the exemption and reduction of VAT, as stipulated in the Minister of Finance Regulation No. 116/PMK.010/2017.

Supply Chain Stage

In Indonesia, the increase in the VAT rate affects various supply chains, from factories to consumers [11]. There are six stages in the supply chain: Factory to Main Distributor, Main Distributor to Distributor, Distributor to Main Agent, Main Agent to Agent, Agent to Seller (retailer), and finally, Seller to Consumer. *Table 1* presents an example of VAT calculation using the supply chain stage flow in Indonesia, starting from the factory level and ending with the final consumer [12, 13].

Table 1 shows that the government planned to increase VAT from 11% to 12% in 2025, which means an increase of 1.09% (the new VAT rate is 12% compared to the old rate of 11%). This example illustrates that the prices of goods become more expensive due to the numerous stages in the supply chain, coupled with the increasing the VAT rate, resulting in a heavy tax burden for society [14]. This simulation can serve as a consideration for the government to reduce the public

Table 1

Supply Simulation of Flow Chain Stages in VAT on Goods (US\$)

No	Business actor	Factory Price	Average of Marketing Cost, others [10%] ^	Average of Expected Profit [10%] ^	VAT 11%	Selling price [VAT 11%]	VAT 12%	Selling price [VAT 12%]
1	Factory: Price of shoes*	3.33	0.11	0.33	0.4	4.07	0.44	4.11
2	Main Distributor**	4.07	0.41	0.81	0.58	5.87	0.63	5.93
3	Distributor**	5.87	0.59	1.17	0.84	8.47	0.92	8.55
4	Main Agent**	8.47	0.85	1.69	1.21	12.23	1.32	12.34
5	Agent**	12.23	1.22	2.45	1.75	17.65	1.91	17.81
6	Seller/Reseller**	17.65	1.76	3.53	2.52	25.46	2.75	25.69
7	Consumer Society	25.46	2.55	5.09	3.64	36.74	3.97	37.08
					10.95		11.95	

Source: Author's own simulation and calculation based on the VAT rates stipulated in the Law of the Republic of Indonesia No. 7 of 2021 on the Harmonization of Tax Regulations. URL: <https://jdih.kemenkeu.go.id/dok/uu-7-tahun-2021> (accessed on 09.05.2024).

Note: * Materials and production costs; ** Transportation, Marketing Costs, and others. ^ Percentage Estimates are generally accepted.

taxation and increase purchasing power by removing one or two supply chain stages, such as the main Distributor and Main Agent.

VAT Gaps

Tax gap analysis measures the loss of tax revenue due to non-compliance, evasion, and policy impacts. There are two main components of the VAT gap, namely the impact of the compliance gap and the policy gap [15, 16]. However, these two components are interrelated, as one gap can influence the other [17]. Tadesse [18] further divides the policy gap into two categories: the tariff differentiation gap, which includes the application of lower or zero VAT rates for essential goods and services, and the exception gap, which includes exemptions from taxation for certain goods and services from taxation [19, 20].

METHODOLOGY

Simulation Model of System Dynamics

This research uses a system dynamics simulation model with a qualitative and quantitative approach [21]. It employs a qualitative system-thinking approach using a soft systems methodology, facilitated by Power-sim constructor software as a cognitive mapping tool, by designing models using quantitative system-thinking approaches such as system dynamics [22, 23]. The main objective of dynamic system analysis is to answer three questions [24]: Why should the government increase

the VAT rate? When or where should the government consider increasing the effectiveness of the VAT rate? Is there a better alternative to increasing the VAT rate besides increasing it? The last question mainly concerns administration and policy implementation.

Stock and Rate on Flow Diagrams is a development of the Causal Loop Diagram [25]. Causal Loop Diagram visualizes two types of variables, Stock and Flow, which will show the dynamics of the modeling process. Stock and Flow are activities in the feedback loop that explain the cause-and-effect relationship diagram. Rate-on-Flow Diagram emphasizes the influence of time on the relationship between variables so that each variable shows the accumulated results from the level and rate of system activity over time. The accumulated result is called the Rate [26]. Dynamic system simulations must determine initial values in the form of constants, function tables, and indicator levels that are useful for describing the relationship model between variables in the model. For example, VAT rate ratios can be derived from constant values, eliminating complicated initial value calculations. Therefore, determining initial parameter values is very important to observe their effect on model sensitivity [27, 28]. Table 2 presents the initial values and model parameters used in the 2023 simulation. These values were mostly derived from secondary data and reputable references, while several some other values were obtained from reliable qualitative information considered [29].

RESEARCH RESULTS

Flowchart of Data VAT Model

Data from the Central Statistics Agency, reputable secondary sources, expert estimates, and scenario assumptions were used to answer the research questions. As shown in *Table 2*, initial values and model parameters were derived from secondary data, reputable references, and expert-based qualitative information. These data were used to determine the effect of increasing VAT from 11% to 12% and to examine the impact on supply chain stages. The results of this analysis describe a generic causal loop model based on systems thinking [30].

Data analysis focuses on system dynamics simulation, which generally outlines the steps for analyzing VAT problems from a system dynamics perspective. This analysis produces system understanding, problem identification and definition, system conceptualization, model formulation, model simulation, and validation [31, 32]. Additionally, this analysis leads to alternative policy improvements within the model [33].

Statistical Test Models

Statistical tests will measure the model's confidence level by establishing and testing its validity [34]. In dynamic system modeling, historical data can be used to construct models, thereby producing measurements of the model's suitability to actual conditions (goodness-of-fit) [35]. The significance test will determine the accuracy of the model [36]. In order to measure the magnitude and nature of the error, this study employs the Root Mean Square Percent Error (RMSPE) and Theil Inequality Statistics [37].

RMSPE measures the average percentage error between the predicted and actual values [38]. A low RMSE value indicates that the variation in values produced by a forecast model is close to the variation in observed values, so RMSE calculates how different a set of values is. The smaller the RMSE value, the closer the predicted and measured values are [39]. As for Theil's inequality, statistics require measuring the accuracy of model estimates. The Theil's U value ranges from 0 to 1, where 0 indicates perfect suitability, and 1 indicates no conformity [40]. Then, bias error, denoted by U^m , represents systematic errors between the model and reality or in determining specification parameters. It is crucial to identify and minimize bias in order to improve the accuracy of the model [41].

Test Results

Table 3 below shows the results of statistical tests. There are bias errors in the variables explained by U^m . These errors may arise from systematic discrepancies

between the model and reality or inaccuracies in determining specification parameters.

Table 3 shows that there are errors in the RMSPE value. These errors are called systematic errors between the model and reality. These errors were likely caused by the determination of the specification parameters. For example, in the VAT rates, a large U^m and small U^s and U^c indicate errors due to bias, namely systematic errors or errors in determining the specification parameters, even if they are relatively small. Regarding tax potential, the triggering factors include VAT reductions, supply chain stages, tax gaps, and exemptions.

The U^s is big, the U^m is small, and the correlation with U^c shows the same mean value but a different mean variance between the simulated and actual values. This shows different trends between simulated values and actual ones. On the other hand, high VAT revenues with low U^c and U^m and U^s show low error due to inequality in covariance. Thus, all values are acceptable because these values do not exceed 1.

State Tax Revenue

In Indonesia, implementing the VAT policy has resulted in relatively increasing state revenues every year. The Ministry of Finance shows that VAT revenues consistently exceed Land and Building Tax, Import Duty and Excise, and International Trade Tax but are still below Income tax. This data can be simulated based on data for 2020–2021 at a rate of 10% and 2022–2023 at 11%. *Table 4* presents a comparison of state tax revenues from 2020 to 2023 and shows the relative position of VAT revenue compared to other major sources of state taxation.

Simulation and Scenario Analysis

This research describes intervention actions in three simulation scenarios by increasing or decreasing variable values. The third scenario is:

- a pessimistic scenario with a rate of 11%, current conditions;
- the government implements a moderate scenario with a 12% tariff in early 2025;
- an optimistic scenario where the government restores the 10% tariff imposed prior to 2022.

Based on the assumptions and parameters used in the system dynamics model, we developed and simulated three VAT growth scenarios. *Figure 2* presents the simulation and analysis of VAT growth under these three scenarios, showing the projected differences in patterns of VAT growth across the modelled policy alternatives.

The Pessimistic Scenario

The pessimistic scenario is a basic scenario that follows current developments and trends. Therefore, the study

Table 2

Initial Values and Model Parameters (2023)

No.	Indicators	Initial Value/Parameter [endogenous variable]	Unit	Source
A	General Information:			
1	Number of tax ID number/taxpayers	17,360,621	Unit	S
2	Number of VAT Collecting Companies	127	Unit	S
3	Tax Ratio	10.21	Percent	S
4	Average increase in VAT Revenue per year	0.5	Percent	E
5	Amount of VAT revenue	47,89	billion US\$	S
6	GDP	20,892,000	billion US\$	S
7	Import	221.89	billion US\$	S
8	Investment Value	8,97	billion US\$	S
B	Public Consumption:			
1	Government Consumption	2.95	Percent	S
2	Number of people shopping in Supermarkets and others (VAT)	49.72	Percent	S
3	No. of Population Shopping in Trad. market (non-VAT)	50.28	Percent	S
4	VAT Tariff 2022	11	Percent	S
5	VAT Tariff 2025	12	Percent	S
C	Exemption:			
1	Average VAT exemption for products and services	20	Percent	E
2	Estimated average VAT taxpayer non-compliance	20	Percent	S
3	VAT Gap	30	Percent	E
4	Non-tax compliance	20	Percent	E
D	Supporting data:			
1	Increase in investor	9.4	Percent	E
2	Company growth	4	Percent	E
3	Public consumption	8	Percent	E
4	Decline in public consumption	1.6	Percent	E
5	Import	11.4	Percent	S
6	Decline Import	3.13	Percent	S
7	Export	6.76	Percent	S
8	Decline Export	0.53	Percent	S
9	Supply chain stage [6 levels]	1.09	Percent	S
10	Inflation	5.28	Percent	S
11	Purchasing power shift to traditional markets [and Factors triggering price increases]	36.74	Percent	S
E	Scenario [10 years simulation]:			
1	Scenario 1 [Pessimistic VAT rate: 11%]	11	Percent	Sc
2	Scenario 2 [Moderate VAT rate: 12%]	12	Percent	Sc
3	Scenario 2 [Optimistic VAT Rate: 10%]	10	Percent	Sc

Source: Author's compilation and calculation based on Statistics Indonesia (BPS), Directorate General of Taxes, Ministry of Finance, Ministry of Investment/BKPM, Jakpat/Databoks survey data, and Law No. 7 of 2021. URL: <https://www.bps.go.id/en/publication/2024/02/28/c1bacde03256343b2bf769b0/statistical-yearbook-of-indonesia-2024.html>; <https://www.pajak.go.id/id/laporan-tahunan-2023>; <https://media.kemenkeu.go.id/getmedia/00d3acf5-5aa8-499a-b7e3-ceadc5be7094/Publikasi-APBN-KiTa-Edisi-Januari-2024.pdf?ext=.pdf>; <https://data.bkpm.go.id/visualisasi-detail/statistik-realisisi-investasi-2023>; <https://databoks.katadata.co.id/datapublish/2022/06/09/survei-warga-yang-belanja-bulanan-di-e-commerce-masih-sedikit>; <https://peraturan.bpk.go.id/details/185162/uu-no-7-tahun-2021> (accessed on 09.05.2024).

Note: S = Obtained from secondary data; E = Estimation based on qualitative information; C = Calculated in accounting; Sc = Scenario model.

Table 3

Model Conformity Statistical Test Results

No.	Variables	RMSPE	Theil Inequality Statistics		
			U ^m	U ^s	U ^c
1	The VAT Rate	0.123	0.131	0.111	0.121
2	VAT Income	0.231	0.128	0.122	0.236
3	Tax Potential	0.355	0.164	0.222	0.197
4	Trigger factors Reducing VAT	0.371	0.243	0.203	0.378
5	Supply Chain Stage	0.234	0.231	0.426	0.197
6	Tax Gap and Exemption	0.414	0.329	0.475	0.337

Source: Author's own calculation based on the historical behavior test of the VAT system dynamics simulation model.

Table 4

State Tax Revenue 2020–2023 (US\$ million)

No	Types of State Taxes	2020	2021	2022	2023	Average 4 year	Average Rate
							11% [2022–2023]
1	Income tax	3960,20	4644,47	6654.73	6938.67	2,95	2.48
2	Value added tax	3002,20	3679,33	4584.07	4948.4	2,83	2.33
3	Land and building tax	139,67	126,13	155.07	163.07	2,48	2.28
4	Excise and Import Duties	1419,00	1793,40	2118.67	1514.73	2,68	1.9
5	International Trade Tax	244,80	491,27	605.93	486	3,51	2.04
6	Other Taxes	45,27	74,20	51.27	64.73	2,75	1.95

Source: Author's calculation based on Statistics Indonesia (BPS). Realisasi Pendapatan Negara (Milyar Rupiah). 2020–2023. URL: <https://www.bps.go.id/id/statistics-table/2/MTA3MCM/realisasi-pendapatan-negara-milyar-rupiah.html> (accessed on 09.05.2024).

does not intervene in modeling variables and values in the pessimistic scenario. The simulation flow chart data [+] shows VAT growth data for:

1. Tariff 11%.
2. The simulation carried out in 2023–2032 [10 years].
3. Import 11.40%.
4. An increase in investors by 9.40%.
5. The taxpayer increase is calculated from [company growth of 3% and an increase in public consumption of 6%].
6. Supply chain stage: 6 levels [1.09%].

The data flow diagram [–] explains the balance caused by a decrease in VAT revenues by several factors as follows:

1. A tax exemption of 24%.
2. Non-Tax Compliance 22.30%.
3. A decrease in public consumption by 1.6%.
4. A decreased exports of 0.53%.
5. A shift in purchasing power towards traditional markets 24.20%.

6. An inflation rate of 5.28%.

The simulation results in Fig. 3.

In Fig. 3, the pessimistic simulation uses eight intervention variables at a VAT rate of 11%: the transfer of purchasing power to traditional markets, trigger factors for reducing VAT (tax avoidance), Import VAT, tax exemptions, tax guarantees, Exports, Imports, and supply chains. The simulation will predict for six years to determine the VAT revenue amount at the end of 2032.

The results of this flow diagram show that since the beginning of 2023, the curve on the right shows an increase in VAT revenue each year, following the rate pattern of the loop [+] and loop [–] as balancers, where the prediction for VAT revenue 6 years later (2032) reaches US\$ 383.1 billion.

The Moderate Scenario

The moderate simulation illustrates the growth in VAT revenues starting from January 1, 2025 – variable intervention by adding or reducing variable

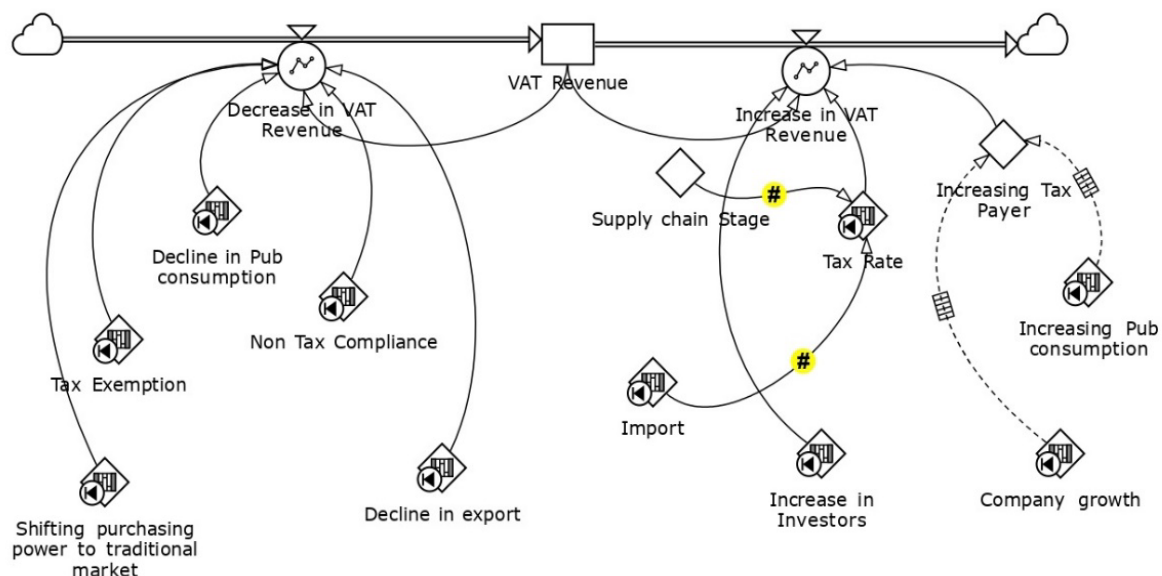


Fig. 2. Simulation and Analysis of VAT Growth Scenarios

Source: Author's own simulation based on the VAT system dynamics model developed in Powersim Studio. Software URL: <https://powersim.com/>

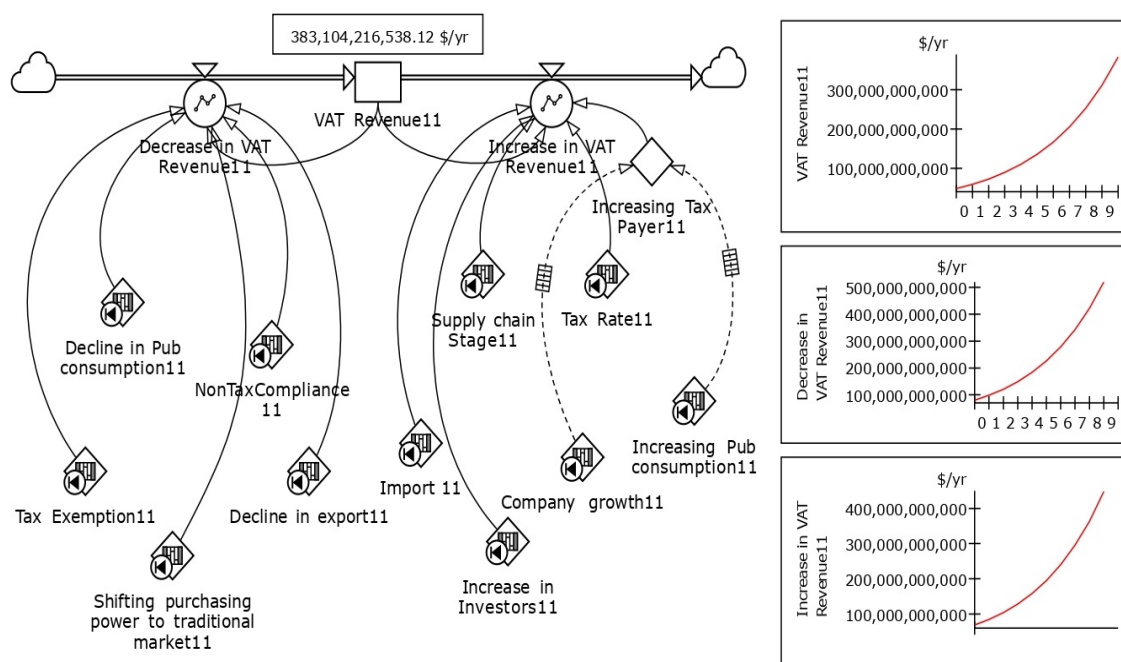


Fig. 3. Simulation of VAT Growth Based on a Pessimistic Scenario

Source: Author's own simulation based on the VAT system dynamics model developed in Powersim Studio. Software URL: <https://powersim.com/>

values that will affect VAT revenue. For example, by intervening with certain variables, whether they influence public purchases, increase tax avoidance, and others. The illustration in loop 1 shows the flow diagram [+] of VAT growth:

1. Tariff 12%.
2. The simulation is carried out in 2023–2032 (10 years).
3. Import 12.20%.

4. Increase in investors by 9.40%.

5. The increase in the number of taxpayers is calculated from company growth of 2% and an increase in public consumption of 4%.

6. Supply chain stage: 6 levels [1.09%].

The loop in the flow diagram [–] explains the balance caused by a decrease in VAT revenues caused by several factors, including:

1. Tax exemption of 20%

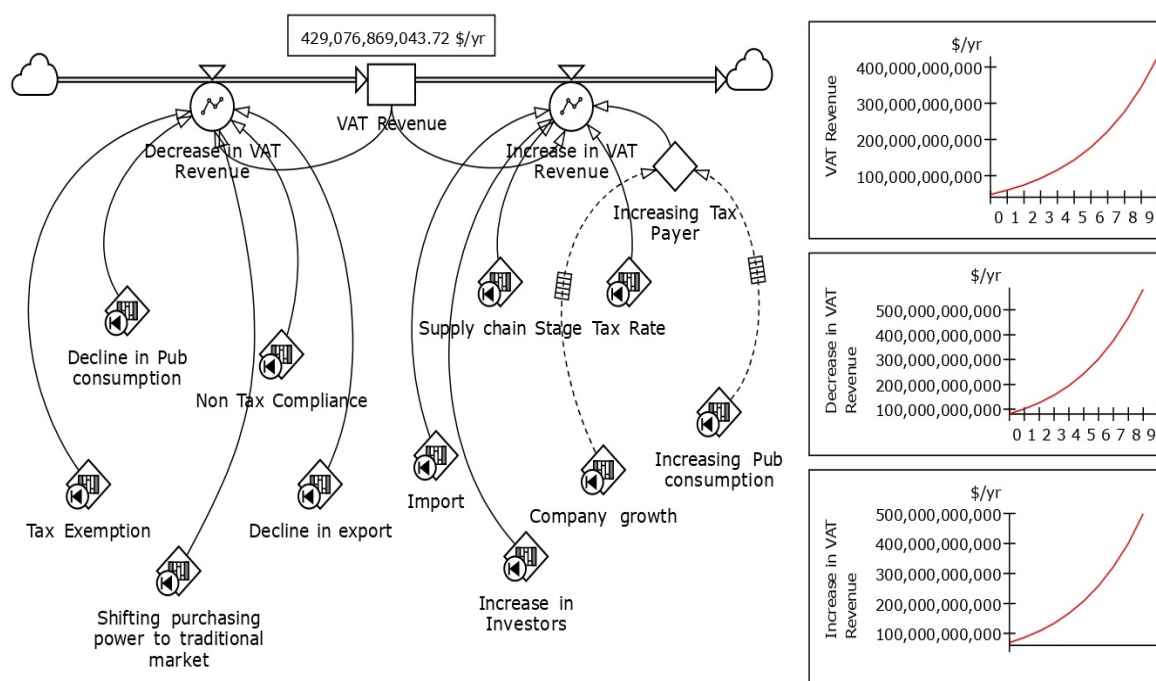


Fig. 4. VAT Growth Simulation Based on Moderate Scenario

Source: Author's own simulation based on the VAT system dynamics model developed in Powersim Studio. Software URL: <https://powersim.com/>

2. Non-Tax Compliance 28.15%.
3. A decrease in public consumption by 1.6%.
4. Decreased exports of 2.96%.
5. A shift in purchasing power towards traditional markets of 37%.

6. An inflation rate of 7.24%.

The Fig. 4 shows the results of this simulation.

In Fig. 4 the moderate simulation still uses eight variables. The VAT rate is 12% (this rate applies from January 1, 2025). In this simulation, the increase in VAT rates has reduced people's purchasing power. However, the moderate simulation estimates that as many as 35% of people will switch to traditional markets for tax avoidance. The simulation shows that the curve on the right is increasing and follows the speed pattern of the loop [+] and loop [-] as balances.

The results of this simulation illustrate that VAT revenues will reach US\$429.1 billion at the end of 2032, but the potential for taxes will decrease by US\$241.36 billion (36%), and VAT losses due to tax avoidance and tax evasion will increase by US\$182.71 billion.

The Optimistic Scenario

Furthermore, this analysis presents an optimistic simulation to illustrate the growth in VAT revenues by reducing the VAT rate from 11% to 10%. In Loop 1, the flow diagram [+] shows the simulation data:

1. Tariff 10%.
2. The simulation is carried out in 2023–2032 (10 years).

3. Import 10.10%.
4. Increase in investors by 9.40%.
5. The taxpayer increase is calculated from company growth of 4% and an increase in public consumption of 8%.

6. Supply chain stage: 6 levels [1.09%].

The loop flow diagram [-] explains the balance because there will be a decrease in VAT revenues caused by several factors as follows:

1. Tax exemption, 12%.
2. Non-Tax Compliance 11.15%.
3. A decrease in public consumption by 1.6%.
4. Decreased exports of 0.31%.
5. A shift in purchasing power to traditional markets 18.2%.
6. An inflation rate of 3.42%.

The simulation produces Fig. 5 as follows.

From Fig. 5, the simulation depicts an optimistic scenario with a VAT rate of 10%. In this scenario eight variables are used to intervene in the model. The optimistic simulation results showed an increase in the average export value by 20.11% and the average import value by 4.11%. The curve on the right shows the dynamic movement since the beginning of 2023, following a rate pattern influenced by Loop [+] and Loop [-] as balancing. The optimistic simulation results show that VAT revenues will reach US\$421.4 billion by the end of 2032, and VAT tax losses due to tax evasion and tax avoidance will fall to US\$ 91.95 billion. Interesting. The optimistic simulation depicts the potential for taxes to

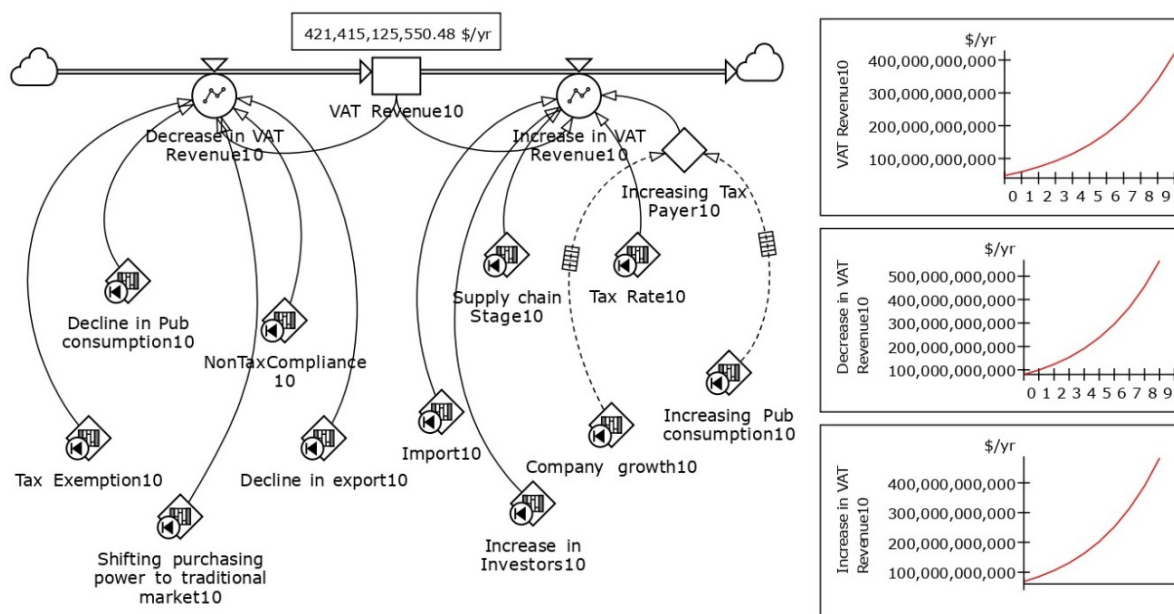


Fig. 5. VAT Growth Simulation Based on Optimistic Scenario

Source: Author's own simulation based on the VAT system dynamics model developed in Powersim Studio. Software URL: <https://powersim.com/>

increase to US\$ 513.36 billion (54.92%) every year. This optimistic simulation shows the widening potential of VAT every year and benefits decision-makers.

Discussion of the Results

Furthermore, the Table 5 compares the results of three simulations under consideration.

In the pessimistic scenario, the tax avoidance value was set at 22.30% with an estimated VAT revenue loss of US\$ 13.409 billion, assuming the Government does not consider reducing the tax avoidance value. This scenario proved the hypothesis of the research.

In the moderate simulation, there was an increase in VAT revenue by an average of 2.33%. This figure is relatively low compared to the average VAT revenue data before 2023, namely 2.83%. This condition concludes that the increase in the VAT rate from 11% to 12% in 2025 hampered the realization of VAT revenues. In the moderate scenario, the value of tax avoidance increases to 28.15%, resulting in an estimated VAT revenue loss of US\$ 19.155 billion. The policy of increasing the tariff from 12% at the beginning of 2025 could lead to increased tax avoidance for lower-middle-class entrepreneurs.

In the optimistic scenario, if the government reduces the VAT rate to 10%, followed by a decrease in the value of tax exemptions by 12% and tax avoidance by 11.15%, then the results will reduce the burden on individuals, increase purchasing power, and increase exports, while reducing imports. Additionally, the government could control taxpayers who engage in tax evasion, leading to the reduction of amount of tax evaded to 11.15% (or 50% of the current condition). As a result, with a 10% VAT

rate, VAT revenues from tax evasion would be estimated to reach US\$ 53.635 billion by the end of 2032.

This research found two main causes of the high prices of goods in Indonesia: The Flow of the Supply Chain Stage and the increase in tariffs. These factors have a significant impact on society.

Therefore, the optimistic scenario with a reduction in the VAT rate to 10% could be considered by the government in the future in order to increase people's purchasing power by reducing or eliminating 1 to 2 Supply Chain Stage, for example, distributors and main agents. Of three scenarios presented, the best option is to pursue the optimistic scenario. Thus, the hypothesis of this research can be considered confirmed.

CONCLUSION

In the pessimistic simulation scenario, increasing the VAT rate to 12% will reduce people's purchasing power and increase tax avoidance. However, in the moderate scenario, maintaining the current 11% rate would balance present economic conditions, but in the future, it will reduce the potential for taxes and increase tax avoidance. In the optimistic scenario, reducing the VAT rate to 10% is considered the best option as it would reduce the tax burden, increase tax potential purchasing power, and stimulate exports, while reducing imports. This scenario predicts that tax avoidance and supply chain simplification will decrease, benefiting the overall economy. The government can also reduce tax exemptions by 50% for large mineral, coal, and geothermal mining companies, resulting in additional VAT revenue.

Table 5

Analysis of Simulation Calculations Using Three Scenarios

No.	Variable	Value	2023			2022		
			Pessimist	Moderate	Optimistic	Pessimist	Moderate	Optimistic
			11%	12%	10%	11%	12%	10%
1	Export	0.53	258.820	257.448	309.218	2.070.560	2.059.586	2.473.744
2	Import	0.11	221.890	221.983	231.184	1.775.120	1.775.863	1.849.468
3	Inflation	0.53	0.53	0.72	0.34	2.89	3.96	0.47
4	Supply Chain Stage		6	6	6	6	6	6
5	Purchasing power shift to traditional markets. and Trigger factors Reducing VAT [tax avoidance]	0.37	4.308	2.725	7.033	34.462	21.801	56.263
6	Import VAT	0.11	24.408	24.418	25.430	195.263	195.345	203.442
7	Tax Exemption [50%]	0.2	-9.578	- [4.310]	4.789	76.621	34.479	38.311
8	Tax Evasion [50%]	0.28	-13.409	-19.155	6.704	-107.269	-153.242	53.635
9	VAT revenue received		47.888	53.635	52.677	383.104	429.077	421.415
10	VAT Receipt Should Be [Potential tax]		24.902	30.169	64.170	199.214	241.356	513.360
11	Loss of VAT revenue		-22.986	-23.465	11.493	-183.890	-187.721	91.945

Source: Compiled by the author based on the simulation results.

Recommendation

- The government should adjust its policy by adopting an optimistic scenario, namely reducing the VAT rate to 10%.
- The government should reform taxes by reducing tax avoidance and simplifying supply chains in order to increase VAT revenue without increasing the burden on consumers.
- The government should continuously monitor economic indicators in order to adjust the VAT rates

by prioritizing the reduction of the tax burden on society.

Policy Implications

- The research suggests that reducing tax avoidance by 50% and eliminating one level of supply chain I could improve VAT revenues.
- It is recommended to review tax exemptions for large mineral coal and geothermal mining companies is recommended to boost VAT collection.

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