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ECONOMY-WIDE IMPACTS OF ELECTRICITY TARIFF REDUCTIONS IN INDONESIA: A SOCIAL ACCOUNTING MATRIX APPROACH

Marsandhi Evan Dino Pardede
Directorate General of Treasury, Ministry of Finance, Padang, Indonesia
Corresponding Email: marsandhi.evan@kemenkeu.go.id

ABSTRACT

Research Originality — Previous studies on the economic impacts of electricity tariff in Indonesia have predominantly relied on regression techniques, which are limited in their ability to capture the full range of direct and indirect economy-wide effects. To address this limitation, this study employs the Social Accounting Matrix (SAM) in conjunction with Path Analysis to capture both the direct and indirect economy-wide impacts of electricity tariff reductions, tracing their impacts on sectoral outputs, wages, gross operating surplus (GOS), tax revenue, and gross domestic product (GDP) across multiple transmission channels.

Research Objectives — The objective of this study is to assess the economic-wide impact of 50% electricity tariff discount introduced in early 2025 in Indonesia, with a focus on changes in sectoral output, wages, GOS, tax revenues, and GDP.

Research Methods — This study uses SAM multiplier and Path Analysis to assess the economic impact and show how tariff reductions affect wages, GOS, tax revenues, and GDP.

Empirical Results — The results indicate that the policy increases Indonesia's GDP by 0.12%. Growth occurs in several important sectors, including mining, manufacturing, electricity supply, construction, trade, transportation, and real estate. Furthermore, wages and GOS increase by 0.09% and 0.22% respectively, while tax revenues decline by 0.86%.

Implications — The results imply that the electricity tariff reductions can contribute positively to Indonesia's 2025 economic growth. For Government, it provides evidence that the policy shall be brought back at the start of the year to support economic growth, implemented similar actions during slowdowns, and boost tax collection to avoid revenue losses while the policy is running.

Keywords: Tariff Discount; Electricity; GDP; Path Analysis; SAM

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INTRODUCTION

Electricity is an important source of energy used for numerous purposes, such as powering lights, watching television, ironing clothes, and running other household appliances. This source of energy is generated through different methods, such as hydropower, wind, and fossil fuels. After the generation, electricity is transmitted through power lines to homes and other places. This distribution process ensures that every household and business have access to sufficient electricity. The demand continues to increase with technological advances and the growing number of users. According to Suprianto et al. (2024), Solikah & Bramastia (2024), and Arungpadang et al. (2018), electricity has evolved into a fundamental and essential requirement, playing an essential role in everyday life.

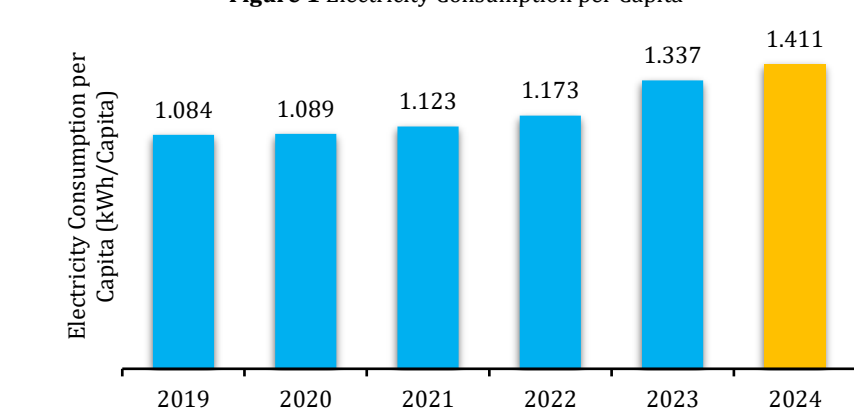
The use of electricity has become a basic necessity in all countries, including Indonesia. This is supported by data from the Ministry of Energy and Mineral Resources, presented in Figure 1, where the consumption per capita in Indonesia has increased from 2019 to 2024. The consumption in 2019 and 2024 was 1.084 and 1.411 kWh per capita, respectively. The increasing per capita consumption reflects the growing importance of electricity in supporting daily economic activities.

The upward trend in electricity consumption per capita reflects a similar rise in average household electricity consumption in Indonesia from 2019 to 2024. As individuals use more electricity, the consumption in each household also grows, given that households consist of one or more people. The rise in household electricity consumption will naturally lead to an increase in overall household consumption. A boost in overall household consumption will, in turn, contribute to the aggregate economy of Indonesia, considering that household consumption is the largest contributor to the economy, measured by Gross Domestic Product (GDP) in the country. This is supported by data from the Central Bureau of Statistics (BPS), as shown in Figure 2. In Figure 2, household consumption accounts for more than half of GDP in 2024 at 54.04%. This indicates that the rise in electricity consumption per capita can increase household consumption. Amri & Iskandar (2021) proved that per capita electricity consumption increased GDP in Indonesia. Apergis et al. (2016) also reported that electricity consumption per capita stimulated GDP growth in the short- and long-term.

APPLICATIONS FOR PRACTICE

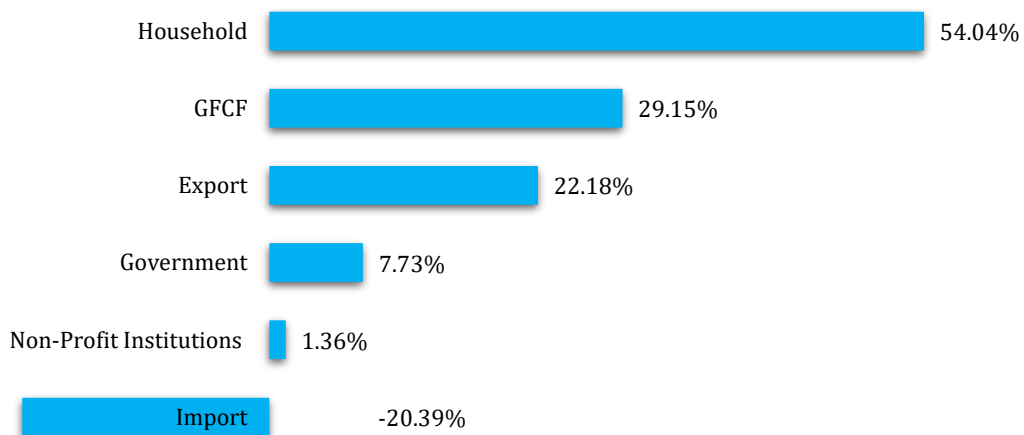
- The electricity tariff discount policy in early 2025 is expected to increase Indonesia's GDP by 0.12%. This policy will help boost growth in several sectors, including Mining, Manufacturing, Electricity Supply, Construction, Trade, Transportation, and Real Estate.
- When broken down by income levels, the 50% electricity tariff discount will lead to an increase in wages by 0.09% and gross operating surplus by 0.22%.
- The government can implement this electricity tariff discount policy at the beginning of the following year because it can help accelerate Indonesia's economy.
- A policy with a similar structure could also be applied if Indonesia experiences an economic slowdown in the future.
- The government should strengthen the tax system and improve tax collection in the future to offset the reduction in tax revenue caused by the electricity tariff discount.

Figure 1 Electricity Consumption per Capita



Source: Ministry of Energy & Mineral Resources (2025)

Figure 2 Distribution of GDP in 2024 According to Expenditure



Source: Central Bureau of Statistics (2025)

One way to increase per capita electricity consumption in order to boost GDP in Indonesia is by lowering electricity prices. Affordable and low electricity rates provide an opportunity for people to use more electricity

without worrying about higher expenses. This is in line with the studies of Setiawan & Wikarya (2024), Mulyani & Hartono (2018), and Johan & Ginting (2022), which explain that a reduction in electricity unit prices can significantly boost electricity consumption. Therefore, it is necessary for the government to implement policies that lower electricity tariffs, which would ultimately encourage higher electricity consumption per capita, contributing to economic growth in Indonesia.

In January and February 2025, the government introduced a policy offering electricity tariff discounts for households. The Ministry of Energy and Mineral Resources (2024) stated that "to maintain purchasing power and improve public welfare, the government provides an electricity cost stimulus as part of an economic incentive package, offering a 50% discount to residential customers of PT PLN (Persero) with a maximum installed capacity of 2.200 VA, covering 81,42 million customers. In accordance with the Ministerial Decree No. 348.K/TL.01/MEM.L/2024 regarding the provision of electricity discounts for PT Perusahaan Listrik Negara (Persero) residential customers, a 50% discount is given to customers with 450 VA, 900 VA, 1,300 VA, and 2.200 VA capacities for January and February 2025" (par.4). Additionally, prepaid customers will receive direct discounts when purchasing electricity tokens, allowing them to pay only half of the previous token purchase price to get the same kWh. According to Deputy Minister of Finance Suahasil, "The total budget required is still being estimated, but the preliminary figure we have noted is IDR 13,6 trillion" (Tempo, 2025). Liputan 6 (2025) said that "The 50% electricity tariff discount will be available for two months, January and February 2025, for PLN customers with a maximum capacity of 2.200 watts. This incentive is expected to reach roughly 81,4 million households or around 97% of PLN's total customers."

The electricity tariff discount leads to the electricity sector itself requiring additional materials from other sectors. Singgih (2016) revealed that the progress of any sector can't be reached without support from other economic sectors. When household electricity consumption rises, the power sector must increase production to meet the higher demand, which in turn stimulates related industries. As a result of demand for electricity generation and other essential energy resources, including coal, natural gas, and geothermal energy, the mining sector becomes more productive. Meanwhile, the manufacturing industry provides the necessary equipment such as cables, transformers, and devices for the generation and distribution of electrical power and other tools. Then, as demand increases, more construction is done to the transmission lines and distribution networks. The construction sector is further supported by trade and transportation services, which provide the raw materials and equipment needed to build power plants and other supporting facilities, while the real estate sector offers the land and infrastructure needed to improve access to electricity for both individuals and businesses. Overall, the rise in electricity supply and the stronger performance of these connected sectors, generates wider economic impacts that contribute to help drive economic growth in Indonesia. This aligns with prior findings by Hafizhulhuda & Sentosa (2024), Prastika (2023), and Maisarah et al. (2024), shows that electricity consumption from the electricity supply sector can give positively impact to Indonesia's economic growth. Meanwhile, Majewski et al. (2022) find that the expansion of green energy generation contributes positively to economic growth by increasing electricity output. Lu (2017) show that a 1% increase in electricity consumption boosts the real GDP by 1.72%, Chirwa & Odhiambo (2019) show that electricity consumption is positively and significantly correlated with economic growth over the long-term, and Rafindadi et al. (2022) show that economic growth, electricity use, and investment are closely connected because when one increases, the others usually grow as well.

Although lower electricity tariffs can encourage higher electricity consumption and support economic growth, the effect does not happen instantly. In the economy, there are series of changes that occur. With the reduction of tariffs, there is an increase in consumption of electricity by both households and businesses. Demand in the electricity supply sector increase. As a result, this sector has to increase its production and in turn, needs more inputs from the dependent sectors. As production grows in these interconnected sectors, there is a gradual increase in income and economic activity that leads to the increase in total economic growth. Therefore, the effect of increased consumption of electricity is not an immediate increase in GDP. It happens after a number of processes and interconnected sectors have interacted. It is only after all these have happened that a significant effect on economic growth is registered. This is in agreement with the finding by Singgih (2016) that availability of electricity does not have an immediate effect on GDP growth, but instead, it grows through mediation variables, and in the linkages of the economic sectors. Mahyoga & Budhi (2022) explain that improving electricity access through infrastructure development does not directly influence economic growth right away but instead affects it indirectly through other mediating factors. According to BPS (2024), the analysis that can be used to evaluate the impact of a policy while considering the integration between economic sectors is the Social Accounting Matrix table.

Several previous studies have discussed the relationship between electricity consumption and economic growth (GDP). Hafizhulhuda & Sentosa (2024), Setiawan & Wikarya (2024), Maisarah et al. (2024), Prastika (2023), Fevriera & Hartatdji (2023), and Nugraha et al. (2022) stated that increased per capita electricity consumption could improve economic growth. However, these studies used regression analysis, which captures direct effects between the variables. Books by Gujarati (2004) and Neter et al. (1983) explained that

regression analysis identified information about direct effects. However, the relationship between per capita electricity consumption and economic growth is indirect. Within this context, Path Analysis will work to identify indirect effects of the relationship between electricity consumption and economic growth. In terms of methodology, this presents a potential gap in indirect effects and structural economic relations when evaluating electricity tariff policy. Accordingly, this study attempts to assess the consequences of policy initiatives pertaining to the reduction of electricity tariffs on economic growth by integrating Path Analysis and the Social Accounting Matrix (SAM) model so as to attain a balanced view of the direct and indirect effects of the economy.

Based on the explanation above, the researcher is interested in studying the impact of electricity tariff reductions on economic growth in Indonesia in 2025 using a combined analysis of the Social Accounting Matrix table and Path Analysis. This could provide new insights, considering that no previous research has used both analyses together. Therefore, the aim of this study is to examine the impact of the electricity tariff reduction policy on GDP in Indonesia in 2025 using a combined analysis of the Social Accounting Matrix table and Path Analysis. It is hoped that this research will provide policymakers with insights into the impact of this electricity tariff reduction policy on GDP in Indonesia.

LITERATURE REVIEW

Electrical energy is the energy come from static electric charges that cause dynamic electric charges (Pujiarini & Sudarti, 2021). Electricity can also be defined as the state of subatomic particles such as electrons and protons, which create attractive and repulsive forces between them. Static electric charges can trigger the movement of dynamic electric charges. Theoretically, there are situations where energy is used to move electron charges from a low potential point to a high potential point due to a potential difference. In this case, the potential difference causes the flow of electrons. When a circuit receives a potential flow of V , an electric charge flow of Q is generated. This flow then produces a current of I and requires a certain amount of electrical energy, W . If expressed in an equation, the formula for electrical energy can be obtained:

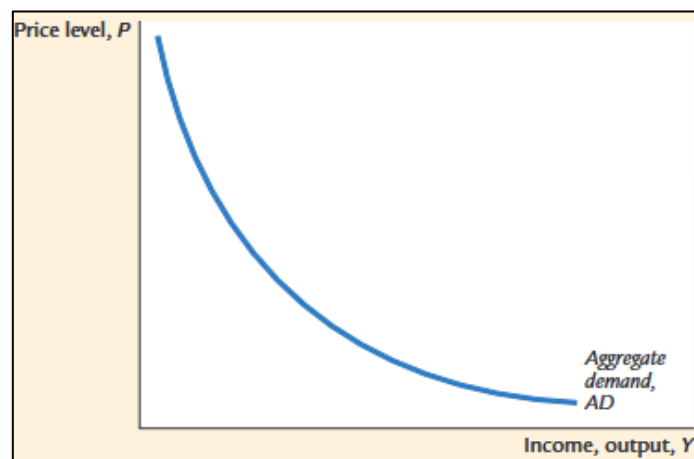
$$W = Q \times V \dots (1)$$

where W is electrical energy, (Joule), Q is electric charge (Coulomb), and V is the potential difference (Volt).

Almost all human activities require electricity, ranging from household needs such as irons, washing machines, fans, TVs, refrigerators, to industrial needs. Everyone certainly needs electricity in their daily life. As living standards continue to rise, electricity consumption in Indonesia has been steadily growing. According to data from the Ministry of Energy and Mineral Resources in Chart 1, electricity consumption in 2024 increased by 30.17% compared to electricity consumption in 2019. This increase in electricity consumption has led to a higher demand for electricity and consequently an overall increase in aggregate demand.

Aggregate demand refers to the relationship between the quantity of output demanded and the aggregate price level (Mankiw, 2013). Aggregate demand can be represented by a curve that provides information about the quantity of goods and services consumed by people at a specific price level. The aggregate demand curve is illustrated in Figure 3.

Figure 3 The Aggregate Demand Curve

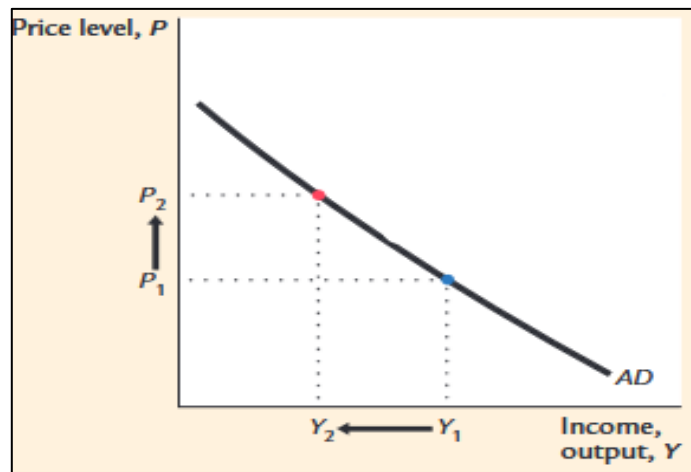


Source: Mankiw (2013)

In Figure 3, it can be seen that the relationship between income or output (Y) and the price level (P) is negative or inverse. This means that as the price level increases, the income or output of goods and services will decrease, and vice versa. This occurs because as the price level rises, or as goods and services become more expensive, the income or output of society for those goods and services will decrease, and the opposite is also

true. To further clarify, the impact of price level changes on the aggregate income or output of goods and services is presented in Figure 4.

Figure 4 Movement Along the Aggregate Demand Curve

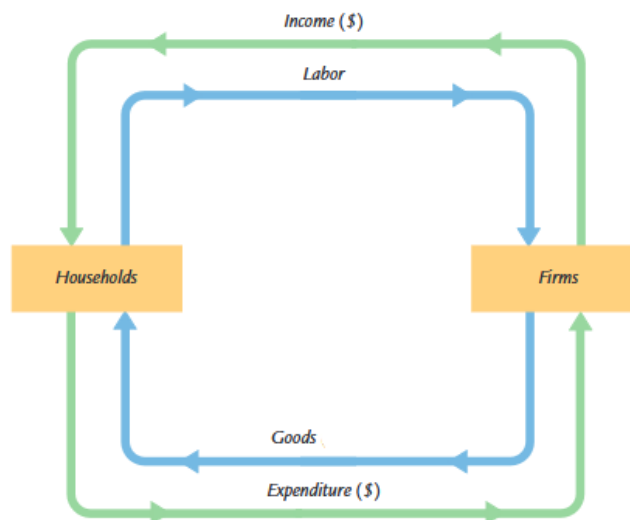


Source: Mankiw (2013)

In Figure 4, the movement along the aggregate demand curve is shown when there is a price increase. When the price level rises from P_1 to P_2 , the aggregate income or output decreases from Y_1 to Y_2 . This downward movement is depicted by the shift from the blue point to the red point. Similarly, when the price level decreases, the opposite occurs. This explains that the level of aggregate income or output in society depends largely on the price level set. The income or output of goods and services that changes due to a change in the price level can be measured using real Gross Domestic Product or real GDP (Mankiw, 2013).

Gross Domestic Product (GDP) is the best measure of how well the economy is performing (Mankiw, 2013). It represents the total income of individuals within the economy or the overall output of goods and services produced. GDP reflects what matters to people—their incomes. In the same way, an economy that produces a high volume of goods and services is more capable of meeting the needs of households, businesses, and the government. Therefore, the method to calculate real GDP can be from the income side or the expenditure on output side. Both of these methods, in theory, will yield the same result. This can be seen in Figure 5.

Figure 5 Flow Chart Transactions Between Household and Firm



Source: (Mankiw, 2013)

As shown in Figure 5, the inner loop illustrates the flow of goods and labour. Households provide labour to firms, which use this labour to produce goods, and these goods are then sold back to the households. Labour flows from households to firms, and goods flow from firms to households. The outer loop in Figure 5 represents the flow of money. Households purchase goods from firms, generating revenues for the firms, which in turn, allocate part of this revenues to pay wages to their workers, while the remaining portion are constituted as profit for the owners (who also belong to the household sector). Consequently, expenditure flows from households to firms, whereas income, both in the form of wages and profits, flows from firms to households. GDP captures this circular flow of money within the economy, which can be measured in two equivalent ways.

First, GDP equals total income generated from the production of goods, namely the sum of wages and profits (representing the upper half of the circular flow). Second, GDP also equals the total expenditure on goods purchases (representing the lower half of the circular flow). To calculate GDP, we can observe either the flow of money from firms to households or from households to firms. These two methods must result in the same value because, according to accounting rules, the expenditure of buyers on goods equals the income of the sellers. Every transaction that changes expenditure also changes income, and vice versa. For example, if a firm sells one more unit of goods to a household, total expenditure on goods rises, and this has an equal effect on income. If the firm produces the additional goods without hiring more labour (for example, by improving production efficiency), profit increases. On the other hand, firm would also have to pay more wages when it hires more labour to produce the extra goods. Both cases indicate that expenditure and income increase equally. According to BPS (2025), GDP is derived from two key frameworks: the System of National Accounts (SNA) and the Integrated Institutional Balance Sheet. Additionally, GDP is associated with other data structures, such as the Social Accounting Matrix.

The Social Accounting Matrix (SAM) serves as a comprehensive framework that presents social and economic data in a structured and connected matrix form, which facilitates clearer observation on how different parts of the economy are interconnected. It connects information on economic performance with income distribution and labor market conditions (BPS, 2024). According to SNA 2008, point 1.74, the SAM is designed to be flexible, so it can be adjusted to suit specific analysis and policy needs. To be useful for evaluating particular policies, SAM should include two main elements such as a strong analytical framework that allows for modular analysis and a detailed classification system supported by complete and reliable socio-economic data.

SAM is commonly utilized by policymakers, scholars, and researchers to carry out simulations and policy assessments. Many users continue to adopt the SNA 1968 format due to the systems they have developed based on this version (BPS, 2024). SAM in the SNA 1968 format is shown in Table 1.

Table 1 Structure of the Social Accounting Matrix (SAM) for Indonesian

Classification of Accounts		Income Generation (Valuze Added)	Institutions	Production Sectors (Industries)	Commodities (Products)	Capital Account	Other Accounts
		1	2	3	4	5	z
Factor of Production (Value Added)	1			Value Added			Value Added from abroad
Institutions	2	Domestic Income	Inter-institutional Transactions				Transactions with Abroad
Production Sectors (Industries)	3				Output		
Commodities (Products)	4		Final Demand	Intermediate Consumption		Non-financial Investment	Export
Capital Account	5		Saving			Domestic capital transfer	
Other Accounts	6		Transactions with foreign entities		Import	Net capital transfers to and from abroad	Net lending

Source: Central Bureau of Statistics (2024)

Table 1 shows that in row 1, column 3, an entry for added value is present. This represents the income generated from production factors, which arise from the expenditures of the production sector (industry). Added value includes three main components such as labour compensation, business surplus, and taxes less subsidies. Labour compensation refers to all payments made by businesses to employees in exchange for their labour. These payments, made either in money or goods, are recorded on an accrual basis, reflecting what employees are entitled to base on the work completed, regardless of the payment timing (SNA 2008: 7.40, 7.41).

According to BPS (2024), domestic income refers to the income institutions receive from spending that generates income. It is calculated from gross value added, adjusted by labour compensation received from abroad and labour compensation paid to other countries, using data from the 2022 NIT and household surveys. Inter-institutional transactions represent the exchange of goods, services, and income between sectors such as households, businesses, government, financial institutions, and the rest of the world.

Output represents the income generated from the production sector’s spending on the goods and services it produces. Final consumption refers to income earned from spending by institutions on goods and services

for direct use, such as household or government consumption. In contrast, intermediate consumption includes goods and services that are used as inputs in the production process.

Non-financial investment reflects income related to capital spending on goods. This consists of gross fixed capital formation (GFCF) and changes in inventories. GFCF captures the purchase of fixed assets minus any disposals during a given period. Meanwhile, changes in inventories show increases or decreases in stock levels, including any change in their value over time.

The basic analysis in the SAM model examines direct and total effects that represented in matrix form. The multiplier matrix is important role within the SAM framework, as it depicts the impact of changes in one sector on other sectors within the economy. It is also used to analyze the effects in one balance resulting from changes in another balance. Initially, a particular sector affects one or more other sectors. In subsequent rounds, these affected sectors effect additional sectors. This process continues through multiple rounds until a new equilibrium is established. The sequence of effects from the initial round to the point where equilibrium is reached is known as the multiplier. The formulas for calculating the direct and total (multiplier) effects are given in equations (2) and (3) below.

$$a_{ij} = \frac{z_{ij}}{y_j} \dots (2)$$

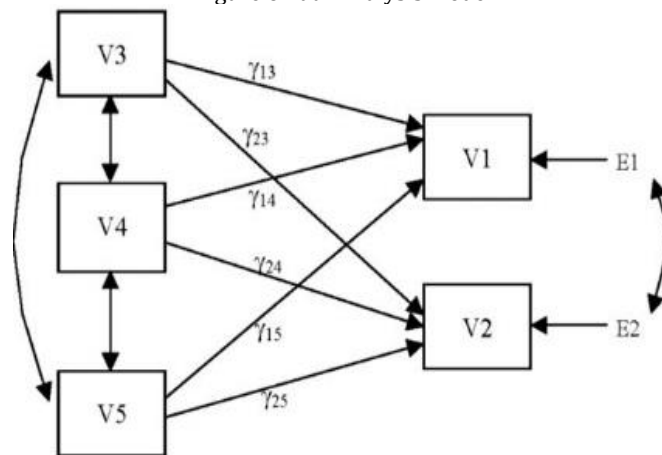
$$M_a = (I - A)^{-1} \dots (3)$$

where a_{ij} represents the direct effect from row i to column j , z_{ij} is the element of the SAM matrix at row i and column j , X_j is the input for the SAM matrix in column j , A is the matrix direct effects containing the elements a_{ij} , I is the identity matrix of size $i \times i$, dan M_a is the matrix representing the total effect or multiplier (Muljono, 2017). Therefore, the indirect effect is the difference between the total effect and the direct effect.

As mentioned earlier, the SAM should contain a foundational framework for modular analysis, allowing the table to explain the relationships between variables within and across subsystems that affect one another (BPS, 2024). Additionally, SAM analysis involves calculating both direct and total impact effects (Muljono, 2017). One method used to examine the relationships between variables and calculate these effects is Path Analysis (Raykov & Marcoulides, 2006).

Path analysis is a technique for modelling the relationships among observed variables (Raykov & Marcoulides, 2006). It assumes that the explanatory variables are measured without errors, or any errors are so small that they can be ignored. In contrast, the dependent variables may experience measurement errors, which are accounted for in the residual terms of the model equations, representing the unexplained variance. Figure 6 shows a visual example about Path Analysis Model.

Figure 6 Path Analysis Model



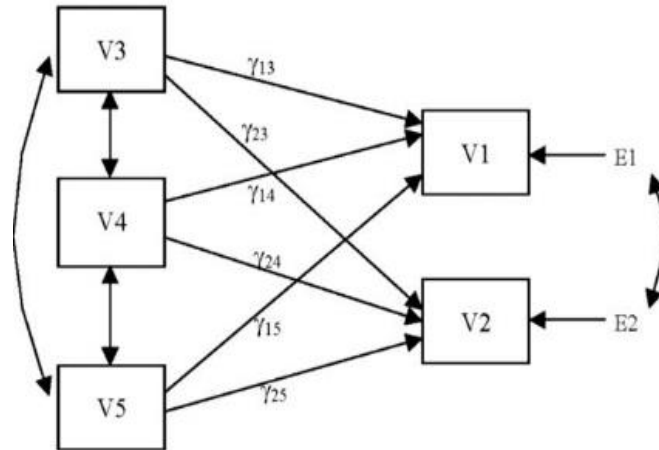
Source: (Raykov & Marcoulides, 2006)

In Figure 6, the three independent variables (V3, V4, and V5) are connected by two-way arrows, showing that they are related to one another. These variables are treated as being measured without error. On the other hand, the dependent variables include residual terms, which reflect possible measurement errors as well as prediction errors in the model. The curved two-way arrow between residuals E1 and E2 indicates that these error terms may also be related, and this possible connection is taken into account in the analysis. Allowing the residuals to correlate is slightly different from traditional path analysis, where error terms are usually assumed to be independent. Because of this specification, the relationships in the model are considered to occur at the same time, rather than separately:

$$\begin{aligned} V_1 &= \gamma_{13}V_3 + \gamma_{14}V_4 + \gamma_{15}V_5 + E_1 \\ V_2 &= \gamma_{23}V_3 + \gamma_{24}V_4 + \gamma_{25}V_5 + E_2 \end{aligned} \quad (4)$$

Coefficients γ_{13} to γ_{25} represent the six key parameters of interest, which are the partial regression coefficients, also known as path coefficients. These coefficients indicate the predictive strength of V3, V4, and V5 on the two dependent variables (V1 and V2), based on the specific metric used. Additionally, in Equation 4, the variables E1 and E2 represent the residuals of the model equations, which may include measurement errors and other effects on the dependent variables not captured by the linear combination of their presumed predictors. The effect between balance sheets occurs through elementary paths, as shown in Figure 7.

Figure 7 Effect Path



Source: Raykov & Marcoulides (2006)

The effect from balance sheet i to j may need to go through intermediaries in other sectors, as shown in Figure 7, where the effect from balance sheet i to j must pass through balance x and y . In the context of SAM, the coefficients γ_{13} to γ_{25} represent direct effects, with their values calculated from equation (4). These effects are linked to one another, creating a sequence of impacts known as Structural Path Analysis (SPA). SPA is utilized to track how effects move between sectors within the economy. When applied within the SAM framework, it helps identify and follow the specific channels through which a particular effect spreads, showing how an initial change in one sector can eventually affect others.

METHODS

This study implemented a quantitative method to explore the connection of different accounts in the Social Accounting Matrix (SAM), which further enhanced with path analysis to better understand the relationships. Descriptive analysis presented the overall structure of the economy, while explanatory analysis examined how interactions within SAM respond to an economic injection. The SAM framework used in this research was developed by BPS, Indonesia's official statistics agency, and is widely regarded as a reliable tool for evaluating and assessing policy impacts. The analysis is based on Indonesia's 2022 SAM table. Although the policy being examined relates to 2025, the SAM table is typically updated every five to six years, making the 2022 data the most recent comprehensive representation of the economic structure. The study assumes that Indonesia's economic structure does not change significantly within that time span. This assumption is supported by BPS data indicating that economic growth from 2022 through the second quarter of 2025 has relatively stable, suggesting that the 2022 SAM still provides a relevant foundation for analysis. Azzahrah et al. (2023) and Rahma et al. (2025) also show that the SAM model gives a complete view of the economy to support policy making. This method can be satisfied to learn the effect of policies (Abimanyu & Imansyah, 2023).

The first step was to calculate the direct effects between various balances, which were transmitted through the system to impact GDP using matrix A, as defined in equation (2). The next phase introduces a 50% reduction in electricity tariffs, linking this change to the direct effects to assess its impact on economic growth via path analysis. The process begins with the government's policy in January and February 2025, which provides a 50% electricity tariff discount and leads households to increase their electricity use. As demand rises, the electricity supply sector needs more inputs, both from within its own sector and from other sectors in the economy. This higher demand encourages greater production, which in turn raises gross value added. The increase in value added was reflected in components such as wages, gross operating surplus, and net taxes. It is important to note that the SAM framework applied in this study assumes that when electricity prices decrease, households respond only by consuming more electricity, while other factors remain unchanged/*ceteris paribus* (Setiawan & Wikarya, 2024). In other words, the model isolates the effect of the tariff reduction and does not account for simultaneous changes in other variables. This assumption allows the

analysis to focus clearly on the direct economic impact of the electricity discount without interference from external effects.

RESULT AND DISCUSSION

The first step is to calculate the effects of impact of a 50% electricity tariff discount on Indonesia's 2025 economic growth. The results are shown in Table 2. The second step entails constructing pathways by integrating the 50% electricity tariff reduction injection into the path analysis, utilizing the direct effects as delineated in Table 2. The ensuing results are illustrated in the subsequent Figure 8.

Table 2 Direct Effects Table SAM

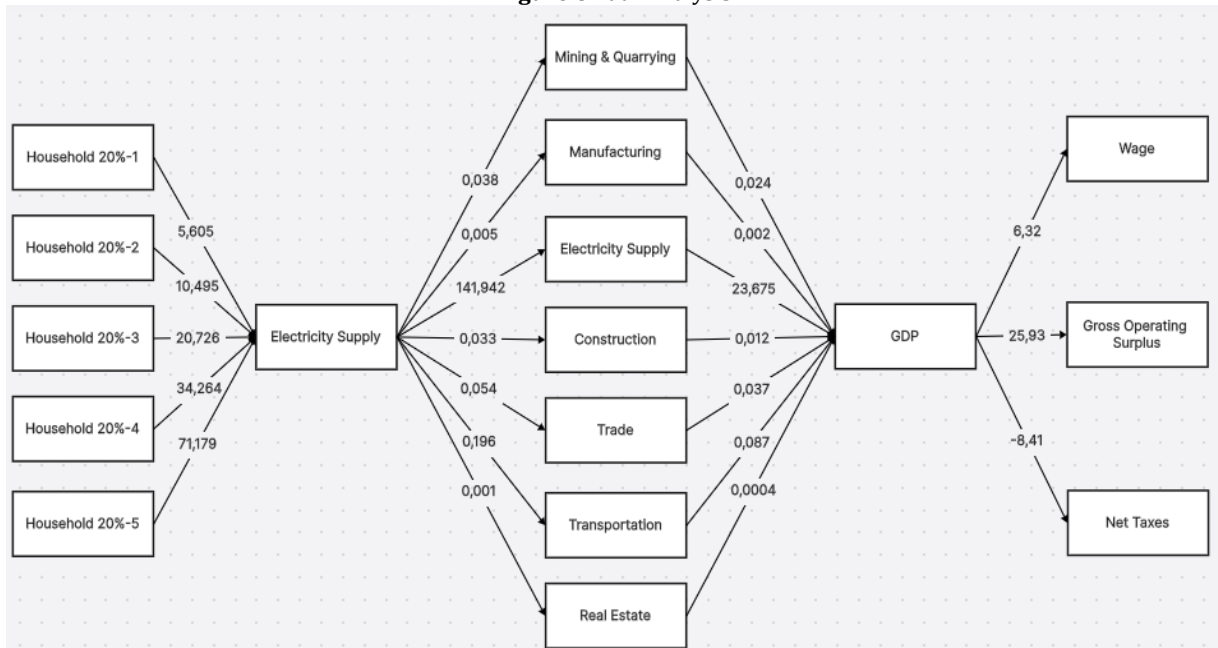
Path	Expenditure	Revenue	Direct Effects
1	Household 20%-1	Electricity	0,00844
	Household 20%-2		0,00719
	Household 20%-3		0,00746
	Household 20%-4		0,00831
	Household 20%-5		0,00828
2	Electricity	Mines	0,00027
		Manufacturing	0,00004
		Electricity	0,99769
		Construction	0,00023
		Trade	0,00038
		Transportation	0,00138
3a		Real Estate	0,00001
		Mines	0,13182
		Manufacturing	0,09920
		Electricity	0,04410
		Construction	0,16702
		Trade	0,28814
		Transportation	0,15188
3b		Real Estate	0,05552
		Mines	0,48140
		Manufacturing	0,23469
		Electricity	0,18195
		Construction	0,19501
		Trade	0,38719
3c		Transportation	0,28346
		Real Estate	0,63074
		Mines	0,01371
		Manufacturing	0,06890
		Electricity	-0,0592
		Construction	0,02658
		Trade	0,00589
		Transportation	0,01018
		Real Estate	0,04052
		Net Taxes	

The discussion starts with the findings shown in Table 2 and illustrates the direct effects between the accounts derived from the technical coefficient matrix of the SAM table. In Path 1, the direct impact of the Household Institution on the Electricity Supply sector is presented as a result of increased household demand due to a 50% electricity tariff discount. The direct effect of household spending on the revenue of the Electricity Supply sector, ranging from households in the lowest 20% income group to those in the highest 20%, is 0,844%, 0,719%, 0,746%, 0,831%, and 0,828%, respectively. This indicates that households in different income groups in Indonesia allocate 0,844%, 0,719%, 0,746%, 0,831%, and 0,828% of their total expenditures to purchasing goods from the domestic Electricity Supply sector.

In Path 2, the direct effect of the electricity supply sector on various other economic sectors is illustrated. This pathway shows that when demand in the electricity supply sector increases, it automatically creates additional demand for inputs from other related sectors. In other words, producing more electricity requires support from several parts of the economy. The direct effects from the Electricity Supply sector to other sectors are relatively small in most cases, except for its own internal input use. The estimated input proportions needed to produce one unit of output in the Electricity Supply sector are 0.027% from Mining, 0.004% from Manufacturing, 99.769% from Electricity Supply itself, 0.023% from Construction, 0.038% from Trade, 0.138% from Transportation, and 0.001% from Real Estate.

Path 3a shows how these sectors directly affect labour wages. When industries use more inputs from these sectors, they need more workers, which pushes wages up. The shares of labour compensation coming from Mining, Manufacturing, Electricity Supply, Construction, Trade, Transportation, and Real Estate are 13.182%, 9.920%, 4.410%, 16.702%, 28.814%, 15.188%, and 5.552%.

Figure 8 Path Analysis



Source: Processed by the author

Path 3b looks at their impact on the gross operating surplus. Higher demand for inputs raises output, which in turn increases the surplus earned by these sectors. Their respective contributions to Indonesia’s gross operating surplus are 48.140%, 23.469%, 18.195%, 19.501%, 38.719%, 28.346%, and 63.074%.

Path 3c examines how these sectors affect net tax revenue. Greater demand for inputs generally raises tax collections, but the Electricity Supply sector shows a negative effect of -5.920%. The other sectors contribute 1.371%, 6.890%, 2.658%, 0.589%, 1.018%, and 4.052%.

In Path 1, cutting household electricity tariffs by 50% increases household demand for electricity by IDR 142.27 trillion. By income group, the increase is IDR 5.60 trillion, 10.49 trillion, 20.72 trillion, 34.26 trillion, and 71.17 trillion from the lowest to highest quintile.

Path 2 shows that the same policy lifts total economic output by IDR 142.27 trillion. The increases by sector are Mining (IDR 38.42 billion), Manufacturing (IDR 5.62 billion), Electricity Supply (IDR 141.94 trillion), Construction (IDR 33.14 billion), Trade (IDR 54.16 billion), Transportation (IDR 196.20 billion), and Real Estate (IDR 0.58 billion).

The electricity supply sector is closely connected to the mining sector because much of electricity generation still depends on fossil fuels such as coal and natural gas. In Indonesia, coal remains a major energy source, so power producers rely on mining output to maintain electricity production. When electricity demand increases, the need for mining inputs also rises. In this case, the 50% tariff discount is estimated to increase demand in the electricity supply sector by IDR 142.27 trillion, which would require about IDR 38.42 billion in additional inputs from the mining sector. This shows how higher electricity demand can also stimulate upstream sectors like mining. This is in line with the findings of (Depari et al., 2023), which explain that the Electricity Supply sector has both backward and forward linkages with the Mining sector.

The electricity supply sector depends on the manufacturing industry for the production of tools and infrastructure used in power plants. Power plants, for instance, require turbines, generators, and other equipment made by manufacturers. In addition, the manufacturing sector provides essential components like electrical cables and transformers for energy distribution. As a result, when the demand for the electricity supply sector rises by IDR 142,27 trillion due to the 50% electricity tariff discount policy, IDR 5,62 billion worth of inputs will be sourced from the manufacturing sector, aligning with the research by Setiawan & Wikarya (2024) that shows increased electricity consumption can enhance manufacturing sector output in Indonesia.

The electricity supply sector naturally requires output from itself as well, because certain components and raw materials involved in the generation and distribution of electricity must come from the same sector. For instance, this sector must generate electricity to operate its own generating equipment, such as turbines and generators. As a result, when demand for the electricity supply sector increases by IDR 142,27 trillion due to the 50% electricity tariff discount policy, the sector will take IDR 141,94 trillion worth of inputs from itself.

The electricity supply sector also needs input from the construction sector for the development and maintenance of infrastructure, such as coal-fired power plants (PLTU) or gas power plants (PLTG). The construction sector plays an important role in supporting electricity production by building power plants, transmission lines, substations, and other related infrastructure. Without this support, the electricity sector

would find it hard to grow capacity. With the 50% electricity tariff discount increasing demand in the electricity supply sector by IDR 142.27 trillion, the sector is estimated to require around IDR 33.14 billion in additional inputs from the construction sector. This result is consistent with the study by Fadhilah & Susanti (2019), which explains that when electricity uses increases, the construction sector needs to take part in building more renewable energy power plants across different regions in Indonesia.

The electricity supply sector is also closely linked to the trade sector, which helps provide the equipment, materials, and components needed for power generation, such as turbines, cables, and other technical supplies. Trade activities also support the distribution of electricity-related goods and services to consumers. As demand in the electricity sector increases by IDR 142,27 trillion due to the 50% tariff discount, it is estimated that around IDR 54,16 billion in additional inputs will be sourced from the trade sector.

In addition, the transportation sector plays a vital role in moving raw materials and heavy equipment required for electricity production. Coal and natural gas must be delivered from mining areas or ports to power plants, while large machinery must be transported to installation sites. With the same increase in electricity sector demand, inputs from transportation are estimated to rise by about IDR 196,20 billion.

The real estate sector also provides essential support by supplying land and facilities for power plants, substations, and transmission networks, ensuring that electricity production and distribution can operate effectively. As a result, when the demand for the electricity supply sector rises by IDR 142,27 trillion due to the 50% electricity tariff discount policy, the sector will need to acquire IDR 0,58 billion worth of inputs from the real estate sector.

In Path 3, it is indicated that the growth in output from the codomain sectors of the economy, attributable to the 50% electricity tariff reduction, will elevate Indonesia's GDP by IDR 23,84 trillion. The detailed breakdown shows that the GDPs of the Mining sector, Manufacturing sector, Electricity Supply sector, Construction sector, Trade sector, Transportation sector, and Real Estate sector will increase by IDR 24,09 billion, IDR 2,27 billion, IDR 23,67 trillion, IDR 12,87 billion, IDR 36,89 billion, IDR 87,41 billion, and IDR 0,42 billion, respectively. In percentage terms, this 50% electricity tariff discount for households will raise Indonesia's GDP by 0,12%. This finding is consistent with prior studies by Maisarah et al. (2024), Prastika (2023), Amri & Iskandar (2021), Hafizhulhuda & Sentosa (2024), Lu (2017), Chirwa & Odhiambo (2019), and Rafindadi et al. (2022) which explain that higher electricity consumption can stimulate economic growth in Indonesia. Study by Khobai et al. (2017) also support this result by that electricity prices negatively affect economic growth, while electricity supply positively affects growth, holding other factors constant. The estimates indicate that a 1% decrease in electricity prices causes economic growth to increase by 0.036%.

Finally, Path 4 elaborates on the impacts on the components of GDP, namely wages, gross operating surplus, and net taxes. The 50% electricity tariff reduction will lead to an increase in total wage levels by IDR 6,32 trillion and the gross operating surplus by IDR 25,93 trillion. Conversely, net taxes will experience a decline of IDR 8,41 trillion. In percentage terms, as shown in Table 3, wages will rise by 0,09%, gross operating surplus will expand by 0,22%, and net taxes will diminish by 0,86%.

Table 3 Growth of Gross Value-Added Components

Component of GVA	Growth resulting from the electricity tariff discount
Wage	0,09%
Gross Operating Surplus	0,22%
Net Taxes	-0,86%
GDP	0,12%

Source: Processed by the author

CONCLUSION

In conclusion, the planned 50% electricity tariff discount in early 2025 has a positive effect on Indonesia's economy, with GDP projected to increase by 0.12%. The policy stimulates activity in several key sectors, including mining, manufacturing, electricity, construction, trade, transportation, and real estate. The benefits are not limited to businesses; workers are also expected to gain, as wages are projected to rise by 0.09%, while gross operating surplus is estimated to increase by 0.22%. Although the policy may reduce net tax revenues due to lower collections from the energy sector, the overall economic impact remains positive.

However, this policy also carries fiscal ramification. The reduction in electricity tariffs may narrow the tax base in the energy sector, which could put pressure on the state budget and reduce available funds for development programs and public services. For this reason, careful fiscal management becomes essential. Strengthening the tax system, improving compliance, and ensuring more efficient budget allocation are important steps to maintain long-term fiscal stability while still supporting economic growth.

This study therefore recommends that the government may consider implementing of 50% electricity tariff discount each year to stimulate economic activity. The policy is also applied during periods of economic slowdown, provided the impact on tax revenues is monitored, and fiscal sustainability remains a priority.

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