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PLASTIC EXCISE TAX IN INDONESIA: FISCAL POTENTIAL AND SHORT-RUN ECONOMIC IMPACTS FROM AN INPUT–OUTPUT SIMULATION

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Abstract

Indonesia faces persistent marine plastic pollution and has considered a plastic excise tax as a fiscal instrument to control single-use plastic consumption. This study estimates the fiscal potential and short-run economy-wide impacts of plastic excise in Indonesia using an updated 2024 Input–Output framework. The 2016 Indonesian Input–Output table is updated through the RAS technique, while the policy shock is derived from an excise-induced price increase and plastic bag demand elasticity. The results show that, under a static baseline scenario, plastic excise could generate IDR 39.82 trillion in 2024 and IDR 40.69 trillion in 2026. However, after incorporating behavioural response, the IDR 200 tariff is estimated to reduce plastic bag consumption by 47.85%, equivalent to a final demand shock of IDR 38.11 trillion in 2024. The Input–Output simulation indicates a national output decline of IDR 73.47 trillion, a Gross Value Added contraction of IDR 32.23 trillion, and a factor income reduction of IDR 24.71 trillion. These findings suggest that plastic excise requires gradual implementation, revenue recycling, and transitional support for affected sectors to balance fiscal, environmental, and economic objectives in Indonesia.

Keywords: plastic excise tax, Input–Output analysis, fiscal policy, environmental taxation, Indonesia

Abstrak

Indonesia menghadapi persoalan pencemaran plastik laut yang terus berlanjut, sementara pemerintah mempertimbangkan cukai plastik sebagai instrumen fiskal untuk mengendalikan konsumsi plastik sekali pakai. Penelitian ini mengestimasi potensi penerimaan dan dampak ekonomi jangka pendek dari cukai plastik di Indonesia dengan menggunakan kerangka Input–Output 2024 yang diperbarui. Tabel Input–Output Indonesia 2016 diperbarui melalui teknik RAS, sedangkan guncangan kebijakan dihitung dari kenaikan harga akibat cukai dan elastisitas permintaan kantong plastik. Hasil penelitian menunjukkan bahwa, dalam skenario statis, cukai plastik berpotensi menghasilkan penerimaan sebesar Rp39,82 triliun pada 2024 dan Rp40,69 triliun pada 2026. Namun, setelah respons perilaku diperhitungkan, tarif Rp200 per kantong diperkirakan menurunkan konsumsi kantong plastik sebesar 47,85%, setara dengan guncangan permintaan akhir sebesar Rp38,11 triliun pada 2024. Simulasi Input–Output menunjukkan penurunan output nasional sebesar Rp73,47 triliun, kontraksi Nilai Tambah Bruto sebesar Rp32,23 triliun, dan penurunan pendapatan faktor produksi sebesar Rp24,71 triliun. Temuan ini menegaskan bahwa cukai plastik memerlukan penerapan bertahap, daur ulang penerimaan, dan dukungan transisi bagi sektor terdampak, khususnya industri plastik, kimia, perdagangan, transportasi, energi, dan layanan pendukung dalam rantai produksi nasional secara adil, terukur, dan berorientasi pada keberlanjutan jangka panjang.

Kata kunci: cukai plastik, analisis Input–Output, kebijakan fiskal, pajak lingkungan, Indonesia

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INTRODUCTION

Indonesia's geographical position as the world's largest archipelagic state gives the country both strategic maritime advantages and serious environmental responsibilities. With more than 17,000 islands and extensive coastal areas, Indonesia plays an important role in marine biodiversity conservation, fisheries, maritime trade, and ocean governance (Kementerian Kelautan dan Perikanan Republik Indonesia, 2024; Wati, 2025). However, this maritime advantage also creates a high level of exposure to land-based marine pollution. Dense coastal settlements, uneven waste collection services, and intensive economic activities along rivers and coastlines provide multiple pathways for unmanaged plastic waste to enter the marine environment.

Plastic pollution has therefore become not only an environmental problem, but also a public finance and governance issue. Indonesia has often been identified as one of the major contributors to marine plastic debris, with earlier global estimates placing the country among the largest sources of plastic waste entering the ocean (Jambeck et al., 2015; Sari et al., 2022). More recent evidence from the World Bank (2021) estimates that Indonesia generates approximately 7.8 million tonnes of plastic waste annually, of which around 4.9 million tonnes are mismanaged through inadequate collection, open dumping, or leakage from poorly managed disposal sites. These figures suggest that the problem is not merely the volume of plastic consumed, but also the limited capacity of the waste management system to prevent plastic leakage into rivers, coastal areas, and the sea.

In response to this challenge, the Indonesian government has explored the use of fiscal instruments to control single-use plastic consumption. One of the most prominent proposals is the introduction of a plastic excise tax, which has been discussed since 2016 as part of the broader agenda of excise extensification. The proposed policy applies an excise tariff of IDR 30,000 per kilogram, equivalent to approximately IDR 200 per plastic bag, particularly for plastic bags below a specified thickness threshold (Ministry of Finance of the Republic of Indonesia, 2020). The policy is expected to serve two closely related objectives: reducing the consumption of environmentally harmful plastic products and creating an additional source of public revenue. From a legal perspective, this proposal is also consistent with Law No. 39 of 2007 on Excise, which allows the government to impose excise on goods whose consumption needs to be controlled, whose circulation requires supervision, or whose use generates negative impacts on society or the environment.

The rationale for plastic excise is also supported by previous studies. Baidarus and Siburian (2018) show that plastic bags meet the economic and legal characteristics of excisable goods and that price increases may reduce plastic bag consumption through demand responses. Rahmi and Selvi (2021) emphasize the environmental relevance of plastic excise as a fiscal instrument for discouraging plastic use, while Gautama et al. (2023) highlight the importance of excise extensification in broadening the fiscal base and strengthening regulatory control. Saputra et al. (2023) further connect plastic taxation with circular economy incentives, suggesting that fiscal policy can be aligned with environmental transition. These studies provide useful justification for plastic excise; however, most of them focus on legal eligibility, fiscal potential, environmental arguments, or regulatory feasibility. Less attention has been given to the wider economic consequences that may arise when a tax-induced reduction in plastic consumption is transmitted across sectors.

This gap is important because plastic products are embedded in various production and distribution chains. A reduction in plastic demand may directly affect the rubber, rubber products, and plastics industry, but the impact is unlikely to stop there. It may also influence upstream suppliers, downstream users of plastic packaging, trade activities, transport, energy use, and supporting services. Therefore, the policy question is not simply whether plastic excise can raise revenue or reduce plastic consumption, but whether its broader economic effects can be managed without creating excessive pressure on output, value added, and income. This issue partly explains why the implementation of plastic excise has been repeatedly postponed, despite its inclusion in fiscal policy discussions. The government has had to consider not only environmental objectives, but also industrial competitiveness, household purchasing power, and the timing of policy implementation within the broader macroeconomic context (Kementerian Keuangan Republik Indonesia, 2024).

Against this background, this study contributes to the literature by assessing the economy-wide impacts of plastic excise in Indonesia using an updated Input–Output framework. Unlike earlier studies that mainly discuss legal justification, fiscal revenue, or environmental benefits, this research estimates how an excise-induced demand shock may affect sectoral output, Gross Value Added (GVA), and factor income through intersectoral linkages. The Indonesian Input–Output table is updated to 2024 using the RAS technique so that the simulation reflects more recent macroeconomic and sectoral conditions. This approach allows the study to distinguish between three related but analytically different aspects of the policy: the potential fiscal revenue from plastic excise, the expected reduction in plastic consumption due to price changes, and the wider economic impact transmitted through the production structure.

Accordingly, this study aims to estimate the potential revenue generated from a plastic excise tax and to evaluate its economy-wide effects on output, Gross Value Added, and factor income. By doing so, the study provides empirical evidence on the trade-off between fiscal gains, environmental objectives, and short-run economic adjustment. The findings are expected to offer a more balanced basis for policy design, particularly in determining whether plastic excise should be implemented gradually, accompanied by revenue recycling and supported by transitional measures for affected sectors.

LITERATURE REVIEW

Public Finance and Environmental Excise

Public finance explains how governments use fiscal instruments to perform allocation, distribution, and stabilization functions (Musgrave & Musgrave, 1989). In this framework, excise taxation is not only a source of revenue but also a corrective instrument for goods that generate social or environmental costs. For plastic products, excise serves an allocative function by internalizing part of the external cost into the market price, thereby encouraging consumers and producers to adjust their behaviour.

However, environmental excise also has broader economic implications. While it may reduce harmful consumption and generate public revenue, it can also affect production, value added, and income in sectors connected to the taxed product. Therefore, plastic excise should be assessed not only by its fiscal and environmental benefits, but also by its potential macroeconomic effects. This is consistent with public financial management principles, which require fiscal instruments to be

evaluated in terms of revenue performance, resource allocation, and economic stability (PEFA Secretariat, 2016).

Negative Externalities and Plastic Consumption

Externalities occur when the actions of consumers or producers impose costs or benefits on others that are not reflected in market prices (Gruber, 2016). Single-use plastic consumption creates negative externalities because its private price does not fully capture the social costs of marine pollution, ecosystem damage, blocked drainage systems, and waste management burdens. As a result, plastic tends to be consumed beyond its socially optimal level.

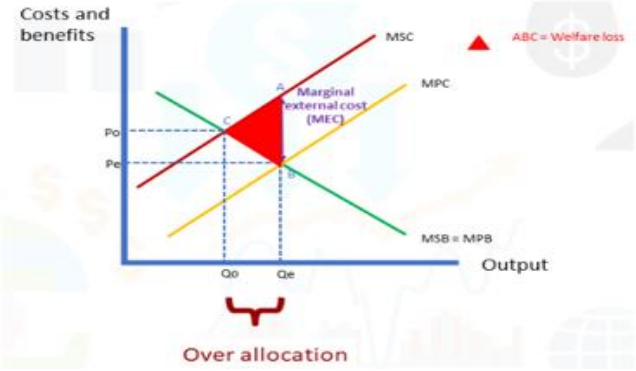


Figure 1 Negative Externalities and Market Failure

Source: Gruber (2016)

As illustrated in Figure 1, the Marginal Social Cost (MSC) of plastic consumption exceeds the Marginal Private Cost (MPC) because society bears additional environmental costs. In a free market, equilibrium occurs at a higher level of output than the socially optimal level, resulting in overconsumption and deadweight loss. A plastic excise tax can therefore be viewed as a Pigouvian-type instrument that raises the effective price of plastic products, reduces excessive consumption, and moves the market closer to the socially optimal level (Pigou, 1920; Gruber, 2016).

Excise and Excise Extensification in Indonesia

Excise is an indirect tax imposed on specific goods whose consumption or circulation requires control because of their negative effects on society or the environment (Subiyantoro, 2004). Under Law No. 39 of 2007, goods may be classified as excisable if their consumption needs to be controlled, their circulation requires supervision, their use creates negative impacts, or their taxation is needed to promote fairness and balance.

Excise extensification refers to the expansion of excisable goods beyond traditional objects such as tobacco, ethyl alcohol, and alcoholic beverages. In Indonesia, this agenda has become increasingly relevant as the government seeks new fiscal instruments to address environmental and social problems (Lorosae & Setyawan, 2022; Gautama et al., 2023). Plastic products, particularly single-use plastic bags, meet the criteria for excisable goods because their consumption contributes to waste accumulation and environmental degradation. Nevertheless, the implementation of plastic excise must also consider industrial competitiveness, household purchasing power, and broader macroeconomic conditions (Kementerian Keuangan Republik Indonesia, 2024).

Plastic Excise, Behavioural Response, and Economic Impact

The main mechanism of plastic excise works through the price channel. When excise increases the price of plastic bags, consumers may reduce consumption or shift to alternative products. Baidarus and Siburian (2018) estimate that a 1% increase in plastic bag prices may reduce demand by 0.957%, indicating that plastic bag consumption in Indonesia is relatively responsive to price changes. This elasticity provides the basis for modelling plastic excise as a demand-side shock.

Previous studies generally support the implementation of plastic excise but emphasize different aspects. Mardanugraha (2017) warns that plastic excise may reduce economic circulation and affect other tax bases. Baidarus and Siburian (2018) highlight its revenue potential and demand-reducing effect. Rahmi and Selvi (2021) emphasize its environmental role, while Gautama et al. (2023) confirm the legal basis for excise extensification. Saputra et al. (2023) further link plastic taxation with circular economy incentives. These studies show that plastic excise has fiscal, legal, and environmental justification, but they have not sufficiently examined its economy-wide transmission across sectors.

Input–Output Analysis and Research Gap

Input–Output analysis is useful for examining how a policy shock in one sector affects other sectors through production linkages (Leontief, 1986; Miller & Blair, 2009). In the case of plastic excise, a reduction in demand for plastic products may directly affect the rubber, rubber goods, and plastics industry, while also influencing chemical inputs, trade, transport, electricity, packaging users, and supporting services.

This study, therefore, uses an updated Input–Output framework to estimate the wider economic effects of plastic excise on output, Gross Value Added (GVA), and factor income. Unlike previous studies that mainly discuss legal eligibility, fiscal potential, or environmental benefits, this study focuses on the trade-off between fiscal revenue, environmental correction, and short-run economic contraction. The approach is appropriate for identifying gross short-run impacts, although it does not capture long-run substitution, technological adjustment, or revenue recycling effects.

RESEARCH METHODS

Data Analysis

This study employs a quantitative simulation approach using an Input–Output (I–O) framework to estimate the economy-wide impact of plastic excise implementation in Indonesia. The I–O model is suitable for this study because it captures intersectoral production linkages and traces how a demand shock in one sector affects output, Gross Value Added (GVA), and factor income in other sectors through direct and indirect effects (Leontief, 1986; Miller & Blair, 2009).

The main dataset is the 2016 Indonesian Input–Output Table of domestic transactions at producer prices, covering 52 industries, published by Statistics Indonesia. The table is updated to 2024 using the RAS balancing technique to reflect more recent macroeconomic and sectoral conditions. Supporting data include nominal GDP, sectoral economic indicators, and population data from Statistics Indonesia; plastic bag consumption estimates from Making Oceans Plastic (2017); the proposed plastic excise tariff from the Ministry of Finance; and the price elasticity of plastic bag demand from Baidarus and Siburian (2018). The use of secondary data is appropriate

because this study relies on official and published macroeconomic datasets that are nationally representative and suitable for economic impact simulation (Serra et al., 2018).

The analysis is conducted in three stages. First, the potential revenue from plastic excise is estimated under a static baseline scenario, using the following formula:

$$\textbf{Excise Revenue} = \textbf{Plastic Consumption} \times \textbf{Excise Tariff}$$

Plastic consumption is calculated by multiplying the population by the annual per-capita plastic bag consumption. This estimate represents an upper-bound revenue scenario because it does not yet incorporate behavioural changes after the excise is imposed.

Second, the study estimates the decline in plastic consumption caused by the excise-induced price increase. The change in quantity demanded is calculated using the price elasticity formula:

$$\%\Delta Q = Ed \times \%\Delta P$$

where **Ed** is the price elasticity of demand and **%ΔP** is the percentage increase in price after the excise tariff is imposed. Following Baidarus and Siburian (2018), this study uses an elasticity value of –0.957. With an assumed initial plastic bag price of IDR 400 and an excise tariff of IDR 200 per bag, the price increase is 50%, resulting in an estimated consumption decline of 47.85%. The nominal reduction in plastic consumption is then calculated as:

$$\Delta Y = \%\Delta Q \times \text{Nominal Plastic Consumption}$$

This value is treated as a reduction in final demand for the rubber, rubber goods, and plastics sector.

Third, the reduction in final demand is introduced into the I–O model to estimate its economy-wide impact. The output effect is calculated using the Leontief demand-driven model:

$$\Delta X = (I - A)^{-1} \Delta Y$$

where **ΔX** is the change in sectoral output, **I** is the identity matrix, **A** is the technical coefficient matrix, and **ΔY** is the final demand shock. The resulting output changes are then used to estimate GVA and factor income impacts using sectoral coefficients:

$$\Delta GVA = v \times \Delta X$$

$$\Delta Income = w \times \Delta X$$

where **v** represents the GVA coefficient, and **w** represents the income coefficient for each sector.

Several assumptions are applied in this study. The revenue estimate is calculated as a static upper-bound projection, while the I–O simulation incorporates demand adjustment through elasticity. The model assumes full pass-through of the excise tariff to consumer prices, fixed production coefficients, and no immediate substitution in production technology. It also does not incorporate revenue recycling, long-term technological adjustment, or substitution toward alternative materials. Therefore, the results should be interpreted as gross short-run economic impacts of plastic excise implementation, rather than as a complete dynamic assessment of the policy.

RESEARCH RESULTS

The empirical results are presented in two related but analytically distinct parts. First, the study estimates the potential revenue from plastic excise under a static baseline scenario, assuming no behavioural response from consumers. Second, the economy-wide impacts are estimated using an Input–Output simulation that incorporates demand adjustment through price elasticity. This separation is necessary because the revenue estimate represents an upper-bound fiscal potential,

while the Input–Output simulation captures the short-run economic effects of reduced plastic consumption.

Table 1 Estimation of Potential Revenue from Plastic Excise

Indicator	2024	2025*	2026*
Population of Indonesia	284,438,800	287,539,183	290,673,360
Plastic consumption in Indonesia (bags)	199,107,160,000	201,277,428,044	203,471,352,010
Excise tariff (IDR/bag)	200	200	200
Estimated excise revenue	IDR 39,821,432,000,000	IDR 40,255,485,608,800	IDR 40,694,270,401,936

*Forecasting.

Source: Processed by the author based on Badan Pusat Statistik (2025), Kementerian Keuangan Republik Indonesia (2017), and Making Oceans Plastic (2017)

Based on Table 1, the potential revenue from plastic excise shows an upward trend from 2024 to 2026. In 2024, with a projected population of 284.44 million people and an estimated annual plastic bag consumption of 199.11 billion bags, the imposition of an IDR 200 excise tariff per bag would generate potential revenue of IDR 39.82 trillion. This amount increases to IDR 40.26 trillion in 2025 and IDR 40.69 trillion in 2026, mainly due to population growth and the corresponding increase in projected plastic bag consumption.

These figures should be interpreted as a static upper-bound estimate. They do not yet incorporate changes in consumer behaviour after the excise is imposed. Therefore, Table 1 reflects the maximum fiscal potential under the assumption that plastic consumption remains at the baseline level.

Table 2 Estimation of Changes in Nominal Plastic Consumption

Indicator	2024	2025*	2026*
Elasticity (Ed)	-0.957	-0.957	-0.957
Plastic consumption in Indonesia (bags)	199,107,160,000	201,277,428,044	203,471,352,010
Minimum plastic bag price (IDR/bag)	400	400	400
Nominal plastic consumption	IDR 79,642,864,000,000	IDR 80,510,971,217,600	IDR 81,388,540,803,872
%ΔQ	-47.85%	-47.85%	-47.85%
Change in nominal consumption/final demand shock	-IDR 38,109,110,424,000	-IDR 38,524,499,727,622	-IDR 38,944,416,774,653

*Forecasting

Source: Processed by the author based on Badan Pusat Statistik (2025), Kementerian Keuangan Republik Indonesia (2017), Making Oceans Plastic (2017), and Baidarus and Siburian (2018)

Table 2 estimates the decline in plastic consumption resulting from the excise-induced price increase. Following Baidarus and Siburian (2018), the study applies a price elasticity of demand of -0.957. With an assumed initial plastic bag price of IDR 400 and an excise tariff of IDR 200 per bag, the price increase reaches 50%. This produces an estimated decline in quantity demanded of 47.85%.

In nominal terms, the estimated reduction in plastic consumption reaches IDR 38.11 trillion in 2024, IDR 38.52 trillion in 2025, and IDR 38.94 trillion in 2026. These values are treated as reductions

in final demand for the rubber, rubber goods, and plastics sector in the Input–Output simulation. Thus, while Table 1 presents static fiscal potential, Table 2 provides the behavioural adjustment used to estimate the economy-wide contractionary effects of plastic excise.

Table 3 Impact on Output of Plastic Excise Implementation

Sector	Sector Code	Output Impact
Rubber, Rubber Goods, and Plastic Industry	I-20	-IDR 40,473,677,287,806
Seasonal and Perennial Crop Sector	I-03	-IDR 8,332,885,410,449
Chemical, Pharmaceutical, and Traditional Medicine Industry	I-19	-IDR 8,069,563,331,601
Wholesale and Retail Trade, Except Motor Vehicles and Motorcycles	I-33	-IDR 2,703,063,976,411
Electricity Sector	I-28	-IDR 2,504,993,626,094
Private Information and Communication Services	I-42	-IDR 1,977,900,555,487
Oil, Gas, and Geothermal Mining	I-08	-IDR 1,151,840,986,670
Financial Intermediation Services other than Central Banking	I-43	-IDR 1,029,594,549,664
Food and Beverage Industry	I-13	-IDR 968,221,068,195
Land Transportation Sector	I-35	-IDR 596,746,799,782
Tobacco Processing Industry	I-14	-IDR 1,901,195,775
Total Economic Impact		**-IDR 73,469,073,385,908**

Note: The table presents selected affected sectors. Full sectoral results may be provided in an appendix.
Source: Processed by the author (2025)

The Input–Output simulation shows that plastic excise generates a contractionary effect on national output. The total output decline is estimated at IDR 73.47 trillion. The largest impact is experienced by the Rubber, Rubber Goods, and Plastic Industry (I-20), with an output reduction of IDR 40.47 trillion. This result is expected because the sector is directly exposed to the decline in plastic demand.

The next largest contractions occur in the Seasonal and Perennial Crop Sector (I-03), at IDR 8.33 trillion, and the Chemical, Pharmaceutical, and Traditional Medicine Industry (I-19), at IDR 8.07 trillion. Trade, electricity, information and communication services, mining, financial intermediation, food and beverages, and land transportation also experience output declines through intersectoral linkages. These findings indicate that the impact of plastic excise is not limited to the targeted plastic-related sector, but spreads to upstream, downstream, and supporting sectors within the production network.

Table 4 Impact on Gross Value Added of Plastic Excise Implementation

Sector	Sector Code	GVA Impact
Rubber, Rubber Goods, and Plastic Industry	I-20	-IDR 13,700,357,330,916
Seasonal and Perennial Crop Sector	I-03	-IDR 6,509,902,709,412
Chemical, Pharmaceutical, and Traditional Medicine Industry	I-19	-IDR 3,052,595,496,306
Wholesale and Retail Trade, Except Motor Vehicles and Motorcycles	I-33	-IDR 1,899,884,793,413
Private Information and Communication Services	I-42	-IDR 1,250,872,515,781
Oil, Gas, and Geothermal Mining	I-08	-IDR 862,932,534,192
Financial Intermediation Services other than Central Banking	I-43	-IDR 778,349,171,966
Coal and Lignite Mining	I-09	-IDR 335,086,001,641
Food and Beverage Industry	I-13	-IDR 327,970,091,579
Land Transportation Sector	I-35	-IDR 295,652,610,402
Tobacco Processing Industry	I-14	-IDR 1,395,622,504
Total Economic Impact		-IDR 32,228,065,732,817

Note: The table presents selected affected sectors. Full sectoral results may be provided in an appendix.
Source: Processed by the author (2025)

The decline in output is also reflected in Gross Value Added. As shown in Table 4, the total GVA contraction is estimated at IDR 32.23 trillion. The Rubber, Rubber Goods, and Plastic Industry (I-20) records the largest reduction, amounting to IDR 13.70 trillion. This indicates that the sector not only experiences a decline in production volume but also a substantial loss in domestic value creation.

The Seasonal and Perennial Crop Sector (I-03) records the second-largest GVA decline, at IDR 6.51 trillion, followed by the Chemical, Pharmaceutical, and Traditional Medicine Industry (I-19), at IDR 3.05 trillion. Wholesale and retail trade also records a significant decline of IDR 1.90 trillion, while information and communication services, mining, financial intermediation, food and beverages, and land transportation are affected through indirect production linkages. These results suggest that the effect of plastic excise extends beyond manufacturing output and affects the value added generated across related sectors.

Table 5 Income Impact of Plastic Excise Implementation

Sector	Sector Code	Income Impact
Rubber, Rubber Goods, and Plastic Industry	I-20	-IDR 12,683,151,647,714
Seasonal and Perennial Crop Sector	I-03	-IDR 3,971,623,441,972
Chemical, Pharmaceutical, and Traditional Medicine Industry	I-19	-IDR 1,958,586,905,344
Wholesale and Retail Trade, Except Motor Vehicles and Motorcycles	I-33	-IDR 1,173,792,282,340
Electricity Supply	I-28	-IDR 1,105,954,232,814
Private Information and Communication Services	I-42	-IDR 552,704,624,409
Financial Intermediation Services other than Central Banking	I-43	-IDR 483,124,826,813
Food and Beverage Industry	I-13	-IDR 267,091,568,241
Oil, Gas, and Geothermal Mining	I-08	-IDR 222,973,784,677
Business Services	I-48	-IDR 206,203,789,330
Tobacco Processing Industry	I-14	-IDR 212,166,830
Total Economic Impact		-IDR 24,713,141,449,970

Note: The table presents selected affected sectors. Full sectoral results may be provided in an appendix.
Source: Processed by the author (2025)

Table 5 shows a pattern similar to the output and GVA effects. The total decline in factor income is estimated at IDR 24.71 trillion. The largest reduction occurs in the Rubber, Rubber Goods, and Plastic Industry (I-20), amounting to IDR 12.68 trillion. This shows that reduced plastic demand affects not only sectoral production and value added, but also the income received by factors of production in the affected sectors.

The Seasonal and Perennial Crop Sector (I-03) records an income decline of IDR 3.97 trillion, followed by the Chemical, Pharmaceutical, and Traditional Medicine Industry (I-19), at IDR 1.96 trillion. Trade, electricity, information and communication services, financial intermediation, food and beverages, mining, and business services also experience income reductions through intersectoral transmission. The Tobacco Processing Industry (I-14) is only marginally affected, with an income decline of IDR 212.17 million, not billion.

Taken together, the results show that plastic excise has two different implications. On the one hand, it has substantial fiscal potential under the static revenue scenario. On the other hand, when behavioural response is incorporated, the policy generates short-run contractionary effects on output, GVA, and factor income. These findings support the need for careful policy design, particularly through gradual implementation, revenue recycling, and transitional support for sectors affected by the decline in plastic demand.

DISCUSSION

Extensification of Plastic Excise Implementation

Excise is a fiscal instrument used by governments not only to raise revenue, but also to regulate goods that generate negative externalities, including risks to public health, environmental sustainability, and natural resource protection (Gautama et al., 2023). In the context of plastic products, the urgency of excise implementation is closely related to the environmental burden caused by single-use plastic consumption. Plastic bags are widely used in daily transactions, but their market price does not fully reflect the environmental costs associated with waste accumulation, river pollution, marine debris, and long-term ecosystem degradation. This condition provides a strong rationale for government intervention through environmental taxation.

Indonesia's plastic waste problem further strengthens this rationale. The country has been identified as one of the major contributors to marine plastic leakage (Jambeck et al., 2015; Sari et al., 2022). The World Bank (2021) estimates that Indonesia generates approximately 7.8 million tonnes of plastic waste annually, of which around 4.9 million tonnes are mismanaged through inadequate collection, open dumping, or leakage from poorly managed disposal systems. These figures indicate that the problem is not limited to plastic consumption itself, but also concerns the capacity of waste management systems to prevent plastic leakage into rivers, coastal areas, and the sea.

From the perspective of excise extensification, plastic products meet the basic criteria of excisable goods under Law No. 39 of 2007 because their consumption requires control and their use creates negative impacts on society and the environment. Baidarus and Siburian (2018) argue that plastic bags have both legal and economic characteristics that justify their classification as excisable goods. Rahmi and Selvi (2021) similarly emphasize the environmental role of plastic excise as a fiscal instrument to discourage plastic use, while Saputra et al. (2023) connect plastic taxation with circular economy incentives. The results of this study support this argument by showing that, under a static baseline scenario, plastic excise has substantial fiscal potential: IDR 39.82 trillion in 2024, IDR 40.26 trillion in 2025, and IDR 40.69 trillion in 2026. However, this revenue estimate should be interpreted as an upper-bound projection, because it does not yet incorporate consumer response to the price increase.

The behavioural response is important because the study estimates that an IDR 200 excise tariff on a minimum plastic bag price of IDR 400 would raise the price by 50%. Using the elasticity estimate of –0.957 from Baidarus and Siburian (2018), this price increase produces an estimated consumption decline of 47.85%. In nominal terms, this equals a final demand reduction of IDR 38.11 trillion in 2024, IDR 38.52 trillion in 2025, and IDR 38.94 trillion in 2026. This finding confirms that plastic excise is not only a fiscal instrument, but also a consumption-control mechanism. The policy may generate revenue, but its environmental effectiveness depends on whether the price signal is strong enough to reduce plastic use.

International experience also shows that price-based instruments can reduce plastic bag consumption when supported by clear regulation and public compliance. Ireland's plastic bag levy, for example, is widely cited as a successful case because it significantly reduced plastic bag use and was administratively feasible (Convery et al., 2007). Similar policies in South Africa, Botswana, China, and Canada show that the effectiveness of plastic levies depends on tariff levels, enforcement, consumer awareness, and the availability of substitutes (Dikgang & Visser, 2012;

Hasson et al., 2007; Haoran, 2012; Rivers et al., 2017). Therefore, Indonesia's plastic excise policy should not be designed merely as a revenue instrument. It must be supported by public communication, enforcement, accessible alternatives, and a clear plan for using excise revenue to strengthen waste management and recycling systems.

Economic Impact and Sectoral Transmission

The main empirical finding of this study is that plastic excise creates a clear policy trade-off. On the one hand, it offers sizeable fiscal potential. On the other hand, when behavioural adjustment is incorporated into the Input–Output simulation, the policy produces short-run contractionary effects across the economy. The 2024 simulation estimates a total output decline of IDR 73.47 trillion, a Gross Value Added contraction of IDR 32.23 trillion, and a factor income reduction of IDR 24.71 trillion. These figures show that the economic burden of plastic excise is not limited to the taxed product, but spreads through production linkages.

The largest contraction occurs in the Rubber, Rubber Goods, and Plastic Industry (I-20), which is directly exposed to the decline in plastic demand. The sector records an output decline of IDR 40.47 trillion, a GVA reduction of IDR 13.70 trillion, and an income decline of IDR 12.68 trillion. This confirms that the initial demand shock is concentrated in the target sector, where lower plastic consumption immediately reduces production activity, domestic value creation, and factor income.

The contraction then spreads to the upstream and supporting sectors. The Seasonal and Perennial Crop Sector (I-03) records the second-largest impact, with output declining by IDR 8.33 trillion, GVA by IDR 6.51 trillion, and income by IDR 3.97 trillion. This result should not be interpreted as a direct tax burden on agricultural commodities. Rather, it reflects intersectoral linkages in the Input–Output structure, particularly through packaging, distribution, wholesale trade, transport, and downstream product flows that are connected to plastic use. The result therefore, needs to be explained carefully so readers do not misunderstand the sectoral transmission mechanism.

The Chemical, Pharmaceutical, and Traditional Medicine Industry (I-19) is also significantly affected, with an output decline of IDR 8.07 trillion, a GVA contraction of IDR 3.05 trillion, and an income reduction of IDR 1.96 trillion. This is economically plausible because plastic production depends on chemical and petroleum-based inputs. A decline in plastic demand, therefore, reduces demand for intermediate inputs supplied by chemical-related industries. This finding is consistent with the logic of backward linkage in Input–Output analysis, where a demand shock in one sector affects input-supplying sectors.

The impact on trade and service sectors further confirms that plastic excise has broader transmission effects. The Wholesale and Retail Trade Sector (I-33) experiences an output decline of IDR 2.70 trillion, a GVA decline of IDR 1.90 trillion, and an income decline of IDR 1.17 trillion. This shows that plastic excise affects not only manufacturing, but also distribution activities, especially because plastic bags and plastic packaging are closely linked to retail transactions and goods circulation. Similarly, the Electricity Sector (I-28) records an output decline of IDR 2.50 trillion and an income decline of IDR 1.11 trillion, reflecting lower energy demand associated with reduced industrial activity.

Modern service sectors are also affected, although indirectly. Private Information and Communication Services (I-42) experience an output decline of IDR 1.98 trillion, GVA decline of IDR 1.25 trillion, and income decline of IDR 552.70 billion. The Financial Intermediation Sector (I-43) records an output decline of IDR 1.03 trillion, GVA decline of IDR 778.35 billion, and income decline

of IDR 483.12 billion. These findings suggest that lower industrial and trade activity also reduces demand for supporting business services, finance, and communication-related activities.

Other affected sectors include the Food and Beverage Industry (I-13), with an output decline of IDR 968.22 billion, GVA contraction of IDR 327.97 billion, and income decline of IDR 267.09 billion, as well as the Land Transportation Sector (I-35), with an output decline of IDR 596.75 billion and GVA decline of IDR 295.65 billion. These sectors are likely affected through packaging, logistics, and distribution channels. Meanwhile, the Tobacco Processing Industry (I-14) is only marginally affected, with an output decline of IDR 1.90 billion, GVA decline of IDR 1.40 billion, and income decline of IDR 212.17 million. The unit must be stated carefully here: the income impact is million, not billion.

These findings are consistent with the core logic of Input–Output analysis, which views sectors as interconnected through intermediate input and output relationships (Leontief, 1986; Miller & Blair, 2009). A shock to final demand in one sector may generate multiplier effects across upstream, downstream, and supporting sectors. The contribution of this study lies precisely in showing that the impact of plastic excise is not confined to plastic-related manufacturing. It is transmitted across agriculture-linked sectors, chemical industries, trade, electricity, transport, finance, and communication services. This extends earlier Indonesian studies that mainly emphasized legal feasibility, fiscal potential, or environmental justification (Mardanugraha, 2017; Baidarus & Siburian, 2018; Rahmi & Selvi, 2021; Gautama et al., 2023).

From a public finance perspective, the findings illustrate the tension between allocation and stabilization functions. Plastic excise supports the allocation function by correcting negative externalities and moving consumption closer to its social cost (Gruber, 2016; Musgrave & Musgrave, 1989). However, the estimated contractions in output, GVA, and income indicate that the stabilization function may be challenged if the policy is implemented abruptly without transitional support. Thus, the central question is not whether plastic excise is justified, but how it can be implemented without creating excessive short-run economic disruption.

Policy Implications

The contractionary effects identified in this study should be interpreted as gross short-run impacts under the assumptions of the Input–Output model. The model assumes fixed production coefficients and does not capture revenue recycling, technological adjustment, material substitution, or the development of new green industries. For this reason, the estimated output decline of IDR 73.47 trillion should not be read as a reason to reject plastic excise, but as evidence that the policy requires careful transition design.

Several policy implications follow from the findings. First, the government should consider gradual implementation of the excise tariff. A phased tariff structure would allow the rubber, rubber goods, and plastics industry, the chemical sector, retail actors, and consumers to adjust over time. This is particularly important because the results show that the largest output, GVA, and income losses are concentrated in sectors directly or indirectly connected to plastic production and distribution.

Second, revenue recycling should become a central part of the policy design. Since the static revenue potential reaches IDR 39.82 trillion in 2024 and may increase to IDR 40.69 trillion in 2026, part of this revenue should be directed toward waste management infrastructure, recycling facilities, research and development for alternative materials, and support for local governments

facing high waste burdens. Without revenue recycling, plastic excise may be perceived merely as an additional tax rather than as an environmental correction instrument.

Third, industrial transition support is necessary for the most affected sectors. The Rubber, Rubber Goods, and Plastic Industry, which bears the largest estimated contraction, should be supported to shift toward recyclable materials, biodegradable packaging, and circular production models. The Chemical Industry should also be encouraged to develop input materials compatible with sustainable packaging. Such support may include fiscal incentives, concessional financing, technical assistance, and industrial upgrading programmes.

Fourth, policy design should consider the distributional effects on small businesses and low-income consumers. Plastic bags are widely used in traditional markets, micro-enterprises, and small-scale retail activities. If the excise is implemented too abruptly, these actors may experience higher transaction costs before alternatives become affordable and widely available. Targeted assistance, temporary transition schemes, or differentiated implementation mechanisms may be needed, provided that they do not weaken the environmental objective of reducing unnecessary single-use plastic consumption.

Fifth, behavioural change strategies should accompany fiscal measures. The estimated 47.85% reduction in plastic consumption depends on the assumption that consumers respond to price increases. This response will be stronger if consumers understand the environmental purpose of the policy and have access to reusable or environmentally friendly alternatives. Therefore, public education, retailer participation, product labelling, and public campaigns are essential to ensure that the excise works as intended.

Overall, the findings suggest that plastic excise can function as both a fiscal and environmental instrument, but its economic consequences depend heavily on implementation design. A well-designed policy should combine tariff implementation, revenue recycling, industrial transition support, waste management investment, and behavioural change programmes. If these elements are integrated, plastic excise may reduce plastic consumption and strengthen environmental governance while limiting excessive short-run contraction in output, value added, and income.

CONCLUSION

This study demonstrates that the implementation of a plastic excise tax in Indonesia has both fiscal potential and short-run economic consequences. Under the static baseline scenario, the policy could generate substantial government revenue, estimated at IDR 39.82 trillion in 2024 and projected to increase to IDR 40.69 trillion by 2026. However, this estimate should be interpreted as an upper-bound projection because it does not incorporate behavioural changes after the excise is imposed. When price elasticity is considered, the IDR 200 excise tariff is estimated to reduce plastic bag consumption by 47.85%, equivalent to a nominal final demand shock of IDR 38.11 trillion in 2024.

The Input–Output simulation shows that this reduction in plastic demand generates contractionary effects across the economy. The 2024 simulation indicates a decline in national output of IDR 73.47 trillion, a reduction in Gross Value Added (GVA) of IDR 32.23 trillion, and a decrease in factor income of IDR 24.71 trillion. The largest impact is concentrated in the rubber, rubber goods, and plastics industry as the directly affected sector, while further spillover effects are transmitted to chemical industries, trade, electricity, transportation, financial services, information

and communication services, and other supporting sectors through intersectoral linkages. These findings confirm that plastic excise is not only a fiscal and environmental instrument, but also a policy that affects production structure, value creation, and income distribution.

The main implication of this study is that plastic excise should not be rejected solely because it produces short-run contractionary effects, but it should also not be implemented without a clear transition strategy. A well-designed policy needs to combine gradual tariff implementation, revenue recycling, investment in waste management and recycling infrastructure, support for environmentally friendly substitutes, and transitional assistance for affected industries and small business actors. Such measures are necessary to ensure that the policy can reduce plastic consumption and internalize environmental costs without creating excessive disruption to economic activity.

This study is limited by the static nature of the Input–Output model, which assumes fixed production coefficients and does not capture long-run substitution, technological adjustment, behavioural adaptation beyond price elasticity, or the recycling of excise revenues back into the economy. Therefore, the estimated impacts should be understood as gross short-run effects rather than a full dynamic assessment of plastic excise policy. Future studies may extend this analysis using a Computable General Equilibrium model, dynamic simulation, or scenario-based analysis that incorporates revenue recycling, substitution toward alternative materials, and long-term industrial transition toward a circular economy.

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