



What Challenges Face Carbon Tax Implementation in Indonesia?

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ABSTRACT

This study analyzes the technical procedures and administrative challenges of implementing a carbon tax in Indonesia. Using a descriptive qualitative approach, this research combines primary data from questionnaires and interviews with tax officials with secondary data from recent academic literature and regulations. The findings indicate that the carbon tax in Indonesia is formally regulated under Law No. 7 of 2021, involving processes such as identifying tax subjects and objects, measuring emissions, reporting, and enforcement. However, its execution is constrained by several critical factors, including limited technical guidelines, inadequate administrative systems, insufficient human resource capacity, and taxpayer resistance. The results also reveal that while tax officials generally understand the concept, their operational readiness remains moderate. This study contributes empirical insights from an administrative perspective, which remains underexplored in the literature. Strengthening regulatory clarity, improving institutional capacity, and enhancing inter-agency coordination are essential to ensure the effective implementation of carbon tax policies in Indonesia.

INTRODUCTION

Climate change has become a global challenge requiring effective policy instruments to mitigate greenhouse gas emissions. One such fiscal instrument is the carbon tax, which aims to internalize the environmental costs of carbon emissions while encouraging a transition toward sustainable energy sources.

Indonesia has also joined this global effort. Through Law Number 7 of 2021 on the Harmonization of Tax Regulations (HPP Law), the government established the legal foundation for a carbon tax. As a commitment to environmental sustainability, this regulation is supported by implementing frameworks formulated by the Ministry of Finance and the Directorate General of Taxes (DGT).

However, the implementation of this policy faces significant hurdles. In practice, tax officials encounter complex and relatively novel technical procedures. They must navigate various stages, from identifying taxable objects and calculating emissions to managing reporting and monitoring processes, all of which require robust administrative readiness and sophisticated information technology support.

While most existing studies focus on the economic and environmental impacts of carbon taxes, research examining implementation from an administrative perspective remains scarce, particularly regarding the challenges faced by tax authorities. This gap underscores the need for empirical studies that explore how carbon tax policies are executed in practice.

Therefore, this study aims to:

1. Analyze the technical procedures of carbon tax implementation in Indonesia.
2. Identify the administrative challenges encountered by tax authorities.

This research is expected to contribute to the development of tax policy by providing insights into practical challenges and proposing potential improvements.

The carbon tax is a fiscal instrument levied on fossil fuel consumption to internalize the environmental costs of emissions. By taxing carbon-intensive energy sources, it aims to foster a shift toward sustainable practices and mitigate the release of CO₂, the primary catalyst of global climate change.

Indonesia supports this global initiative through regulatory frameworks, including:

1. Law No. 7 of 2021 (HPP Law)
2. Presidential Regulation No. 98 of 2021 on Carbon Economic Value

The implementation of the carbon tax has several key objectives:

1. Reducing Carbon Emissions
The primary objective is to reduce CO₂ emissions generated by economic activities, particularly fossil fuel combustion.
2. Providing Economic Incentives
Carbon tax encourages businesses and society to adopt renewable energy and environmentally friendly practices.
3. Enhancing Green Economic Competitiveness
It promotes industries that prioritize sustainability and innovation.
4. Supporting Government Revenue
Revenue from the carbon tax can be allocated to environmental protection and sustainable development programs.

LITERATURE REVIEW

Carbon Tax Economic Theory

Carbon tax in theory is a form of Pigouvian tax, which is a tax imposed on economic activities that generate negative externalities, namely harmful impacts on third parties or the environment that are not reflected in market prices. In the context of climate change, carbon dioxide (CO₂) emissions are considered a negative externality because they cause global warming, rising sea levels, and other climate disasters.

Arthur C. Pigou, a classical economist, proposed that externalities can be corrected by applying a tax equivalent to the social cost of the negative impact. By implementing a carbon tax, the cost of environmental pollution is directly borne by the polluters. This will encourage business actors to innovate, reduce emissions, and use cleaner technologies.

Table 1. Carbon Tax Instruments vs. Other Policy Instruments

Instrument	Objective	Advantages	Disadvantages
Carbon Tax	Reduce emissions	Transparent; generates government revenue	Fixed tax rate; limited flexibility
Cap-and-Trade (ETS)	Reduce emissions	Clear emissions target; flexible market-based pricing	Complex to implement
Green Energy Subsidies	Increase the use of clean energy	Reduce the cost of clean energy	High fiscal burden

METHODS

This study employs a descriptive qualitative research approach. This approach is used to provide a comprehensive and in-depth understanding of the technical procedures and administrative challenges in the implementation of the carbon tax in Indonesia.

A qualitative approach is considered appropriate because this research focuses on analyzing processes, perceptions, and implementation practices rather than numerical relationships. The descriptive method is used to systematically describe the actual conditions related to carbon tax implementation based on empirical data collected from respondents and supporting literature.

The data collection method is through the distribution of questionnaires using the Likert Scale, which produces numerical values that are then weighted in the form of percentages. According to Sugiyono (2018:152), the Likert Scale is a measuring tool used to assess the attitudes, opinions, and perceptions of individuals or groups towards a social phenomenon. In its implementation, the measured variables are elaborated into several indicators. Assessment is carried out by respondents with illustrative guidelines as follows:

Table 2. Illustration of Likert Scale Responses

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Scores are determined based on the distribution of the questionnaire to ten respondents who have strategic roles in carbon tax calculations, so the obtained figures reflect their responses to the questions asked. Furthermore, these figures are processed using several formulas as follows:

1. Calculating the total selected scores :
 - Formula: $T \times P_n$
 - T is the total number of respondents
 - P_n indicates the score chosen on the Likert scale
2. Interpreting the score results :
 - Y represents the highest value on the Likert scale
 - X represents the lowest value on the Likert scale
3. Calculating the percentage index
 - Formula: Total score / T
 - Indicates the overall index of the survey results
4. Determining the measurement interval
 - Formula: According to Table 3.1 (1 = Strongly Disagree to 5 = Strongly Agree)
 - Determines the parameter range in the evaluation process

In this study, there are 10 questions that were analyzed. Based on the data obtained, the score details are as follows:

1. The highest score in this study is determined based on the number of respondents who filled in the answers for each question.
2. The maximum score that can be achieved for each question is 50, while the minimum score is 10.

Table 3. Methods for Processing Likert Scale Data in the Study

Statement	Score	Total Score (XY)	Index (D)	Low est (Pn1)	High est (Pn2)	Number of Respondents (T)	Low est (X) = (Pn1) × (T)	High est (Y) = (Pn2) × (T)	Low est (D) = (X)/(T)	High est (D) = (Y)/(T)
I understand the basic concept of carbon tax and the objectives of its implementation.	1			1	5	10	10	50	1	5
I feel that I have received sufficient training or socialization regarding carbon tax.	1			1	5	10	10	50	1	5
The technical procedures for implementing carbon tax are sufficiently clear and easy to understand.	1			1	5	10	10	50	1	5
The emission data and	1			1	5	10	10	50	1	5

information required for reporting are available and easily accessible.										
The administrative and reporting systems used are sufficiently efficient.	1			1	5	10	10	50	1	5
There is good coordination among the relevant institutions in the implementation of carbon tax.	1			1	5	10	10	50	1	5
I experience difficulties in understanding emission calculations and carbon tax obligations.	1			1	5	10	10	50	1	5
The lack of technical regulations is a major obstacle to the implementation of carbon tax.	1			1	5	10	10	50	1	5
The lack of competent human	1			1	5	10	10	50	1	5

resources is a challenge in implementin g the policy.										
I believe that the implementa tion of carbon tax can help reduce greenhouse gas emissions.	1			1	5	10	10	50	1	5

The percentage of responses from each question is then calculated using the average percentage to obtain an overall picture of respondents responses to the question segments asked.

Responses from the Likert scale in this study yield percentage values that reflect the overall responses of participants to all questions. As explained in Table 3.2, the Likert scale used consists of 5 indicators, which when converted into percentages, will have the following distribution.

Table 4. Likert Scale Intervals for a Five-Point Scale

Interval	Category
1.0-1.7	Strongly Disagree
1.8-2.7	Disagree
2.8-3.7	Neutral
3.8-4.7	Agree
4.7-5.0	Strongly Agree

RESULTS

The implementation of the carbon tax needs to be aligned with the carbon tax roadmap and/or the carbon market roadmap. These roadmaps include strategic plans to reduce emissions, identify key sectors, and ensure alignment with renewable energy policies. The Indonesian government, together with the House of Representatives (DPR RI) prepares and establishes these roadmaps as part of a democratic decision-making mechanism in taxation policy.

Indonesia strives to achieve the target of the Nationally Determined Contribution (NDC) or national commitment target in reducing greenhouse gas emissions through various sectors that have great potential in climate change mitigation. According to Presidential Regulation No. 98 of 2021, this strategy covers six main sectors:

1. Energy Sector: Focused on power plant efficiency, transition to renewable energy, vehicle electrification, environmentally friendly transportation, and the implementation of energy-efficient building standards.

2. Waste Sector: Reducing emissions from landfills and wastewater through recycling, better waste management, and waste reduction campaigns.
3. Industrial Sector (IPPU): Implementing cleaner production technology, reducing the use of raw materials that generate high emissions, and increasing the efficiency of industrial processes.
4. Agricultural Sector: Reducing methane emissions from rice fields and livestock through water management, low-emission animal feed, and the application of sustainable agricultural practices.
5. Forestry Sector: Preserving forests, carrying out reforestation, managing land sustainably, and maintaining peatland and mangrove ecosystems as carbon sinks.
6. Other Sectors: Including the marine sector with the blue carbon concept, which continues to be developed based on advances in technology and science.

In addition, Indonesia implements a carbon economic value (NEK) mechanism as part of its mitigation policy. The goal is to reduce emissions, improve the market system, apply the 'polluter pays' principle, create a low-carbon economy, increase state revenue, and support sustainable growth. The Carbon Economic Value (NEK) uses two main approaches:

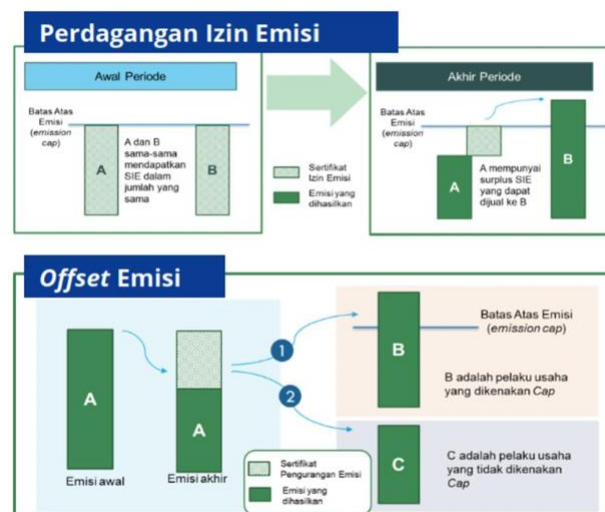
1. Trading instruments:

- Emission Trading System (ETS), where companies with high emissions buy permits from companies that successfully reduce emissions.
- Emission offsets, which allow companies to sell their carbon credits to other entities that need them.

2. Non-trade instruments:

- Carbon tax, which is imposed based on carbon content or emission activities.
- Result-Based Payment (RBP), where companies receive financial incentives for successfully reducing emissions.

Gambar III.1 Konsep Perdagangan Emisi Karbon



Sumber : Badan Kebijakan Fiskal (2023)

In the concept of carbon emission trading, as shown in Figure III.1, it can be explained that each company or business actor at the beginning of the period is given an Emission Permit Certificate (SIE) that determines their emission limits, but at the end of the period, the total

emissions released must comply with the given SIE. After that, the technical aspects are divided into two :

1. If there is a business actor who has excess permits or a surplus of SIE, the excess can be sold to other companies that are experiencing a shortage.
2. Meanwhile, companies that successfully reduce emissions receive Emission Reduction Certificates (SPE) that can be traded.

Technical Procedures for Carbon Tax Implementation

1. Tax Subjects and Objects: The subjects of the carbon tax refer to business entities whose carbon emissions exceed the thresholds established by the government. The object of the taxation is carbon dioxide equivalent (CO₂e) emissions that surpass the prescribed emission limits (caps).
2. Scope of Taxation: In accordance with Article 13, paragraph (6) of the HPP Law, the carbon tax is levied on the purchase of carbon-intensive goods or on specific activities that generate carbon emissions within a defined period and volume.
3. Tariff and Market Linkage: Referring to Article 13, paragraphs (8) and (9) of the HPP Law, the government has set a minimum carbon tax rate of IDR 30.00 per kilogram of carbon dioxide equivalent (CO₂e). Alternatively, the rate may follow the prevailing carbon market price if it exceeds the minimum threshold. If the market price falls below IDR 30.00 per kilogram of CO₂e, the minimum statutory rate of IDR 30.00 per kilogram (or its equivalent unit) remains applicable.

Challenges in the Implementation of Carbon Tax

The implementation of a carbon tax in Indonesia faces various technical and institutional challenges, especially for tax officials, including:

1. Human Resource (HR) Capacity.
There are still several tax officials who do not have specific competencies in emissions verification and carbon calculation. However, some training has already been provided to certain Tax Officials, although not all Tax Officials have received such training.
2. Interagency and Community Coordination.
Integration of systems is needed between the DG of Taxes (Direktorat Jenderal Pajak), the Ministry of Environment and Forestry (KLHK), and other technical agencies for emissions reporting and monitoring. Strategies to address this challenge include gradual implementation, the formation of a strong coalition between the government, industry, and civil society, as well as transparent and accountable management of carbon tax revenues. The goal is to build public trust and support the transition toward a low-carbon economy and sustainable development (Tjoanto & Tambunan, 2022).
3. Limitations of Emission Measurement Infrastructure: Not all sectors have access to accurate carbon monitoring technology. From a technical perspective, challenges in the collection and management of carbon taxes become a crucial factor. Indonesia needs to build a robust system to measure, report, and verify carbon emissions so that carbon tax policies can be implemented effectively and transparently (Maghfirani et al., 2022).
4. Lack of Specific Operational Guidelines Until now, technical operational guidelines and specific SOPs regarding the implementation of the carbon tax have been limited. Many tax officers have to rely on general regulations, which are not very specific in explaining Procedures for verification, handling discrepancies in carbon data, and the use of third-party data in emission assessments. Without detailed and clear guidelines, there is a risk of inconsistency in implementation across work units. However, currently, the implementation of the Carbon Tax is still gradual, and the current goal of implementing the Carbon Tax is still to encourage the public to adopt low-emission behaviors.

5. Taxpayer Resistance Most industry players view the carbon tax as an additional burden amid production demands and economic recovery, which results in Tax Authorities having to have good mediation and communication capacity in handling this resistance.

The implementation of a carbon tax in Indonesia faces diverse and complex challenges, particularly related to resistance from various parties as well as the balance between economic and environmental interests. Tjoanto and Tambunan (2022) revealed that the business sector feels burdened by the potential increase in operational costs due to the carbon tax. Industries are also concerned about the impact of this policy on their competitiveness, considering the increase in production costs that affects product selling prices.

In addition, political and governance challenges that are not yet optimal further complicate the implementation of the carbon tax. Factors such as complex political dynamics and the involvement of stakeholders with varying interests often hinder decision-making efficiency. The presence of politicians who also act as business actors in parliament can create conflicts of interest that potentially obstruct pro-environment policies (Tjoanto & Tambunan, 2022).

From a social perspective, carbon tax policies raise concerns for low-income community groups, who may experience price increases for goods and services. This impact can increase the cost of living and reduce their purchasing power, thus requiring appropriate compensation and subsidy mechanisms to alleviate the burden on affected communities (Tjoanto & Tambunan, 2022).

Maghfirani et al. (2022) highlight that the challenges in implementing the carbon tax in Indonesia include economic, social, and technical aspects. One of the biggest challenges is the potential economic distortion, where the increase in the price of high-carbon-emission products can affect consumer purchasing power and slow down economic growth, especially in the context of post-COVID-19 pandemic recovery.

In addition, carbon taxes can have a significant impact on low-income households, which may experience increases in the cost of living that are disproportionate to their income. Therefore, an effective compensation strategy is needed to protect the most vulnerable groups in society from the effects of this policy (Maghfirani et al., 2022).

In the context of carbon tax implementation in the UK, Chyong et al. (2020) identified that estimates of carbon savings from increased wind energy capacity depend on the Marginal Displacement Factor (MDF). In the short term, MDF is influenced by the price and availability of fossil fuels, affected by the carbon tax as well as uncertainties in daily wind energy production. Meanwhile, in the long term, increased wind energy capacity is expected to enhance CO₂ emission reductions.

DISCUSSION

As part of the analysis, the author has also conducted a survey using a questionnaire instrument with 10 respondents who are tax officials or individuals involved in the implementation of the carbon tax. The questionnaire was designed based on a Likert scale and aims to measure the level of understanding, system readiness, and challenges faced in the implementation of the carbon tax. The results of the questionnaire summary are presented in the following table:

Tabel 5. Kuesioner Key Success Factor

No.	Statement	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total	Interval	Category
1	I understand	5	3	5	4	5	5	3	3	4	4	41	4.1	Agree

	the basic concept of carbon tax and the objectives of its implementation.													
2	I feel that I have received sufficient training or awareness-raising activities regarding carbon tax.	5	4	3	3	1	4	3	3	2	4	32	3.2	Neutral
3	The technical procedures for implementing carbon tax are sufficiently clear and easy to understand.	5	4	5	3	3	4	4	3	2	2	35	3.5	Neutral
4	The emission data and information required for reporting are available and easily accessible.	4	4	3	4	2	4	4	3	1	2	31	3.1	Neutral
5	The administrative and reporting systems used are sufficiently efficient.	3	4	4	3	1	4	3	3	2	2	29	2.9	Neutral
6	There is good coordination among the relevant institutions in the	3	4	4	4	3	5	4	3	3	3	36	3.6	Neutral

	implementatio n of carbon tax.													
7	I experience difficulties in understanding emission calculations and carbon tax obligations.	4	4	3	3	5	3	3	4	3	4	36	3.6	Neutral
8	The lack of technical regulations is a major obstacle to the implementatio n of carbon tax.	4	4	5	2	5	4	4	3	4	4	39	3.9	Agree
9	The lack of competent human resources is a challenge in implementing the policy.	4	4	4	3	5	3	4	3	4	4	38	3.8	Agree
10	I believe that the implementatio n of carbon tax can help reduce greenhouse gas emissions.	5	4	5	4	5	5	5	4	4	4	45	4.5	Agree

From the table above, it can be concluded that the majority of respondents have a good understanding of the concept and objectives of the carbon tax (4.1) and show high confidence in its effectiveness in reducing greenhouse gas emissions (4.5). However, the results also indicate that only a small portion of respondents feel they have received adequate training or outreach (3.2 – Neutral).

In addition, the statement about an efficient administration and reporting system received the lowest percentage (2.9), indicating a perception that the efficiency of the system still needs to be improved. This is reinforced by the high level of agreement with the statement that the lack of technical regulations (3.9) and competent human resources (3.8) are real challenges in the implementation of this policy. Therefore, it is expected that in the future, the administration and

reporting system will be further improved to make it easier for tax officials to supervise and calculate tax potential on carbon taxes and to facilitate taxpayers in reporting carbon taxes.

Thus, it can be concluded that the knowledge of tax officials regarding the carbon tax is in the good category; however, there is a need to strengthen technical and operational understanding so that policy implementation can run more effectively.

These findings reinforce the fact that, besides requiring a comprehensive regulatory system, human resource aspects and training are key factors in the successful implementation of the carbon tax in Indonesia.

CONCLUSION

Based on the research results related to the technical procedures for the implementation of the carbon tax and the challenges faced by tax officials, several conclusions can be summarized as follows:

The technical procedures for the implementation of the carbon tax in Indonesia have been formally regulated through Law No. 7 of 2021 (HPP Law) and its derivative regulations. This process includes the identification of tax subjects and objects, emission calculations, tariff determination, reporting, payment, as well as supervision and law enforcement.

For its implementation to be successful, the government needs to pay attention to several aspects: (1) Education and communication to the public and industry regarding the benefits of the carbon tax, both economically and environmentally. Effective communication about the long-term benefits of reducing carbon emissions; (2) Conducting more intensive socialization so that information about the carbon tax can be disseminated to the public; (3) Clear and transparent regulations, to ensure compliance and smooth implementation; (4) Incentives for the industry, such as tax credits and subsidies, to encourage investment in green technology; (5) Development of infrastructure that enables accurate measurement and verification of carbon emissions.

Tax officials face various challenges, both from internal organizational factors and external pressures, including the limited number of competent human resources in emissions management, which necessitates comprehensive training for tax officials to be able to calculate and understand the business processes of companies that generate carbon taxes.

Suboptimal reporting system infrastructure, lack of coordination between agencies, and resistance from taxpayers. In addition to requiring a comprehensive regulatory system, human resources and training aspects become key factors in the successful implementation of the carbon tax in Indonesia.

The effectiveness of carbon tax policy heavily depends on cross-sector synergy between the Directorate General of Taxes, the Ministry of Environment and Forestry, and other institutions related to the environment and energy.

Currently, the government is preparing infrastructure and regulations to support this policy, including technical provisions regarding the calculation, payment, and reporting of carbon taxes in the Minister of Finance Regulation (PMK). In addition, an emissions trading mechanism is also being developed to be integrated with the carbon tax system.

Resistance from the Industrial Sector: Another challenge faced is resistance from the industrial sector, which is concerned about increased operational costs and decreased competitiveness due to the carbon tax.

RECOMMENDATIONS

To ensure the implementation of the carbon tax in Indonesia runs optimally, and tax officials can perform their duties effectively, the following are recommended:

1. Increasing the capacity of tax officials through technical training focused on aspects of emission calculation, verification, and relevant environmental policies.

2. Strengthening the carbon emissions reporting and monitoring system that is digitally integrated between tax authorities and the industrial sector, with a system that is transparent and easily accessible.
3. Expanding cross-agency coordination and the preparation of joint operational guidelines between the Directorate General of Taxes, the Ministry of Environment and Forestry, and other technical agencies to unify standard procedures and workflows.
4. Providing incentives and transition schemes for affected businesses, thereby reducing resistance and encouraging a shift toward sustainable business practices.
5. Periodically evaluating policies to adjust rates, sector coverage, and emission calculation methods according to the actual conditions of economic and technological developments in Indonesia.
6. Refinement of Carbon Tax Regulations: The government needs to strengthen and develop more mature rules regarding carbon taxes, including setting fair rates that correspond to the external impacts of carbon emissions. To ensure this policy is effective without hindering economic growth, thorough analysis and consultation with experts and stakeholders are necessary.
7. Public Socialization and Education, the government needs to increase public and industry awareness about the urgency of the carbon tax and its benefits. With effective socialization, resistance to this policy can be reduced, thereby increasing public support. Educational campaigns should include information about the use of carbon tax funds and their positive impact on the economy and the environment in the long term.

LIMITATION

This study has several limitations that need to be considered. It uses a qualitative descriptive approach, which focuses on understanding perceptions and experiences rather than testing causal relationships. Therefore, the results of this study cannot be widely generalized without the support of further quantitative research.

This research was conducted at the early stage of carbon tax implementation in Indonesia, where policies and technical guidelines are still in the development process. Consequently, the findings of this study may change alongside future policy developments. This study also focuses on the perspective of tax officials, and thus does not yet include the viewpoints of other stakeholders such as industry actors, policymakers, or environmental agencies.

RESEARCH TRANSPARENCY AND ETHICS STATEMENTS

1. Author Contributions:

CDP : Conceptualization, Methodology, Data Collection, Data Analysis, Writing – Original Draft, Visualization, Review and Editing.

2. Funding:

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3. Conflict of Interest:

No conflict of interest: The authors declare that they have no conflict of interest related to the research and publication of this article.

4. Research Ethics:

The study did not involve any intervention, biological specimens, vulnerable groups, or sensitive personal data. Participation was voluntary, and the confidentiality of the respondents was maintained.

5. Use of Artificial Intelligence (AI):

No Use of AI. The authors declare that generative AI was not used in the preparation of this article.

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