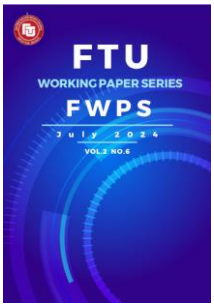

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HỆ THỐNG TRAO ĐỔI HẠN NGẠCH TRONG THỰC TIỄN TẠI INDONESIA VÀ BÀI HỌC CHO VIỆT NAM

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Tóm tắt

Vào tháng 2 năm 2023, Indonesia đã triển khai hệ thống giao dịch phát thải (ETS) lần đầu tiên, đánh dấu một bước tiến mới trong nỗ lực của chính phủ để chống lại biến đổi khí hậu. Bài viết này nhằm đánh giá ETS của Indonesia để đưa ra những đề xuất các hậu quả chính sách cho chính phủ Việt Nam và các khuyến nghị dành cho doanh nghiệp của họ. Các tác giả đã sử dụng phương pháp nghiên cứu tại bàn (desk study) thông qua phân tích, tổng hợp tài liệu và tiến hành đánh giá ETS hiện tại dựa trên năm tiêu chí: hiệu quả môi trường, hiệu quả kinh tế, quản lý thị trường, quản lý doanh thu và tương tác với các bên liên quan. Việc triển khai gần đây của ETS tại Indonesia cho thấy rằng hầu hết các tiêu chí được đánh giá ở mức độ thấp, trung bình và một số tiêu chí không có dữ liệu sẵn có cho nghiên cứu. Từ kết quả nghiên cứu, bài báo cáo đề xuất một số tính năng quản lý thị trường có thể được áp dụng trong bối cảnh của Việt Nam.

Từ khoá: hiệu quả kinh tế, hiệu quả môi trường, hệ thống trao đổi hạn ngạch, Indonesia, Vietnam

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EMISSIONS TRADING SYSTEMS IN PRACTICE: THE CASE STUDY OF INDONESIA AND LESSONS LEARNED FOR VIETNAM

Abstract

In February 2023, Indonesia launched its first emissions trading system (ETS), marking a new step forward in the government's attempt to fight against climate change. This article aims to evaluate Indonesia's ETS in order to propose policy implications for Vietnamese governments and recommendations for their enterprises. By using the desk study through analyzing and synthesizing documents, the authors conduct the assessment of this current ETS against five criteria: environmental effectiveness, economic efficiency, market management, revenue management, and stakeholder engagement. The recent implementation of ETS in Indonesia demonstrates that most criteria are evaluated at low and medium levels and some of them do not have already available data for research. From the research results, the paper proposes several market management features that can be applied in the context of Vietnam.

Keywords: economic efficiency, environmental effectiveness, emissions trading systems, Indonesia, Vietnam

1. Introduction

Climate change can be considered one of the most threatening problems regarding human survival (William, 2011). The ever-increasing concentration levels of carbon dioxide, CFC, or nitrous oxide are creating a sophisticated problem regarding natural catastrophes, and thus are required to be taken seriously (B.D.Purnamasari and A.E.Nurachmah, 2018).

In the case of Vietnam, the country has actively engaged in many agreements, including United Nations Framework Convention on Climate Change (UNFCCC – 1992), Kyoto Protocol (1997), and most recently, Paris Agreement (2015), with the target of reaching net-zero emissions by 2050. To catch up with the global pace, economic measures are currently the preferred methods, hence the growing spread of the carbon markets.

Among the countries in the commitments, Indonesia shines as the leading nation for their determination to accomplish them. The most recent update of the Paris Agreement in 2021 of Indonesia's nationally determined contribution (NDC) saw their target of reducing its greenhouse gas (GHG) emissions target unconditionally to 29% and conditionally to 41% compared to the business as usual (BAU) scenarios by 2030 (PSE UGM, 2021).

To compare with Indonesia, Vietnam shares a fair amount of similarities. Both countries lay on the Southeast Asia region, where the effect of climate change and natural catastrophes is considered the most devastating (Sentian et al., 2022). Moreover, Indonesia and Vietnam are rising developing regions, with overall the same infrastructure and living standard (OACD, 2024). From those commonalities, it is helpful to investigate and evaluate the performance of Indonesia as a reference. Therefore, this article will focus on ETSs and how they work in practice in the region of Indonesia, and later what Vietnam can utilize to build their own.

2. Literature Review

An emission trading scheme is the implementation of market-based and cost-effective solutions with an aim to reduce GHG emissions (Lam, 2021). The government issues the emissions units and determines which entities of each sector will be in charge of their emissions (Leining, n.d). Entities, normally companies, can buy units to cover their payable emissions and sell units they do not need in the trading market. According to OECD (n.d), emission trading systems are divided into two main types: "cap-and-trade systems" and "baseline-and-credit systems". The cap-and-trade system determines an upper limit on emissions, and emission permits are distributed without charge or sold at auction in accordance with preset criteria. Meanwhile, there is no set cap on emissions under a baseline-and-credit system, but polluters can earn "credits" by reducing their emissions more than would otherwise be required and sell to other parties, who in turn demand strict conformity to their standards.

Since the introduction of the first ETS market in the EU in the year 2005, the system has been widely implemented as the most prospective mitigation tool characterized by attributes such as flexibility, cost savings, and overall effectiveness (Tang et al., 2017; Jiang et al., 2016). Despite its prominence, ETS, as a market-driven policy, poses a substantial challenge in the spheres of energy and climate economics research (Sandoff and Schaad, 2009). In contrast to mandatory regulations, such as emission standards targeting specific emitting behaviors, ETS operates subtly through market mechanisms, with its ultimate effects dependent on various uncertain factors (Tang et al, 2015; Zhu et al, 2018). Although carbon taxes and subsidies impose clear costs or benefits directly on emissions, an ETS policy involves a complex framework of rules and designs tailored for different agents and markets, each of which significantly influences the mitigation outcome. (Tang et al., 2017).

The intricate nature of the emission trading system has prompted the application of diverse evaluation models in research, providing detailed insights to assist ETS-involved entities in addressing their specific challenges. This literature review is essential due to the distinctive characteristics of each model, presenting varied quantification and assessment frameworks with different criteria and attributes from specific national conditions.

A study by Zhao et al (2016) focusing on four criteria: carbon pricing, trade volume, market liquidity, and information transparency revealed that the market efficiency of China's ETS pilots remains unfulfilled due to market participants and institutional arrangements, etc. Shi, Paramati, & Ren (2019) adopted the ADRL model to assess carbon emission markets in the EU, Japan, China, and Korea, particularly emphasizing the need for a unified carbon emission trading system. Dissanayake et al (2020) compares the impacts of three carbon emissions mitigation strategies and indicates that due to political economy constraints, carbon tax implementation is more practical than ETS in the short to medium term.

Meanwhile, Chen, Song, & Wang (2021) examine the carbon emissions trading pilot of 2013 as a quasi-natural experiment and employ the difference-in-difference (DID) model to explore the precise effects and mechanisms of the ETS on energy efficiency. In their study, Howie et al. (2020) investigated Korea and Kazakhstan, assessing the cost of mitigation efforts, ensuring reliability, enhancing policies' adaptability, promoting transparency, and evaluating suitability to put forward six essential conditions for the success of an ETS. Venmans' research

(2012) assessed the environmental effectiveness of the EU, focusing on environmental effectiveness, cost efficiency, institutional feasibility, and distributional considerations, yet no trade-related carbon leakage was observed. Another research conducted by Liu and Wei (2016), focusing on climate policy, energy policy, emissions trading, and international cooperation in both the EU and China, suggest that China's carbon intensity goal could allow for higher emissions within a collaborative EU-China ETS if the carbon pricing remains inadequate for EU approval. By analyzing the system dynamics, driving factors, and scenario analysis concerning carbon emissions in Hebei Province, China, Li, An, and Lu (2018) highlight the challenge of achieving emission reduction goals solely through the implementation of a carbon trading market and indiscriminate policy reduction, highlighting the necessity for the promotion of emission reduction technology to facilitate effective mitigation strategies.

While the majority of current research emphasizes China and countries within the European Union, there is a lack of research attention devoted to the Southeast Asian region, notably Indonesia and Vietnam. This poses a challenge in comprehending and comparing the policies and implementations of countries in the region, raising questions about the consistency and applicability of existing frameworks in the unique geographical and cultural context of Southeast Asia. Therefore, the demand for new research will center around investigating and evaluating environmental policies in this region, emphasizing the application of a comprehensive framework to provide a multidimensional and deeper insight into the emissions trading system status in Indonesia and practical implications for the nation’s governments and enterprises.

3. Methodology

This research is implemented by utilizing the framework of previous research to analyze the ETS in Indonesia and derive valuable insights for the implementation of ETS in Vietnam based on five primary criteria: environmental efficacy, economic efficiency, market management, revenue management, and stakeholder engagement, as well as 18 sub-characteristics (E. Narassimhan et al, 2018). The research method employed in this study is desk study, which involves the examination, analysis, and synthesis of documents and relevant information to evaluate them. After a comprehensive examination, we opt to evaluate the ETS's performance based on specific criteria, classifying each attribute into low, moderate, or high levels. We also analyze the current situation of Vietnam's carbon trading market in its early stages to find what the Vietnamese government and enterprises should do to achieve the best result.

4. Overview of criteria evaluating ETS performance

4.1. Environmental effectiveness

Environmental effectiveness can be defined as the ability of a producer to consume desired outputs and contract unwanted inputs and byproducts at the same time (Wang et al., 2017). According to Narassimhan, E. et al. (2018), the environmental effectiveness of each ETS is

assessed based on the coverage of key emitting sectors, emissions cap to covered emissions and stringency of cap.

4.2. Economic efficiency

The economic efficiency of an ETS refers to the effectiveness and optimization of resource allocation in achieving emission reduction goals (Xiao et al, 2021). It is evaluated by considering three factors namely the marginal cost of abatement, compliance costs (including MRV costs) for regulated firms and the government's expenses in administering the ETS.

4.3. Market Management

Market management in the ETS refers to the action of overseeing the functioning of the market where emissions permits are traded. It is evaluated by considering 7 factors including method of current allocations, improved allocation practices over time, percentage auctioning, trajectory of price stability, price signal commitment, system flexibility and current international linkage (Narassimhan, E. et al, 2018).

4.4. Revenue Management

Revenue management entails managing the company's "interface with the market" with the goal of raising revenue. Additionally, it can be seen as a complement of supply-chain management, which deals with the supply decision and procedures of a company (Talluri and Ryzin, 2004). The evaluation criteria of revenue management used include 4 main key metrics, which are revenue raised, share of revenue used to alleviate the burden of EITE firms to participate in the carbon market, green earmarking and revenue used towards distributional equity.

4.5. Stakeholder engagement

Stakeholder engagement refers to the practices that an organization implements to actively involve individuals or other entities in its projects or activities (Greenwood, 2007). Stakeholder engagement levels can be assessed by 2 main factors namely the number of meetings per period or comments received and outcomes. Specifically, the “outcomes” factor is evaluated by the effectiveness of stakeholder engagement in achieving consensus (Narassimhan, E. et al, 2018).

5. Assessment of Indonesia’s ETS

5.1 Overview of Indonesia's ETS

The intensity-based ETS in Indonesia was officially launched on 22 February 2023 for the power generation section by the Indonesian Ministry of Energy and Mineral Resources (MEMR) (Asia Society Policy Institute, n.d.). The ETS implementation will consist of 3 different stages. The first phase, which exclusively applies to coal-fired power facilities, will run from 2023 to 2024. The government intends to extend the ETS's coverage to oil and gas-fired power plants as well as additional coal-fired power plants that are not connected to Perusahaan Listrik Negara’s (PLN) grid, which is a state-owned electricity company, during the second (2025–2027) and third (2028–2030) stages. The Indonesia ETS will operate as a hybrid "cap-trade-and-tax" system, governed by the more comprehensive "Law of the

Harmonization of Tax Regulations in Indonesia" and starting alongside a carbon tax in April 2022. In addition, the carbon tax will be extended to other sectors based on factors such as stakeholder readiness, economic conditions, sector readiness, impact, and/or scale (International Carbon Action Partnership, 2023).

5.2 Detailed assessment of Indonesia's ETS

5.2.1. Environmental effectiveness

The establishment of a domestic ETS in the power industry serve as key policy tools to achieve recently enhanced NDC goals and promote low-carbon sustainable development. Initially, 84 coal-fired power plants were invited, with 32 ultimately joining. Until 2024, the ETS will apply solely to coal-fired plants (OCED,2022). Although Indonesia has climate policies and mitigation policies (National laws), they didn't set up EITE exemptions (OCED, 2022). As a result, the coverage of key emitting sectors is low.

Emission Trading System (ETS) targets an unconditional reduction of 31.9% by 2030 compared to the Business-As-Usual (BAU) scenario and a conditional reduction of 43.2% by 2030. Furthermore, Indonesia aims to cap CO2 emissions from the power sector at 290 million tonnes annually by 2030 (Asian Society, n.d). Consequently, the emissions cap is considered to be set at a high level.

It is unclear whether Indonesia has set up a restriction on the stringency of emissions cap, so it is noted as N/A.

5.2.2. Economic efficiency

The effects of Indonesia's ETS on the country's economic efficiency can be evaluated based on three attributes: abatement cost, cost of compliance, and cost of administration. Marginal abatement cost is the cost of reducing negative impacts on the environment, such as GHG emissions (PSE UGM, 2021). It shows the cost of removing one additional unit of GHG emissions and is useful for evaluating policies because it reflects the costs that must be borne by the community to achieve GHG emission reductions. Regarding abatement cost, there has not been any official publication for the real statistics of this attribute in Indonesia's ETS system.

The next factor to assess economic efficiency is the cost of compliance, specifically MRV cost. The MRV system is a critical component of any ETS, including Indonesia's. Indonesia has established a national MRV system in its effort to reduce greenhouse gas emissions (IKI, n.d). The MRV system in Indonesia is complex and involves various sectors and levels of government. However, specific statistics on the marginal MRV cost in Indonesia are not readily available.

The third component - the administration cost of an ETS - includes the expenses related to the operation of an ETS scheme, such as personnel costs, IT infrastructure, and others (Laing et al., 2013). As a part of its administration plan for the ETS system, the national ETS of Indonesia specified for coal-fired power plants came into use in February 2023 (Asia Society, n.d). The administration cost of the ETS system in Indonesia is also not published yet.

5.2.3. Market management

While Indonesia's ETS is practiced in three phases (Ministry of Energy and Mineral Resources, 2022), recently, only the information about the first stage (2023 - 2024) was published. Particularly, in phase I, allowance is distributed freely based on the firm's category and capacity; therefore, the ETS is classified as medium-performing.

Table 1. Classification of ETS in Indonesia

CFPPP Category	**Installed Capacity**	**Emissions Cap (PTBAE)** *Unit: ton CO2e/MWh*
None mine-mouth CFPP	at least 25 MW up to 100 MW	1.297
None mine-mouth CFPP	at least 100 MW up to 400 MW	1.011
None mine-mouth CFPP	more than 400 MW	0.911
Mine-mouth CFPP	at least 100 MW	1.089
Mine-mouth CFPP	more than 100 MW	0.911

Source: Ashurst (2023)

On the other hand, the quota emission cap will be changed gradually from the initial allocation which implies that the ETS is medium-performing. According to the Ministry of Energy and Mineral Resources (2022), from 2024, the cap allocation will be changed slightly; in particular, the next year's volume of carbon trading will be equal to 85% of the current year whether the current year's volume of carbon trading is more than 85% of the tradable quota allocated in the previous year, and vice versa.

Regarding percentage auctioning, the Indonesian government has not published any declaration about the intention to apply an auction instead of free allocation. In phases II and III, Indonesia only expects to expand to other business sectors not only in the power industry before 2025 (Ashurst, 2023). Therefore, in this dimension, the ETS is evaluated as low level.

Instead of the fact that the project owner can set the offering prices (IDX Carbon, 2023), which results in the fact that the price will differentiate from the projects, the price of carbon is relatively stable at around $4 per tonne. Specifically, in the first launch in September 2023, the unit price was 4.51$; and in January 2024, it was around $3.88 per tonne. It suggests a high-performing score in the price stability dimension. Moreover, the price sold on the trading platform of Indonesia is much below that in other markets, such as the European Union ETS at $68 per tonne (Statista, 2024). In the future, Indonesia's carbon price is expected to experience a significant increase to at least $30 per tonne to reduce coal use (Ordonez et al., 2022).

Concerning the price signal commitment, several specific targets have to be set in the emissions trading and GHG emissions offset before the launching of an emission trading system (the Ministry of Environment and Forestry of the Republic of Indonesia, 2022). As a result, the authors still acknowledge the emissions cap target while it is not public yet. Secondly, the Indonesian authority makes an effort to stabilize the price by setting the floor price of carbon in the regular market at $1.28 regarding the previous day's closing price (Florentina, 2023). However, there is not enough information to conclude that there is a ceiling price as well as an allowance reserve in the ETS. Therefore, Indonesia's ETS is rated at a low level. As regards system flexibility, the lack of formal available data about allowance reserve prevents us from assessing this dimension.

International trading is also approved in Indonesia carbon trading. According to Florentina (2023), the foreign carbon units are tradable in Indonesia's ETS if these units are verified by the international registration system as well as meet the requirements of OJK and the other foreign carbon exchange, implying that the indirect link between the ETS and others exists. However, based on current public information, there is no direct linkage between Indonesia's ETS and other emission trading systems as the link between the European Union ETS and the Swiss ETS (The Dutch Emission Authority, n.d), which refers to a low score in this dimension.

5.2.4. Revenue management

Revenues from carbon pricing could be utilized to make up for people's economic losses brought on by rising energy costs. For Indonesia, for example, a $25 carbon price would result in 16 percent fewer greenhouse gas emissions as well as 0.7 percent of GDP in revenue (International Monetary Fund. Asia and Pacific Dept, 2022)

Indonesia has designated the Financial Services Authority (Otoritas Jasa Keuangan) to oversee the country's Carbon trading platform. OJK's current mandate focuses on regulating and overseeing the financial services sector (To Hue, 2023). According to Perdan and Azapagic (2011), carbon trading plays a crucial role within ETS as it decreases the amount of greenhouse gas emissions cost-effectively to mitigate climate change. On the other hand, since Carbon finance is a relatively new financial instrument, or even a commodity to trade, it is not clear whether OJK is capable of monitoring transactions (To Hue, 2023). The data and statistics to evaluate all the factors for revenue management are poor and limited. Therefore, all 4 elements will be characterized as "N/A".

5.2.5. Stakeholder engagement

Public information on stakeholder engagement of Indonesia's ETS are not readily available. However, some fundamental insights about the general status quo could be provided. Only 99 state-owned coal-fired power plants participated in the ETS, representing a small fraction of businesses (Asia Society, n.d; Asia Foundation, 2023). Moreover, regulatory oversight of the carbon market was concentrated within specific ministries and governmental agencies, led by the Coordinating Ministry for Maritime and Investment Affairs (CMMIA) (OECD, 2022).

Additionally, to address critical aspects of ETS development, Indonesia's Ministry of Energy and Mineral Resources collaborated with the IEA and OECD to conduct four technical Focus Group Discussions (FGDs) on ETS development, claiming the involvement of diverse

stakeholders (OECD, n.d). However, the exact influence of these engagements on policy outcomes remains unclear and a handful of stakeholders allowed to participate in these discussions raises concerns about the inclusivity of the decision-making process.

From the aforementioned information, it can be inferred that stakeholder engagement of Indonesia's ETS remains at a low level, characterized by highly restricted participation, centralized decision-making power, and a lack of large-scale public meetings.

5.3 Overall assessment

Apart from certain components that are not able to be assessed due to a lack of information, we have the ability to evaluate the strengths and limitations in the Emissions Trading Scheme (ETS) of Indonesia in relation to four sectors, namely Environmental relevance, Economic efficiency, Market management, and Stakeholder engagement.

In terms of environmental effectiveness, the Indonesian government implements a stringent emissions cap; however, it is limited in its coverage of key emitting sectors. This presents an overall limitation as it has the potential to create gaps and hinder Indonesia's ability to adhere to the emissions cap.

With regards to economic efficiency, despite the Indonesian government's failure to consider the Energy-Intensive, Trade-Exposed (EITE) sectors, it has established a suitable abatement cost for its 2030 target. Consequently, this can be regarded as a strength.

When examining market management, the Indonesian government has performed relatively well in terms of resource allocation and price stabilization. Nevertheless, there is room for optimization through the enhancement of its linkage, an increase in the auction percentage, and a stronger commitment to price.

Lastly, stakeholder management poses a significant limitation to Indonesia's ETS, as the majority of public information pertaining to the decision-making process and outcomes remains undisclosed.

6. Recommendations for Vietnamese entities

6.1. Present situation of Vietnam's carbon trading market

Currently, Vietnam has no detailed ETS documents, as the country has yet to imply a carbon trading system to the public. However, Vietnam has had an initial document to guide through the procedure of developing one named Decree No. 06/2022/ND-CP, in which Vietnam's domestic carbon market will be expected to include establishments on the list of sectors and facilities emitting GHG as main participants, along with other entities and organizations. This, as listed in Article 16 of the Decree, is too broad to narrow down to a particular sector.

Delegation to ministries and committees for the development of the domestic carbon market in Vietnam can be evaluated as well divided, concluded from Article 21. However, it only requires a small amount of available human resources, which raises doubt regarding the

longer run. Some other departments can join in the execution of Vietnam's carbon market to expand the voluntary market to the foreign entities for example.

In the international market, as of June 2020, Vietnam ranked 4th in the number of CDM Executive Board projects with 257 projects, accounting for 140 million tons of carbon dioxide (USAID, 2022). Moreover, since 2013, Vietnam has taken part in the Program on Reducing Emissions Through Reducing Deforestation and Degradation (REDD+) (USAID, 2022), with the outcome being 10 million tons of carbon credits per year for Japan (Binh Truong, 2023).

Considering the domestic market, on September 29, 2023, CT Group launched ASEAN Carbon Credit Exchange Joint Stock Company (CCTPA), becoming the first Vietnamese enterprise to kick off a carbon emissions exchange (VNA, 2023). Aside from that, Vietnam will have a pilot carbon credit exchange market in 2025, along with implementing capacity building activities and raising public awareness.

6.2. Recommendations for state agencies

Vietnam's new ETS, guided by Decree No. 06/2022/ND-CP, focuses on the power sector to align with increased NDC goals. Insights from Indonesia's abatement cost of $42.75/ton of CO2 (PSE UGM, 2021) suggest Vietnam should assess its costs and streamline compliance processes. Lessons from Indonesia's MRV system can enhance clarity and efficiency. Vietnam could improve its ETS with user-friendly online platforms and regular communication channels. However, challenges arise in environmental effectiveness, as Vietnam's focus on power may overlook sectors like EITE. Taking cues from the EU's extensive sectoral coverage (R. Watanabe and G. Robinson, 2011) and New Zealand's forestry approach (C. Leining, S. Kerr, and B. Bruce-Brand, 2019), Vietnam could broaden its scope beyond the power sector, drawing inspiration from California's stable carbon market (Barry G. Rabe, 2015). Engaging stakeholders diversely and expanding coverage to industries beyond power plants are pivotal steps. Setting ambitious reduction targets and establishing enduring revenue management systems will better align with global climate objectives.

6.3. Recommendations for Vietnamese enterprises

With respect to the enterprises situated in Vietnam, as they find themselves on the receiving end of the governmental policies concerning the ETS, they must make adequate preparations for the implementation of the Emission Trading System in the Vietnamese market. Once the ETS is put into effect, corporations must initially grasp and adhere to the regulations, while also evaluating their emissions about the allotted allowances. In addition, they should formulate strategies to curtail emissions, invest in cleaner technologies, and obtain supplementary allowances if necessary. The establishment of robust monitoring and reporting systems is of utmost importance, as is staying abreast of the developing regulations. Corporations can also consider investing in carbon offset projects, partake in emission trading, and collaborate with relevant stakeholders to drive collective action. It is crucial to ensure transparent communication of sustainability initiatives in order to foster trust and showcase a steadfast commitment to environmental responsibility.

7. Conclusion

As Vietnam contemplates the adoption of an emissions trading system, the lessons learned from the Indonesian case study serve as a valuable blueprint. Through this article, the strengths and drawbacks of Indonesia's ETS have been detailed and analyzed, with a fair rating of the carbon market progress has been made, and applied to Vietnam, with ETS on the development process, generating first-hand experience to build a sustainable market later on.

One of the findings from the research is the critical importance of a well-crafted regulatory framework and robust enforcement mechanisms. The efficacy of an emissions trading system hinges on the clarity of guidelines and the stringent enforcement of monitoring systems. In addition, the case study underscores the necessity of active participation of government bodies, industries, and environmental organizations in navigating the complexities associated with emissions trading, as well as the tailored design of ETS for the specific socio-economic and environmental context of each country. While the Indonesian experience provides a rich source of insights, Vietnam must carefully consider its distinct challenges and opportunities when crafting an ETS that aligns with its national goals and aspirations.

Similar to other researches, this article contains certain limitations. The research process is based on the comparison with Indonesia only, which results in a regional limited output. Moreover, the carbon market of Vietnam, despite having a lot of initial actions up to the present, is still under development. Future evaluation is necessary to compare this article's recommendation to the actual result, in order to come up with more realistic suggestions.

8. Appendix

Table 2. Summary of assessment result of Indonesia's ETS

Overall assessment	Attributes	Indonesia's ETS rate
Environmental effectiveness	Coverage of key emitting sectors	Low
	Emissions cap to total emissions ratio	High
	Stringency of cap	N/A
Economic efficiency	Abatement cost	N/A
	Cost of compliance	N/A
	Cost of administration	N/A
Market management	Method of current allocations	Medium
	Improved allocation practices over time	Medium

Overall assessment	Attributes	Indonesia's ETS rate
	Percentage auctioning	Low
	Trajectory of price stability	High
	Price signal commitment	Low
	System flexibility	N/A
	Current linkage	Low
Stakeholder engagement	Number of meetings per period or comments received	Low
	Outcomes	Low
Revenue management	Revenue raised	N/A
	EITE earmarking	N/A
	Green earmarking	N/A
	Earmarking for distributional equity	N/A

Source: Self-generated

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