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THE CASE STUDY OF INDONESIA'S EMISSION TRADING SYSTEM AND LESSONS LEARNED FOR VIETNAM

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ABSTRACT

Climate change has increasingly become a concerning threat in the past few decades. Aware of this reality, developing nations are actively engaged to mitigate greenhouse gas emissions. One of these engagements is the implementation of emmission trading system. This article aims to compare the effectiveness of Indonesia's and Vietnam's expected emmission trading system to propose policy implications for Vietnamese governments. By using the desk study through analyzing and synthesizing documents, the authors conduct the assessment of these two emmission trading systems against five criteria: environmental effectiveness, economic efficiency, market management, revenue management, and stakeholder engagement. The recent implementation of emmission trading system 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. Similarly, Vietnam's expected emmission trading system has little information to analyze. 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 has increasingly become an existential threat in the past few decades (Kurma et al., 2021; Huggle et al., 2022). The ever-increasing concentration levels of carbon dioxide, CFC, or nitrous oxide are exacerbating the occurrence of natural disasters, diseases, and casualties across nations, demanding urgent attention (Purnamasari and Nurachmah, 2018). Among those, developing countries are proven to be more vulnerable to climate change (Saeed et al., 2023). However, the emissions that developing nations emit grow at a faster rate compared to developed nations and increasingly account for a larger share of the world's emissions (IEA, 2018; Jiang & Liu, 2019).

Aware of this reality, developing nations are actively engaged in endeavors to mitigate greenhouse gas emissions. It is noteworthy that discussions surrounding the establishment of carbon markets, Emission Trading Systems (ETS), or carbon taxation have gained prominence in COP 26 and 27 conferences in view of coping with climate change (World Bank, 2023). Some countries such as Malaysia, Thailand and China have already implemented pilot carbon markets, preparing to launch an official one.

Numerous studies have advocated the notion that employing market-based mechanisms for carbon emission reduction and environmental problem-solving is more cost-effective and efficient than traditional government oversight. (Ted & John, 2005; Yamin, 2012; Jiang, Zhang & Hui, 2023). Regarding modern market mechanism instruments, the Emission Trading System (ETS) is one of the most auspicious ones, owing to its perceived advantages of flexibility, cost-efficiency, and effectiveness. (Tang et al., 2017; Ashurst, 2023; Asia Society, n.d.).

An emissions trading system (ETS) is a policy instrument designed to combat greenhouse gas emissions by imposing restrictions on the number of such emissions (ICAP, 2020; Ian et al, 2022). The primary objective of an ETS is to foster economic incentives for businesses to curtail their greenhouse gas emissions and adopt more sustainable technologies (Jung & Song, 2022). According to the OECD, ETS can be categorized into two types: "Cap-and-trade" and "baseline-and-credit" systems. In a cap-and-trade setup, an upper limit on emissions is set, and permits are either auctioned or allocated. Meanwhile, there is no set cap on emissions under a baseline-and-credit system. Instead, entities that reduce emissions beyond their obligations can earn credits, which they can sell to others who require them to comply with regulations (OECD, n.d.). Additionally, compared to other pricing instruments like carbon taxes and subsidies, which impose clear costs or benefits on emissions, an ETS policy involves a much more complex interplay of rules and designs tailored for different agents and markets (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.

Many studies have utilized desk research methodology to assess the effectiveness of emission trading systems (ETS) across various countries worldwide. Venmans (2012) employed this approach to examine the EU's ETS, evaluating environmental effectiveness, cost efficiency, institutional feasibility, and distributional considerations. Despite divergent estimates for at-risk sectors, trade-related carbon leakage was not observed.

Regarding China’s ETS, Zhao et al. (2016) focused on four criteria: carbon pricing, trade volume, market liquidity, and information transparency. Their findings revealed that the market efficiency of China’s ETS pilots remains unfulfilled due to various factors such as market participants and institutional arrangements. Thomas et al. (2019) assessed China’s emission trading scheme following 10 design aspects of PMR & ICAP 2016 - a handbook published by the World Bank.

To investigate the efficiency of ETS in Korea & Kazakhstan, Howie et al. (2020) identified eight key conditions for emerging market ETS success. Unlike previous studies which mostly concentrated on economic or environmental aspects, this study emphasized mitigation and policy adaptability factors.

Besides, studies utilizing quantitative methods seem to be overwhelming in terms of quantity. Liu & Wei (2016) analyzed climate and energy policies in the EU and China by using the GRACE model. It particularly examined emissions trading and international cooperation.

Employing ARMA, VAR, and GARCH models, Li, An, & Lu (2018) investigated Hebei Province's ETS in China, emphasizing carbon emissions, system dynamics, and driving factors. Their research underscored the importance of technological advancements to achieve emission reduction goals effectively.

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. Their analysis highlighted the highly segmented nature of these markets, suggesting the necessity of integration.

Dissanayake et al (2020) compare the impacts of three carbon emissions mitigation strategies – a carbon tax, a fuel tax, and an emissions trading scheme (ETS) by using the GTAP-E model. The study showed that due to political economy constraints, carbon tax implementation is more practical than ETS in the short to medium term. However, simulation results could be affected by under or overestimated BAU projections used for setting emission reduction targets and tax rates.

Chen, Song, & Wang (2021) examine the carbon emissions trading pilot of 2013 as a quasi-natural experiment. Utilizing panel data from 30 provinces and cities in China spanning 2000–2017, they employ the difference-in-difference (DID) model to explore the precise effects and mechanisms of the carbon emissions trading scheme (ETS) on energy efficiency.

It can be easily seen that 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.

Indonesia stands out with its earnest efforts to reduce greenhouse gas emissions. Its latest commitment under the Paris Agreement, updated in 2021, sets ambitious targets to reduce emissions by 29% unconditionally and 41% conditionally compared to business as usual scenarios by 2030 (PSE UGM, 2021). In 2023, Indonesia officially launched its ETS despite its small focus on the coal-fired industry and became the first nation in SouthEast Asia has this system (The Asia Foundation, 2023).

Similarly, Vietnam has actively participated in various international agreements, including the United Nations Framework Convention on Climate Change (UNFCCC – 1992), the Kyoto Protocol (1997), and the Paris Agreement (2015), with the goal of achieving net-zero emissions by 2050. Vietnam plans to implement a pilot phase for its Emissions Trading System (ETS) in the period of 2025-2027 (Hoai Thu, 2024).

Notably, Vietnam shares a fair amount of similarities with Indonesia. Situated in Southeast Asia, both countries confront significant challenges stemming from climate change and natural disasters, which are particularly severe in this region (Sentian et al., 2022). Furthermore, they share similar developmental trajectories, characterized by emerging

economies and comparable levels of infrastructure and living standards (OECD, 2024). From those commonalities, it is helpful to investigate and evaluate the performance of Indonesia as a reference for Vietnam.

2. RESEARCH METHOD

The framework of evaluation applied in this research has been previously developed with five main criteria: environmental efficacy, economic efficiency, market management, revenue management, and stakeholder engagement, and 18 sub-indicators involved to assess the operation of the ETS in Indonesia and Vietnam (E. Narassimhan et al., 2018). These are the key design considerations to yield robust insights on the performance of the ETS, gathered from publicly available data, reporting by firms and qualitative information. The study employs the method of desk research with thorough revision and analysis of existing literature to classify each attribute into three levels of operation: Low, Medium, or High. The definition of each category and the inclusive sub-attributes will be given in detail together with the evaluation in the following section. Consequently, an overall assessment chart is established from the evaluation results, reviewing the strengths and weaknesses throughout the implementation process and exposing the potential opportunities and threats Indonesia and Vietnam may confront in the evolution of their ETS. Recommendations are drawn for further development of ETS in Indonesia and Vietnam based on current situations.

3. RESULTS AND DISCUSSIONS

The current situation of Indonesia's ETS and Vietnam's expected ETS

The official introduction of the emissions trading system (ETS) in Indonesia on 22 February 2023 was made by the Indonesian Ministry of Energy and Mineral Resources (MEMR) as the first effort of this country to initiate a national carbon pricing instrument. Operating in the power generation subsector, the emissions trading will consist of three stages. The first phase started in 2023 with the establishment of the voluntary pilot program focusing on coal-fired power plants. In the second (2025-2027) and the third phase (2028-2030), the government aims to expand the installations of the system to oil and gas-fired power plants as well as additional coal-fired power plants. By 2025, the carbon tax will be considered to apply to other sectors based on the initial evaluation of the feasibility of transport fuels and/or land use sector. The national carbon offsets will be allowed to facilitate regulated installations towards the goal of compliance. By developing the ETS phase by phase, Indonesia can gradually involve its domestic offsets in international carbon markets and support its Paris Agreement Commitments with result-based finance and voluntary carbon markets.

In Vietnam, carbon trading mechanisms have been established and implemented under the Kyoto Protocol (CDM) and outside the Kyoto Protocol (JCM, REDD+) (Lien et al, 2020). Up to June 2020, Vietnam has launched a total of 257 CDM projects and 13 Programs of Activities registered by the CDM Executive Board, making Vietnam the 4th-ranked country in the world regarding a number of projects, accounting for a total potential GHG reduction during the crediting period of about 140 million tons of CO2 equivalent (CO2eq) (Truong, 2023). For the voluntary carbon market, Vietnam had joined the Joint Crediting Mechanism (JCM) scheme with Japan and the Program on Reducing Emissions Through Reducing Deforestation and Degradation (REDD+), with the production of ten million tons of carbon dioxide credits per year for Japan through 28 projects since July 2013 (Truong, 2023). This facilitates Vietnam to access Japanese energy-saving and emissions-reducing technologies.

Overall, by implementing the current carbon market projects and studies, Vietnam is step-by-step heading to participate in the international carbon market.

Detailed assessment of Indonesia's ETS and Vietnam's expected ETS

Environmental effectiveness

The definition of environmental effectiveness refers to a concept that aims to develop systems, goods, and procedures that benefit the environment over the course of their whole lives (SDCourses, n.d). 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.

Regarding Indonesia's ETS, 99 coal-fired power plants were invited, accounting for 81.4% of the country's national power generation capacity (ICAP, 2023), with 32 ultimately joining. The domestic ETS regulates direct CO2 emissions from coal-fired power plants to 290 million tonnes each year by 2030 (Asia Society, n.d), which makes up only 51% of CO2 emissions in Indonesia (WorldBank, 2023). Although Indonesia has climate and mitigation policies (National laws), they didn't set up EITE exemptions (OCED, 2022). As a result, the coverage of key emitting sectors is rated as low.

Moreover, Indonesia's 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% with international help on financing and technology by 2030 (Asian Society, n.d). The authorities will set top-down goals that dictate the allocation of allowances to each facility based on their electricity generation, with an estimated total allowance valued at 20 million tonnes of CO2. (ICAP, 2023). As a result, the emissions cap is perceived to be high. Moreover, it remains unclear whether Indonesia has implemented any restrictions on the stringency of the emissions cap, implying that it is n/a.

As regards Vietnam's expected ETS, detailed information about the pilot phase and others has not been revealed. However, according to Decree 06/2022/NĐ-CP, the main areas might be target sectors of Vietnam's pilot ETS, namely energy, transportation, construction, and waste treatment. Additionally, the Decree has not included EITE exemption, which implies that the future pilot ETS is evaluated as low in the coverage of the key emitting sector. Thus, the public information about the emission cap and its stringency of cap is not enough for the authors to assess.

Economic efficiency

The economic efficiency of an ETS refers to the effectiveness and optimization of resource allocation in achieving emission reduction goals, which can be evaluated based on three attributes: abatement cost, cost of compliance and cost of administration.

Marginal abatement cost is the charge for reducing negative impacts on the environment, such as GHG emissions (PSE UGM, 2021). By showing the cost of removing one additional unit of GHG emissions, marginal abatement cost will be useful in evaluating policies as it reflects the costs needed to achieve GHG emission reductions generated by the community.

With a target of reducing GHG emissions by 29% from business-as-usual by 2030, Indonesia's marginal abatement cost is estimated at US $42.75 per ton of CO2 (PSE UGM,

2021). Regarding abatement cost, there has not been any official publication for the real statistics of this attribute in Indonesia's ETS system.

Cost of compliance, specifically MRV cost (Monitoring, Reporting, and Verification system) is a critical component of any Emissions Trading System (ETS). Indonesia has established a national MRV system for its measures to reduce greenhouse gas emissions (IKI, n.d). The system, including, among others, specification of monitoring reports; quantification methodologies; reporting periods; verification of reported emissions; government approval of monitoring and verification reports, surrendering of allowances; enforcement of sanctions, and submission of changes to monitoring plans, might help national and sub-national stakeholders integrate existing tools into the new solutions (Lien et al, 2020). The MRV system in Indonesia is complex and involves various sectors and levels of government. Specific statistics on the marginal MRV cost in Indonesia are not readily available.

The administration cost of an Emissions Trading System (ETS) includes the expenses related to the operation of an ETS scheme, such as personnel costs, IT infrastructure, and others (Laing et al., 2013). Indonesia launched the first phase of its national ETS for coal-fired power plants in February 2023 as part of the administration plan. (Asia Society, n.d). However, the administration cost of the ETS system in Indonesia is also not published yet.

In the context of Vietnam, there is not any official publication on the statistics of the abatement cost and administration costs. Also, Vietnam had not yet terminated any guidelines or legal framework for the application of MRV in the reduction of GHG emissions.

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 the method of current allocations, improved allocation practices over time, percentage auctioning, the trajectory of price stability, price signal commitment, system flexibility and current international linkage (Narassimhan, E. and et al, 2018)

Firstly, although Indonesia's Emissions Trading Scheme (ETS) operates in three stages according to the Ministry of Energy and Mineral Resources (2022), only information in the initial phase (2023-2024) has been released recently. Specifically, during Phase I, allowance is distributed freely based on the firm's category and capacity as shown in the Table 1; therefore, the ETS is classified as medium-performing.

Table 1. Classification of emission cap in Indonesia
Source: Ashurst (2023)

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

On the other hand, the gradual adjustment of the emission cap from the initial allocation suggests that Indonesia's ETS performance is moderate. As outlined by the Ministry of Energy and Mineral Resources (2022), starting in 2024, there will be slight change in cap allocation. Specifically, the volume of carbon trading for the following year will be set at 85% of the current year's volume, provided that the current year's trading volume exceeds 85% of the previous year's tradable quota, and vice versa. Regarding the percentage of auctioning, the Indonesian government has not made any official statements regarding the potential adoption of auctions instead of free allocation. Consequently, in this aspect, the ETS is assessed as having a low level of implementation.

Concerning Vietnam's expected ETS, according to Article 12, Decree 06/2022/NĐ-CP, the Ministry of Natural Resources and Environment issues the total greenhouse gas emission quota, reserve cap ratio, and auction for the period 2026 - 2030 and annually. Based on this total greenhouse gas emission quota, the overall target, and the bottom-up results of the greenhouse gas checking in the compliance period, the Ministry of Natural Resources and Environment allocates allowances per product unit for types of production and types of business. The government has considered partial auctioning when operating the ETS pilot in the future, as a result, the method of allocation will be evaluated as high. Regarding improvement over time and the percentage of auctioning, the government has not made any official declaration, so it will be classified as n/a.

Secondly, project owners can establish offering prices (IDX Carbon, 2023), which might result in price variations across projects, but the carbon price remains relatively stable at approximately $4 per tonne, as indicated in the table 2. This stability suggests a high level of performance in terms of price stability. Furthermore, the carbon price on Indonesia's trading platform is significantly lower than that of other markets, such as the European Union ETS, which stands at $68 per tonne (Statista, 2024). In the future, it is anticipated that Indonesia's carbon price will see a substantial increase to at least $30 per tonne to mitigate coal usage (Ordonez et al., 2022).

Table 2. Carbon price record of Indonesia
Source: Reccessary (n.d), IDX Carbon (2024)

Time	Unit Price
September 2023	$4.51
All 2023	$4.01
January 2024	$3.88

Regarding price signal commitment, specific targets must be established in emissions trading and GHG emissions offset before the launch of an emissions trading system, as mentioned by the Ministry of Environment and Forestry of the Republic of Indonesia (2022). Consequently, while the emissions cap target is acknowledged by the authors, no specific number has been made public yet. Additionally, Indonesian authorities aim at stabilize the price by setting a floor price of carbon in the regular market at $1.28 based on the previous day's closing price (Florentina, 2023). However, more information is needed to evaluate the presence of a ceiling price or an allowance reserve in the ETS. Consequently, Indonesia's ETS is rated at a low level in this attribute. Concerning system flexibility, the absence of formal available data about allowance reserves prevents our ability to assess this dimension.

Regarding Vietnam's expected ETS, because the ETS has not been launched yet, liquidity, price stability commitment can not be ranked and will be n/a. According to Article 12, Decree 06/2022/NĐ-CP, the Ministry of Natural Resources and Environment will set a reserve cap ratio annually from 2026 to 2030 which refers to a medium level of system flexibility.

Thirdly, international trading is permitted in Indonesia's carbon trading system. As stated by Florentina (2023), foreign carbon units can be traded in Indonesia's ETS if they are verified by the international registration system and comply with the requirements of OJK as well as other foreign carbon exchanges. This suggests the existence of an indirect link between Indonesia's ETS and others. However, based on current publicly available information, there is no direct linkage between Indonesia's ETS and other emission trading systems, unlike the connection between the European Union ETS and the Swiss ETS (The Dutch Emission Authority, n.d), resulting in a low score in this dimension.

As regards Vietnam, the amount of carbon credits collected domestically and internationally following the provisions of law and international laws to which Vietnam is a member is allowed to trade on the carbon exchange. This implies an indirect link between Vietnam and other emission trading systems when it is officially launched. As a result, in this dimension, Vietnam is expected to rank low.

Revenue management

Revenue management entails managing the company's "interface with the market" to raise revenue. Additionally, it can be seen as a complement of supply-chain management, which deals with the supply decisions and procedures of a company (Talluri & 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.

Revenue from carbon pricing could be used to offset economic losses resulting from increased energy costs. For instance, in Indonesia, a $25 carbon price could lead to a 16 percent reduction in greenhouse gas emissions and generate revenue equivalent to 0.7 percent of GDP (International Monetary Fund. Asia and Pacific Dept, 2022). However, the available data and statistics for evaluating all aspects of revenue management are inadequate and limited in both Vietnam and Indonesia. Therefore, all four elements are characterized as n/a.

Stakeholder engagement

Public information on the policy-making process of Indonesia's Emissions Trading Scheme (ETS) remains scarce, regarding the frequency of meetings and the extent of public participation. This is similar when it comes to the factor "outcomes". However, some fundamental insights about the general status quo could be provided. Indonesia's Emissions Trading Scheme (ETS) has limited stakeholder engagement, with only 99 state-owned coal-fired power plants participating, representing a small fraction of businesses (Asia Society, n.d; Asia Foundation, 2023). Regulatory oversight of the carbon market was concentrated within specific ministries and governmental agencies, notably the Coordinating Ministry for Maritime and Investment Affairs (CMMIA), supported by the Ministry of Environment and Forestry (MoEF), the Ministry of Finance, and the Ministry of Home Affairs (MoHA) (OECD, 2022).

In an effort to address critical aspects of ETS development and implementation tailored to Indonesia's context, the Ministry of Energy and Mineral Resources collaborated with international partners such as the International Energy Agency (IEA) and the Organisation for Economic Co-operation and Development (OECD) to conduct a series of four technical Focus Group Discussions (FGDs) (OECD, n.d). While these discussions purportedly involved a diverse array of stakeholders, including ministries, international experts, universities, think tanks, and private entrepreneurs, the exact influence of these engagements on policy outcomes remains unclear. Moreover, 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 in Indonesia's ETS remains at a low level, characterized by restricted participation, a concentration of decision-making power among specific entities, and a lack of large-scale public meetings and discussions.

In Vietnam, the Emission Trading System (ETS) pilot program is scheduled to be conducted during the 2025-2027 period (Tap chi tai chinh, 2023). According to the Ministry of Natural Resources and Environment, 1,912 enterprises are obligated to inventory GHG emissions and meet emission quotas (Khanh An, 2023). The Department of Climate Change (DCC) under the Ministry of Natural Resources and Environment is primarily responsible for developing regulations and legal frameworks for ETS, with support from other ministries and experts from international organizations such as UNDP and the Federal Ministry for Economic Affairs and Climate Action (BMWK) (Thu Huong, 2024).

The Vietnamese government plans to organize two training courses on the Emission Trading System (ETS) and carbon market for relevant state agencies, organizations, and businesses (VNECC, 2023). The first training session taking place in February 2024 in Hanoi has attracted more than 100 enterprises (Thu Huong, 2024), and the second is scheduled for April in Ho Chi Minh City. Furthermore, the government emphasizes the development of a website and simulation software for ETS to provide knowledge and enhance awareness and readiness among stakeholders regarding ETS (Tap chi tai chinh, 2023).

In general, the Vietnamese government has initially shown its interest in other stakeholders. However, the number of training sessions and the participation of businesses are limited, thereby the impacts remain unclear. Decision-making power is also centralized within certain government bodies. Therefore, in terms of stakeholder engagement criteria, similar to Indonesia, Vietnam is also assessed as low.

Both Vietnam and Indonesia have not yet publicly announced clear regulations on many aspects, such as economic efficiency and revenue management, which prevents their ETS from proving fairness and effectiveness for all stakeholders as shown in the Table 3. Developing a successful ETS requires enduring public and political support (ICAP, 2020). The transparency with which ETS policymakers engage with others in government and external stakeholders will determine the long-term viability of the system. Therefore, in the future, Vietnam and Indonesia need to consider declaring this information.

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.

When examining market management, Indonesia's successful maintenance of stable price levels is what Vietnam can learn from. In specific, the Indonesian government has implemented several policies such as flooring prices. Thus, Indonesia also consistently demonstrates improvements in the allocation of allowances over different phases. Nevertheless, there is room for optimization through the enhancement of its linkage, an increase in the auction percentage, and a stronger commitment to price in both countries.

Regarding stakeholder engagement, both Vietnam's and Indonesia's ETS are evaluated as low, which requires gradual improvement in the future.

Table 3. Overall assessment of Indonesia's ETS and Vietnam's expected ETS

Overall assessment	Attributes	Indonesia's ETS rate	Vietnam's expected ETS rate
Environmental effectiveness	Coverage of key emitting sectors	Low	Low
	Emissions cap to total emissions ratio	High	N/A
	Stringency of cap	N/A	N/A
Economic efficiency	Abatement cost	N/A	N/A
	Cost of compliance	N/A	N/A
	Cost of administration	N/A	N/A
Market management	Method of current allocations	Medium	High
	Improved allocation practices over time	Medium	N/A
	Percentage auctioning	Low	N/A
	Trajectory of price stability	High	N/A
	Price signal commitment	Low	N/A
	System flexibility	N/A	Medium
	Current linkage	Low	Low
Stakeholder engagement	# of meetings per period or comments received	Low	Low
	Outcomes	Low	Low
Revenue management	Revenue raised	N/A	N/A
	EITE earmarking	N/A	N/A
	Green earmarking	N/A	N/A
	Earmarking for distributional equity	N/A	N/A

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.

To ensure the effectiveness of an emissions trading system, it's crucial to consider many of the factors contributing to policy success in the specific institutional and political contexts of each country. One limitation of our approach is its limited consideration of the specific circumstances of individual countries. Another limitation is the lack of data preventing from comprehensive and detailed assessment.

4. CONCLUSIONS AND SUGGESTIONS

Based on existing data collection and analysis, this paper evaluates the performance of the emissions trading system in Indonesia, which has just been implemented in recent years. Pioneering in establishing this carbon trading program among the Southeast Asian countries, Indonesia has made several contributions to reduce the national carbon emissions, yet encountering institutional and regulatory challenges regarding operation efficiency, complex policy framework and the issue of stakeholder engagement.

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.

Some suggestions are put forward so that Indonesia can improve and Vietnam can apply to develop their ETS. It is necessary to gain political support and negotiate to ensure effectiveness when operating the system aligning with conformity to national regulations. Organizing campaigns to reach different stakeholders is critical as a tool for raising transparent awareness and gaining consensus. Also, it is recommended to introduce the scheme through a step-by-step process involving pilot activities to test the functionality, evaluate the effectiveness, and come up with the optimal implementation. Most importantly, cross-border cooperation with countries having developed ETS could be applicable for Vietnam and Indonesia to further enhance their scheme of emission trading.

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