Navigating Towards a Sustainable Future Analysis and Strategy for Carbon Trading in Indonesia

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Abstract. This article explores Indonesia's trajectory towards a sustainable future, explicitly focusing on analyzing carbon trading strategies. Leveraging data from IDXCarbon, the study elucidates opportunities and challenges in adopting carbon trading mechanisms to mitigate climate change impacts by examining market trends, regulatory frameworks, and environmental challenges. This study evaluates Indonesia's carbon market dynamics from January to April 2024, focusing on a comparative analysis of volume, transaction value, frequency, and participation in different types of carbon markets. The data analyzed includes the Main Market, Regular Market, and Other Markets (Auction, Marketplace, and Negotiation). The research identified several opportunities and challenges in developing Indonesia's carbon market. An increase in the number of participants from 48 in January to 57 in April indicates growing interest, although consistency of activity remains a key challenge. Based on these findings, strategic recommendations include improving the consistency of trading activities, developing market stabilization policies, and diversifying products and trading mechanisms to increase market liquidity and participation. This research provides important insights for stakeholders in the carbon sector and the Indonesian government in building a sustainable and efficient carbon market, which aligns with global efforts to reduce carbon emissions and address climate change.

Keywords: Carbon Trading, Climate Change Mitigation, Sustainable Development

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1 Introduction

Climate change is a global challenge that requires immediate action and collaboration from all countries[1][2][3]. As the world's largest archipelago, Indonesia is crucial in climate change mitigation efforts. With its vast tropical rainforests and significant biodiversity, Indonesia is the world's lungs and has excellent potential to contribute to reducing global carbon emissions [4][5]. In recent years, increasing attention has been paid to carbon trading as one of the strategies to reduce greenhouse gas emissions [6]. Carbon trading allows countries or companies that produce emissions lower than a set limit to sell their excess emissions quota to entities with difficulty meeting emissions reduction targets. The scheme is expected to encourage innovation and investment in green technologies while providing economic incentives for countries or companies that successfully reduce their emissions.

In Indonesia, carbon trading is conducted through the Indonesia Carbon Exchange (IDXCarbon), officially launched in September 2023. The business license of the Carbon Exchange Operator has been granted to IDXCarbon by the Financial Services Authority (OJK) through Decree number KEP-77/D.04/2023 [7]. In accordance with OJK Regulation (POJK) Number 14 of 2023 concerning Carbon Trading Through Carbon Exchange, IDXCarbon, as a Carbon Exchange Operator, provides a transparent, regular, fair, and efficient trading system. In addition to price transparency, IDXCarbon trading provides an easy and straightforward transaction mechanism. Currently, there are 4 (four) IDXCarbon trading mechanisms: Auction, Regular Trading, Negotiated Trading, and Marketplace. Carbon trading is still a relatively new concept and requires a deeper understanding and a mature implementation strategy. The challenges faced include regulations that still need to be comprehensive, low public and industry awareness, and the need for adequate supporting infrastructure. Therefore, a comprehensive analysis of the potential challenges and strategies for implementing carbon trading in Indonesia is crucial [7][8][9].

Acceleration of the preparation and harmonization of regulations is needed, especially in the Nationally Determined Contribution (NDC) sectors. Among them are energy, waste, industrial processes, and the use of agricultural products, forestry, and other sectors by developing science and technology, such as blue carbon. Accelerating the preparation and harmonization of regulations related to carbon trading is needed so that Indonesia can capture the enormous economic potential of the market, both through bilateral carbon trading and carbon exchange mechanisms.

The potential for carbon trading in Indonesia is enormous due to its natural resources, especially the abundance of tropical forests, temperate grasslands, and marine and coastal biodiversity (blue carbon) in the form of mangroves, seagrass beds, and seaweed, which can be a source of carbon sequestration and is very important in overcoming the climate crisis. Indonesia's resources, market potential, and demand are significant. However, carbon trading and carbon exchanges have yet to go as expected [10][11]. The obstacle is in the process of drafting and harmonizing regulations, such as those related to carbon taxes and setting carbon emission thresholds in several sectors. In making regulations, KLHK ensures that the measures set in carbon trading can contribute to emission reductions according to the Nationally Determined Contribution (NDC) target in the Paris Agreement [12][13]. Two forms of carbon trading can be done in Indonesia. First, emissions trading. Where what is sold is the

emission limit or emission ceiling agreement. Second, emission offsetting refers to carbon trading by buying and selling emission reduction certificates.

This article aims to examine the dynamics of carbon trading in Indonesia, evaluate its potential and challenges, and formulate effective strategies to achieve a sustainable future through this mechanism. With a holistic approach, Indonesia can utilize carbon trading as a strategic tool in the global effort to address climate change while promoting sustainable and inclusive economic growth.

2 Literature Review

The literature review will cover the basic concepts of carbon trading, international experience in its implementation, and the specific Indonesian context. In this regard, it is essential to understand the existing policy framework, including regulations, carbon markets, and ongoing emissions mitigation projects in Indonesia.

2.1 Carbon Trading.

Carbon trading is a mechanism designed to reduce greenhouse gas (GHG) emissions by creating a market to trade the right to emit [14][15]. This literature review will summarize the basic concepts of carbon trading, including its types, such as cap and trade, carbon offsetting, and carbon pricing. International Experience Several countries have implemented carbon trading systems with varying degrees of success. This review will cover experiences from countries such as Europe (through the European Union Emissions Trading System), the United States, China, and Australia [16][17]. Learning from these international experiences will provide valuable insights into designing and improving Indonesia's carbon trading system [4].

Indonesia Specific Context Indonesia has unique characteristics in terms of geography, economy, and policies that affect the implementation of carbon trading. This literature review will explore the existing policy framework, including environmental, energy, and climate policy regulations. In addition, it will analyze ongoing emissions mitigation projects in Indonesia and specific challenges faced in the local context. Carbon Market Potential in Indonesia Through this literature review, the carbon market potential in Indonesia will be explored, including sectors that could be included in carbon trading, emission mitigation potential, and estimated future carbon market value [18][19]. This assessment of carbon market potential will serve as a basis for designing effective strategies to optimize Indonesia's carbon trading system.

2.2 Carbon Trading Mechanism in Indonesia.

Regular Trading

The trading is conducted by a continuous auction mechanism where all parties can submit their buy and sell offers in real time.

a. Buyers and sellers submit the volume and price of the order.
b. Buy orders will queue in the bid order book; sell orders will queue in the ask order book.

c. The exchange will match the order with price and time priority.
d. The matched price will be the market price.

Negotiated Trading
Facilitate the transparent and secure completion of the previously agreed trades through the IDXCarbon system.
a. Buyers and sellers make deals outside the exchange.
b. Participants submit an arranged volume, price, and counterpart to execute the trade.
c. Settlement will be done in the exchange.

Carbon pricing mechanisms, rooted in the polluter pays principle, are pivotal in fostering a transition towards a greener economy. By facilitating the transfer of capital from businesses with minimal investments in carbon reduction or removal efforts to those demonstrating a proactive commitment to sustainability ("going green"), these mechanisms effectively introduce economic incentives for emission reduction. The implementation of carbon pricing can take various forms, with two prominent methods being trading mechanisms such as allowances and offsets and penalty mechanisms like carbon taxes [9][8][7].

Furthermore, carbon pricing initiatives aim to penalize high emitters and incentivize and reward emission reducers, thus fostering a more balanced and sustainable economic landscape. Over the long term, the widespread adoption of carbon pricing is anticipated to encourage businesses to reevaluate their strategies, steering them towards more environmentally conscious practices. Consequently, this shift is poised to catalyze a broader transition towards sustainability, ultimately contributing to a greener economy characterized by reduced greenhouse gas emissions and enhanced environmental stewardship.

3 Method

This research will use a quantitative descriptive approach to analyze secondary data from various sources [20]. This research analyzes the potential, challenges, and implementation strategies of carbon trading in Indonesia. The methods used include:

a. Literature Study, i.e., this research started by reviewing relevant literature on carbon trading.
b. Descriptive Analysis, i.e., document analysis, was conducted on policies, regulations, and official documents related to carbon trading in Indonesia. This includes government regulations and environmental policies, as well as reports and data from the Ministry of Environment and Forestry, the Environmental Fund Management Agency (BPDLH), and other relevant entities.
c. A SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis was used to identify strengths, weaknesses, opportunities, and threats related to carbon trading in Indonesia. This Analysis helps formulate a comprehensive and realistic strategy.

This research is expected to provide a clear and in-depth picture of the dynamics of carbon trading in Indonesia and formulate effective strategies to achieve a sustainable future.

4 Result and Analysis

Indonesia has great potential in carbon trading thanks to its abundant natural resources, especially the vast tropical rainforests that serve as natural carbon sinks. In addition, a growing renewable energy sector, such as solar and wind power, provides opportunities to reduce carbon emissions significantly. Indonesia's existing regulatory framework is still under development. Some necessary regulations have been issued, such as Presidential Regulation No. 98 of 2021 on implementing Carbon Economic Value for Achieving Nationally Determined Contribution Targets and Controlling Greenhouse Gas Emissions in National Development. However, its implementation still requires adjustments and refinements to be more effective.

4.1 Descriptive Analytics

Tables 4.1 to 4.3 contain data on carbon transactions in Indonesia obtained from IDX Carbon. This data provides information on carbon transactions in the Indonesian carbon market during the first few months of 2024. These transactions include three types of markets: Main Market, Regular Market, and Other Market (Marketplace, Auction Market, and Negotiated Market). A detailed description of each data section follows.

Table 1. Primary Market

Period	Volume (tCO2e)	Value (IDR)	Freq	Participant
Jan-24	7.656	453.233.400	7	48
Feb-24	-	-	-	50
Mar-24	70.046	3.939.504.800	2	53
Apr-24	108	6.350.400	4	57

Source: idxcarbon, 2024

Description:

Period	:	Month and year when the transaction occurred.
Volume (tCO2e)	:	The volume of traded carbon emissions measured in tons of carbon dioxide equivalent (tCO2e).
Value (IDR)	:	The transaction value is in Indonesian Rupiah (IDR).
Freq	:	The frequency or number of transactions that occurred during the period.
Participant	:	The number of participants involved in the transaction in that period.

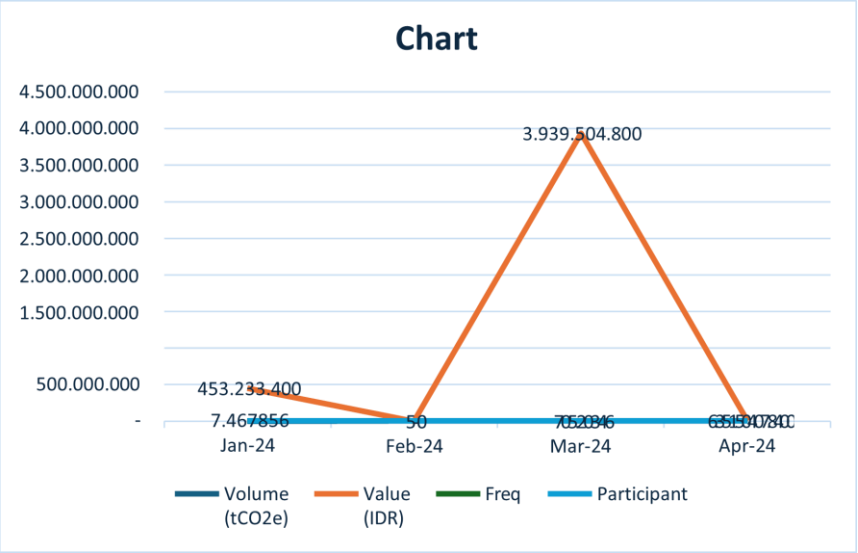

Figure 1. Primary Market
Source: data processed, 2024

Based on table 4.1 and graph 4.1, in January 2024, there were 7.656 tCO2e transactions with a value of IDR 453.233.400 through 7 transactions involving 48 participants. No transactions were recorded in February 2024. Volume, Value, and Freq columns have no data. In March 2024, there were 70.046 tCO2e transactions with a value of IDR 3.939.504.800 through 2 transactions involving 53 participants. In April 2024, there were 108 tCO2e transactions with a value of IDR 6.350.400 through 4 transactions involving 57 participants.

Table 2. Regular Market

Period	Standardized Product (tCO2e)	Open Price (IDR)	Close Price (IDR)	Volume (tCO2e)
Jan-24	IDTBS	59.200	58.800	7.656
Feb-24	IDTBS	58.800	58.800	-
Mar-24	IDTBS	58.800	58.800	46
Apr-24	IDTBS	58.800	58.800	108

Source: idxcarbon, 2024

Description:

Period	:	Month and year when the transaction occurred.
Standardized Product (tCO2e)	:	Standardized traded product, in this case IDTBS measured in tCO2e.
Open Price (IDR)	:	Opening price for standard carbon products at the beginning of the period.

Close Price (IDR) : The closing price for standard carbon products at the end of the period.
Volume (tCO2e) : Volume of standardized carbon products traded in tCO2e.

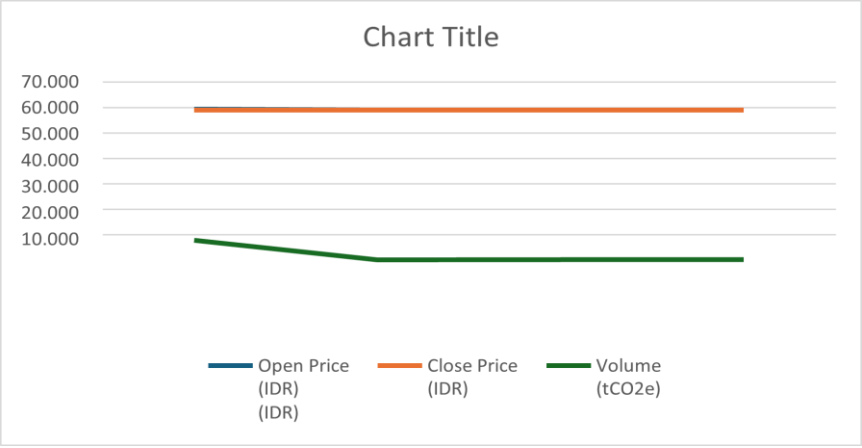

Figure 2. Reguler Market
Source: idxcarbon, 2024

Based on Table 2 and Figure 2, in January 2024, IDTBS products were traded with an opening price of IDR 59,200 and a closing price of IDR 58.800. The transaction volume was 7,656 tCO2e. In February 2024, there was no trading volume in February 2024, although the opening and closing prices remained at IDR 58.800. In March 2024, trading volume reached 46 tCO2e, with opening and closing prices remaining at IDR 58.800. In April 2024, trading volume increased to 108 tCO2e, with opening and closing prices remaining at IDR 58.800.

Table 3. Other Market

Period	Marketplace	Auction Market	Negotiated Market
Jan-24	-	-	
Feb-24	-	-	
Mar-24	-	70.000	
Apr-24	-	-	

Source: idxcarbon, 2024

Description:
Period : Month and year when the transaction occurred.
Marketplace : Volume of trade through marketplace markets in tCO2e.

Auction Market : Opening price for standard carbon products at the beginning of the period.
Negotiated Market : Volume of trading through negotiated markets in tCO2e.

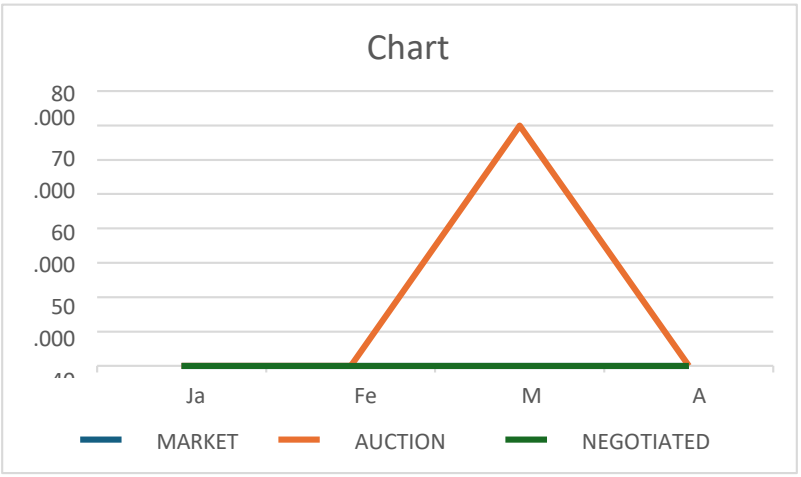

Figure 3. Other Market
Source: idxcarbon, 2024

Table 3 and Figure 3 show that no transactions were recorded in the other three market categories in January 2024. In March 2024, only the auction market recorded a transaction of 70 tCO2e. The Marketplace and Negotiated Market had no transaction volumes. No transactions were recorded in the other three market categories in April 2024.

Based on the data mentioned earlier, several points need attention, which include:

a. Large fluctuations in the monthly transaction volume and value in the Main Market exist. March showed a significant spike, while February did not record any activity. The Regular Market showed a gradual increase in trading volumes month-on-month, although prices remained stable after January.
b. The number of participants tends to increase over this period, although the frequency of transactions is only sometimes consistent. This suggests there may be more participants, but not all are actively involved in trading each month.
c. Activity in other markets was minimal. Only the Auction Market in March showed volume, while the Marketplace and Negotiated Market had no recorded activity.
d. Stable Prices in the Regular Market. Prices of standardized products (IDTBS) remained stable from February to April, although trading volumes fluctuated. This may indicate a controlled market or the absence of significant pressures affecting prices.

4.2 SWOT Analysis

Based on carbon transaction data in the Indonesian market from January to April 2024, the following SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis illustrates the carbon market's strengths, weaknesses, opportunities, and threats.

Table 4. SWOT Analysis of Indonesian Carbon Transaction Data (January to April 2024)

Strengths	Weaknesses
a. Increase in Participants b. Price Stability in the Regular Market c. Activity in the Auction Market	a. Fluctuations in Transaction Volume and Value b. Lack of Activity in Other Markets
Opportunities	**Threats**
a. Increased Interest and Engagement b. Auction and Negotiated Market Development c. Regular Market Stability d. Data Analysis and Optimization	a. Market Volatility and Uncertainty b. Operational and Regulatory Barriers c. Lack of Support for Other Markets d. Macroeconomic Uncertainty

Strengths

a. Participation Growth includes:
   a.1. Increase in Participants, i.e., the number of participants in the Main Market increased from 48 in January to 57 in April. This indicates a growing interest in carbon trading and the potential for further growth.
   a.2. Diversity of Participants, i.e., The sizable number of participants indicates a broad diversity and interest from a wide range of stakeholders, which can support market stability.
b. Price Stability in the Regular Market includes:
   b.1. Consistent price for IDTBS, i.e., the opening and closing price of IDTBS in the Regular Market, remained stable at IDR 58,800 from February to April, after a slight decline in January. This stability indicates a mature and reliable market.
   b.2. Volume Surge in March. In March, transaction volume jumped significantly to 70,046 tCO2e, with transaction value reaching IDR 3,939,504,800, indicating the potential for large-volume trading under certain conditions.
c. Activity in the Auction Market in March with a volume of 70 tCO2e indicates that alternative mechanisms for carbon trading can be further developed.

Weaknesses

a. Fluctuations in Transaction Volume and Value include:
   a.1. Instability in the Main Market. Significant fluctuations in the volume and value of transactions on the Main Market indicate a lack of consistency, which may undermine participants' confidence and long-term interest.
   a.2. Lack of Activity in February. The lack of activity in February indicates the challenge of maintaining continuous and consistent monthly trading. This may be related to external factors such as regulatory or operational barriers.

b. Lack of Activity in Other Markets
   b.1. Inactive Marketplace and Negotiated Markets. The lack of activity in the Marketplace and Negotiated Markets suggests that market participants still need to utilize or accept these trading mechanisms fully.
   b.2. The decline in Transaction Value in April. Meager transaction value in April (IDR 6,350,400) despite a volume of 108 tCO2e, indicating potential pricing issues or suboptimal transaction value.

Opportunities

a. Increased Interest and Engagement include:
   a.1. Growing Interest, i.e., with increased participation, there are opportunities for more education and promotion programs that can increase understanding and engagement in carbon trading.
   a.2. Diversification of Participants, i.e., the increased number of participants indicates the potential to attract more entities from different sectors to participate, including the private sector and government.

b. Auction and Negotiated Market Development includes:
   b.1 Optimization of the Auction Market. Activity in the Auction Market suggests opportunities to develop and optimize this mechanism, perhaps through increased frequency of auctions or more aggressive promotion.
   b.2 Revitalize Marketplaces and Negotiated Markets, i.e., there are opportunities to increase engagement and trading volumes in Marketplaces and Negotiated Markets with additional support or incentives.

c. Regular Market Stability
   c.1 Attractive Price Stability. A regular market that exhibits price stability may attract more investors who seek a predictable and stable trading environment.
   c.2 Future Volume Increase. The upward trend in volumes from January to April in the Regular Market indicates the potential for steady growth in the long term.

d. Data Analysis and Optimization
   d.1 Use of Data for Policy Development. Analysis of historical data can be used to develop policies that support market stability and growth.
   d.2 Increased Transparency and Efficienc in transactions and prices can help attract more participants and improve market efficiency.

Threats

a. Market Volatility and Uncertainty include:
   a.1 Volume and Value Fluctuations. Instability in transaction volume and value can create uncertainty that deters investors and participants from making long-term commitments.
   a.2 Reliance on Specific Months. Reliance on certain months for high activity (such as March) can lead to imbalances and uncertainty in planning and management.

b. Operational and Regulatory Barriers
   b.1 Inactivity in February. Months with no trading activity, such as February, may signal regulatory or operational obstacles that must be overcome to keep the market viable.
   b.2 Potential Policy Changes. Sudden government regulation or policy changes can affect market dynamics and trade stability.

c. Lack of Support for Other Markets
   Weak Marketplace and Negotiated Markets. The lack of activity in the Marketplace and Negotiated Markets suggests a risk that these trading mechanisms may need to be able to support market diversification and growth fully.

d. Macroeconomic Uncertainty. Unstable macroeconomic conditions can affect the participation and value of transactions in the carbon market, especially in global or national economic uncertainty.

The main challenges include 1) Low public and industry awareness of the importance of carbon trading. Intensive education is needed to increase understanding and participation; 2) Infrastructure required to support carbon trading, such as monitoring, reporting, and verification (MRV) systems, is still inadequate; 3) Consistent policies and legal certainty are essential to attract investment in carbon trading; 4) Regulatory uncertainty can hinder the development of carbon markets. 5) Comparative Analysis with other countries shows that the European Union has an established carbon trading system with precise market mechanisms and strict regulations. China has developed a sizeable national carbon market focusing on key emitting sectors. South Korea adopts a comprehensive approach by involving various industries and providing incentives for green innovation.

Indonesia's Comparative Advantages are as follows: 1) Indonesia has the potential to become a significant player in global carbon trading thanks to its vast natural resources and government policies that are starting to lead to emissions reductions. 2) Renewable energy development can be one of the main strategies to reduce dependence on fossil fuels and reduce carbon emissions. Effective Implementation Strategies, i.e., 1) More comprehensive and consistent regulations are needed to support carbon trading. The government must develop a clear regulatory framework, including an effective MRV system. 2) Awareness and Capacity Building, such as Education and training programs, should be improved to increase stakeholders' awareness and capacity in carbon trading. 3) Investment in supporting infrastructure, such as emissions monitoring technology and carbon trading platforms, is essential. 4) Learning from other countries' experiences and forging international partnerships can help accelerate the development and implementation of carbon trading in Indonesia.

Economic and Environmental Impacts include 1) the practical implementation of carbon trading could positively impact Indonesia's economy by attracting green investment and creating new jobs. 2) carbon trading can contribute significantly to greenhouse gas emission reductions, helping Indonesia achieve its climate targets and contributing to global efforts to address climate change.

With these findings, Indonesia has a solid foundation to develop an effective and sustainable carbon market, which will help address the challenge of climate change and drive sustainable economic growth.

1. Strategies to Increase Consistent Activity
   a. It increased Monthly Activity. Pursue strategies to maintain more consistent trading activity throughout the year. This could involve increased incentives or educational programs that explain the benefits of continued participation in carbon trading.
   b. Focus on Months with Low Activity: An in-depth analysis of why February had no activity could provide insights to prevent similar occurrences in the future. This approach may include promotional campaigns or policy changes to address barriers to participation.
2. Other Market Diversification and Promotion include:
   a. Enhancing the Marketplace and Negotiated Markets. Additional promotion and support for Marketplaces and Negotiated Markets can help increase trading volumes in these markets. This may involve the development of digital platforms or incentives for trading through these channels.
   b. Optimize Auction Market Given the booming activity in March; this market could be further developed by adding more auction sessions or offering incentives for participation.
3. Optimizing Participant Participation:
   a. Increasing Participant Engagement As the number of participants increases, providing facilities and support that can encourage more active engagement is essential. This could include training, more transparent market information, or technical assistance for new participants.
   b. Education Program on the benefits of carbon trading and how it works can help attract more participants and increase trading volumes.
4. Price Stability and Transaction Reliability:
   a. Price Monitoring and Analysis, i.e., maintaining price stability as seen in the Regular Market, is essential for investor confidence. Continuous price monitoring and Analysis can help prevent unwanted volatility.
   b. Transaction Audit and Validation, i.e., applying audit and validation to transactions that occur, can help ensure that the recorded transaction value reflects the actual value, reducing the risk of unexplained impairment, as happened in April.
5. Data Utilization and Analysis:
   a. Trend Analysis and Influencing Factors using in-depth data analysis to understand trade trends and influencing factors can assist in strategic planning and decision- making.

b. Data-driven Policy Development from previous months can be used to develop better policies support carbon trading and improve market reliability.

By addressing the challenges and capitalizing on the opportunities, Indonesia's carbon market can grow more consistently, attract more participants and investors, and play a more significant role in climate change mitigation.

Various policy recommendations will be put forward to strengthen the carbon trading system in Indonesia. These include regulatory improvements, capacity building of relevant institutions, fiscal incentives, and promoting innovation in emissions mitigation projects.

a. Strengthening the Regulatory and Policy Framework includes Formulating Clear and Consistent Policies. The government needs to develop more comprehensive policies related to carbon trading, including regulations governing carbon trading mechanisms, incentives for participating companies, and sanctions for emissions violations.
b. Monitoring, Reporting, and Verification (MRV) System. Establish and implement a transparent and accountable MRV system to ensure that reported emission reductions are real and can be independently verified.
c. Awareness raising and education through:
    1. Public Campaign. Conduct a national campaign to raise public and industry awareness of the importance of carbon trading and its environmental and economic benefits.
    2. Training and Capacity Program. Conduct training programs for industry players, local governments, and the general public to improve understanding and skills related to carbon trading.
d. Supporting Infrastructure Development includes:
    1. Emissions Monitoring Technology. Invest in technologies that enable real-time and accurate emissions monitoring, such as emission sensors and integrated data systems.
    2. Carbon Trading Platform. Establish a secure and transparent digital platform to facilitate carbon trading transactions, ensuring liquidity and easy access for all market participants.
e. Economic and Financial Incentives include:
    1. Tax Subsidies and Incentives by providing subsidies or tax incentives for companies that invest in low-carbon technologies or significantly reduce their emissions.
    2. Develop green financing schemes that support emission reduction and renewable energy projects, including microfinance for small and medium enterprises (SMEs).
f. Collaboration and Partnerships include:
    1. International cooperation can be achieved by establishing partnerships with other countries and international organizations to share knowledge, technology, and resources in developing and implementing carbon trading.
    2. Public-Private Partnerships: Encourage partnerships between the government and the private sector in carbon trading projects and other environmental initiatives.

g. Focus on Key Sectors include:
    1. The Energy Sector encourages the transition to renewable energy sources by providing incentives and support for developing renewable energy projects.
    2. The Agriculture and Forestry sector integrates carbon trading with sustainable forest management initiatives and environmentally friendly agricultural practices to reduce deforestation and land degradation emissions.
h. Periodic Monitoring and Evaluation includes:
    1. Policy evaluation is conducted by conducting periodic evaluations of existing policies and regulations to ensure their effectiveness and make adjustments if necessary.
    2. Public Reporting by providing regular reports to the public on the progress and results of carbon trading implementation to maintain transparency and accountability.

By implementing these policy recommendations, Indonesia can strengthen its position and role in global carbon trading, achieve its emissions reduction targets, and promote sustainable economic development. A holistic and collaborative approach will ensure that carbon trading is beneficial for the environment and provides significant economic benefits for the whole society.

Indonesia Carbon Exchange strives to boost carbon trading in Indonesia and encourage companies to pursue decarbonization objectives. Thus, IDXCarbon continually holds events, such as public socialization, seminars, and one-on-one sessions, to promote carbon trading and carbon-neutral practices to wider audiences, including business owners, academics, and other stakeholders. Institutions and related associations as well.

As stated in POJK No. 51/POJK.03/2017, all financial services companies and listed companies must issue their sustainability report. The report should include their carbon footprint calculation and their emissions reduction strategies. To support this initiative, IDXCarbon and the Indonesia Stock Exchange provide various services to their users and listed companies. More seminars, programs, and initiatives will be launched this year, mainly crafted for exchange users and listed companies to create their pathways for a greener business.

5 Conclusion

Carbon trading is one of the critical instruments in global efforts to address climate change and achieve sustainable development. With its rich natural resources and commitment to emissions reduction, Indonesia has great potential to become a significant player in the international carbon market.

Through an analysis of the potential, challenges, and implementation strategies of carbon trading in Indonesia, this article finds that despite various obstacles, such as immature regulations, low public awareness, and inadequate infrastructure, the oppor-

tunity for success remains wide open. Experience from other countries shows that carbon trading can provide significant economic and environmental benefits with the right policies, a transparent monitoring system, and active participation from all stakeholders.

Policy recommendations include strengthening the regulatory framework, increasing awareness and education, developing supporting infrastructure, economic incentives, international collaboration, focusing on key sectors, and periodic monitoring and evaluation. Implementing these recommendations will create Indonesia's compelling and sustainable carbon trading ecosystem.

Overall, carbon trading is a tool to achieve climate targets and an opportunity to drive innovation, green investment, and inclusive economic development. With a strong commitment and targeted strategy, Indonesia can navigate towards a sustainable future and make a real contribution to global efforts to address climate change while reaping economic benefits for the welfare of its people.

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