



MANAGING INTERNATIONAL CARBON TRADING THROUGH COLLABORATIVE GOVERNANCE (INDONESIAN CONTEXT)

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ABSTRACT

Peluncuran pasar karbon (IDX Carbon) di Indonesia pada September 2023 diharapkan dapat mendorong pelaku ekonomi untuk beralih menuju pembangunan hijau. Di pasar ini, para pelaku industri memiliki kesempatan untuk menjual kredit karbon mereka, sementara produsen dengan emisi karbon berlebih dapat membelinya. Terdapat potensi untuk unit karbon yang telah mendapatkan sertifikasi internasional untuk diperdagangkan antarnegara di masa depan. Penelitian ini menguraikan langkah-langkah yang dapat diambil pemerintah untuk terlibat dalam perdagangan karbon internasional serta manfaat yang diperoleh dari transaksi global tersebut. Penulis menggunakan pendekatan kualitatif dan metode analisis konten dalam penelitian ini. Penelitian ini mengungkapkan potensi pendapatan negara dari transaksi perdagangan karbon internasional. Pemerintah dapat memanfaatkan instrumen pajak untuk memastikan bahwa kredit karbon yang tersedia memenuhi kebutuhan domestik sebelum dijual ke negara lain. Disarankan juga untuk membangun sistem pemantauan perdagangan karbon internasional yang melibatkan semua pemangku kepentingan dengan prinsip-prinsip tata kelola kolaboratif. Pada akhirnya, penelitian ini bertujuan memberikan wawasan untuk memantau perdagangan karbon internasional di Indonesia.

The launch of the carbon market (IDX Carbon) in Indonesia in September 2023 is expected to encourage economic actors to transition towards green development. In this market, industry players have the opportunity to sell their carbon credits, while producers with excess carbon emissions can purchase them. There is potential for internationally certified carbon units to be traded between countries in the future. This study outlines the measures the government can take to engage in international carbon trading and the benefits derived from these global transactions. The author utilized a qualitative approach and content analysis method in this study. The research revealed the potential for state revenue from international carbon trade transactions. The government can utilize tax instruments to ensure that available carbon credits meet domestic needs before being sold to other countries. A monitoring system of international carbon trading is suggested involving all stakeholders with collaborative governance principles. Ultimately, this study aims to provide insights for monitoring international carbon trade in Indonesia.

1. INTRODUCTION

In 2021, the Indonesian government proposed to amend the General Provisions and Tax Procedures Law (KUP) to require green economic progress by imposing a carbon tax.

Indonesia has committed to carbon neutrality by 2060 by implementing a carbon tax, included in The Law on Harmonization of Tax Regulations (Prabawani et al., 2024). The government collects carbon tax from those who create carbon outflows. Polluters pay the levy based on the environmental damage caused by

pollution. Therefore, this levy is expected to reduce the level of carbon emission outflows in Indonesia. Furthermore, the social cost of carbon emissions resulting from polluters' payments can be transferred based on a proportion to address negative externalities (Jaelani et al., 2024).

Moreover, the government formally expressed that climate alteration is one of the issues in its national improvement. Climate change happens because of the overabundance of carbon outflows and

less accentuation on the green economy. The soul of diminishing carbon outflows as the portion of a green economy is also expressed within the 2020-2024 National Medium-Term Advancement Arrange (RPJMN) (Saputra et al., 2022).

Based on the Nationally Determined Contribution (NDC), Indonesia has set a target of reducing emissions in 2030 of 29 percent with its own efforts and 41 percent with foreign assistance, with the projected base year being 2010 (Indonesia, 2016). The establishment of the Nationally Determined Contribution is a follow-up to the Agreement signed on April 23, 2016 in Paris, France by 195 UN member states, including Indonesia. The agreement is known as the Paris Agreement (Matheus et al., 2023). The reduction of Greenhouse Gas Effects aims to protect the environment from the negative impacts of global warming and climate change. Furthermore, the target of reducing emissions by 29 percent which will be carried out independently through the State budget and the participation of local governments, the private sector, and State-owned enterprises without international assistance requires the right strategy (Saputra et al., 2022).

On September 26, 2023, the Indonesian Stock Exchange started the Indonesia Carbon Exchange (IDX Carbon). This is an important step for Indonesia in its goal to have no net emissions by 2060. The IDX Carbon was introduced about two years after President Joko Widodo made a rule called Presidential Regulation Number 98 Year 2021. This rule is about a system for pricing carbon to help the country meet its goals for reducing greenhouse gases and environmental impact. It is often called the Carbon Pricing Regulation. Carbon Pricing means putting a price on each unit of greenhouse gas (GHG) that is released from human actions and economic activities (PWC, 2023).

The carbon tax set in 2021 is the Indonesian government's choice to reduce carbon emissions. Data shows that in the previous year, in 2020, there were 61 carbon pricing programs being used or planned. This included 31 cap-and-trade systems and 30 carbon taxes (World Bank, 2020). Financial Services Authority (OJK) Regulation Number 14 of 2023 regulates the governance of trade in the capital market sector to organize Carbon Trading through the Carbon Exchange. Furthermore, carbon trading organizers are required to first obtain a business license from the Financial Services Authority. Therefore, with various existing regulations and regulations on carbon exchange governance issued by OJK, Indonesia launched a carbon exchange in 2023.

In the carbon market, the price for carbon emissions, called carbon emission allowances, is a new product that people can buy and sell like any other item. So, the predictions for carbon prices can help individual investors manage risks when they join the carbon market. They can also help policymakers understand how stable the carbon market is. For example, businesses can buy or sell permission slips

for emissions and future ones to save money. So, improving how we predict carbon prices is very important and needs to be addressed quickly to help the carbon market grow healthily (Hao & Tian, 2020).

Based on the IDX Carbon Monthly Report, in July 2024 there are 3 projects whose carbon units are ready to be traded. The available carbon quota is 1,359,388 tons of CO₂e with an average transaction price of IDR51,580 per ton of CO₂e. This price is far above the carbon tax rate stated in the HPP Law of IDR30,000. Currently, Indonesia does not have a verified methodology that refers to international standards in carbon regulation. If in the future carbon units in Indonesia can be transacted internationally, then efforts are needed from the government to ensure that the national carbon emission reduction target can still be achieved. This study explores the efforts that can be made by the government in dealing with international carbon trading and the benefits obtained from these international transactions. The government can use taxation instruments (Saputra, 2021; Saputra et al., 2022) to achieve the 2030 carbon emission reduction target.

2. LITERATURE REVIEW AND HYPOTHESIS

2.1. Carbon Pricing

According to the World Bank, there are three types of direct carbon pricing: emissions trading system (ETS), carbon taxes, and carbon crediting mechanism (World Bank, 2024). These systems allow countries to trade things like carbon credits to help them achieve their emission reduction goals. International carbon pricing became more popular with the Kyoto Protocol in 1997. This agreement aims to reduce greenhouse gas emissions from developed countries. This is done through local action or three flexible ways: buying and selling emission permits, collaborating on projects, and helping to develop cleaner projects in other countries.

Carbon pricing policies (CPPs) are important tools used to help fight climate change. Charging for carbon, either through a carbon tax or an emissions trading system (ETS), encourages people and businesses to choose options that produce less carbon. It allows the market to find the best and cheapest technologies and solutions (Steinebach et al., 2021). Carbon pricing, which can be a system where parties trade emission rights or a tax on carbon emissions, is seen as an important tool to tackle climate change. It helps to meet the Paris Agreement goal of keeping the rise in global temperature below 2 degrees Celsius (Bureau et al., 2019; Lilliestam et al., 2021).

Carbon prices can be shown through tools like carbon taxes, which charge a set amount for each extra ton of carbon dioxide. There are also methods like carbon emissions trading that focus on limiting the to Many economists now believe that countries should be allowed to choose any way to reduce carbon

emissions—like a tax, a cap-and-trade system, or a combination of methods—as long as it follows a global standard for carbon pricing. For example, the total amount of carbon taxes, special taxes on energy use, and tradable pollution permit the total amount of emissions (Haibara, 2020). Most of the points talked about both kinds of carbon pricing.

Carbon pricing raises the cost of production. Authorities enforce carbon taxes or emissions permits, leading to increased prices for essential items like electricity. Additionally, carbon pricing significantly affects the competitiveness of countries, industries, and companies compared to others. The term "carbon pricing" encompasses various methods for charging greenhouse gas emissions, including emissions trading systems, carbon taxes, and taxes on fossil fuels (Venmans et al., 2020). Carbon taxes are extra fees added to the use of fuel or energy. In ETSs, the government puts a limit on how much pollution can be released. Allowances are given to companies that follow the rules of the program, either for free or through bidding (Green, 2021).

This study mainly looks at the ETS because it explains the carbon market rules that started in Indonesia in December 2023. The ETS started in Europe. The European Union Emissions Trading System started in 2005 to lower greenhouse gas emissions (Dutta, 2018). The plan aims to help the European Union meet its goals for cutting down pollution as promised in the Kyoto Protocol. It has become the biggest market for trading pollution permits and is a key influence on the global carbon market (Dutta, 2018; Viteva et al., 2014).

2.2. Carbon Market

The European Union Emissions Trading System (EU ETS) started in January 2005. It is a major part of the worldwide carbon market and is the largest carbon trading market to date (Zhang et al., 2018; Zhu et al., 2017). Later, The 2015 Paris Agreement gives more importance to putting a price on carbon. Article 62 lets countries trade "internationally transferred mitigation outcomes." This means if a country reduces its emissions more than it promised in the Paris Agreement, it can sell the extra reductions to another country. Article 64 establishes a new international carbon market managed by the United Nations, aimed at promoting sustainable development. It takes the place of the Clean Development Mechanism (CDM), which was the system for carbon offsets set up by the Kyoto Protocol (Green, 2021).

Since 2011, China has tried out carbon emission trading in five cities (Beijing, Shanghai, Tianjin, Chongqing, and Shenzhen) and three provinces (Hubei, Guangdong, and Fujian) (Weng & Xu, 2018). Since 2013, the prices of carbon in China's emissions trading pilot programs have changed a lot (Lyu et al., 2020). For example, in the Shenzhen carbon market, the highest price ever was 130.9 ¥ per ton, and the lowest price was just 15.67 ¥ per ton. Right now,

carbon prices are low in China, with an average of about 22 ¥ for each ton. However, it costs 345 ¥ for each ton to reduce emissions to meet their goals. Next, in 2016, the federal, provincial, and territorial governments of Canada started creating a plan to reduce greenhouse gas emissions by 30% compared to 2005 levels by the year 2030. Following the idea that charging for carbon pollution is a smart way to lower emissions (Aldy, 2017; CPLC, 2024), one part of the plan is to create a national carbon price for all of Canada. (Mascher, 2018).

Ji et al., (2021) emphasized that carbon prices are determined based on the cost of reducing carbon emissions by a small margin. The Marginal Abatement Cost (MAC) approach represents the additional funding required to decrease greenhouse gas emissions by 1 ton within a specific timeframe. Typically, MAC analysis is utilized to assess the agricultural sector's potential to mitigate greenhouse gas emissions (MacLeod et al., 2010).

2.3. Export Duty and Taxes

According to Law Number 17 of 2006, which changed Law Number 10 of 1995 about Customs, export duty is a fee that the government charges on goods sold to other countries. Export duty is a levy on goods sent to other countries. It is meant to help meet local needs, protect natural resources, prevent big price hikes for some goods in the world market, and keep prices stable for certain items at home. So, the export duty mentioned in this article is to safeguard our country's interests, not make it harder for our products to compete in the global market. Furthermore, Finance Minister's Regulations (PMK) Number 39/PMK.010/2022, 123/PMK.010/2022, and PMK 71 of 2023 specifically mention commodities such as cocoa beans, palm oil products, and minerals as subjects of export duties. Sanchez-Ugarte (1987) argues that export duties not only serve as a significant source of revenue for developing countries but can also function as an alternative to income tax for exporters, thus making a substantial contribution to the country's revenue structure. Indonesia's export duties are subject to frequent changes influenced by factors such as the type of commodity, prevailing global market conditions, and government policies. While specific rates can vary significantly over time, the table below provides a general overview of how export duties are structured in Indonesia.

Table 1. Export Duty Rates in Indonesia

Commodity	Export Duty Rate
Cocoa Beans	0-15 %
Palm Oil Products	0-262 US\$/MT
Processed Minerals Products	0-5%
Leather	15-25 %
Wood	2-15 %

Source: PMK 71 of 2023

Moreover, under the Harmonized Commodity Description and Coding System, coal, metal minerals, and non-metal minerals exported by individuals or entities with mining business permits are subject to a 1.5% tariff. This export income tax, as outlined in PMK-34/2017, along with export duties, constitutes a comprehensive fiscal policy aimed at boosting government revenue and protecting domestic industries. There have been many discussions about tax policies and politics. But taxes are seen as a way for the government to make money (Gans et al., 2017). Taxes help manage the government's money and also set rules for behaviour (Mardiasmo, 2016). The first function shows how taxes are important because they give the government money to pay for its spending. At the same time, the second role means that taxes can be used to help control things for the public. Taxes can be understood by looking at how they affect the money a state makes and the overall economy of the country (Laffer, 2022). The Laffer curve explains that changing tax rates, whether increasing or decreasing them, has two main effects: simple mathematical effects and economic effects. In the arithmetic effect, when tax rates go up, the government will get more money. If the tax is reduced, the state's income will also go down. Likewise, Article 22 export income tax can be a source of state revenue and control foreign trade transactions.

2.4. Collaborative Governance

Ansel, in *The Oxford Handbook of Governance* (2012), says that working together in governance is a method that has many advantages. People involved can find ways to help each other, build trust and understanding, share knowledge, work together more efficiently, and make their decisions seem more acceptable. Collaborative governance is tailored to meet the user's goals and uses language specific to different areas. Jung et al., (2009) define Collaborative Governance as the way various organizations work together to solve public problems that one organization alone cannot fix. Collaborative governance occurs when government agencies work together as groups. These groups help make decisions about public policies, manage public programs, and manage public resources (Ansell & Gash, 2008). This includes forming teams, leading efforts, helping each other, managing the work, and overseeing the whole process.

The Ministry of Finance of Indonesia has adopted a collaborative governance approach to state financial management, particularly in the area of state revenue. The regulation used by the apparatus to conduct collaborations among stakeholders is Decree of the Minister of Finance Number 667/KM1/2022 (KMK 667/2022) concerning Amendments to Decree of the Minister of Finance Number 210/KMK.01/2021 concerning the Reform Synergy Program in the Framework of Optimizing State Revenue. Therefore, the Ministry of Finance has experience implementing

cooperation with various parties to realize shared goals.

3. RESEARCH METHODOLOGY

This study suggests using a method that focuses on describing things in detail. Qualitative research helps us understand social events from the viewpoint of individuals or communities (Cresswell & Creswell, 2009). Qualitative research helps researchers gather specific information using methods like detailed interviews, group talks, watching people, analyzing written content, using pictures, and studying people's life stories (Hennink et al., 2011). Qualitative research is a way to explore and understand topics in detail, using different methods that the researcher thinks are needed. The authors believe that this research model can find key factors that might not have been measured before. This research is a descriptive study that analyzes documents such as laws, rules, and scientific studies.

This method helps researchers examine much text information (Sekaran & Bougie, 2016) by following certain steps to draw correct conclusions (Smith, 2003). The authors examined the information in this study based on the steps for content analysis described by Krippendorff (2004). These parts include breaking things down into units, taking samples, writing things down, summarizing, drawing conclusions, and narrating. The data collected is secondary in the form of papers, regulations, or reports published by credible agencies. Researchers also collect data on websites and up-to-date news about carbon pricing in Indonesia to complete the written data. In data processing, the author uses a content analysis approach, which is then analyzed to obtain conclusions.

The framework of thinking in this study is as follows: First, the authors determine levies following existing regulations on international carbon trading transactions. Second, the study calculates the potential state revenue from carbon credit sales transactions abroad. The calculation of potential revenue starts with determining the tariff and quantity of carbon units sold. Finally, this study will design a system to monitor international carbon trade activities involving stakeholders. The monitoring information system will be used to oversee carbon trading export activities.

4. RESULTS AND FINDINGS

4.1. Proposed Duties and taxes imposed

A carbon certificate contains carbon units obtained from carbon credits, which can be traded. To reduce carbon emissions, it is important to restrict other countries' purchase of carbon credits. This restriction aligns with the intention behind imposing export duties on various commodities. Mardiasmo (2016) states that taxes have two main functions: budgetary and regulatory purposes. This is why duties and taxes can be used as tools to regulate carbon certificates in international trading.

The Indonesian President mentioned during the launch of the carbon market that the estimated carbon exchange potential exceeds IDR3,000 trillion or USD193 billion. Indonesia stands to gain significant economic benefits from the emerging carbon market, aligning with the global shift towards a greener economy (Cabinet Secretary, 23092023). The Institute for Essential Services Reform (2023) stated that it is important to maintain a balance between supply and demand, as there is potential for carbon leakage if prices are not competitive. As a result, domestic companies may not benefit from the incentives the carbon market provides.

International trade transactions will be exciting in the future. Therefore, the government must ensure that transactions are balanced with the need for emission reductions within the country. Carbon credits must be maintained so other countries do not claim them through carbon trading. State levies must be given to regulate carbon credit owners to consider carefully before selling their carbon units abroad.

In accordance with the Customs Law (Indonesia, 2006) and Income Tax Law (Indonesia, 2008) in Indonesia, the Indonesian Government is authorized to apply export duties and income tax (PPh) article 22 on exported goods. It is aimed at regulating the international trade of green certificates by imposing export duties and income tax. The export duty rates in Indonesia range from 0 percent to 25 percent. For specific goods like cocoa beans and wood, the rates fall within the 0-15 percent range. This study suggests an export duty rate of 7.5 percent, which is close to the 10 percent import duty rate on general imported goods. The calculation of potential tax revenue from export duties is based on the 7.5 percent value. moreover, the PPh article 22 rate applicable to general transactions is 1.5 percent of the transaction value.

4.2. Potential revenue

According to the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.71/Menlhk/Setjen/Kum.1/12/2017 concerning the Implementation of the National Climate Change Control Registry System, there are four mitigation areas for greenhouse gas reductions: energy; land use, land use change, and forestry; agriculture; industrial processes and product use (IPPU); and waste. In the energy sector, as seen in the table, the targets and achievements of greenhouse gas reductions from 2019 to 2023 have consistently shown a surplus.

Table 2. Energy Sector Greenhouse Gas Reductions

Year	Target (million ton CO ₂)	Realization (million ton CO ₂)	Surplus (million ton CO ₂)
2019	51	54,8	3,8
2020	58	64,4	6,4
2021	67	70	3

2022	91	91,5	0,5
2023	116	127,67	11,67

Source: processed by the authors (2024)

International carbon offsets can facilitate trade between countries, enabling those with excess emissions to purchase credits from nations that have reduced their emissions below their Paris Agreement targets (MacDonald & Parry, 2024). The potential for international trade in surplus greenhouse gas reductions from the energy sector is significant. This is supported by PRESS RELEASE SP. 047/HUMAS/PPIP/HMS.3/03/2024, which outlines plans to establish an international carbon market in 2024. The Minister of Finance at the G20 also stated that the excess carbon credit achieved beyond the NDC target is estimated to be quite large, thus it can be traded in the global market (antaranews, 2022). This study attempts to calculate the potential state revenue from export duties and taxes in the context of imports. The data is based on the carbon surplus value issued by the Ministry of Environment and Forestry. The assumption of carbon units sold abroad is the total of all surpluses in the calculation year. There are two scenarios in the calculations: the use of carbon prices according to regulations and carbon prices on the IDX Carbon market. The levies imposed on the sale of credit carbon certificates in international trade are export duties and 2 Income Tax Article 2.

Scheme I

Total carbon credit surplus :	11,67 million ton CO ₂ e
Export duty rate :	7,5%
Income tax article 22 rate :	1,5%
Carbon unit price :	IDR3.000 per ton CO ₂ e
Unit carbon (100%) exported	11.670.000 ton CO ₂ e
Value unit carbon exported (30.000 IDR x 11.670.000 ton CO ₂ e)	350.100.000.000 IDR
Import taxes(1,5%x article 22 (IDR350.100.000.000))	5.251.500.000 IDR
Export duty (7,5% x IDR355.351.500.000)	26.651.362.500 IDR
Total potential revenue	39.902.862.500 IDR

According to the Harmonization of Tax Regulations Law (UU HPP), there is a tax of Rp 30,000 per ton CO_e. The potential state revenue from this tax is IDR 39,902,862,500, assuming that all excess carbon credits in the energy sector are sold abroad. Additionally, the export duty rate is 7.5 percent and the income tax is 1.5 percent.

Scheme II

Total carbon credit surplus :	11,67 million ton CO ₂ e
Export duty rate :	7,5%

Income tax article 22 rate	:	1,5%	
Carbon unit price	:	IDR51.580	per ton CO ₂ e
Unit carbon exported (100%)		11.670.000	ton CO ₂ e
Value unit carbon exported	(51.580 IDR x 11.670.000 ton CO ₂ e)		IDR 601.938.600.000
Import taxes article 22	(1,5%x IDR350.100.000.000)		IDR 9.029.079.000
Export duty	(7,5% x IDR355.351.500.000)		IDR 45.822.575.925
Total potential revenue			IDR 54.851.654.925

Based on the average carbon unit price of IDR 51,580 in July 2024, as issued by IDXCarbon Indonesia, the potential revenue from exported carbon units is approximately IDR 54.8 billion. It's important to note that the price of carbon units may fluctuate over time. Therefore, if the price increases, the potential revenue will also increase.

4.3. Carbon Trading Monitoring System

Given the potential of carbon tax in the future, it is essential for the government to build such infrastructure which can provide a verifiable assurance of information and data. Thus, collaboration which involving multiple stakeholders in monitoring carbon unit trading transactions, particularly those involving exports abroad is needed. The stakeholders include IDXCarbon, a recognized carbon market in Indonesia; OJK, which regulates carbon trading in Indonesia; the Ministry of Environment and Forestry (KLHK), which verifies carbon credit certificates; and the Ministry of Finance as the authority collecting export duties (Directorate General of Customs and Excise/DJBC) and income tax (Directorate General of Taxes/DJP). To establish collaborative governance among these stakeholders, real-time data integration is necessary for monitoring carbon trading. This monitoring system is in line with the OECD's guidelines on Tax Control Framework which emphasis on disclosure and transparency (OECD, 2016).

As described by Turban & Volonino (2011), data is a description of products, people, events, activities, and transactions that are recorded, classified, and stored. Data is information created and maintained for quality, reliability, and integrity to provide useful insights. Ensuring data reliability and integrity serves as a shared capital for monitoring carbon trading transactions. The purpose of this monitoring system is not only for storing data base but also as a control risk mechanism which compare data from all stakeholders and processed through further analysis as shown in Figure 1 (Appendix I).

Figure 1 gives an overview of the process for establishing an international carbon trading monitoring system. The Ministry of Finance will

oversee the data warehouse to comply with the confidentiality requirements for taxpayer data as mandated by the General Provisions of the Taxation Law. All stakeholders will have access to the general data through the application interface. Generally, this monitoring system use the input - process - output model (IPO model) in processing information which regarded as basic sequence of data processing. However, agencies can collaborate by conducting joint supervision or inspection of international carbon trading actors suspected of committing irregularities in recording, reporting, and paying government levies.

The data flow in the Enterprise Architecture for the Data Service System can be seen in the data contribution by all agencies. The inputted data must be combined with the appropriateness of the required elements. The existing data elements are made with the following data types.

Table 3. Data Element Type

Agency	Input	Data Type	Unit
DJP	Carbon Unit sold	Float	tonCO ₂ e
DJP	Tax Paid (PPh article 22)	Float	IDR
DJBC	Carbon Unit Export	Float	tonCO ₂ e
DJBC	Export Duty paid	Float	IDR
OJK	Sustainability report	Float	tonCO ₂ e
OJK	Carbon unit sold report in IDXCarbon	Float	tonCO ₂ e
KLHK	Carbon available	Credit Integer	tonCO ₂ e
KLHK	Carbon emission quota	Integer	tonCO ₂ e

Source: processed (2024)

First, all data from different sources that inputted by all stakeholder into monitoring system such as carbon unit sold tax report, tax paid, carbon unit export report, export duty paid, and carbon credit will be extracted. Furthermore, these data will be transformed into specific format to meet the operational needs This step will also prevent double input data from each stakeholder by using actions like data cleansed and mapped to ensure the quality and integrity of data. Next, the converted data will be loaded into data warehouse. Using logical data warehouse, each data will be separated into data mart depends on the need of the stakeholders to meet all of their varying analytics requirements. Finally, using business intelligence environment, the data will be analyzed by using several actions depend on the purpose of analyzing. For example, descriptive analysis will be used to figure out which sector has the most carbon credit used, what is the carbon price trends, which country has the most carbon export and etc.

Diagnostic analysis will be used to understand why something or anomaly has happened, for

instance, it could help stakeholders draw correlations between the issue (struggling to export carbon) and factors that might be causing it (e.g. project costs, regulatory, limited customer, etc.). This action will help stakeholders to take the right treatment to tackle the issue for example KLHK with revised regulation, DJP and DJBC with some tax or custom incentives, or OJK with carbon price regulation/scheme in order to maintain carbon market price. Moreover, predictive and prescriptive analysis will be used to identify the future of carbon tax trends based on historical data and what recommendations will be proposed for the future.

The information provided in Figure 1 and table 3 illustrate the cooperation among government agencies in overseeing carbon credit data, transaction quantity, and carbon unit transaction value. This data can be cross-referenced with the information reported in tax returns and the amount of import tax paid. This joint monitoring will help to scrutinize all transactions to ensure that potential tax revenue is maximized. Additionally, the Indonesian government can use this collaborative system to establish the limit of carbon units that can be sold abroad. This integrated information system will also guarantee that the sale of carbon units remains within the limits set by the government. Ultimately, this data integration will ensure that carbon trading does not impede Indonesia's efforts to reduce carbon emissions and will boost state revenue from import taxes.

KMK 667/2022 mandates every agency under the Ministry of Finance to collaborate for the benefit of state financial management. Opportunities for cooperation in the decision of the Minister of Finance are also opened by involving other ministries and institutions. Therefore, a collaborative task force can be formed to supervise international carbon unit trading transactions. The complexity of measuring carbon emissions, the transaction of surplus quotas certificates, and the payment of carbon pricing require data exchange between several agencies (Saputra et al., 2022). The task force's teamwork shows that tax collection involves DJBC and DJP. Measuring carbon credits depends on IDXCarbon or sustainability reports overseen by the Financial Services Authority (OJK). The Ministry of Environment and Forestry is responsible for measuring the actual amount of carbon produced, expired, and available by companies.

5. CONCLUSIONS

The Indonesian government can benefit from managing international trade in carbon units. Collaboration between agencies is needed to handle this. The government must remain focused on the NDC target in 2030, but also not miss the potential for state revenue from the export of carbon units available from carbon credits by business actors. By imposing export duties and import taxes, fluctuating carbon unit prices in the market can contribute to state revenue.

The government's commitment to launching IDXCarbon must be immediately greeted with the issuance of regulations regarding transaction supervision aimed at international demand. International certification as a transaction requirement needs to be accommodated by stakeholders. However, regulations regarding trade supervision and the determination of levies by the government must be processed simultaneously with the certification efforts. Data shows that carbon credits in Indonesia are increasing from year to year. Therefore, it is a must to benefit from this condition.

6. LIMITATIONS.

This research employs a qualitative approach by analyzing documents, research papers, and regulations. The carbon credit data utilized is solely derived from the carbon surplus in the energy sector. The carbon surplus in the energy sector is gathered from KLHK directly from the official website. Additionally, the assumptions concerning export tariffs and taxes are also based on moderate considerations. A collaborative task force is proposed based on Decree of Ministry of Finance and need to be escalated as Presidential Regulation or Laws. Notably, Indonesia has no specific regulations regarding the international trading of carbon credit certificates. Therefore, this study could serve as valuable input for the development of rules in the field of global carbon trading. Furthermore, academics can utilize this study to understand how taxes can play a significant role in regulating carbon trading transactions.

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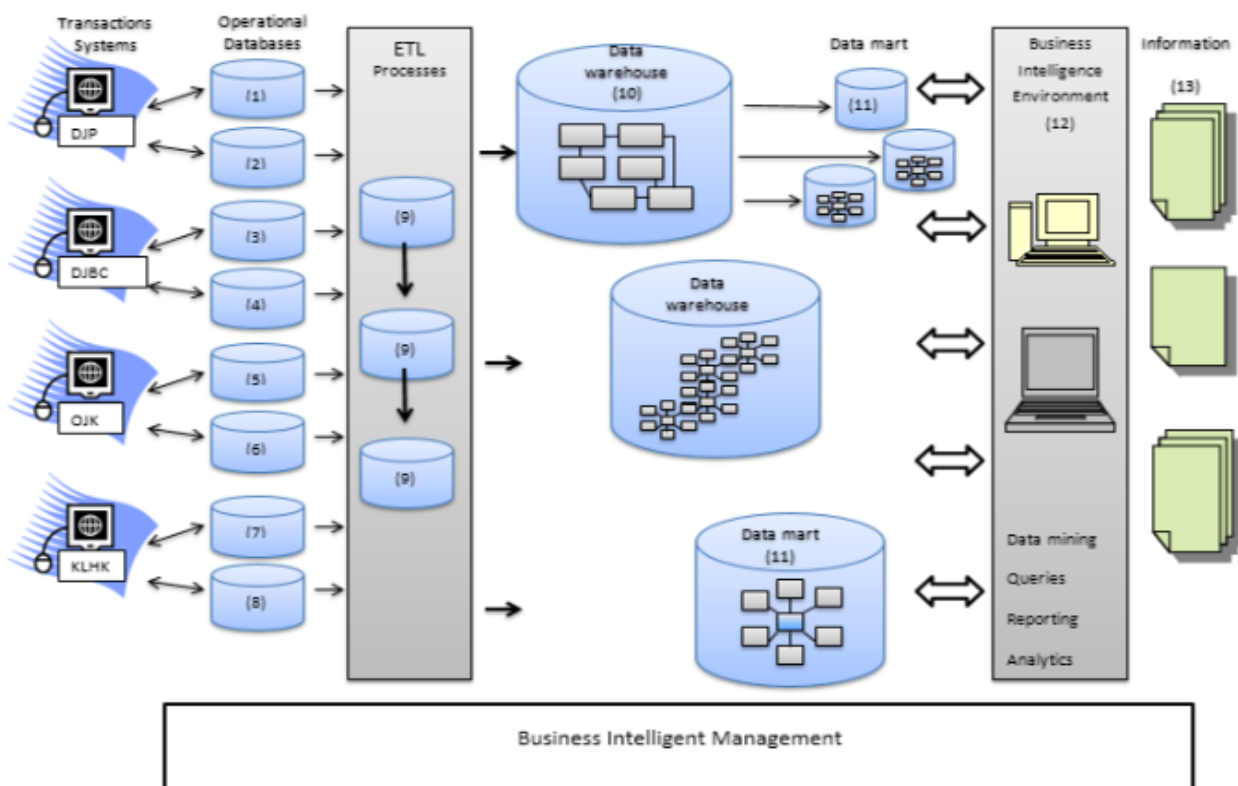
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APPENDIX I

Figure 1. Enterprise Architecture for Data Service System



Source: adapted from (Turban & Volonino, 2011)

Marks;

1. Carbon Unit sold tax report
2. Tax paid input (PPh article 22)
3. Carbon unit export report by taxpayer input
4. Export Duty paid input
5. Sustainability report input
6. Carbon unit sold report in IDXCarbon input (quantity and price)
7. Carbon Credit available report input
8. Regulation of carbon emission quota input
9. Data of interest are extracted, transformed and loaded into a standard format
10. Data loaded into the warehouse
11. Data warehouse structure consists of multiple data marts that focus on a single subject (or functional area)
12. Joint dashboard for every party, available for access, report and analysis
13. Information of a certain taxpayer, integrated, reliable and updated

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