

# Environmental, Social and Governance implementation in Indonesian ports.

## A qualitative approach and its impact on global sustainability

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**Abstract.** *The main aim of this study is to investigate the incorporation of Environmental, Social, and Governance (ESG) concepts into the operational structure of Indonesian Ports, with a specific emphasis on Port Indonesia. The research methodology employed in this study was qualitative, involving comprehensive literature studies and analysis of secondary data sources. The*

*data collection entailed compiling information from various sources, including scholarly journals, company reports, and official government documents. The gathered data underwent a thorough and systematic analysis to uncover and comprehend pertinent patterns, issues, and connections about the research subject. The results indicate that the Port of Indonesia has achieved notable progress in achieving economic sustainability, as seen by its consistent improvement in important financial indicators throughout the previous three years. Nevertheless, the findings about environmental sustainability and community engagement exhibited a heterogeneous trend, wherein specific locations showed noteworthy dedication while others showcased a need for more consistency. The data presented demonstrates a solid commitment to social sustainability, as seen by the company's concentrated endeavors to improve community involvement and promote the welfare of the local population. The Port of Indonesia has exhibited a solid dedication to Environmental, Social, and Governance (ESG) principles, specifically emphasizing economic sustainability. Despite experiencing volatility, the environmental and local participation components have displayed an overall tendency of persistent dedication toward improvement. Maintaining consistent focus on these elements and ongoing surveillance and documentation is essential to ensure long-term sustainability and uncover potential opportunities for improvement.*

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## **1. Introduction**

Indonesia holds a prominent position in global climate change, ranking as the fifth most significant contributor to cumulative carbon emissions in 2021 (Mishra, Pandita, Bhat, Mishra, & Sharma, 2022). Regarding carbon emissions, it places Indonesia below the United States, China, Russia, and Brazil. Indonesia's total carbon emissions amounted to 102,562 GtCO<sub>2</sub>. Shipping significantly contributes to carbon dioxide emissions (Mutia, 2022; Shen, Liu, & Tian, 2022). Research indicates that Indonesia accounts for 19% of carbon dioxide emissions from shipping activities within the country (Ambari, 2021; Shen et al., 2022).

Ports play a crucial role in supporting the shipping industry and hence necessitate the implementation of sustainable management practices. The Port of Indonesia, called Pelindo, is a corporate entity providing port and logistical services. Pelindo, a State-Owned Enterprise (BUMN), was officially established on February 5, 1960, and is wholly owned by the Government of the Republic of Indonesia. The legal foundation for the founding of Pelindo is articulated in the Deed of Founding No. 3, executed on December 1, 1992. Pelindo, a significant entity in the port industry of Indonesia, remains dedicated to delivering optimal services within the port and logistics domain. As of December 31, 2022, the Port of Indonesia, a renowned port company in Indonesia, has a workforce of approximately 7,204 individuals employed directly by the company. The corporation possesses a comprehensive network of offices, consisting of one central headquarters, twelve regional ports I & II, twenty-five regional ports III, and twenty-two regional ports IV (Kusumaningrum & Heikal, 2023; Pasaribu, 2023; Pelindo, 2023a).



**Figure 1.** Pelindo Business Regions

Port of Indonesia, a prominent port management entity, must modify its operational rules following environmental sustainability, social responsibility, and effective governance (Koroleva, Baggieri, & Nalwanga, 2020). Implementing Environmental, Social, and Governance (ESG) policies addresses concerns about carbon emission reduction, business transparency, and local community

empowerment (Finger & Rosenboim, 2022; WorldSmith, 2022). Port of Indonesia faces the task of mitigating its operational footprint, enhancing transparency and accountability, and engaging local communities, all of which align with the three critical pillars of the ESG (T.-T. Li, Wang, Sueyoshi, & Wang, 2021; Senadheera et al., 2021). The imperative for Port Indonesia to improve its reputation and business performance is not solely driven by ethical considerations but also by the strategic advantages it might yield.

While numerous prior research endeavors have underscored the significance of ESG (Caldeira dos Santos & Pereira, 2022) principles in the realm of business, there exists a dearth of scholarly investigations that specifically concentrate on the port industry, particularly within the Indonesian environment. Furthermore, more literary material is needed regarding the interconnection between technology, innovation, and implementing ESG practices within the maritime industry (Nõmmela & Kõrbe Kaare, 2022). Hence, this research addresses the knowledge gap by conducting a case study on the Port of Indonesia (Lee, Lee, Lee, & Kim, 2023). The objective of this study is fourfold: firstly, to examine the implementation of ESG (Environmental, Social, and Governance) principles (T.-T. Li et al., 2021) in the operations of Indonesian Ports; secondly, to determine the effects of implementing ESG principles on the operational and financial performance of Port Indonesia; thirdly, to evaluate the role of technology and innovation in facilitating the implementation of ESG principles in Indonesian Ports; and finally, to identify opportunities for cross-sector collaboration in the performance of ESG principles in Indonesian Ports.

Moreover, the research inquiry in this particular instance encompasses the following aspects: 1) How Port of Indonesia incorporates ESG principles into its operational practices; 2) The consequences of implementing ESG principles on the operational and financial performance of Port Indonesia; 3) The extent to which technology and innovation contribute to the facilitation of ESG implementation within Indonesian Ports; and 4) The identification of key stakeholders involved in cross-sector collaboration to implement ESG practices in Indonesian Ports, along with an exploration of the mechanisms employed in such collaborations.

## 2. Literature Review

The significance of ESG factors is progressively growing within the contemporary landscape of the corporate sphere. Organizations that embrace ESG principles are inclined to exhibit enhanced sustainability and garner

increased stakeholder esteem (Septania, 2022; Sibarani, 2023). The corporation's adherence to governmental legislation and oversight from regulators across different nations, such as Indonesia, will catalyze businesses to adopt and implement Environmental, Social, and Governance (ESG) principles within their operational frameworks. Several studies (Cherkasova & Nenuzhenko, 2022; Rau & Yu, 2023; Zheng, Khurram, & Chen, 2022; G. Zhou, Liu, & Luo, 2022) have conducted research indicating that organizations that adopt environmental, social, and governance (ESG) principles demonstrate improved financial performance and enhanced risk resilience.

ESG refers to a framework used to evaluate a company's or investment's sustainability and ethical impact. The ESG framework is employed by investors who prioritize environmental, social, and corporate governance factors when making investment decisions (Finger & Rosenboim, 2022). The assessment of the ethical and sustainability implications of investing in a firm involves the utilization of the ESG framework, which comprises three primary elements (T.-T. Li et al., 2021). Most socially responsible investors utilize these ESG factors to evaluate and filter a company's investment opportunities. One of the non-financial performance metrics encompasses environmental, social, and governance factors. The abovementioned concerns encompass ethical considerations, sustainability, and corporate governance, which entail establishing mechanisms to ensure accountability and effectively manage a company's carbon emissions (Business, 2020).



**Figure 2.** Three key ESG factors

### 3. Method

The present study employs qualitative research methods. Qualitative methods encompass a set of research approaches that prioritize comprehensive observation and seek to comprehend social events through the lens of participants' perspectives (Bernard, Wutich, & Ryan, 2016; Cissé & Rasmussen, 2022; Priya, 2021; Rashid, Rashid, Warraich, Sabir, & Waseem, 2019). The following are the procedural stages employed in this qualitative research study: 1) The process of gathering and recording information for analysis and interpretation is commonly called data collection. The data collection method involves a comprehensive review of relevant literature and analysis of secondary data sources. The process of doing a literature study entails the collection of pertinent material from a diverse range of sources, including scholarly publications, articles, corporate reports, and official documents directly related to the subject of research. Secondary data refers to information gathered and examined by researchers other than the one utilizing it. This data type encompasses various forms, including statistical data, industrial reports, and scientific publications. 2) Data analysis examines and interprets data to uncover patterns, relationships, and insights. Upon completion of data collection, the researcher will analyze the acquired information to discern patterns, themes, and linkages about the research topic. Data analysis in qualitative research includes the systematic procedures of interpretation, categorization, and synthesis of information derived from various data sources. 3) The following section presents the findings of the study. Subsequently, the data analysis outcomes are articulated through a lucid and cohesive exposition, encompassing research discoveries, interpretations, and deductions. The purpose of presenting findings in qualitative research is to communicate a comprehensive comprehension of the phenomenon being investigated and offer suggestions for enhancing the resilience and sustainability of the Port of Indonesia in response to global issues.

This study investigates various solutions that the Port of Indonesia might employ to enhance its resilience and sustainability in light of global challenges. This study examines the data using qualitative research methods to produce strategic recommendations. Nevertheless, this research is subject to certain constraints, including the time required for its completion, the potential for subjective biases to influence the findings and the extent to which the results may be applied to broader contexts. Integrating qualitative and quantitative procedures in future research endeavors can yield enhanced insights and a more holistic comprehension of the subject matter.

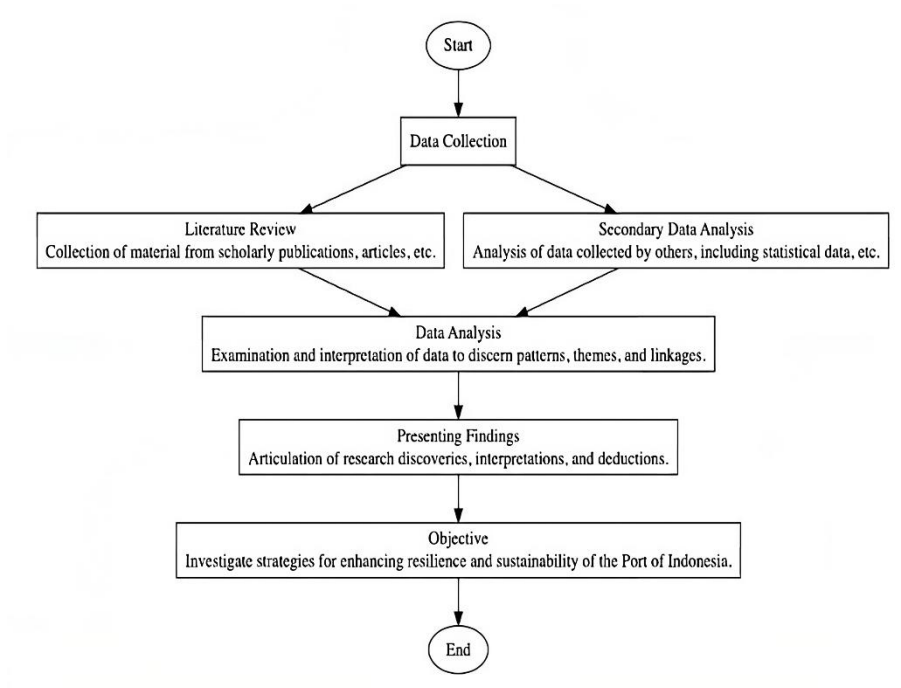


Figure 3. Research workflow

#### 4. Results and discussion

What is the extent of Port Indonesia's dedication and effort in implementing these three primary ESG factors?

##### *Environmental Aspect*

Minimize the release of carbon emissions and mitigate the impact of greenhouse gases.

The Port of Indonesia has implemented electrification for its port equipment as a strategic measure to mitigate air pollution and curb the release of greenhouse gas emissions associated with port operations (Pelindo, 2023b). Furthermore, the utilization of the Onshore Power Supply (OPS) (Kizielewicz, 2023; Williamsson, Costa, Santén, & Rogerson, 2022) is implemented by Port Indonesia at various

ports as a means to mitigate carbon emissions and the adverse impacts of greenhouse gases within the Port industry (Port Technology Team, 2021). The utilization of Onshore Power Supply (OPS) enables ships berthed in ports to get electrical power from land sources, resulting in a substantial reduction of exhaust emissions generated by ship engines, with reported reductions ranging from 75% to 95% (Hubla, 2022; Uly, 2022).

The Port of Indonesia demonstrates a solid dedication to mitigating carbon emissions and addressing the challenges posed by climate change (Ismadi, 2021). The Port of Indonesia has undertaken many initiatives, including establishing Green and Smart Ports, as outlined by the Port of Indonesia, to contribute to climate change mitigation (Pelindo, 2021b). The Indonesian ports have collaborated with the UK government to establish a reputable pilot project for blue carbon Fields (Sugimura et al., 2021), estimated to involve 59.6 million tonnes of (Marves, 2023).

According to a study undertaken at The Port of Rotterdam, there are ongoing efforts to mitigate the adverse effects of container ships on public health by investigating sustainable energy alternatives to minimize the environmental impact of diesel emissions from ships. One technique under consideration is Shore Side Electricity (SSE), potentially powered by offshore wind sources (Lieshout, 2019). Pelindo examines the potential of incorporating liquefied natural gas (LNG) in addition to conventional operational practices (OPS) or shore-side electricity (SSE). This consideration is supported by research conducted at Chinese ports, which demonstrates that clean energy alternatives such as solar power, wind energy, geothermal energy, LNG, and electricity are beneficial in mitigating sulfur dioxide (SO<sub>2</sub>) and carbon dioxide (CO<sub>2</sub>) emissions. (Z. Li & Cuihong, 2018).

#### Enhancing trash management practices

The Port of Indonesia has partnered with the Ministry of Environment and Forestry (KLHK) to establish a team that evaluates marine waste management practices. This collaboration aims to apply the idea of green ports throughout Indonesia to mitigate the environmental consequences associated with port operations (Rizky, 2023).

The Port of Indonesia actively participates in diverse facets of environmental stewardship, including proficiently overseeing the use of raw materials, materials, energy, water, emissions, waste, and biodiversity (Budianto, 2023). The waste management activities carried out by Port Indonesia encompass the treatment of both organic and inorganic waste. Additionally, Port Indonesia engages in



collaborative efforts with relevant stakeholders to address the treatment of solid, liquid, and hazardous waste, as evidenced by the studies conducted by (Kusman, Kapita, & Mulya, 2020) and (Tangkau & Gurning, 2021).

The plastic trash recycling program has been implemented to provide fuel for fishermen and residents in the Thousand Islands. The Port of Indonesia supports this initiative and aims to enhance the well-being of individuals residing in the Thousand Islands region (Nabhani, 2021).

The Port of Indonesia actively contributes to the advancement of digital technology applications. Furthermore, apart from facilitating customer service and mitigating corrupt practices, this digital technology application also contributes to initiatives to reduce reliance on paper for office communication (Budianto, 2023). Examples of such initiatives include adopting e-office technology, utilizing QR codes as ticket substitutes, and implementing digital-based payment systems (Safuan, 2023). The digitization effort implemented by the Port of Indonesia encompasses a wide range of operational activities, including the Seaside, Terminal, Line 2, back-office functions, and customer interactions. Implementing digitalization within the port industry is of utmost importance due to its potential to enhance port services and contribute to environmental preservation by facilitating clean and efficient operating practices (Pelindo, 2021c).

Effective waste management is crucial in keeping a pristine and sustainable environment within port operations. Indonesian ports can potentially derive valuable insights from the successful waste management initiatives implemented in prominent port cities such as Helsinki, Stockholm, Tallinn, and Copenhagen Malmö Port. The research places significant emphasis on the establishment of uniform environmental regulations, the implementation of consistent measuring frameworks, and the development of robust ecological surveillance systems. Ports must give precedence to trash management and engage in spatial collaboration. (Svaetichin & Inkinen, 2017).

#### Enhancing energy efficiency

The Port of Indonesia has developed and constructed a Building Automation System (BAS) (Tang, Shelden, Eastman, Pishdad-Bozorgi, & Gao, 2020) and Smart Panel to implement efficiency policies in energy management. These technological advancements are intended to enhance the efficiency of the building's electrical system. Furthermore, the Port of Indonesia has devised a Remote Crane Management and Monitoring System (RCMMS) device (Y. Zhou, Fu, Zhang, Li, & Gao, 2022) to enhance energy usage profile collection efficiency

and precision. The primary aim of this program is to integrate energy-efficient technology into loading and unloading equipment (Budianto, 2023). According to the Port of Indonesia, many measures were implemented, including replacing traditional lights with LED lights, optimizing equipment and machinery usage, and incorporating solar power plants (Pelindo, 2021c).

The use of electric vehicles at Indonesian ports, inspired by the practices observed at the Port of Los Angeles and the Port of Long Beach, where the objective is to achieve a 5% usage rate of electric drayage trucks for container operations, is a crucial approach to advancing sustainability. This strategy's successful implementation necessitates optimizing the combination of electric cars, charging infrastructure, and scheduling to effectively satisfy the demands of the container throughput (Wu, Zhang, & Chen, 2023). The European port industry is adopting energy efficiency strategies to mitigate greenhouse gas emissions and foster using renewable energy sources. This encompasses integrating many technologies, such as dynamic lighting, automation, eco-driving, and truck appointment systems. Transitioning towards environmentally sustainable infrastructure encompasses adopting LED lighting technology and implementing hybridization strategies—field(Sdoukopoulos, Boile, Tromaras, & Anastasiadis, 2019).

#### The conservation of the natural environment

During the initial six months of 2021, the Port of Indonesia undertook a substantial initiative under the supervision of the Coordinating Ministry for Maritime Affairs and Investment, wherein approximately 40,000 mangrove trees were planted as part of a comprehensive program to rehabilitate Indonesian mangrove forests. According to the Port of Indonesia, in 2022, a collaborative effort between the Port of Indonesia and the Human Initiative resulted in the planting of 2,747 trees (Human Initiative, 2022). One instance of the environmental conservation program implemented by the Port of Indonesia is the cultivation of diverse tree species, including Angsana kencana, ketapang kencana, trembesi, and mangroves. The program encompasses the principles of Social and Environmental Responsibility (IJSI). Plantation activities are conducted in many locations around Indonesia, containing a cumulative count of 608,600 seedlings (Budianto, 2023; Pelindo, 2021c).

International ports, such as the Port of Rotterdam, Port of Long Beach, and Port of Melbourne, have implemented environmental initiatives to conserve natural resources, reduce environmental damage, and foster the welfare of indigenous wildlife. Several initiatives have been conducted in the region, including the

building of Maasvlakte 2, the creation of nature reserves, efforts to restore habitats, and the implementation of stormwater management systems (Baldwin, Sereno, Saylor, & Martin, 2016; Donald & Seeger, 2010; Edwards & Francey, 2008; Notteboom, van der Lugt, van Saase, Sel, & Neyens, 2020).

### *Social aspect*

#### Enhance community involvement

The Port of Indonesia has assisted local communities through various projects, as exemplified by its initiatives in Kedung Asem Village and Marparan Village (Purnama, 2023). Kedung Asem Village, located in the Port of Indonesia, endeavors to promote the growth of tourism villages by enhancing the local economy by producing and promoting its exceptional goods. The development of ecotourism and mangrove tracking trails and the rise of mangrove crab cultivation is being undertaken in Marparan Village, located in the Port of Indonesia. These initiatives aim to enhance the local community's engagement with sustainable practices and economic empowerment (Media Indonesia, 2023). According to Ismadi, this program is anticipated to yield favorable outcomes for the economy, society, and environment, aligning with the principles of corporate social responsibility (Ismadi, 2021). Furthermore, the Port of Indonesia supports Small and Medium Enterprises (SMEs), precisely eight MSEs operating in batik enterprises. This initiative is undertaken to enhance the economy and safeguard the cultural heritage of batik within the community (Desfika, 2023).

Implementing the Green Port Initiative by the Johor Port Authority in Malaysia aims to facilitate sustainable operations and mitigate adverse environmental effects. The Early Learning Initiative in Dublin is dedicated to enhancing educational achievement. In California, fishing communities have undertaken a participatory strategic planning process to tackle various difficulties, such as diminished resource accessibility and environmental pressures (Richmond et al., 2019).

#### Enhance the overall well-being and standard of living of individuals.

In the world of education for local communities, the Port of Indonesia also participates in soft skills training and certification programs from BNSP (Akses Pelabuhan Indonesia, 2023). In addition, the Port of Indonesia provides scholarships to students of the Applied Undergraduate Study Program of Universitas Negeri Jakarta (UNJ), named the 2022 Champion Scholarship (FT UNJ, 2022). Port of Indonesia also offers an Internship Program for students throughout Indonesia who meet the requirements to be placed in Port of

Indonesia's work area throughout Indonesia (Pelindo, 2023a). The program provided by the Port of Indonesia is expected to improve the quality of life of the surrounding community.

In the North American context, port management organizations and terminal operators have been actively adopting strategies focused on assessing local communities' perceptions and engaging with the public. These efforts are aimed at cultivating and nurturing connections with the nearby communities. These practices enable port controlling bodies to enhance their strategic alignment with the needs and requirements of their local communities. Implementing such methodologies is of utmost importance in cultivating a favorable perception of the port cluster and advancing toward sustainable development (Moeremans & Doods, 2021).

#### Promoting the establishment of quality and enduring employment opportunities

Fatimah anticipates that the Port of Indonesia Merger will generate 1,500 employment opportunities throughout 2021-2025 (Fatimah, 2021). It will be accomplished by implementing port development initiatives with prospective partners. The Port of Indonesia creates employment prospects and emphasizes enhancing operational performance and customer service through training and developing its internal human resources (Hajdari, Qerimi, & Qerimi, 2023). The digital-centric applied learning approach facilitates training programs that prioritize enhancing employees' talents and skills. According to Nasution and Amanda, each employee possesses an electronic wallet and a sought-after learning package available on the online learning platform (Nasution & Amanda, 2021). The expected result of improving competencies and skills is to provide the Port of Indonesia with essential capacities.

#### *Governance aspect*

#### Enhance the level of transparency and accountability inside corporate entities.

The Port of Indonesia is dedicated to implementing the principles of good corporate governance (GCG) within its operational framework, which encompasses the values of transparency and accountability. To enhance good corporate governance (GCG) practices across its operations, the Port of Indonesia engages in a collaborative effort with Transparency International Indonesia (TII) (Triyatna, 2022). The Port of Indonesia has partnered with the Corruption Eradication Commission to promote anti-corruption principles and prevent corrupt practices (Pelindo, 2022a).

The International Maritime Organization (IMO) created the International Ship and Port Facility Security (ISPS) Code to enhance security measures in ship and port operations. In the case of Azerbaijan, the country has accepted and implemented the ISPS Code to address and mitigate concerns related to corruption and bribery inside its port facilities (Hasanov & Alsulaiman, 2021).

#### Enhancing effective corporate governance practices

The Port of Indonesia has demonstrated its dedication to its stakeholders by implementing measures to prevent fraudulent behavior by its personnel, including acts such as pungli (illegal levies) and corruption. To facilitate reporting such misconduct, the Port has established a complaint channel known as the whistle-blowing system, officially named “Pelindo Bersih” (Pelindo, 2022b; Safuan, 2018). Furthermore, the use of digitization by the Port of Indonesia, as highlighted by Safuan, has the potential to mitigate corruption, pungli, and other fraudulent activities, as emphasized by the Port of Indonesia (Safuan, 2023). To achieve the objective of ensuring the provision of lawful and unencumbered operating services at ports, a Joint Integrity Pact was entered into by Pelindo and port maritime personnel (Pelindo, 2021a).

Industry 4.0 technologies, including the Internet of Things (IoT), artificial intelligence (AI), blockchain, and big data, can facilitate the utilization of real-time data, data authentication, predictive capabilities, transparency, authentication mechanisms, and structured data. These technologies could reduce the acquisition of precise ESG data and create reliable ESG reports. Consequently, they can enhance transparency and mitigate the risk of corrupt practices and bribery (Saxena et al., 2022).

#### Assessing the accomplishments in sustainability performance in the period 2020-2022.

The sustainability performance of the Port of Indonesia is assessed based on the outcomes of three primary ESG factors: environmental, economic and social. These factors are implemented through the adoption of the Corporate Social Responsibility (CSR) concept, specifically the triple bottom line framework, which encompasses the dimensions of Profit, Planet, and People (Gbejewoh, Keesstra, & Blancquaert, 2021; Larivière & Smit, 2022). The Port of Indonesia’s sustainability performance can be observed in Tables 1, 2, and 3, as reported by (Pelindo, 2023b).

*Economic aspect*

Aspects	Description	Year		
		2022	2021	2020
Economics	Operating Income (Rp)*	29.7	28.8	26.5
	Current Year Profit (Rp)*	3.9	3.2	2.9
	Eco-Friendly Products (Units)	53	11	24
	Local Party Engagement			
	1. Number of Suppliers	439	774	439
	2. Contract Value (Rp)*	6.1	1.9	1.2

**Table 1.** Sustainability performance achievements in economic aspects (Pelindo, 2023a)

\* (in billions)

Table 1 presents the sustainability performance accomplishments of the economic components of a corporation or organization throughout the preceding three years, specifically 2022, 2021, and 2020. During the specified time frame, there was an observed growth in operating revenue, with a rise of 8.68% from 2020 to 2021, followed by a further increase of 3.13% from 2021 to 2022. The profit for the year exhibited notable growth, specifically by 10.34% from 2020 to 2021 and by 21.88% from 2021 to 2022. In the interim, there was a significant decline of 54.17% in the quantity of environmentally sustainable items between 2020 and 2021. However, there was a substantial growth of 381.82% in the same products between 2021 and 2022. With the involvement of local parties, there was a notable rise of 76.31% in the count of suppliers between the years 2020 and 2021. However, this figure experienced a decline of 43.26% from 2021 to 2022. The contractual value of local suppliers had a notable surge of 58.33% between the years 2020 and 2021, followed by a substantial increment of 221.05% from 2021 to 2022. In general, the economic side of sustainability performance demonstrates a consistent upward trend in achievement throughout the years. The participation of local entities in this particular situation exhibits a drop in the number of suppliers involved while simultaneously seeing a notable gain in contract value.

The findings of this study demonstrate a robust association between the disclosure of ESG information and the overall value of a business. This correlation suggests that ESG disclosure can improve the financial stability and sustainability performance of 213 publicly listed ports over five years (Gavalas, 2023). This article examines the practices of ESG reporting in multinational businesses, with a specific emphasis on the involvement of financial experts in

promoting its acceptability and the possible influence it may have on shareholder value. A model for implementation is presented by (Raghavan, 2022).

### *Environmental Aspect*

Aspects	Description	Year		
		2022	2021	2020
<b>Environment</b>	Fuel Usage (Liters)*	40.6	41.6	39.2
	Electricity Usage (kWh)*	1,284	539.9	677.5
	Water Use			
	1.Fee (Rp)*	40.3	42.7	40.4
	2.PDAM (Cubic Meter)**	489	556	1.373
	3.Groundwater (Cubic Meters)**	53	39	38
	Limbah B3 (Ton)	(206)	165	-
	Fuel Emissions (KgCO <sub>2</sub> eq)*	(2.8)	6.6	-
	Electricity Emissions (KgCO <sub>2</sub> eq)*	695	(128)	-
	Environmental Cost*	31.757	10.093	-
Biodiversity**	215	609	12	

**Table 2.** Environmental sustainability performance achievements (Pelindo, 2023a).

\* (in millions)      \*\*(in thousands)

Table 2 presents the sustainability performance accomplishments of the environmental components of a corporation or organization throughout the past three years, specifically 2022, 2021, and 2020. During the specified time frame, there was a reduction of 4.88% in fuel consumption from 2020 to 2021, followed by an increase of 2.44% from 2021 to 2022. Electricity consumption declined by 20.38% between 2020 and 2021, followed by a subsequent rise of 137.85% from 2021 to 2022. The Cost of water utilization had a 6.67% increase between 2020 and 2021, followed by a subsequent decline of 6.47% between 2021 and 2022. The water consumption of PDAM experienced a growth rate of 4.82% during the years 2020 and 2021, followed by a decline of 65.99% from 2021 to 2022. The utilization of groundwater experienced a growth rate of 2.63% between 2020 and 2021, followed by a substantial increase of 35.90% from 2021 to 2022. The quantity of B3 trash generated showed a notable increase of 165 tons between 2020 and 2021, followed by a decline of 371 tons between 2021 and 2022. The data indicates a reduction in fuel emissions of 22.58% between 2020 and 2021. However, there was a subsequent increase of 337.11% in fuel emissions from 2021 to 2022. The emissions associated with electricity experienced a substantial reduction of 92.13% between the years 2020 and 2021. However, there was a

subsequent notable increase of 214.44% in these emissions from 2021 to 2022. The environmental costs significantly increased by 183.33% between 2020 and 2021, followed by a subsequent decline of 87.57% between 2021 and 2022. The biodiversity exhibited a net gain of 50.83K from 2020 to 2021, followed by a subsequent loss of 18.24K from 2021 to 2022.

The overall successes in sustainability performance of environmental factors have demonstrated consistent growth over time. However, it is worth noting that there has been a rise in Electricity Emissions. The utilization of electricity equipment by the Port of Indonesia is consistent with its operational practices. In addition to the observed decrease in biodiversity, it is imperative to prioritize future improvements.

The Port Sustainability Framework aims to establish a comprehensive framework that integrates various port sustainability activities and measures, focusing on aligning them with the Sustainable Development Goals set forth by the United Nations. The utilization of this framework has the potential to enhance the incorporation of sustainability concepts within port operations, promoting sustainable performance and mitigating the release of greenhouse gas emissions (Alamouh, Ballini, & Ölçer, 2021).

### *Social aspect*

Aspects	Description	Year		
		2022	2021	2020
Social	Organic Employees (People)	7.204	7.370	7.463
	Recruitment (People)	-	245	-
	Education & Training (Hours)*	330	241	2
	BUMN TJSL Fund (Rp)*	199	132	141
	Consumer Satisfaction Survey;			
	1. Pelindo Regional 1**	4.05	3.93	3.93
	2. Pelindo Regional 2**	4.71	4.69	4.37
	3. Pelindo Regional 3**	4.25	4.20	4.44
4. Pelindo Regional 4**	4.06	4.21	4.52	

**Table 3.** Social sustainability performance achievement (Pelindo, 2023a)

\*(in millions) \*\*(on a scale of 1-5)

Table 3 presents the sustainability performance achievements of the social aspects of a corporation or organization throughout the preceding three years, specifically 2022, 2021, and 2020. During the time above frame, there was a



decline of 1.25% in the number of organic employees from 2020 to 2021, followed by a further fall of 2.25% from 2021 to 2022. In the year 2021, the organization successfully onboarded a total of 245 individuals. However, it is worth noting that there needs to be more relevant recruitment statistics for the preceding year of 2020 and the subsequent year of 2022. The education and training hours saw a significant surge of 12,033% between 2020 and 2021, followed by an additional expansion of 36.93% between 2021 and 2022. The State-Owned Enterprises (SOEs) witnessed a growth of 7.04% in their corporate social responsibility (CSR) funds between 2020 and 2021. It was then followed by a significant surge of 50.76% from 2021 to 2022. The findings of the consumer satisfaction survey revealed a notable rise in satisfaction levels throughout all regions between the years 2020 and 2022, except for Region Four, where a marginal decline was observed during the period spanning from 2020 to 2021.

In general, there has been a consistent upward trend in achieving sustainability performance in social elements over the years. However, there has been a decline in the number of organic employees due to the implementation of pension and digitization initiatives. The survey findings of regional services indicate a positive trend overall, except for Regional Four, where there is a need for concerted efforts to enhance the quality of services provided. Maintaining consumer loyalty is of utmost importance.

Integrated carriers, which provide transportation services, stand to gain advantages by embracing ESG initiatives. According to studies, these activities have the potential to boost sustainability performance, mitigate ecological impact, foster societal well-being, and enhance corporate governance standards (Gavalas, 2023).

## 5. Conclusions

Incorporating ESG principles inside Indonesian ports have substantially influenced global sustainability. This study employs a qualitative research approach to examine the tactics used, focusing on digitization, community empowerment, and onshore electricity. These approaches facilitate the achievement of sustainable port operations and reduce the promotion of openness, accountability, and good governance, thereby mitigating corruption. The research also emphasizes the far-reaching effects of ESG principles, empowering indigenous communities to effectively govern their ecological assets and fostering sustainable behaviors that extend beyond the scope of port

activities. Future research endeavors should employ a mixed-methods design, comparative studies, longitudinal studies, targeted interventions, and data-sharing practices to understand these activities better.

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