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Conference Paper

MANAGING DISRUPTION FOR SUSTAINABILITY IN MARITIME INDUSTRY

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Abstract.

The maritime sector, responsible for transporting over 80% of global merchandise by volume, contributes significantly to global CO_2 emissions and faces increasing pressure to adopt sustainable practices. This study examines the decarbonization strategies of Pertamina International Shipping (PIS), focusing on the integration of Environmental, Social, and Governance (ESG) principles within operational, technological, and market-based initiatives. Using a qualitative content analysis approach, the study systematically reviews corporate disclosures, international maritime regulations, and empirical performance indicators to evaluate alignment with global climate targets. Findings reveal that PIS has adopted a four-pronged strategy emphasizing operational efficiency, green vessel design, alternative fuels, and green cargo handling. These measures are reinforced by business diversification, fleet modernization, and carbon reduction technologies. Despite significant progress, challenges remain in scaling alternative fuels due to high ownership costs and infrastructure limitations. The study concludes that sustained investment, regulatory alignment, and innovation are essential for positioning maritime logistics as a driver of low-carbon economic growth in the years ahead.

Keywords: ESG, green logistics, maritime decarbonization, shipping sustainability.

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Introduction

The maritime industry is vital in global trade, with over 80% of merchandise transported by sea (1). However, this sector faces increasing scrutiny due to environmental impact. Maritime transport contributes approximately 2.5% of global energy-related CO_2 emissions, a figure that, while seemingly modest, holds significant weight within the broader transportation sector, which collectively accounts for 19–20% of global emissions (2,3). As environmental concerns intensify, stakeholders within the maritime sector are under growing pressure to adopt more sustainable practices. In response, Pertamina International Shipping (PIS), a subsidiary of Pertamina specializing in shipping and integrated marine logistics, has initiated strategies aimed at reducing environmental footprint (3,4). PIS operates sixty-three fleets on sixty international routes, serving destinations across the Indo-Pacific, connecting Japan, Korea, Papua New Guinea, and Australia, as well as markets in Africa and South America. These strategies reflect a broader commitment to responsible business operations, encompassing not only the transportation of products but also port operations, logistics, and marine support services. By tackling sustainability challenges, PIS aim to contribute meaningfully to global decarbonization efforts within the maritime domain.

Figure 1. PIS Area of Operation and Distribution
Source: Harto (2024)

Literature Review

Theoretical Studies

The pursuit of sustainability in the maritime sector increasingly relies on the integration of Environmental, Social, and Governance (ESG) principles (5). Effective ESG implementation involves structured initiatives aimed at mitigating environmental impact, managing climate-related risks, and enhancing biodiversity

protection. Strategic orientation toward these priorities enables maritime organizations to align operational goals with broader global sustainability frameworks (3). In the tanker shipping industry and marine logistics, achieving ESG objectives demands not only compliance but proactive leadership. Operational scale is critical in driving sustainable change (6).

Empirical Studies

Global maritime policy has increasingly centred around net-zero emission targets, with the International Maritime Organization (IMO) establishing 2050 as the deadline for achieving full decarbonization within the sector (7). National targets vary, with Indonesia setting a longer-term goal for 2060 (3). Despite this extended timeline, operational realities in international maritime logistics demand alignment with global standards.

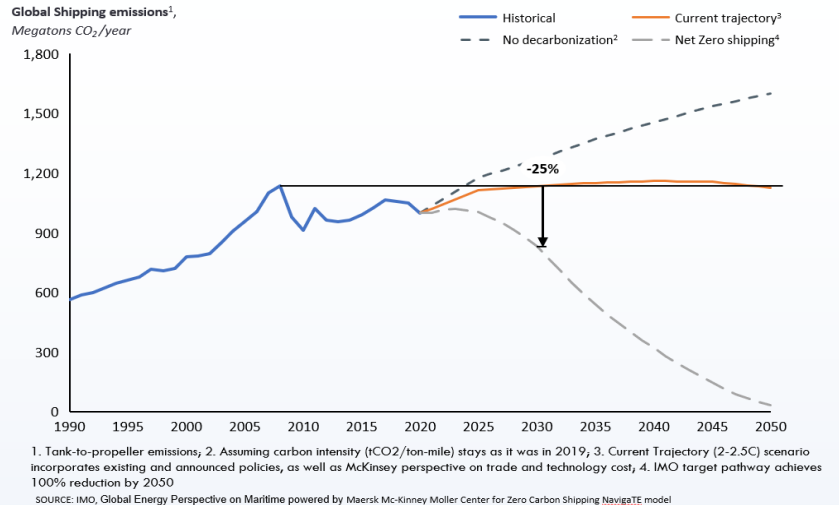

Figure 2. Shipping Industry Track on Meeting IMO Target
Source: Harto (2024)

Empirical observations indicate that active alignment with IMO's decarbonization goals reflects not only regulatory compliance but also strategic positioning in global markets (8). Operating across international routes necessitates proactive adoption of low-carbon practices, regardless of domestic policy leniencies. These dynamics underscore the importance of anticipating global regulatory shifts and integrating them into operational planning, particularly for companies engaged in cross-border maritime activities.

Methods

This study adopts a qualitative content analysis approach, defined as a research technique for drawing replicable and valid inferences from texts (9,10). The method enables a systematic examination of corporate sustainability strategies, institutional

reports, and regulatory frameworks relevant to maritime decarbonization. The data sources comprise of strategic documents, public disclosures, and sustainability reports published by Pertamina International Shipping (PIS), as well as policy guidelines from international bodies like the International Maritime Organization (IMO). The selection criteria prioritize content related to Environmental, Social, and Governance (ESG) initiatives, carbon reduction measures, fleet modernization, and green shipping technologies. The unit of analysis focuses on corporate responses to global decarbonization mandates and their alignment with national and international sustainability goals. The study was conducted over a one-year period, with data credibility ensured through triangulation across corporate disclosures, regulatory documents, and empirical performance indicators.

Results and Discussion

The implementation of a comprehensive four-pronged strategy has driven measurable progress in advancing maritime sustainability (4). The first strategic focus on operational efficiency has yielded reductions in waiting times at ports, improvements in fuel consumption, and enhanced capacity utilisation. The second strategy, centred on fleet design, has guided the transition toward green specifications for new vessels, contributing to lower emissions. The third and most complex approach involves the gradual adoption of alternative fuels, while the fourth promotes the handling and transport of environmentally friendly or “green” cargo.

To support long-term sustainability and business growth, operational targets consist of tripling revenue to $9 billion and achieving a $7 billion market capitalisation within the next decade (4). Marine services and terminal operations are expected to contribute 20% of the projected growth. Planned expansion of the tanker fleet from 103 to 190 vessels by 2034, along with a reduction in average fleet age from 24 to 15 years, reflects an integrated approach to efficiency and emissions reduction. A current Tanker Management and Self-Assessment (TMSA) score of 3.5 out of 4 highlights the company’s adherence to high standards in ship management. Financial restructuring also aims to ensure that 34% of total revenue originates from low-carbon activities, alongside a 32% cut in emissions.

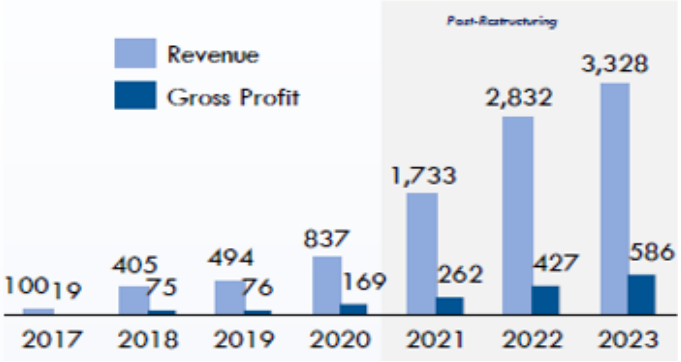

Figure 3. PIS Business Growth (US$ Million)
Source: Harto (2024)

Business diversification forms a critical component of the sustainability roadmap (4). While petroleum remains the current operational core, expansion into petrochemicals, chemicals, dry bulk, and container shipping broadens the revenue base. Geographic expansion in marine logistics and services, with an initial public offering (IPO) targeted for 2026, supports strategic growth. Central to the effort is the development of a green energy segment to the carbon shipping operations with a goal to capture over 40% of market revenue within Indonesia.

Emission reduction efforts already underway, for example compliance with International Maritime Organization (IMO) regulations, adoption of eco-friendly ship designs, engine power limitation technologies, and the installation of scrubbers (4). The deployment of dual-fuel vessels operating on both oil and liquefied natural gas (LNG) represents a transitional step toward alternative energy sources. Additional initiatives comprise of “green port” and terminal projects, along with strategic collaborations in carbon capture, storage, and CO_2 shipping technologies.

In 2023, the emission reduction commitment reached 24.5 kilotonnes of CO_2, supporting an annual reduction target of 448.8 kilotonnes CO_2e, equivalent to a 32% cut from current baselines (4). Despite the progress, the transition to alternative fuels remains the most significant operational hurdle. Fossil fuels maintain dominance due to their cost advantage, and achieving scale in alternative fuel adoption will require a significant reduction in total cost of ownership. Overall, current strategies demonstrate alignment between economic growth objectives and environmental sustainability goals. The integration of technology, regulatory compliance, and long-term investment planning positions maritime operations to lead the sector toward a low-carbon, resilient future.

Conclusion

Efforts to decarbonize maritime logistics require integrated strategies that align environmental responsibility with economic

performance. By implementing a four-pronged approach, focused on operational efficiency, green fleet design, alternative fuels, and environmentally friendly cargo handling, progress has been made in reducing emissions and improving sustainability metrics. The expansion of low-carbon revenue streams, diversification into new cargo markets, and investment in green technologies demonstrate a long-term commitment to climate goals, even in the face of sectoral and economic challenges.

However, the transition to alternative fuels remains the most significant barrier due to cost and infrastructure constraints. Achieving economies of scale and reducing total ownership costs will be critical to accelerating the shift. Continued alignment with global standards, particularly those set by the IMO, and proactive adaptation of technological innovations position maritime logistics are leading in achieving a low-carbon future. Ultimately, sustainability-driven growth strategies offer a viable path forward, balancing environmental stewardship with competitiveness in global shipping.

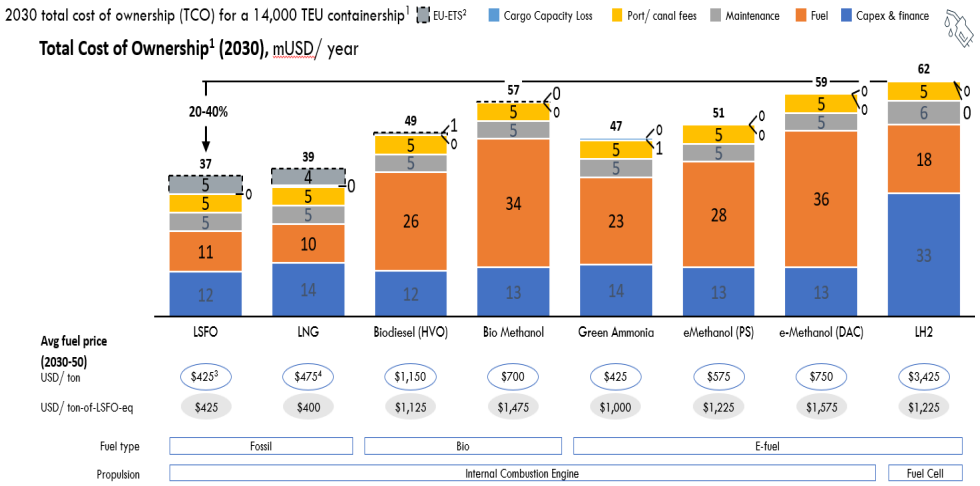

Figure 4. Total Cost Ownership Fossil Fuel vs Alternative Fuel
Source: Harto (2024)

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