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PHÂN TÍCH THỰC HÀNH VẬN TẢI XANH CỦA MAERSK VÀ KHUYẾN NGHỊ CHO CÁC CÔNG TY LOGISTICS TẠI VIỆT NAM

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Abstract

Với sự phát triển mạnh mẽ của các hoạt động thương mại quốc tế, việc giảm thiểu khí thải nhà kính và các vấn đề môi trường khác do vận chuyển hàng hóa trong logistics gây ra đã trở thành mối quan tâm chính của cá nhân, doanh nghiệp và chính phủ. Do đó, logistics vận chuyển xanh đã trở thành xu hướng giải quyết các vấn đề môi trường của ngành vận tải biển. Mục đích của nghiên cứu này là phân tích ứng dụng hiện tại của các phương thức vận chuyển xanh của một trong những công ty vận tải biển lớn nhất thông qua một nghiên cứu điển hình - Maersk. Nghiên cứu sẽ tiết lộ việc triển khai thành công các phương thức vận chuyển xanh và những nỗ lực giảm thiểu khí thải của Maersk. Dựa trên những phân tích này, bài viết đưa ra các khuyến nghị về cách các công ty logistics Việt Nam có thể áp dụng những phương thức đó vào các hoạt động logistics của quốc gia trong tương lai để tối ưu hóa hiệu quả kinh tế, giảm thiểu khí thải từ hoạt động vận tải và đạt được trách nhiệm xã hội.

Keywords: Phương thức vận chuyển xanh, Logistics xanh, Ảnh hưởng môi trường và kinh tế, Kiểm soát khí thải và tài nguyên.

ANALYSIS OF GREEN SHIPPING PRACTICE IN MAERSK AND RECOMMENDATIONS FOR LOGISTICS CORPORATIONS IN VIETNAM

Abstract

With the blooming of international trade activities, reducing the emissions of greenhouse gasses and other environmental problems caused by logistics shipping has become the main concern

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for individuals, corporations, and governments. Therefore, green shipping logistics has become a trend in dealing with environmental liabilities of the shipping sector. This study aims to analyze one of the largest shipping companies' current application of green shipping practices through a specific case study - Maersk. The study will reveal the successful implementation of green shipping practices and efforts to reduce emissions from Maersk. Based on these analyses, the article recommends how Vietnamese logistics corporations can apply those practices to the nation's logistics activities in the future to optimize economic efficiency, reduce emissions from transportation activities, and achieve social responsibility.

Keywords: Green shipping practices, Green logistics, environmental and economic effects, emission and resources controls.

1. Introduction

It is undeniable that the logistics and transportation industry is one of the world's most significant contributors to greenhouse gas emissions. According to the publication released by Smart Freight Center and the World Business Council for Sustainable Development, this sector accounts for over a third of greenhouse gas emissions. Moreover, regarding research conducted by McKinsey, the shipping industry presents a significant number of environmental liabilities since it consumes 300 million tons of fuel annually, leading to a rise in concern about climate change and the environment. To cut 50% of the overall greenhouse gas emissions within the sector by 2050 and reduce logistics costs, green shipping was introduced and is being applied by many logistics companies worldwide. Among some of the largest logistics companies, Maersk has a long history of innovation and has been a pioneer in the development of container shipping. With the vision to become the global integrator of container transportation and logistics to enable international trade in an efficient, simple, and sustainable way, the company has integrated many green shipping practices such as applying ship recycling practices, changing to green fuels, applying decarbonization to improve fuel efficiency, decrease the effect of environmental liabilities to the environment and ensure economic efficiency of the company. The rising concern about the environment and climate change has urged all logistics companies to make sustainable changes in shipping operations.

This study, "Analysis of green shipping practice in Maersk and recommendations for logistics corporations in Vietnam," will use qualitative methods to analyze the green shipping practices that Maersk has applied in transportation and its business operations to minimize environmental footprints and reduce its logistics costs, while also analyzing the current situation of green shipping practices application in Vietnam's logistics industry and make suggestions to improve the green shipping practices within the nation. The report contains four main sections:

- Literature review
- Theoretical framework
- Analysis of green shipping practices of Maersk
- Recommendations for Vietnamese logistics companies

2. Literature Review

The rising tide of environmental concern has drawn increasing scholarly attention to green shipping practices. In response to the industry's environmental impact, researchers have actively sought to enhance and comprehend its eco-efficiency (Lai et al., 2011). A comprehensive review of the literature concerning environmental sustainability in shipping revealed a surge in studies published within the last decade, with virtually none appearing before 2005 (Mansouri et al., 2015). Most of these investigations have focused on strategies for minimizing speed and fuel consumption, exploring novel energy technologies, and evaluating the environmental and economic benefits for shipping companies. Importantly, eco-friendly vessels have emerged as instrumental tools within the shipping and operational sectors, serving as key drivers of green shipping practices.

2.1. Prior Research

2.1.1. Definition

Xiaofang Wu, Luoping Zhang, and Meifeng Luo (2019) propose a non-anthropocentric definition of green shipping that focuses on conserving nature's health. They suggest that green shipping is a better approach to sustainability than sustainable shipping, which follows sustainable development.

Furthermore, International Trade Magazine (2023) defines green shipping as an activity that involves moving people or goods by ship while being mindful of the environment. The idea is to use fewer resources and less energy to minimize the impact of ship-generated pollutants. Green shipping aims to “promote cleaner practices, including emission control, efficient port management, and equipment management.”

2.1.2. Impacts of green logistics practices on logistics costs and environmental goals

A growing body of research explores the intricate link between green shipping practices and business performance. Lai et al. (2011) laid the groundwork by proposing a framework for evaluating green practices and outlining conditions for environmentally responsible behavior by shipping firms. Lun et al. (2015) introduced the concept of "Greening and Performance Relativity,” utilizing an input-output analytic approach to demonstrate a positive association between green practices and firm performance in shipping operations.

Yang (2017) employed an institutional theory-based framework to empirically examine the interplay between institutional pressures, internal green practices, external green collaborations, and green performance. Their study revealed a cascading effect, where institutional pressures foster internal green practices, which drive external collaborations, ultimately leading to enhanced green performance.

Yuen et al. (2017) adopted a multifaceted approach, drawing on stakeholder, planned behavior, and resource dependence theories to analyze the drivers and outcomes of sustainable shipping practices. Their findings highlight the influence of stakeholder pressure, attitude, and behavioral control on a company's adoption of green shipping practices, indirectly impacting business performance.

Numerous studies have explored the relationship between adopting green shipping practices and achieving environmental and economic performance. Production performance focuses on product development and delivery improvements, while environmental performance measures a company's success in reducing pollution, conserving resources, and enhancing its environmental image.

Rao and Holt (2005), Klassen and McLaughlin (1996), and Yang et al. (2013) demonstrated that implementing environmental initiatives can enhance a firm's environmental and production performance.

A growing body of research supports a positive relationship between adopting environmental initiatives and a firm's economic performance. By mitigating their environmental impact, firms can secure several competitive advantages, including cost reduction through more efficient resource utilization, reduced fines and risk costs, quality improvement, early adoption of new regulations, and enhanced management and personnel practices (Russo & Fouts, 1997).

As for the relationship between adopting green practices and environmental performance, studies demonstrate that adopting environmental management practices directly improves a company's environmental performance. This reduces pollution, which benefits the environment and leads to cost savings for the company (Lam & Lai, 2015). This highlights the potential for a win-win scenario where environmentally responsible practices contribute to sustainability and economic viability.

Chang and Danao (2017) conducted empirical research using structural equation modeling to determine the factors motivating shipping firms to adopt green shipping practices. They showed that these practices can increase shipping firms' productivity and help them achieve environmental goals.

Felício, Rodrigues, and Caldeirinha (2021) used exploratory factor analysis and structural equation modeling to prove that green shipping influenced both the sustainable economy and environmental performance. Also, taxes and financial incentives offered to shipping firms positively influenced environmental performance even further

2.1.3. Performance indicators of green shipping practices

Chang and Danao (2017) conducted empirical research to examine whether adopting green shipping practices significantly influenced productivity and environmental performance. They found that shipping firms are incentivized to start practicing green shipping mainly by industrial norms, customer demand for environmental friendliness, and their strategy. As for indicators of green shipping practices improving firms' performance, reductions in carbon emission, wastewater, solid waste, consumption of hazardous materials, and environmental accidents proved that environmental performance increased with green shipping practices in effect. In contrast, improved product quality, market position, reputation, and cost reduction showed that productivity performance was also positively impacted.

2.2. Research Gap

Most of the research studies on green shipping have focused on finding the motivation factors of green shipping or the links between business and environmental performances and

green shipping (Lai et al., 2011; Lun et al., 2015; Yang, 2017; Yuen & Lim, 2016; Yuen et al., 2017). It also targeted countries and not global logistics firms, specifically A.P. Moller-Maersk. Also, only some studies have focused on Vietnam's current green shipping situation. Considering that the Vietnamese logistics scene has been relatively new and immature, coupled with the trade surplus of Vietnam in recent years, it is apparent that green shipping in Vietnam needs to be more prominent to ensure productivity and sustainability goals. Through this report, our group wants to provide shipping corporations in Vietnam with a summary of how a world-leading logistics firm has implemented green shipping practices in its operations, with implications and suggestions for more effective adoption of green shipping in Vietnamese firms.

3. Theoretical framework

3.1. Definition of green shipping practices

Green shipping, or environmentally friendly shipping practices, has gained widespread recognition within the logistics industry in recent years. Lee and Nam (2017) defined green shipping as the resource and energy minimization to transport people and goods by ship and emphasized mitigating greenhouse gas emissions and pollutants.

Lai et al. (2011) defined green shipping practices as an environmental management practice encompassing waste reduction and resource conservation across cargo handling and distribution. Green shipping refers to the practices and eco-environmental efficiency adopted in shipping (Hjelle, 2010).

We can conclude with the core concept of green shipping. It refers to adopting environmentally sustainable and ecologically responsible practices within the maritime industry. Green shipping practices (GSP) encompasses a range of strategies and initiatives that aim to minimize the ecological impact of shipping operations on the oceans and the environment.

Crucial elements of green shipping include using cleaner and renewable energy sources, such as alternative fuels like liquefied natural gas (LNG), biofuels, and hydrogen. Additionally, it involves implementing technologies and practices to improve fuel efficiency, reduce emissions of harmful pollutants, and optimize the overall environmental impact of ships.

Green shipping practices also encompass innovative approaches to hull design and coatings, waste management, ballast water treatment, and integrating renewable energy technologies like wind or solar power. Regulatory compliance with international standards and guidelines set by organizations such as the International Maritime Organization (IMO) also plays an essential role in ensuring the adoption of green practices across the industry. In 2020, the IMO introduced a sulfur limit for emissions from the exhaust stacks of ocean-going ships. Furthermore, this organization has issued a directive to halve total greenhouse gas emissions from ships by 2050 (Yildirim, O., 2024).

By prioritizing sustainability and environmental responsibility, green shipping aims to balance the economic benefits of maritime transportation with the need to protect marine

ecosystems and mitigate the industry's impact on climate change. This approach is essential for fostering a more environmentally friendly and resilient future for global shipping.

3.2. The impact of green shipping practices

The importance of green shipping is underscored by its multifaceted impact on the maritime industry. Here are several vital impacts of green shipping practices on the logistics costs and sustainability objectives:

Logistical and Operational Streamlining: Green shipping helps reduce shipping inefficiencies by implementing advanced logistical and operational practices. This includes optimizing routes, improving cargo handling processes, and employing cutting-edge technologies. For instance, utilizing intelligent warehouse technology, such as automated storage and retrieval systems (AS/RS), can significantly enhance inventory management and streamline shipment preparation time.

Enhanced Fuel Efficiency: By leveraging state-of-the-art technologies, the industry can minimize fuel consumption, resulting in economic benefits and a significant reduction in carbon emissions. Take CMA CGM VEL, a recently constructed vessel, as an example. It combines cutting-edge engines that notably decrease fuel consumption (an average reduction of -3%) and oil usage (-25%).

Diverse Carbon Emission Reduction Methods: This involves utilizing eco-friendly technologies, implementing emission-reducing equipment, and incorporating sustainable practices throughout shipping. This holistic approach enables companies to choose the most suitable strategies aligned with their sustainability goals.

Utilization of Alternative Fuels and Energy Sources: Green shipping encourages the adoption of alternative fuels to mitigate the environmental impact of traditional fossil fuels. Diversifying the energy mix in transportation contributes to a cleaner and more sustainable shipping industry.

Adherence to Recommended Driving Best Practices includes maintaining optimal speeds, reducing idling time, and employing advanced navigation technologies to optimize routes. For example, utilizing speed nozzles instead of conventional methods for powering the ship can lead to fuel savings of around 5% (Yildirim, O., 2024). The industry can minimize its carbon footprint by promoting responsible driving practices while maximizing operational efficiency.

3.3. Performance indicators of green shipping practices

In the empirical study by Felício, Rodrigues, and Caldeirinha (2021), the positive impact of green shipping on the sustainable economy is most prominent in the economy of scale of ships, fleet growth, and productivity gains, while for environmental performance, environmental protection and quality played a key role.

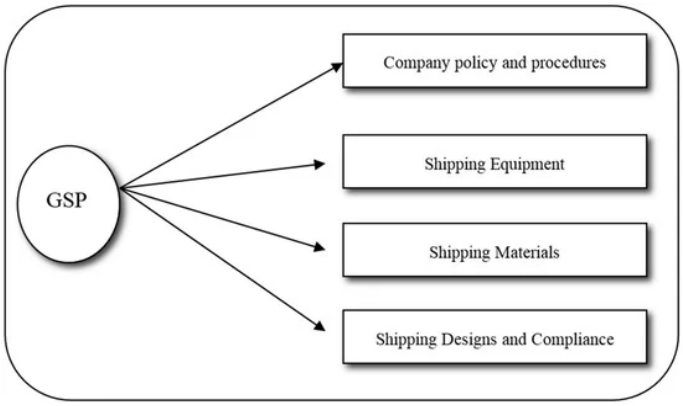

Figure 1. Scope of Green Shipping Practices

Source: Lai, K.; Lun, V.Y.H.; Wong, C.W.Y.; Cheng, T.C.E. Green Shipping Practices in the Shipping Industry: Conceptualization, Adoption, and Implications

Performance indicators of green shipping practices are metrics used to assess the effectiveness and success of environmentally sustainable initiatives within the maritime industry.

The first indicator falls into the group of company policy and procedures (CPP). Companies adopting green shipping practices often establish policies that prioritize environmental sustainability. This includes commitments from senior managers to every department to reduce carbon emissions and adhere to eco-friendly practices. Moreover, it showcases the company's social responsibility that contributes to the well-being of local communities.

Secondly, GSP also focuses on environmentally friendly shipping equipment (SE). Shipping companies choose eco-friendly shipping equipment and technologies to mitigate adverse effects during operations. For example, they avoid using refrigerated containers with chlorofluorocarbons (CFCs) by employing eco-labeling for resources. Additionally, companies strive to attain environmental certifications like ISO 14001, signifying their dedication to environmental management and sustainability.

Another performance indicator of green shipping practices is shipping materials (SM). It involves recycling used shipping resources to cut costs and enhance operational efficiency. This includes selling excess equipment, facilities, and shipping materials like packaging instead of discarding them as waste. Quantifying decreased greenhouse gas emissions, sulfur dioxide, and other pollutants from ships also contributes to this practice.

Lastly, GSP is evident in shipping design and compliance (SDC). This includes designing shipping activities and equipment that minimize material and energy consumption, refraining from polluting energy sources, and implementing programs to reuse, recycle, and recover materials. Besides, GSP involves assessing and optimizing fuel consumption through improved engine efficiency, route optimization, and the incorporation of alternative fuels. It also adopts innovative technologies, including clean propulsion systems, renewable energy sources, and energy-efficient designs to enhance maritime operations' environmental sustainability.

3.4. Methodology

This study employs qualitative research methods, drawing upon secondary data from prior research and business-related information from the Maersk website.

Firstly, the study collects data from prior research on platforms like ResearchGate and Google Scholar. This includes scholarly articles, reports, and studies discussing green shipping practices in the marine industry. By utilizing existing research on Maersk's environmental initiatives and sustainability practices, the study seeks to build upon the knowledge already established in the field and provide deeper insights into Maersk's green shipping efforts.

Secondly, the research methodology involves collecting business-related data from Maersk's official website, such as the company's financial report from 2015 to 2022. The study aims to obtain reliable statistics and insights into the company's environmental commitments and performance by accessing information directly from Maersk's website.

Thirdly, the methodology consists of gathering information from diverse online sources such as industry publications, articles, government reports, and trade associations. These sources provide additional perspectives on Maersk's green shipping practices. Industry publications and news articles also offer insights into recent innovations in sustainable shipping within the maritime industry.

4. A case study of green shipping practices in Maersk

4.1. Overview of Maersk

4.1.1. General information of Maersk

Maersk, founded in 1904 by A.P. Moller, is a Danish shipping company with over 135 branches and 120,000 workers. With a history of innovation, it has become one of the world's largest shipping companies. Maersk operates shipping containers and ports, transports dry, refrigerated, and special cargo, manufactures containers, conducts used container sales, and supports intermodal transport. APM’s major brands include Maersk Line, Damco, APM Terminals, Svitzer, Twill, Sealand, Hamburg Sud, Alianca, Maersk Container Industry, and Maersk Training (GlobalData, 2023).

4.1.2. Vision – Mission

Maersk’s vision is “to become the Global Integrator, offering truly integrated logistics solutions that connect, protect, and simplify our customers’ supply chains." The company's success is built on core values such as constant care, humbleness, employees, uprightness, and brand name. These values guide Maersk's operations and reinforce its commitment to being a responsible global leader in the logistics industry. The company values diversity, openness, and empowering individuals to exceed expectations.

4.1.3. Business model and business performance

Regarding the business model

Maersk has shifted its business model from a diversified conglomerate to an integrated entity, focusing on becoming a global integrator of container transportation and logistics. The

company aims to emulate successful packaging models like UPS or FedEx by providing end-to-end services, including core container shipping, customs clearance, truck transportation to ports, and cargo insurance. APM Terminals is expanding onshore services to cater to railway operators and freight haulers. Digitization is an essential strategy, with Maersk partnering with IBM to develop blockchain technology for supply chain security. The sale of its energy businesses, including oil assets and tankers, reflects a strategic shift towards shipping, logistics, and port operations. By integrating and transforming its transport and logistics business, Maersk aims to deliver best-in-class services, compete on differentiation, and ensure customer satisfaction while maintaining cost leadership.

Regarding the business performance

Table 1. Maersk's business performance in the 2015 – 2022 period (Unit: Million USD)

Annual Data	2015	2016	2017	2018	2019	2020	2021	2022
Revenue	40,308	27,266	30,945	39,280	38,890	39,740	61,787	81,529
Gross Profit	9,043	2,466	3,525	3,654	5,760	7,936	24,039	36,647
Operating Income	1,608	170	671	220	1,496	3,887	19,188	30,728
Pre-tax Income	1,447	-298	25	-180	967	3,307	18,730	30,231
Income after Taxes	$925	-469	-194	-578	$509	2,900	18,033	29,321
Net Income	791	-1,939	-1,205	3,157	-84	2,850	17,942	29,198

Source: Macrotrends 2023

From 2015 to 2022, Maersk experienced significant fluctuations in crucial financial indicators. In 2016, the company adopted a global integrator strategy, leading to a decline in revenue, gross profit, and net income. However, subsequent years saw a recovery and growth trend. In 2017, 2018, and 2020, Maersk experienced a significant surge in revenue, gross profit, and net income attributed to strategic initiatives and the global economic landscape. In 2021 and 2022, Maersk experienced substantial growth in all financial metrics, with a robust surge in operating income and pre-tax income. As of May 2023, Maersk operated 682 container ships with a combined capacity of around 4.13 million TEUs.

4.2. The current green shipping practices in Maersk

Maersk has set a goal to achieve net zero greenhouse gas emissions by 2040, a decade ahead of global targets. The company aims to establish green offerings and significant emissions reductions within 2030, aligning with the Science Based Targets initiative's Net Zero criteria.

4.2.1. Decarbonization of customer supply chains

Maersk emphasizes that decarbonization is a strategic imperative for their industry and company. The company is committed to developing end-to-end low greenhouse gas (GHG) emission solutions, encompassing all transport modes and logistics facilities. Maersk aims to enhance visibility on GHG emissions and provide advisory services to optimize environmental impact.

Decarbonization of Maersk's Ocean

- **Improving fuel efficiency**

Maersk's decarbonization strategy focuses on enhancing fuel efficiency, resulting in a nearly 40% reduction in carbon intensity since 2008. This involves optimizing fleets and networks, deploying more efficient vessels, and refining port operations. Despite challenges in 2022, Maersk remains optimistic about resolving issues and anticipates efficiency gains. They are exploring retrofitting solutions for vessels, collaborating with charter owners, and implementing retrofits on around 40 vessels. While energy efficiency is crucial, Maersk recognizes that achieving its net-zero target by 2040 depends on transitioning to green fuels.

- **Transitioning to green fuels**

Maersk focuses on decarbonization investments in ocean transport, exploring three green fuels: biodiesel, green methanol, and green ammonia. They focus on readily available green methanol, aligning with their emergency mindset and commitment to low-readiness technologies.

Maersk is transitioning to green fuel as a critical decarbonization strategy, focusing on vessel capacity and integrating green fuel capabilities into new vessels. The company is also exploring conversions to run on green fuels and incorporating charter vessels capable of using green fuels. In 2021, Maersk ordered 19 methanol-enabled vessels, highlighting the demand for environmentally friendly marine fuels. In 2022, the company expanded its commitment by ordering six more large vessels with dual-fuel methanol engines, with the first delivery scheduled for 2023, larger vessels set to be delivered in 2024 and 2025. This proactive approach has influenced industry peers to join the movement, reflecting a positive trend toward sustainable shipping practices within the maritime sector.

Decarbonization of inland logistics and service offerings

Maersk is implementing an Inland Decarbonization Program to reduce its inland logistics and services, contributing 5.7% of its GHG footprint. The program aims to provide end-to-end decarbonized logistics solutions, including landside transportation, contract logistics, cold chains, air freight, and emissions transparency. The goals include achieving 100% green solutions by 2040, 90% green operations by 2030, and net-zero status for air freight by 2040. These initiatives underline Maersk's commitment to environmentally responsible logistics, emphasizing transparency, collaboration, and innovation.

In 2022, Maersk conducted assessments to implement decarbonization goals, setting standards and testing solutions. However, challenges like limited renewable energy and regulatory support still need to be addressed, particularly in decarbonizing air freight, which

heavily relies on Sustainable Aviation Fuel (SAF). Despite aiming for 30% SAF by 2030, limited availability and high costs pose obstacles. In 2023, Maersk focused on developing regional roadmaps, gathering insights from pilots, and formulating a commercially viable SAF sourcing strategy. Key highlights include electric van deployment in India, transitioning electric rail to renewable electricity in Germany and Spain, adopting lower-impact cold storage refrigerants in New Zealand, and piloting SAF offerings in collaboration with United Airlines and Air France KLM. All new logistics buildings aim for LEED Platinum or BREEAM Excellent certification.

Decarbonising Terminals

Maersk is focusing on decarbonization in its port terminals to achieve a 70% reduction in greenhouse gas emissions by 2030. The company is optimizing energy consumption, reducing fuel and electricity consumption, sourcing renewable energy, and transitioning to green fuels. Maersk is building local net zero roadmaps to tackle terminal emissions, collaborating with suppliers and partners on wind/solar farms, and discussing green energy supply with local governments.

Maersk's terminal decarbonization efforts extend to strategic businesses like Svitzer and Maersk Supply Service (MSS). Svitzer introduced Ecotow, a marine biodiesel-powered tug that reduces greenhouse gas emissions by 90% over its lifecycle. MSS focuses on technical upgrades, digitalization, and energy efficiency across its fleet, aiming to reduce CO2 emissions by 50% by 2030 and achieve net zero by 2040.

In 2022, Maersk demonstrated progress in terminal decarbonization with the hybridization of Rubber Tyre Gantry Cranes in Gateway Terminals India, resulting in over 50% fuel and emission savings. The company also commissioned a 1 MW onsite solar plant in Pipavav, India, and pursued equipment electrification strategies.

4.2.2. Responsible ship recycling

Overview of Maersk's Responsible Ship Recycling Activities

Maersk, a leading ship recycling company, has been actively championing responsible practices because nearly 90% of gross tonnage is recycled under poor health, safety, and environmental conditions. With the demand for ship recycling services projected to double by 2028 and quadruple by 2033, the need for suppliers with responsible practices becomes increasingly urgent. Over the past six years, Maersk has undertaken responsible recycling of 16 of its vessels in Alang, a critical South Asian region that receives around 20% of the world's ships for recycling. The company has also encouraged shipyards to voluntarily adhere to specific recycling standards, even before they become official. Maersk's commitment to responsible recycling is formalized through the Maersk Responsible Ship Recycling Standard (RSRS), a stringent set of guidelines that the company adheres to to ensure responsible ship recycling practices.

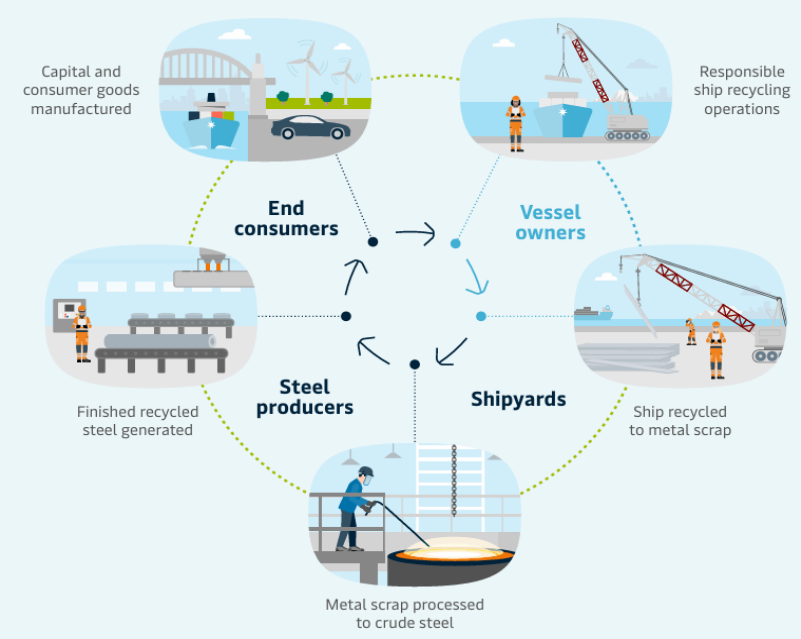

Figure 2. How ship recycling can support the decarbonization of steel

Source: Maersk's 2022 Sustainability Report

In 2021, Maersk took significant strides in its commitment to responsible ship recycling, placing two vessels for recycling in Alang and completing the recycling of three more. Maersk ensures that the yards in Alang are screened thoroughly. This involves checking that these yards meet specific standards before any ship is sent their way. Moreover, Maersk maintains a constant presence of its staff on the ground, showing that they are not just hands-off – they are actively involved in overseeing the recycling operations.

Despite the challenges of the COVID-19 pandemic, Maersk remained committed to conducting external verification audits and expanding its responsible ship recycling network. The company engaged with a new partner in safe, environmentally sound, and RSRS-compliant recycling operations in Alang yards. This resilience and commitment to maintaining high standards contributed to the success of Maersk's responsible ship recycling initiatives despite global challenges in 2021.

From 2017 to 2021, fourteen ships were responsibly recycled at six Alang yards, engaging more than 1000 workers. This goes beyond a company's efforts; it is a collaborative venture influencing Alang's entire ship recycling landscape.

While no additional vessels were sent for recycling in 2022, Maersk's commitment remained unwavering. The mobile health unit, supported by Maersk since 2018 to enhance healthcare access in Alang, achieved a significant milestone of providing 75,000 outpatient department services. This is not just about ships but about actively contributing to the local community's well-being.

Maersk is not just fulfilling its obligations; it aims to promote responsible practices in the industry. Its ambitious goals include facilitating global post-Panamax ship recycling, collaborating with stakeholders, contributing to the Alang area, and enhancing the global steel

value chain's environmental sustainability. Maersk is actively shaping a future where responsible ship recycling is a worldwide standard.

The commitment displayed by Maersk underscores its position as a significant player in the shipping industry and a leader in driving responsible ship recycling practices.

Collaboration in Maersk's Responsible Ship Recycling Activities

In addition to its efforts, Maersk actively collaborates with industry partners to drive transparency and foster responsible ship recycling practices. A notable collaboration is the Ship Recycling Transparency Initiative (SRTI), where Maersk has played a foundational role since its inception in 2018. The SRTI is a collective endeavor that brings together diverse stakeholders across the shipping industry value chain to promote transparency and enhance ship recycling policies, practices, and performance.

As a founding signatory, Maersk has remained committed to the SRTI, contributing to the initiative's success. In 2022, significant developments occurred within the SRTI, reflecting its growing influence and importance. The Sustainable Shipping Initiative, an entity previously hosting the SRTI, withdrew from its hosting responsibilities. However, demonstrating the initiative's resilience and industry backing, Smart Freight Centre has stepped in to assume hosting duties starting January 2023.

Maersk's involvement in the SRTI extends beyond being a signatory; the company remains an active steering group member. This entails endorsing the initiative's principles and actively participating in its governance and evolution. The SRTI, as of 2022, boasts 31 companies as signatories, with 14 shipowners representing various vessel types and geographical regions. This collaborative effort involves sharing valuable information on ship recycling policies and practices.

This collaborative approach is profoundly significant. It empowers lenders, investors, cargo owners, and other stakeholders to make informed decisions, recognizing and rewarding good practices in ship recycling through market mechanisms. The SRTI's impact has been substantial, with 2021 witnessing a surge in interest from insurance providers. This heightened interest has facilitated increased collaboration between shipowners and financial stakeholders, propelling the initiative's goals forward.

In quantifiable terms, the SRTI has achieved significant representation within the shipping industry. With 30 signatories, encompassing shipowners and other stakeholders, the initiative now covers over 50% of the global container fleet by TEU (Twenty-foot Equivalent Unit) capacity. This widespread involvement underscores the growing recognition and adoption of responsible ship recycling practices, positioning the SRTI as a pivotal force in transforming the industry landscape. As Maersk continues to actively participate and support the SRTI, the industry's collective efforts are shaping a future where transparency and responsibility are integral to ship recycling practices worldwide.

Impacts of Maersk's Responsible Ship Recycling Activities

Maersk's commitment to responsible ship recycling has translated into significant and positive impacts across various dimensions, encompassing health and safety, environment, labor and human rights, and the broader development of the Alang region. The Alang impact

assessment study, given by Maersk's 2021 Annual Sustainability Report, covering the period from 2017 to 2021, provides comprehensive insights into the outcomes of recycling 14 Maersk ships at six Alang yards, engaging more than 1000 workers.

Health and Safety: Maersk's responsible ship recycling initiatives resulted in over 2,950 man-days of supervision, conducted more than 4,350 training sessions, and underwent over 40 Lloyd's Register audits. These efforts culminated in zero fatalities, zero lost time injuries, zero spills, and hazardous materials incidents, showcasing a robust commitment to the well-being of workers and the surrounding environment.

Environment: The impact on the environment was substantial, with Maersk's initiatives leading to the establishment of over 82,000 square meters of impermeable floor at yards, the installation of 20 heavy-duty cranes, and the completion of over 35 environmental tests. These measures collectively contributed to minimizing the environmental impact of ship recycling operations.

Labor and Human Rights: Maersk's commitment extended to improving labor and human rights standards. Over 1,300 workers' homes were made ILO-compliant, and social security standards and working conditions were enhanced. The company conducted over 35 responsible procurement audits, ensuring adherence to stringent labor and human rights standards.

Wider Alang Development: Maersk's engagement in the wider Alang development areas encompassed over 62,200 consultations through the Mobile Health Unit, over 5,800 laboratory tests, and over 5,000 workers participating in health awareness training programs. The overall impact included improved living standards, enhanced healthcare access, and positive outcomes in health awareness, contributing to the holistic development of the Alang community.

4.3. Evaluation of green shipping logistics in Maersk

Maersk's Responsible Ship Recycling Activities are evaluated using the SWOT framework:

4.3.1. Strengths

Pioneering Industry Standards: Maersk's proactive stance in championing responsible ship recycling practices establishes it as an industry pioneer, setting high standards for health, safety, and environmental conditions in ship recycling.

Transformative Influence in Alang: By actively engaging in responsible recycling operations and encouraging shipyards in Alang to adhere to specific standards voluntarily, Maersk is driving transformative changes in the ship recycling practices prevalent in the region.

Formalized Standards: Maersk's commitment to responsible recycling is formalized through the Maersk Responsible Ship Recycling Standard (RSRS), ensuring adherence to stringent guidelines to uphold responsible ship recycling practices.

Positive Community Impact: Maersk's involvement extends beyond recycling vessels; initiatives such as the mobile health unit contribute to the local community's well-being, demonstrating a commitment to broader social responsibility beyond business operations.

Positive environmental effects: Maersk's commitment to green shipping practices demonstrates a proactive approach toward reducing its environmental footprint. Secondly,

initiatives such as decarbonization of ocean transport and retrofitting for green fuels highlight Maersk's dedication to addressing emissions-intensive operations. Thirdly, the Responsible Ship Recycling initiatives showcase Maersk's efforts to prevent environmental hazards and minimize the impact of ship recycling operations, contributing to a more sustainable shipping industry.8

4.3.2. Weaknesses

Operational Challenges: Ensuring compliance with stringent recycling standards and maintaining a constant presence in ship recycling yards in Alang may pose operational challenges and require significant resources and investments. In addition, despite Maersk's commitment, there may be challenges in fully implementing green solutions, particularly in landside transportation and air freight decarbonization, which may require significant investments and operational adjustments. Achieving targets such as 100% green solutions in landside transportation by 2040 and net-zero status in air freight by 2040 may pose logistical and financial challenges.

Resource Intensive: Conducting thorough screenings of recycling yards and external verification audits requires dedicated resources and a workforce, potentially diverting attention and resources from other operational priorities.

4.3.3. Opportunities

Market Leadership: Maersk's leadership in responsible ship recycling presents an opportunity to strengthen its market position by leveraging sustainability as a competitive advantage and attracting environmentally conscious customers. In addition, Maersk's focus on sustainability aligns with evolving industry trends, presenting opportunities to attract environmentally conscious customers and strengthen its market position.

Industry Collaboration: Collaborating with industry stakeholders through initiatives like the Ship Recycling Transparency Initiative (SRTI) provides opportunities to influence industry-wide adoption of responsible ship recycling practices and foster a culture of transparency and accountability. In addition, collaboration with industry stakeholders and partnerships for digitization and sustainability, such as with IBM for blockchain technology, opens avenues for innovation and long-term success.

4.3.4. Threats

Regulatory Compliance: Adhering to evolving regulations and standards in ship recycling practices adds complexity and may entail additional costs for Maersk, impacting operational efficiency and profitability. For example, regulatory changes and compliance requirements in decarbonization efforts and responsible ship recycling may pose challenges and increase operational costs for Maersk.

Market Dynamics: Maersk's commitment to responsible ship recycling may face challenges in markets where cost considerations outweigh sustainability concerns, potentially affecting competitiveness in price-sensitive markets.

Industry Adoption: Despite Maersk's leadership, broader adoption of responsible ship recycling practices may vary, posing challenges in achieving widespread adherence to high standards across the industry.

5. Recommendations for Vietnamese logistics companies

5.1. Current situation of green shipping practices in Vietnamese logistics companies

The current state of green shipping practices in Vietnam reflects challenges and progressive developments. The country is actively working towards enhancing its logistics and shipping sectors to be more environmentally friendly but faces certain obstacles.

One of the primary challenges is the need for substantial investment in infrastructure, including roads, railways, airports, and ports. This investment is crucial to facilitate efficient goods transportation across the country. Simplifying regulations and reducing administrative procedures that hinder freight service providers is also necessary. Encouraging these providers to adopt more environmentally friendly transport modes, such as electric vehicles, and reducing packaging waste are critical steps towards sustainable logistics practices. Additionally, logistics and food firms in Vietnam are advised to embrace digitalization and new technologies, like warehouse automation and transportation management systems, to improve the efficiency and accuracy of their operations.

Regarding port development, Vietnam is significantly transitioning towards greener and smarter ports. This transition aligns with the government's Net Zero commitment and the 2021 seaport master plan, which aims to combine modern technologies, operations, and funding sources for port development. The plan includes significant private investment to raise the necessary funds and anticipates a considerable increase in cargo throughput. The maritime sector is expected to adhere to upcoming benchmark standards for green ports, with the goal of all seaports being "green" by 2030. This ambitious project requires a comprehensive understanding of Vietnam's numerous ports' varying needs and capabilities.

Moreover, Vietnam is embarking on a significant project to achieve carbon neutrality in transportation, which will entail overhauling the entire transport ecosystem. This includes gradually reducing fossil-fueled vehicles and promoting electric and other forms of green energy like hydrogen power. The government's plan is divided into near-term (2022-2030) and long-term (2030-2050) objectives, covering various transport sectors, including road vehicles, railway travel, inland waterways, sea traffic, and urban transport. The strategy also includes the development of electric vehicle charging networks and the modernization of existing railway assets.

Furthermore, Vietnam's growing role in global trade has led to a surge in export-import activities, driving demand for seaport operations and infrastructure modernization. The country has witnessed a significant growth rate in container port traffic, leading the region in this aspect. This boom necessitates advancements in seaport facilities and operations to handle the increasing volume efficiently and sustainably.

5.2. Potential challenges in adopting green shipping practices in Vietnamese logistics companies

Maersk's green shipping practices are comprehensive, focusing on decarbonizing their supply chains, transitioning to green fuels, and promoting responsible ship recycling. Such practices are desirable for Vietnam's logistics, which, if adopted, would demonstrate the country's strong commitment to sustainability and environmental responsibility in the shipping industry. However, the push towards sustainable and green shipping practices, exemplified by global leaders like Maersk, underscores a complex landscape shaped by infrastructure needs, regulatory frameworks, technological advancements, economic factors, and industry-specific dynamics.

5.2.1. Resource and Infrastructure Limitation

Vietnam's logistics infrastructure requires considerable investment to keep pace with the country's rapid economic growth. The expansion in exports and imports, which nearly doubled from $298.2 billion in 2014 to $545.3 billion in 2020, demands a robust infrastructure to support this growth. Modernizing seaport operations is particularly pressing, given their central role in handling the increased volume of international trade.

At the same time, Vietnam currently grapples with a lack of facilities for alternative fuel sources, such as biofuels, LNG, or hydrogen, which are essential for green shipping. This deficiency limits the shipping industry's transition from traditional fossil fuels. Moreover, the availability of green technology, crucial for reducing emissions and enhancing energy efficiency, could be improved. Technologies such as electric or hybrid propulsion systems, advanced emission control technologies, and energy-efficient ship designs are not readily accessible or financially feasible for many Vietnamese shipping operators.

The inadequate support infrastructure for sustainable shipping operations further compounds the problem. This includes lacking green ports with facilities for alternative fuels, recycling waste, or enabling energy-efficient operations. Additionally, the existing ports often lack the technological capabilities to optimize logistics and reduce environmental impact, such as advanced cargo handling equipment or digital systems for efficient port management.

Another area of focus is encouraging providers to adopt environmentally friendly transport modes like electric vehicles and reduce packaging waste. Additionally, digitizing operations and adopting new technologies such as warehouse automation and transportation management systems are necessary for logistics and food firms to optimize costs while improving efficiency.

5.2.2. Inadequate Legal and Regulatory Frameworks

Vietnam's legal and regulatory frameworks are currently insufficient to support and enforce green shipping practices effectively. The existing policies may not have the necessary provisions or robust enforcement mechanisms to foster the adoption of eco-friendly practices in shipping. This regulatory inadequacy, as reported, necessitates the development of more comprehensive and enforceable regulations that align with international standards and cater to the unique aspects of Vietnam's maritime sector. Reforming these frameworks is essential to creating an environment conducive to sustainable shipping practices.

The International Maritime Organization (IMO) sets global standards for shipping, including environmental norms. However, Vietnam's current maritime regulations do not align with these standards. This misalignment poses challenges for Vietnamese shipping companies operating internationally and impacts the country's global trade relations and environmental credibility. For Vietnam to effectively participate in the global maritime industry, its regulatory framework must reflect and integrate international standards and practices.

Effective enforcement of environmental regulations is crucial for their success. In Vietnam, the enforcement mechanisms for green shipping practices are often weak or inconsistent. This inconsistency can lead to non-compliance and undermine the effectiveness of the regulations. Establishing robust enforcement mechanisms and consistent policy implementation is crucial for ensuring shipping companies adhere to green practices.

5.2.3. Lack of Market Readiness

A significant barrier in Vietnam's maritime sector is the limited understanding of Environmental, Social, and Governance (ESG) principles among businesses and investors. This knowledge gap often results in the slow adoption of green practices in the shipping industry, a sector pivotal to the nation's economic growth. A survey by Vietnam Briefing indicates a need for increased awareness and understanding of ESG principles, which could drive more significant investment in sustainable practices within the logistics and shipping sectors. Addressing this lack of awareness is not just about adhering to global trends but is critical for Vietnam's maritime industry's long-term sustainability and international competitiveness.

5.2.4. Economic Challenges

Global economic shifts have a direct impact on Vietnam's logistics sector. Surges in commodity prices affect the cost of raw materials, directly influencing the logistics and transportation costs. This increase in operational expenses can deter companies, especially SMEs, from investing in green technologies, which often require substantial initial capital. Inflation further exacerbates this issue, eroding the purchasing power of businesses and consumers alike, making green investments less attainable. Rising interest rates add another layer of complexity, increasing the cost of borrowing and further discouraging investments in sustainable practices.

In Vietnam, Small and Medium-sized Enterprises (SMEs) play a crucial role in the economy. However, these businesses are particularly vulnerable to economic challenges. According to a report, about 98% of SMEs in Vietnam lack sufficient resources for the green transition. This funding gap is a significant barrier to adopting sustainable practices within the logistics sector. SMEs often struggle to access the capital needed for green investments, such as retrofitting vehicles for improved fuel efficiency or investing in renewable energy sources for logistics operations.

Labor shortages in critical industries compound the challenges faced in the green transition. A skilled workforce is essential for implementing and maintaining sustainable logistics practices. However, sectors crucial for the transition, like renewable energy and green technology, often experience talent gaps. This shortage of skilled labor can delay the implementation of green initiatives and increase operational costs, making it more challenging for businesses to commit to sustainable practices.

5.3. Lessons learned from Maersk for green shipping practices in Vietnamese logistics companies

In its journey towards adopting green shipping practices, Vietnam can glean valuable lessons from Maersk, a global leader in implementing sustainable maritime solutions. Maersk's strategies and initiatives offer insights that the Vietnamese government, regulators, and enterprises can leverage to accelerate their green transition in the shipping and logistics sectors.

Commitment to Carbon Neutrality: Maersk's ambition to achieve net-zero CO2 emissions by 2040 sets a high bar for environmental responsibility in the shipping industry. Vietnam's government and businesses can draw inspiration from this commitment, recognizing the importance of setting ambitious, achievable environmental goals. A clear and dedicated roadmap towards carbon neutrality, backed by policy support and enterprise action, can drive substantial changes in the industry.

Investment in Green Technology: Maersk's strategy involves substantial investment in new technologies, such as green methanol and eco-friendly vessels. This underscores Vietnam's need for strategic investments in green technologies and infrastructure. The Vietnamese government could incentivize such investments through subsidies, tax breaks, or public-private partnerships, facilitating the adoption of cleaner fuel options and energy-efficient technologies in the maritime sector.

Fleet and Network Optimization: Maersk's focus on fleet optimization for better fuel efficiency demonstrates the importance of operational efficiency in reducing environmental impact. Vietnamese shipping enterprises can adopt similar strategies, such as optimizing route management, improving vessel load factors, and investing in modern, fuel-efficient ships. This approach not only reduces emissions but also enhances operational cost-effectiveness.

Regulatory Framework and Enforcement: Maersk's adherence to stringent international environmental regulations highlights the need for Vietnam to strengthen its regulatory framework. This involves aligning national regulations with international standards and ensuring robust enforcement mechanisms. A solid regulatory environment will encourage businesses to comply with green practices and maintain competitiveness on the global stage.

Standardized ship recycling process: The effects of ship recycling activities conducted by Maersk have proved the demand for developing a standardized ship recycling process in Vietnam using the idle shipyard's infrastructures. With the advantages of the availability of shipbuilding facilities, low capital costs, and an abundant yet skilled labor force, Vietnam can develop a standardized ship recycling process by strengthening the legal framework on ship recycling activities and investing in improving ship recycling practices among employees. The recycled materials from ship recycling practices will be an excellent source for Vietnam’s steel production industry and will reduce energy consumption and CO2 emissions.

Collaboration and Knowledge Sharing: Maersk's collaborative efforts in research and developing low-readiness-level technologies provide a template for how Vietnamese enterprises can engage in knowledge sharing and collaborative research. Partnerships with academic institutions, international maritime organizations, and other stakeholders can facilitate the exchange of best practices and innovation in green shipping.

Training and Development: Vietnam can learn from Maersk in other areas, such as investing in human capital. Training the workforce in green logistics practices and raising awareness about environmental sustainability are essential steps. This includes programs for skilling, reskilling, and upskilling employees in new green technologies and sustainable shipping practices.

In summary, Vietnam can derive lessons from Maersk's approach to green shipping, focusing on ambitious carbon neutrality goals, investment in green technology, fleet optimization, robust regulatory frameworks, collaborative innovation, and human capital development. By adopting these strategies, Vietnam can make significant strides in transforming its maritime sector into a more sustainable and environmentally responsible industry.

6. Conclusion

This research has revealed the environmental and economic impacts of applying green shipping practices by Maersk and proposed some practical green shipping solutions from the case study to Vietnamese logistics cooperations based on current shipping situations to minimize environmental impacts and ensure financial stability and growth. With the effort of Maersk to cut down the effects of shipping activities on the environment concerning both ocean and inland transportation, such as ensuring fuel efficiency, transforming to green fuels like biodiesel or green methanol and ammonia alongside ship recycling activities, the company has shown outstanding results in not only economic efficiency by increasing global market presence and ensuring a competitive positioning in the market but also greenhouse gas emissions significant reduction. Regarding Vietnam’s logistics companies, although there are several hindrances, such as resources and infrastructure limitations, insufficient legal and regulatory frameworks, and financial burdens, Vietnam's green action plan for the upcoming period shows efforts and actions to implement green shipping practices and apply digital transformation in logistics activities with the commission to achieving net zero emissions by 2050, said at the United Nations Climate Change Conference in 2021.

In essence, this research contributes to the discourse on green shipping practices, offering a blueprint for companies in Vietnam to navigate the challenges and embrace the opportunities associated with sustainable logistics. Limitations of time and resources highlight the need for future studies to delve deeper into specific aspects beyond the scope of our current research. In the ever-evolving landscape of logistics and sustainability, the research identifies areas for future exploration.

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