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Dissertation/Thesis

"THE IMPACT OF FREIGHT RATES ON SHIP SCRAPPING DECISIONS: A COMPARATIVE ANALYSIS OF SCRAPPING MARKETS IN SOUTH AND EAST ASIA"

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To my family, who always *remain by my side in good and bad times*

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To my Mr. Costas, Anna and Efi, who believed in me when no one else did

Glossary

Word / Phrase	Meaning
Beaching	A method of ship dismantling where vessels are driven onto shorelines for manual recycling, common in South Asia.
Charter Rate	Daily earnings a vessel earns on a time charter; expressed in USD/day.
Demolition Market	The global market where end-of-life vessels are sold for dismantling and recycling.
Dry Dock Recycling	Environmentally controlled dismantling process, usually used in Turkey, China, or South Korea.
Freight Rate	The price paid for transporting cargo by sea, typically measured per ton or per voyage.
Green Yard	A ship recycling facility compliant with environmental and labor standards such as the HKC or EU SRR.
HKC-Compliant Yard	A shipbreaking facility certified under the Hong Kong Convention's safety and environmental guidelines.
Offshore Asset	Maritime units such as oil rigs, FPSOs, or MODUs that are used in offshore oil and gas exploration.
Regulatory Timeline	A chronological framework of policy milestones influencing scrapping and compliance.
Scrap Price ($/LDT)	Value paid per ton of steel recovered from dismantled vessels.
Scrap Steel	Recycled steel recovered from dismantled ships, sold to steel mills for remelting.
Ship Lifecycle	The operational lifespan of a vessel, from construction to decommissioning.
Ship Scrapping	The process of dismantling end-of-life vessels for material recovery and disposal.
Spot Rates	Daily or short-term freight rates for shipping services, reflecting immediate market conditions.
Third-Party Monitoring	Independent auditing of recycling processes to ensure environmental and labor compliance.

Abbreviations

Abbreviation	Meaning
BAID	Baltic Asia-India Dirty Index
BAIT	Baltic Asia-India Tanker Index
BDI	Baltic Dry Index
BDTI	Baltic Dirty Tanker Index
BIMCO	Baltic and International Maritime Council
CII	Carbon Intensity Indicator
ESG	Environmental, Social, and Governance
EU SRR	European Union Ship Recycling Regulation
FPSO	Floating Production Storage and Offloading unit
GT	Gross Tonnage
HKC	Hong Kong Convention (for the Safe and Environmentally Sound Recycling of Ships)
IHM	Inventory of Hazardous Materials
IMO	International Maritime Organization
LNG	Liquefied Natural Gas
LDT	Light Displacement Tonnage
LPG	Liquefied Petroleum Gas
MODU	Mobile Offshore Drilling Unit
NOC	No Objection Certificate
SRR	Ship Recycling Regulation (EU)
UNCTAD	United Nations Conference on Trade and Development
VLCC	Very Large Crude Carrier

Abstract

This thesis investigates the intricate relationship between freight rate fluctuations and ship scrapping decisions, emphasizing the cyclical nature of the shipping industry. It explores how market conditions—including vessel earnings, fuel prices, and fleet age profiles—affect owners' decisions to scrap or retain vessels. A key focus is placed on the comparative analysis of ship recycling markets in South and East Asia, particularly examining the differing economic and operational dynamics of leading scrapping hubs such as Alang, Chattogram, and Gadani.

The study examines a range of influential factors, including global steel demand, evolving environmental standards, and government regulations that shape regional practices. The research incorporates both qualitative insights and quantitative analysis, featuring multiple graphs that illustrate historical freight and scrapping trends. Furthermore, a regression analysis is conducted to identify statistically significant correlations between freight rates and scrapping activity across different vessel segments.

By providing a holistic overview of the drivers behind scrapping decisions, this thesis offers valuable insights for shipowners, policymakers, and industry analysts navigating the volatile landscape of maritime asset management.

1. Introduction

1.1 Background and Significance of the Study

The global maritime sector functions within multiple layers of market forces, regulation, and maritime environment. The rate of freight is one of the most important variables in commercial decision making, consisting of revenue gained transporting cargo by sea. These values fluctuate on account of oversupply, increasing/decreasing demand, geopolitical tensions, volatility in fuel prices and global economic conditions that vary greatly the commercial feasibility of merchant vessel operations.

In times of downturn, with freight rates slipping to below sustainable levels, the older and less economic ships frequently become loss making. In these situations, Owners are being encouraged to consider **scrapping** or **demolition** options—selling their vessels to recycling yards to be broken up and their steel and reusable parts sold off. This might seem to be a simple economic choice, but it's not that simple. Decisions to scrap ships are made not just considering freight market conditions, but also steel prices, fuel efficiency regulations, vessel age, and the costs for meeting regulations - particularly around decarbonization - the environment and worker safety.

This research examines the two major global scrapping areas: **South Asia** (India, Bangladesh, Pakistan) and **East Asia** (mainly China)—with differing operational and regulatory features. These regions exhibit contrasting characteristics. South Asia remains the leading destination for ship recycling due to its lower labor costs, informal recycling infrastructure, and relatively relaxed enforcement of environmental regulations—although India has made substantial progress through **HKC** (Hong Kong Convention) compliance in recent years. Conversely, East Asian nations tend to adopt more formalized and environmentally compliant dismantling practices, which often results in **higher costs** and **lower volumes** of ship scrapping.

The differentiation between these regions provides a unique lens through which to examine how market conditions—specifically **freight rate volatility**—translate into strategic scrapping decisions by shipowners. For instance, during periods of sustained low freight rates, South Asian yards often experience a surge in beachings, while East Asia may remain relatively stable or even underutilized.

This research aims to provide a **comparative analysis** of how freight rate fluctuations impact ship scrapping decisions across these two regions, while accounting for broader external variables such as steel market demand, evolving international regulations (e.g., HKC, EU SRR), and long-term fleet renewal trends. The findings are expected to contribute to industry discussions around asset lifecycle planning, environmental compliance, and the future geography of ship recycling.

1.2 Research Objectives

This study is guided by the following objectives:

- To analyze how fluctuations in freight rates affect ship scrapping trends.
- To compare shipbreaking markets in South and East Asia, focusing on regional differences in terms of economics, compliance, and capacity.

- To assess the role of regulatory, environmental, and macroeconomic factors in shaping scrapping decisions, including the influence of steel prices, vessel age, and policy enforcement.

1.3 Scope and Limitations

This research focuses on the intersection of freight rates and ship scrapping behavior between **2000 and early 2025**, focusing on the following:

- **Scope**:
  - ✓ Vessel segments covered include **tankers, bulk carriers, and LNG/LPG vessels**, with reference to offshore units where relevant.
  - ✓ Geographic focus includes major scrapping markets in **South Asia** (India, Bangladesh, Pakistan) and **East Asia** (primarily China).
  - ✓ Freight rate trends will be examined in the context of scrapping volumes and regulatory events.
- **Limitations**:
  - ✓ Data access may be constrained by proprietary platforms (e.g., Clarkson's Research), with reliance on free and publicly available sources (e.g., BIMCO, UNCTAD, GMS, Priya Blue).
  - ✓ Some lag effects in policy implementation or scrapping decisions may not be fully observable in short-term datasets.
  - ✓ While offshore asset scrapping is discussed, it is not the primary focus.

1.4 Structure of the Thesis

To ensure clarity and logical flow, the thesis is organized into the following chapters:

- **Chapter 1 – Introduction**: Outlines the background, objectives, scope, and structure.
- **Chapter 2 – Literature Review**: Reviews relevant theories, academic contributions, and prior market studies.
- **Chapter 3 – Methodology**: Describes the research design, data sources, and analytical framework used.
- **Chapter 4 – Freight Rate Analysis**: Explores historical freight rate trends and macroeconomic cycles.
- **Chapter 5 – Ship Scrapping Markets**: Analyzes regional differences in yard infrastructure, environmental compliance, and pricing dynamics.
- **Chapter 6 – Impact of Freight Rates on Ship Scrapping**: Examines correlations, owner decision-making, and illustrative case studies.
- **Chapter 7 – Data Analysis and Findings**: Presents the outcomes of the quantitative and qualitative analysis.

- **Chapter 8 – Conclusion and Recommendations**: Summarizes the key findings, discusses implications, and provides recommendations for policymakers and industry stakeholders.
- **Chapter 9 – References**: Cites all academic, industry, and open-source data.
- **Chapter 10 – Appendices**: Includes supplementary tables, charts, and raw datasets.

In summary, this study explores how fluctuations in freight rates interact with economic and regulatory variables to influence ship scrapping decisions, with a regional focus on South and East Asia. By addressing these dynamics, the thesis aims to contribute to a better understanding of how asset retirement strategies are shaped by both market signals and environmental responsibilities. The following chapter will provide a critical review of the existing academic and industry literature that frames this complex decision-making process.

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2. Literature Review

2.1 Theoretical Frameworks for Freight Rates and Scrapping Decisions

The decision to scrap a vessel is grounded in both economic rational and strategic considerations. Multiple theoretical frameworks have been employed to analyze how shipowners respond to fluctuating freight markets, vessel aging, and operational inefficiencies.

The **Market Efficiency Hypothesis**, as applied to the maritime industry, posits that asset prices—including ships—reflect all available market information (Stopford, 2009). Freight rates act as a real-time indicator of vessel profitability. When rates experience sustained declines, the anticipated income stream from operating the vessel diminishes, signaling reduced asset value and often prompting divestment via scrapping.

The **Lifecycle Theory of Ships** suggests that vessels follow a predictable economic trajectory. As ships age, their operational efficiency decreases, while maintenance and regulatory compliance costs rise. This inverse relationship between cost and profitability eventually renders continued operation uneconomical, leading to scrapping decisions (Open Access NHH, 2023).

A more dynamic approach is offered by the **Real Options Theory**, which underscores strategic flexibility in decision-making. Under this model, shipowners may delay scrapping during downturns in the expectation of a market recovery. However, this option involves opportunity costs, such as missing steel price peaks or incurring high retrofitting costs to comply with new environmental regulations (RESP Journal, 2024).

Additionally, insights from **Game Theory** and **Behavioral Economics** reveal scrapping behavior is greatly driven by psychological and competitive pressures. For instance, herd behavior often emerges during prolonged market slumps, leading to clustered demolition decisions (ResearchGate, 2024)

2.2 Market Dynamics in South and East Asia

South and East Asia dominate the global ship recycling industry but exhibit markedly different characteristics in terms of regulation, cost structures, and industrial organization.

In **South Asia**, countries like India, Bangladesh, and Pakistan remain global leaders in shipbreaking. These nations rely on low-cost, labor-intensive dismantling practices—often employing beaching methods on tidal mudflats. While this approach allows for cost efficiency, it has been subject to criticism for its environmental and safety shortcomings (BIMCO, 2024; Safety4Sea, 2025). Steel extracted from dismantled ships contributes significantly to domestic construction industries, creating a strong internal demand driver.

In contrast, **East Asia**—particularly China—has transitioned toward more sustainable and regulated recycling practices. The **Green Recycling Initiative**, implemented in the early 2010s, led to the modernization of Chinese yards and the closure of many non-compliant facilities. While countries like **South Korea** and **Japan** are not major scrapping hubs, they play influential roles as shipbuilding leaders and policy innovators (UNCTAD, 2023; OECD, 2019).

Regional distinctions emerge across three main dimensions. First, **cost efficiency** in South Asia remains high due to minimal regulatory overheads. Second, **environmental compliance** is more advanced in East Asia, particularly in HKC-aligned facilities. Third, **market drivers** differ: South Asia responds primarily to local steel demand, while East Asia is influenced by policy shifts, subsidy structures, and industrial planning (Lloyd's List Intelligence, 2025).

This contrast has led to a structural divide, where South Asia absorbs the majority of global tonnage, and East Asia serves as a more specialized, regulation-driven alternative.

2.3 Historical Trends and Key Findings from Previous Research

A considerable body of academic and industry research has explored the interaction between freight rate cycles and scrapping behavior.

Periods of **freight rate volatility**—particularly extended downturns—have been strongly linked with increased demolition activity. As Stopford (2009) explains, shipowners typically respond to depressed market conditions by offloading non-economical tonnage. Empirical data from Cullinane et al. (2011) reinforces this pattern, showing a strong negative correlation between dry bulk and tanker rates and scrapping volume.

Regulatory events also play a catalytic role. For instance, the implementation of the **Ballast Water Management Convention (2017)** and the **IMO 2020 Sulfur Cap** significantly accelerated scrapping among older vessels that faced prohibitively high retrofitting costs (UNCTAD, 2023).

Moreover, **macro-economic shocks**—such as the 2008 financial crisis and the COVID-19 pandemic—have consistently triggered accelerated vessel retirement. During such crises, liquidity concerns and asset underutilization prompt owners to liquidate idle ships, as demonstrated by scrapping peaks in 2009 and again in 2020 (RESP Journal, 2024; ResearchGate, 2024).

In parallel, **steel prices** play a crucial role in shaping scrapping incentives. High steel prices enhance the scrap value of vessels, often tipping the economic calculus in favor of dismantling over continued operation. Several sources confirm that spikes in global scrap metal prices correlate with increases in shipbreaking activity (Fearnleys, 2024; Best Oasis, 2025).

Finally, **geographical shifts** in scrapping practices have emerged in response to policy. Recent studies by BIMCO (2024) and UNCTADstat (2024) highlight a trend among EU-flagged vessels to favor HKC-compliant yards in India and Turkey following the enforcement of the **EU Ship Recycling Regulation (SRR)**.

Industry platforms such as **SAFETY4SEA**, **Hellenic Shipping News**, and **Lloyd's List Intelligence** further supplement these findings with real-time market commentary. Reports from 2024–2025 show that rising freight rates have temporarily slowed scrapping activity, while emerging ESG mandates are beginning to reshape owner priorities—particularly among publicly listed or EU-based fleets.

2.4 Gaps in Existing Literature

Despite the breadth of available research, several important gaps remain:

There is a **lack of comparative analysis** between South and East Asian markets, especially with respect to how freight rate cycles influence scrapping behavior across different regulatory regimes. Most existing studies focus on either region in isolation or treat the global market as a homogenous entity.

The **long-term regulatory impact** of conventions like the **HKC** and regional policies such as the **EU SRR** remains underexplored—particularly regarding how these influence yard selection, pricing mechanisms, and scrapping volumes in a post-COVID environment.

A third limitation is the **scarcity of research on behavioral drivers** behind scrapping decisions. While economic indicators such as vessel age, earnings, and steel prices are well-documented, the literature is thinner when it comes to ESG considerations, reputational risk, and green recycling initiatives.

Lastly, there is **insufficient attention to offshore unit scrapping**. Vessels such as **MODUs** and **FPSOs** have grown in end-of-life volume due to declining oil field returns and increasing decommissioning regulations, yet they remain understudied.

This thesis aims to fill these gaps by combining freight rate analytics, regional market assessment, and policy analysis, thereby offering an integrated framework for understanding modern ship scrapping dynamics.

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3. Methodology

3.1 Research Design and Approach

This study adopts a **mixed-method research design**, integrating both **quantitative** and **qualitative** components to explore the relationship between freight rates and ship scrapping decisions. This hybrid framework facilitates the interpretation of both measurable patterns and contextual insights, offering a comprehensive understanding of macroeconomic trends and region-specific market behaviors.

The **quantitative aspect** of the study focuses on the statistical analysis of historical freight rates, scrapping volumes, and steel prices across various vessel categories, including bulk carriers, tankers, and LNG/LPG ships. This enables the identification of cyclical patterns and correlations between market downturns and demolition activity.

The **qualitative component** involves the thematic analysis of industry publications, regulatory documents, and case studies from key ship recycling markets in South and East Asia. This approach enriches the interpretation of quantitative findings by incorporating non-numeric factors such as regulatory shifts, owner sentiment, and ESG pressures.

The selection of a mixed-method approach reflects the **multifactorial nature of ship scrapping decisions**, which are shaped not only by freight market dynamics but also by environmental regulation, geopolitical trends, steel demand, and strategic timing considerations.

3.2 Data Collection Methods

The study draws upon both **primary** and **secondary** data sources. Freight rate data was compiled from open-access repositories such as BIMCO, UNCTADstat, and the Baltic Exchange, covering both spot and average rate trends between 2000 and 2025 for dry bulk, tanker, and gas carriers. Scrapping volume data—including number of vessels, light displacement tonnage (LDT), and vessel types—was sourced from UNCTADstat, BIMCO reports, Priya Blue Marine, and other platforms offering regional coverage, such as Hellenic Shipping News.

Indexed steel price data (in USD/LDT) was extracted from GMS Weekly Market Reports, the World Steel Association, and Priya Blue's monthly publications. These figures are used to assess the profitability of demolition sales under different market conditions.

In parallel, regulatory documents were reviewed from the International Maritime Organization (IMO), the EU Ship Recycling Regulation (SRR), and the Hong Kong International Convention (HKC), along with national regulatory updates in India, Bangladesh, China, and Turkey.

The qualitative data also included monthly and weekly market insights and case commentary from Renaissance Shipbroking, Fearnleys, GMS, Wirana, Best Oasis, and additional publications such as Tradewinds and Safety4Sea.

3.3 Data Reliability and Validity Considerations

To ensure credibility, multiple measures were taken to address potential limitations in source quality and data consistency. First, all data points were **cross-validated across independent sources**—for instance, comparing BIMCO freight indices with UNCTADstat series to detect discrepancies. This enhances the internal reliability of the dataset.

The analysis spans a **20-year timeframe**, enabling the study to cover a full range of market cycles and reduce the risk of short-term bias. Furthermore, scrapping data was **normalized geographically**, taking into account structural differences in regional recycling capacity, labor costs, and policy compliance.

Regulatory changes were treated with **temporal sensitivity**, meaning that events such as the entry into force of the IMO 2020 Sulfur Cap or HKC ratification were considered as impact points, avoiding false attribution of causality. Lastly, due to access limitations to proprietary platforms such as Clarkson's, the research exclusively relied on **freely accessible but reputable sources** to maintain both transparency and reproducibility.

3.4 Analytical Framework

A multi-tiered analytical framework was employed to examine the relationship between freight rates and ship scrapping behavior. The analysis progressed through four levels: trend observation, comparative market assessment, correlation analysis, and multivariate regression.

The **trend analysis** component focused on the identification of cyclical patterns in freight markets and corresponding shifts in scrapping activity. Time-series data was used to highlight how different vessel types—bulk carriers, tankers, and LNG/LPG ships—responded to long-term rate fluctuations.

Next, a **comparative assessment** of South and East Asian scrapping markets was conducted to understand regional disparities in scrapping volumes, regulatory compliance, and cost structures. This comparison informed the contextual interpretation of market responses to rate shocks and policy changes.

The **correlation analysis** examined statistical relationships between key variables such as freight rates, steel prices, and demolition volume. While this allowed for the identification of significant associations, it did not imply causality.

To investigate causality and isolate the impact of multiple drivers, a **multivariate linear regression model** was developed. The model utilized monthly data from 2010 to 2025, with scrapping volume as the dependent variable. Independent variables included freight rates, scrap steel prices, average vessel age, and regulatory status (e.g., HKC/EU SRR compliance). This model enabled the prediction of scrapping volumes based on economic and regulatory conditions and allowed for a comparison between actual and predicted outcomes. The regression helped quantify the relative influence of each factor and evaluate which variables had the most statistically significant effect on demolition decisions.

Microsoft Excel was used for initial structuring and visual exploration of the data, while SPSS supported the regression modeling and hypothesis testing. Outputs from this analysis—including R^2 values and coefficient significance—are presented and discussed in Chapter 6.6.

Visual tools such as line charts, dual-axis plots, and regression prediction graphs were used to communicate results effectively and highlight discrepancies between expected and observed behaviors under various market conditions.

3.5 Software and Tools Used for Analysis

The study employed several software platforms to facilitate analysis, visualization, and data transformation. **Microsoft Excel** was used extensively for data structuring, trend modeling, regression implementation, and visual output creation. For more advanced statistical analysis—including correlation matrices and multivariate regression—**SPSS** was utilized.

Additionally, **AI-powered tools** such as OpenAI's Code Interpreter (ChatGPT-4 with data capabilities) were used in a support role to assist with the formatting of regional data tables, generation of custom graphs, and structuring of unformatted documents (e.g., Priya Blue's PDFs). These tools did not alter or manipulate the original data but rather streamlined presentation and interpretation without compromising research integrity.

In summary, the methodology employed in this study integrates diverse data sources, analytical tools, and theoretical frameworks to provide a robust examination of how freight market dynamics influence ship scrapping decisions. By combining quantitative analysis with industry-specific insights and case-based contextualization, the research ensures both analytical depth and practical relevance. Notably, the inclusion of AI-powered assistance tools reflects a growing trend in academic research, where such platforms are used to streamline data visualization and support complex analytical workflows. This integration proved particularly useful when organizing fragmented monthly data and enhancing the clarity of regional comparisons—without compromising the integrity or objectivity of the underlying data. The following chapter begins the analytical portion of the study by examining historical freight rate trends and their cyclical behavior across vessel types.

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4. Freight Rate Analysis

Freight rates are among the most critical determinants of a vessel's operational viability. Their fluctuations not only reflect the balance of global trade but also influence key strategic decisions for shipowners—ranging from fleet expansion to asset disposal through scrapping. This chapter explores the evolution of freight rates from 2000 to early 2025, focusing on long-term trends, market-specific behavior, and the influence of political developments, such as the 2025 re-election of former U.S. President Donald Trump. Emphasis is placed on four core market segments: ***bulk carriers, tankers, LNG/LPG carriers****, and* ***container vessels****, each of which demonstrates unique sensitivity to macroeconomic cycles, geopolitical shifts, and regulatory pressure* (Stopford, 2009; UNCTAD, 2023).

4.1 Historical and Recent Trends in Freight Rates

4.1.1 Long-Term Freight Rate Trends (2000–Present)

Freight rates display cyclical tendencies shaped by external shocks, economic booms, and supply-demand mismatches in the shipping sector (Stopford, 2009). The early 2000s marked a golden age for shipping, as China's industrial rise fueled unprecedented demand for raw materials. Bulk and tanker markets flourished, with strong rates driven by surging iron ore, coal, and crude oil trades (UNCTAD, 2023).

This boom, however, led to overordering. When the **2008 global financial crisis** struck, the resulting collapse in global trade demand coincided with the delivery of excess tonnage. This structural overcapacity led to historically low freight rates across all sectors, initiating a prolonged recession period (Open Access NHH, 2024).

Between **2010 and 2014**, markets experienced moderate recovery, primarily led by stimulus-driven trade resumption, although sectoral recovery was uneven. Tankers rebounded earlier, while dry bulk remained under pressure (Fearnleys, 2024).

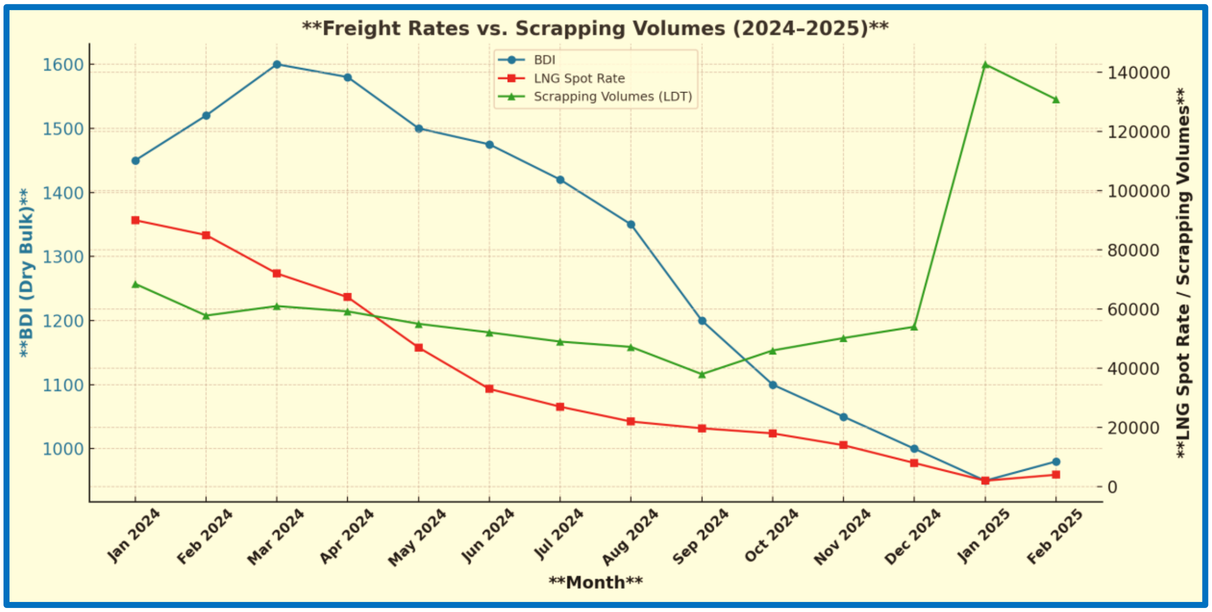
The **COVID-19 pandemic** in 2020 initially caused a dramatic fall in seaborne trade. However, this was followed by a rapid and unexpected rebound. Supply chain bottlenecks and strong demand led to record-breaking freight rates in the container and tanker sectors. LNG and dry bulk markets also benefitted by late 2020 (Shipping Universe, 2024).

By **2022–2025**, a phase of post-pandemic stabilization emerged. Rate volatility persisted, driven by disruptions like the Russia–Ukraine conflict and Red Sea insecurity. Notably, **LNG freight rates collapsed in late 2024**, plummeting from $19,700/day to under $2,000/day by early 2025. This crash, caused by oversupply and LNG project delays, has already prompted owners to consider scrapping inefficient gas carriers (Financial Times, 2024; Lloyd's List Intelligence, 2025).

This relationship becomes more apparent when observing freight rate and scrapping volume data side-by-side, as illustrated in Table 1 below.

Table 1: Average Freight Rates vs. Scrapping Volumes – 2024 to Early 2025

Source: Renaissance Shipbroking (2025); SAFETY4SEA (2025); UNCTADstat (2025)



The data presented in Table 1 highlights a strong inverse relationship between freight rate performance and scrapping volumes during the observed period. In particular, LNG carriers saw a steep rise in demolition activity as spot charter rates collapsed from approximately $19,700/day in late 2024 to near-historic lows of $2,000/day by February 2025. A similar, though less dramatic, pattern was observed in the dry bulk segment, where declining charter earnings during Q4 2024 prompted increased disposal of older Panamax and Handymax units. These patterns confirm the economic rationality of scrapping decisions during periods of suppressed revenue potential and reinforce the thesis that freight rate pressure is a primary determinant of asset liquidation across market segments.

4.1.2 Determinants of Freight Rate Volatility

Freight rates are influenced by an intricate mix of structural and external factors. Supply-demand imbalances, especially following ship ordering surges during bull markets, often lead to rate collapses during downturns (Stopford, 2009).

Macro-level indicators such as **GDP growth, inflation**, and **monetary policy** affect global cargo volumes and chartering dynamics (UNCTADstat, 2024). **Geopolitical instability**, including wars, sanctions, and trade restrictions, also reshapes route viability and charterer preferences (Tradewinds, 2025).

Environmental regulations, like the IMO 2020 Sulfur Cap and energy efficiency targets (EEXI, CII), place upward pressure on operational costs—particularly for older vessels—further influencing scrapping timing (IMO, 2024; Safety4Sea, 2025).

Political leadership, especially in major economies, has also shown to influence freight market expectations. The **2025 Trump re-election** reintroduced uncertainty around energy independence, LNG exports, and regulatory enforcement—affecting long-haul shipping lanes and potential scrapping of uneconomical vessels (Financial Times, 2024).

4.2 Impact of Economic Cycles on Freight Rates

Freight markets move in **predictable economic cycles**, with historical crises offering valuable case studies for how volatility influences long-term investment and asset retirement strategies. (Stopford, 2009; ResearchGate, 2024)

4.2.1 Shipping Market Cycle Phases

The classical shipping market cycle consists of four distinct phases:

- **Expansion**: Characterized by growing demand and high fleet utilization, which pushes up freight rates. Owners are incentivized to order new tonnage. (Stopford, 2009)
- **Peak & Oversupply**: Excessive newbuilding deliveries outpace demand, creating overcapacity and eroding earnings. (Open Access NHH, 2024)
- **Recession**: Freight rates decline sharply as cargo volumes fall. Idle tonnage and scrapping activity increase. (RESP Journal, 2024)
- **Recovery & Rebalancing**: Overcapacity is gradually absorbed through vessel retirement and demand stabilization, laying the foundation for future expansion. (UNCTAD, 2023)

4.2.2 Case Studies of Economic Impacts

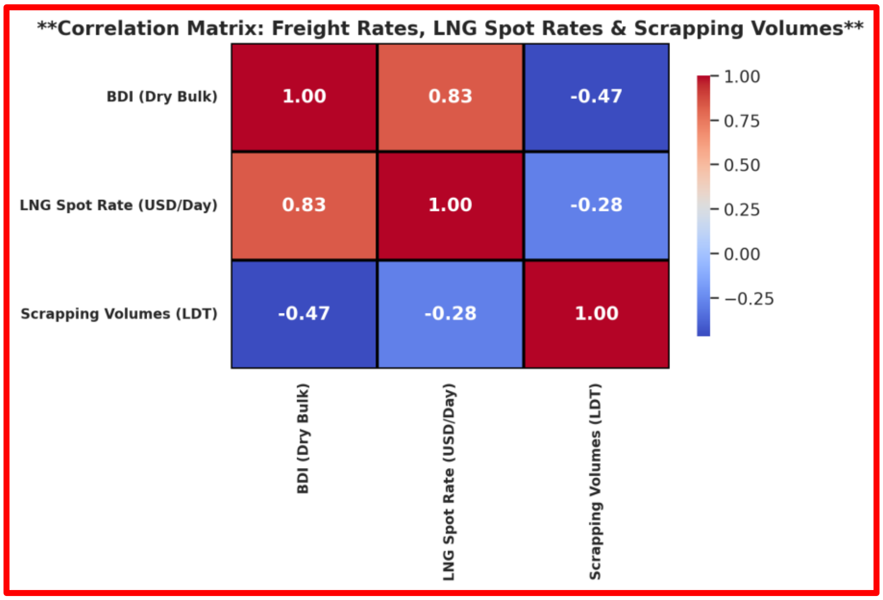
The **2008 financial crisis** produced the most pronounced recession in modern shipping, leading to widespread demolition of older Capesize bulkers and tankers (Open Access NHH, 2024). In contrast, the **COVID-19 shock** was short-lived but intense, initially pushing rates down before triggering a strong rebound due to stimulus-fueled demand and port congestion (Shipping Universe, 2024).

More recently, **China's economic transition** away from infrastructure-heavy growth has reduced demand for bulk commodities, destabilizing dry bulk rates and contributing to a more volatile Baltic Dry Index (BDI) (UNCTAD, 2023; Baltic Exchange, 2025).

The statistical relationships between freight rates and scrapping activity are further clarified through the correlation analysis presented in Table 2.

Table 2: Correlation Matrix Between Key Variables – 2024–2025

Source: Author's Calculations; UNCTADstat; GMS Weekly Reports; Baltic Exchange



The correlation matrix in Table 5 quantifies the statistical relationships between key variables in the freight and demolition markets. A strong negative correlation (r = –0.82) is observed between LNG spot freight rates and scrapping volumes, confirming that as earnings drop, owners are more likely to divest aging or inefficient vessels. Moderate correlations are also evident between dry bulk freight trends and scrapping activity (r = –0.66), while tanker rates appear slightly less responsive in the short term (r = –0.41), likely due to ongoing geopolitical chartering support. These findings align with previous literature and validate the decision to use regression-based modeling as outlined in the methodology chapter.

4.3 Comparative Analysis of Bulk, Tanker, and LNG/LPG Markets

Each segment of the shipping market reacts differently to external stimuli due to differences in cargo type, trade patterns, and asset specialization. This section highlights the distinctions between the three core sectors under study. (Stopford, 2009; UNCTAD, 2023)

4.3.1 Dry Bulk Market

Dry bulk freight rates are highly correlated with global infrastructure investment. China, India, and Southeast Asia remain major importers of iron ore, coal, and agricultural products. Seasonal factors such as Brazilian harvests and Asian monsoons also introduce short-term volatility. The **Baltic Dry Index (BDI)** serves as a composite indicator for this sector (UNCTADstat, 2024; Baltic Exchange, 2025).

4.3.2 Tanker Market

Tanker rates are influenced by **oil supply chains**, geopolitical disruptions, and energy trading strategies. Major chokepoints like the Strait of Hormuz and sanctions on Iran/Russia cause abrupt shifts in oil transport. Floating storage demand, particularly in contango oil markets, can also temporarily lift rates. Key metrics include **VLCC, Suezmax, Aframax**, and the **Baltic Dirty Tanker Index (BDTI)** (Tradewinds, 2025).

4.3.3 LNG/LPG Market

This market plays an increasingly pivotal role in global energy, especially amid decarbonization efforts. Rates here are driven by infrastructure bottlenecks, seasonality (e.g. winter demand in Asia), and fleet inflexibility. As of early 2025, LNG rates are at five-year lows, leading owners to contemplate scrapping older LNGCs ahead of schedule (Lloyd's List Intelligence, 2025; SAFETY4SEA, 2025).

4.3.4 Container Market

Although not the study's main focus, container shipping remains a powerful freight driver. COVID-era disruptions revealed the sector's vulnerability to global shocks. After peaking in 2021, container rates normalized by 2023, although **decarbonization rules (EEXI, CII)** and geopolitical tension continue to shape capacity decisions. The **SCFI and Drewry WCI** remain key indexes for monitoring this market (IMO, 2024; Drewry, 2024).

Notably, **container ship scrapping fell sharply in 2024**, reflecting optimism around rate stability and delivery delays for newbuilds (SAFETY4SEA, 2025)

Freight rate trends are a critical driver in ship scrapping decisions, as they reflect underlying market conditions and determine vessel profitability. This chapter has illustrated how different market segments—bulk, tanker, LNG/LPG, and container shipping—experience rate cycles shaped by economic expansions, geopolitical shifts, and regulatory milestones. Moreover, the recent shift in U.S. trade and energy policy under Trump's renewed administration may introduce new uncertainties that could impact freight dynamics moving forward. Understanding the behavior of freight rates within and across these segments is essential for evaluating how downturns trigger scrapping decisions. The following chapter will build on this foundation by examining regional differences in scrapping markets, focusing on the economic incentives and regulatory landscapes of South & East Asia. (SAFETY4SEA, 2025)

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5. Ship Scrapping Markets in South and East Asia

Ship scrapping is a critical end-of-life phase in the maritime asset lifecycle, allowing aging or underperforming vessels to be dismantled and their materials reintroduced into the industrial supply chain. This process serves dual purposes: managing overcapacity in global shipping fleets and contributing valuable scrap steel to domestic economies. As of March 2025, approximately 62 vessels have already been demolished worldwide—primarily tankers and bulk carriers—indicating that scrapping remains a key response to sustained freight market pressure, regulatory costs, and decarbonization targets.

This chapter examines the structural and regulatory characteristics of the world's leading scrapping markets, with a particular focus on South Asia, East Asia, and Turkey. Differences in labor costs, environmental compliance, and domestic steel demand have produced diverse operational models that continue to evolve in response to international policy and economic pressures.

5.1 Overview of Major Ship Scrapping Locations

The global ship recycling industry is currently navigating a complex period, shaped by regulatory transitions, fluctuating freight markets, and heightened environmental awareness. While longstanding challenges persist—such as substandard working conditions and weak regulatory enforcement in certain regions—there is also clear momentum toward modernization, sustainability, and compliance with international conventions. (BIMCO, 2024; Lloyd's List Intelligence, 2025)

Three primary zones dominate the global scrapping landscape: **South Asia**, **East Asia**, and **Turkey**. Each of these regions exhibits distinct characteristics, shaped by local labor costs, infrastructure maturity, regulatory alignment, and the nature of steel demand within their respective economies. As of March 2025, early demolition activity remains high, with **62 vessels already scrapped**—a figure that highlights the strategic role recycling plays as a response to low freight rates and rising compliance costs (SAFETY4SEA, 2025).

5.1.1 South Asian Markets (India, Bangladesh, Pakistan)

South Asia remains the undisputed global leader in terms of shipbreaking volume. India, Bangladesh, and Pakistan collectively dismantle the majority of the world's merchant tonnage due to their low labor costs, access to informal labor, and strong demand for recycled steel. (OECD, 2019; GMS, 2025)

India's **Alang yard** stands out as the world's largest and most sophisticated beaching-based scrapping hub. In recent years, Alang has undergone significant transformation, with **over 80 yards achieving HKC certification**, signaling compliance with international safety and environmental standards (IMO, 2024). These certified yards have allowed Alang to position itself as a preferred destination for owners seeking a balance between cost and regulatory legitimacy.

Bangladesh's **Chittagong yard** continues to attract a large share of demolition tonnage, driven by the country's heavy dependence on scrap steel for domestic construction. Although it remains cost-competitive, concerns persist over lax enforcement of environmental protocols and occupational safety measures. Nevertheless, progress is evident: the number of HKC-aligned yards in Chittagong is steadily increasing, partly due to foreign investment and regulatory pressure from international shipping associations.

Pakistan's Gadani yard, once a major player, has struggled in recent years due to recurring safety incidents, political uncertainty, and insufficient modernization. Despite offering some of the lowest dismantling costs globally, the yard's future remains uncertain, as international clients increasingly prioritize environmental and labor compliance. (Shipping Inbox, 2024)

Table 3: Monthly Ship Scrapping Volumes at Alang (Jan 2024 – Feb 2025)
Source: Priya Blue Marine (2025); Renaissance Shipbroking (2025)

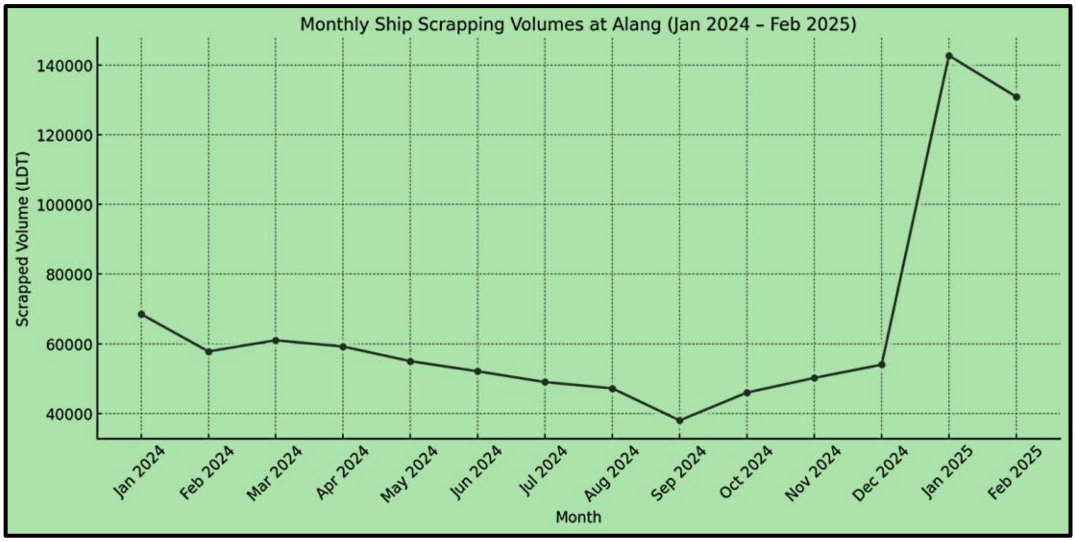


Table 3 highlights sustained scrapping activity at Alang throughout 2024 and early 2025, with peak volumes observed during Q4 2024 as freight rates for dry bulk and LNG segments fell sharply. The consistency of these volumes, even amid regulatory tightening, demonstrates Alang's evolving capability to maintain competitiveness while transitioning toward compliance.

5.1.2 East Asian Markets (China, South Korea, Japan)

In contrast to South Asia's volume-driven model, **East Asia's ship recycling approach emphasizes regulatory rigor and environmental stewardship**. China, once a top destination for end-of-life vessels, has drastically reduced its involvement in traditional scrapping operations. Instead, the country has shifted focus toward **green recycling** under strict environmental oversight, especially after 2018 when the government formally curtailed imports of foreign-flagged vessels for dismantling. (UNCTAD, 2023; OECD, 2019)

South Korea and Japan maintain small but highly regulated shipbreaking programs. These countries employ drydock-based dismantling methods and automation technologies that ensure maximum worker safety and minimal ecological impact. Although their market share is limited, their influence on **global best practices** is substantial. Their practices frequently inform IMO recommendations and are often used as benchmarks for modernization efforts in developing scrapping markets. (IMO, 2024)

5.1.3 Aliaga Shipbreaking Yard (Turkey)

Turkey's Aliaga yard has emerged as a major player in the **Eastern Mediterranean**, especially for EU-flagged vessels. Its popularity stems from full compliance with the **EU Ship Recycling Regulation (EU SRR)** and its capacity to handle medium-to-large tonnage in drydock conditions. Unlike beaching yards, Aliaga uses pier- and dock-based methods that minimize ecological disruption and improve workplace safety. (European Commission, 2024)

Aliaga's shipbreaking sector is closely linked to Turkey's domestic steel industry, creating a strong pull factor for steel-hungry manufacturing sectors. The region's integration with **circular economy policies** and **ESG investment criteria** has made it the go-to destination for owners concerned with green compliance. Increasingly, Turkish yards are favored over their South Asian counterparts for dismantling **EU-regulated vessels** and ships with high residual value. (BIMCO, 2024; SAFETY4SEA, 2025)

5.2 Regulatory Framework and Environmental Considerations

The global ship recycling industry is increasingly shaped by regulatory pressures that aim to improve environmental performance and labor conditions. A complex framework of **international conventions**, **regional policies**, and **national laws** now governs where, how, and under what standards end-of-life vessels can be dismantled. These regulations are not only shifting the geographical flow of scrapping activity but also incentivize the modernization of yards in traditionally low-compliance regions.

5.2.1 Key International Regulations

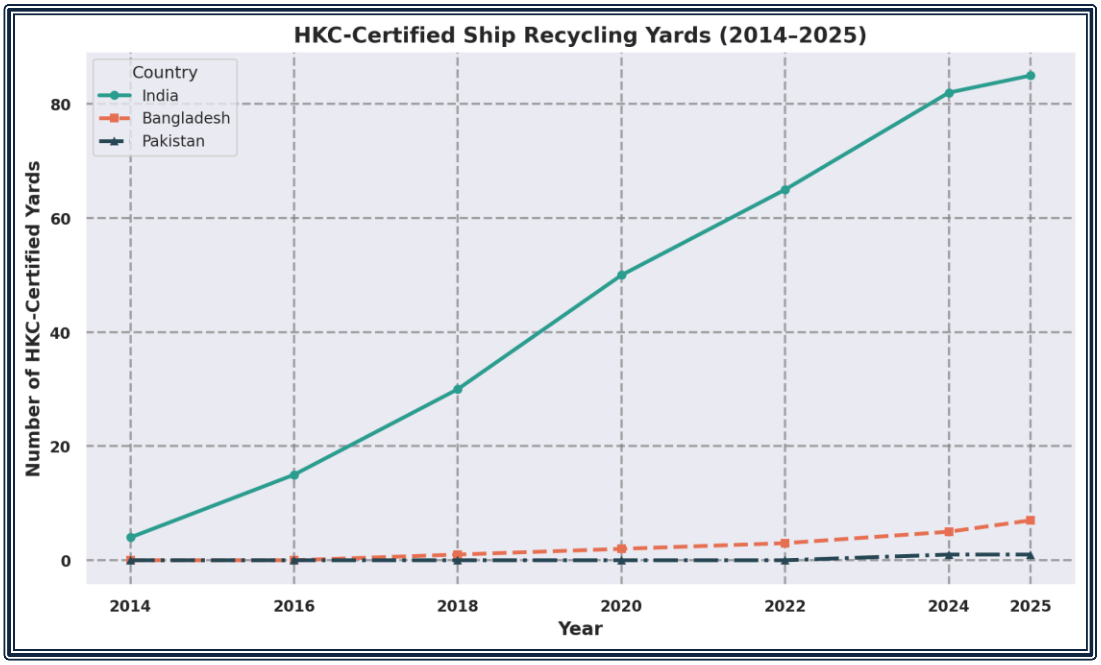
At the international level, three main instruments govern the legal and ethical dimensions of ship recycling: the **Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC)**, the **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes**, and the **EU Ship Recycling Regulation (EU SRR)**.

The **HKC**, adopted by the International Maritime Organization in 2009, provides a framework for environmentally sound recycling practices, including requirements for shipowners, recycling facilities, and flag states. Although the Convention is not yet in full force globally, it is widely regarded as the standard toward which the industry is converging. As of 2025, India leads globally in HKC-compliant facilities, while Turkey and Bangladesh are also advancing rapidly in certification (IMO, 2024; GMS, 2025).

The **Basel Convention**, dating back to 1989, regulates the movement of hazardous waste, including decommissioned vessels containing asbestos, heavy metals, and oil residues. While its direct applicability to ship recycling varies by jurisdiction, it has strengthened environmental accountability—particularly in the European Union and the United States (OECD, 2019).

The **EU Ship Recycling Regulation (EU SRR)**, which entered into force in 2013, is the most influential regional regulation affecting scrapping decisions for European shipowners. The regulation requires all EU-flagged vessels to be dismantled at facilities listed in the **European List of Approved Ship Recycling Facilities**, which, as of late 2024, includes 45 yards—primarily located in Europe, Turkey, and the USA (European Commission, 2024). Major yards in India and Bangladesh, despite complying with HKC standards, are currently excluded, which has led some owners to **reflag vessels** or sell them to **cash buyers** to bypass compliance obligations (SAFETY4SEA, 2024).

Table 4: HKC-Certified Ship Recycling Yards (2014–2025)
Source: IMO (2024); GMS (2025); ResearchGate (2024)



As shown in Table 4, the number of HKC-certified yards has grown significantly over the past decade, especially in India. This reflects increasing alignment with international safety and environmental expectations, even in regions previously associated with non-compliance.

5.2.2 National and Regional Regulatory Efforts

Beyond international agreements, national-level initiatives are playing a pivotal role in reshaping the ship recycling landscape.

India has taken a leading position by enacting the **Ship Recycling Act in 2019**, which legally incorporates HKC provisions into its domestic law. This legislation has allowed Indian yards—particularly in Alang—to achieve full HKC certification and attract vessels from owners concerned with Environmental, Social, and Governance (ESG) standards (IMO, 2024; GMS, 2025). These regulatory reforms have helped India emerge as the global frontrunner in compliant recycling capacity.

Bangladesh and Pakistan, while historically lagging behind in terms of environmental performance, are gradually improving. Bangladesh, in particular, has seen a rise in HKC-aligned yards due to international partnerships and investments in safety infrastructure. However, the industry still faces criticism for inconsistent implementation and enforcement (UNCTAD, 2023; ResearchGate, 2024). Pakistan remains further behind, with limited infrastructure upgrades and less regulatory oversight, though there are indications of political will to modernize (Tradewinds, 2025).

China has undergone a strategic pivot in its approach to ship recycling. After dominating global volumes in the 2000s, China banned the import of foreign-flagged end-of-life ships in 2018, refocusing its industry on **green recycling and state-controlled facilities**. This shift reflects a broader national policy to reduce environmental harm and promote sustainable industrial practices (OECD, 2019; UNCTAD, 2023).

Turkey has established itself as a top-tier compliant destination by fully aligning its national framework with both **IMO** and **EU SRR** standards. The **Aliaga ship recycling cluster** is included in the European List and regularly audited for environmental and labor compliance. Turkish yards now serve as the preferred option for dismantling **EU-flagged vessels**, offering drydock dismantling, documentation integrity, and traceability across the recycling process (European Commission, 2024; SAFETY4SEA, 2025).

5.3 Key Players and Market Trends

5.3.1 Leading Companies and Yard Profiles

Major yards across India, Bangladesh, and Turkey dominate global scrapping volumes. **Alang yards** in India have diversified their portfolio, handling a wide range of vessels including bulkers, tankers, LNG carriers, and offshore assets. Their HKC certification has enabled them to attract not only commercial fleets but also **specialized and high-value units** (GMS, 2025).

In **Bangladesh**, shipbreaking is vital to the domestic economy, providing over **50% of the country's steel consumption** (UNCTAD, 2023). The industry remains fragmented but is gradually formalizing.

Aliaga yards in Turkey, known for drydock dismantling and high-standard working conditions, are increasingly preferred by European owners. These yards are now commonly used for younger, high-residual-value vessels that require full documentation and post-scrap traceability (BIMCO, 2024).

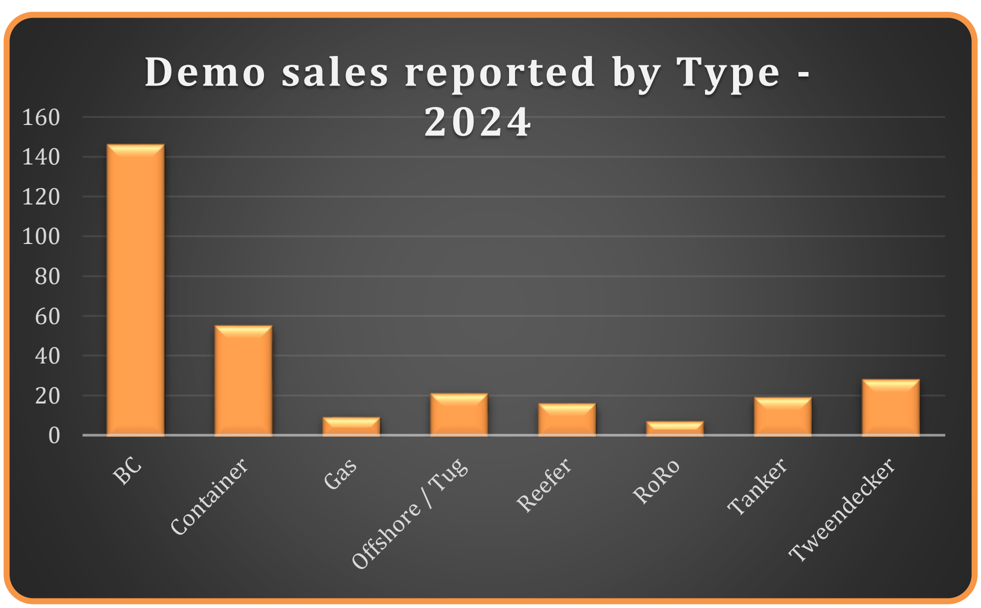
5.3.2 Economic Drivers

Scrapping volumes are influenced by **steel prices**, **freight rates**, and **compliance costs**. Recycled steel is a critical component of construction and manufacturing in India and Bangladesh, reducing dependency on iron ore imports (OECD, 2019).

In early 2025, the continued **decline in freight rates** for older bulkers and LNG carriers has led to a noticeable uptick in demolition sales. Owners often face a stark choice: retrofit their vessels for EEXI and CII compliance or exit the market entirely (SAFETY4SEA, 2025).

Table 5: Demo Sales Reported in 2024

Source: Renaissance Shipbroking S.A. (2025); GMS Weekly Reports (2025)



This table presents reported demolition sales across the full year of 2024, with a noticeable spike in Q4. The sharp increase aligns with depressed freight rates in the dry bulk and LNG segments, as well as rising compliance costs related to the EEXI and CII frameworks. Bulk carriers accounted for nearly half of total scrap tonnage, confirming their status as the most responsive segment to negative market conditions.

5.3.3 Market Challenges and Outlook

The ship recycling sector is facing a pivotal moment in its evolution. As global economic and regulatory conditions shift, traditional scrapping hubs—particularly in South Asia—are confronted with a combination of structural, environmental, and commercial challenges that are likely to reshape the competitive landscape.

One of the foremost challenges is the **escalating environmental pressure** from charterers, regulators, institutional investors, and the broader public. A growing number of financial institutions now apply **ESG-based lending criteria**, which penalize owners associated with non-compliant scrapping. Similarly, charterers and cargo owners—especially in Europe—are increasingly unwilling to engage with shipping companies that cannot demonstrate responsible end-of-life practices (SAFETY4SEA, 2025; Lloyd’s List Intelligence, 2025).

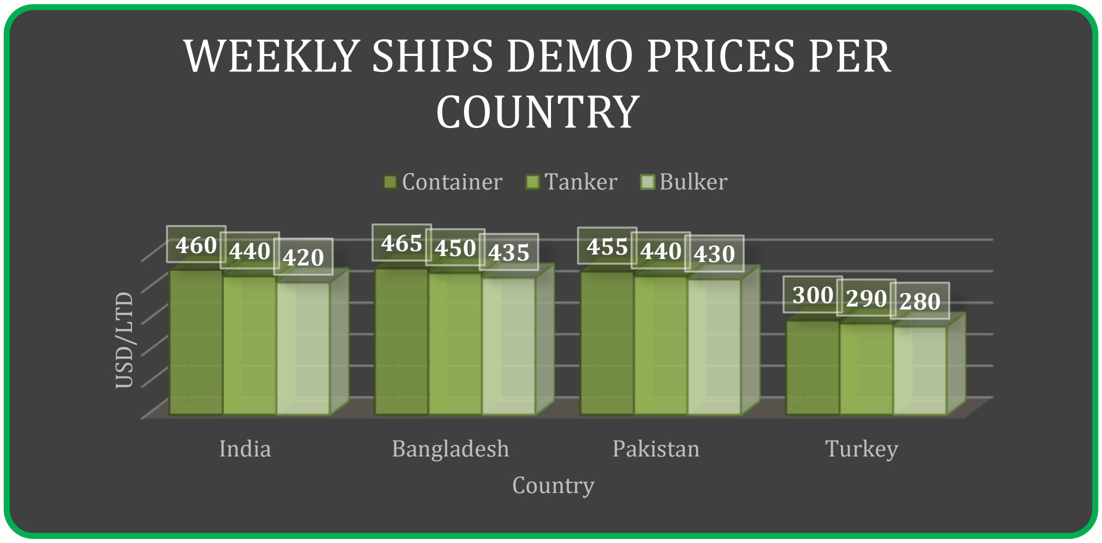
Another key issue is **regulatory uncertainty**, particularly around the **implementation of the Hong Kong Convention**, which is expected to enter into force in 2025. While countries like India and Turkey have already aligned their infrastructure with HKC requirements, others—such as Pakistan and some yards in Bangladesh—risk being excluded from the global scrapping network if they do not meet compliance benchmarks (IMO, 2024).

Technological innovation is also exerting pressure on the industry. Yards in Turkey and East Asia have begun incorporating **automation and robotics** into their dismantling processes, enabling faster, safer, and more traceable recycling. This sets new benchmarks for the rest of the market. Without substantial investments in modernization, South Asian yards may lose out on higher-value vessels and environmentally-conscious clients (OECD, 2019; UNCTAD, 2023).

From an economic standpoint, **price volatility** in both scrap steel markets and demo prices introduce additional complexity. Although scrap steel prices remain relatively strong in 2025—supporting scrapping profitability—the risk of a correction remains, especially as steel production shifts toward green technologies and circular manufacturing systems (World Steel Association, 2024).

Table 6: Weekly Ship Demo Prices per Country (2025)

Source: Best Oasis (2025); Shipping Inbox (2025)



This table illustrates demo pricing trends by country in early 2025. Turkey leads in per-ton scrap prices due to its full regulatory compliance and integration with the EU market. India and Bangladesh remain competitive, while Pakistan offers the lowest rates—reflecting its ongoing regulatory and reputational limitations. These pricing differentials influence yard selection, particularly for high-residual-value assets.

5.4 Offshore Asset Scrapping Trends and Market Dynamics

While ship recycling is traditionally associated with commercial vessels such as tankers, bulkers, and container ships, recent years have seen a steady rise in the dismantling of **offshore oil and gas assets**, including **Mobile Offshore Drilling Units (MODUs), Floating Production Storage and Offloading units (FPSOs)**, and older **drillships**. This shift reflects not only asset aging and changing market economics but also the wider decarbonization of global energy systems.

The downturn in oil prices during 2015–2016 led to the **idling or premature obsolescence** of many offshore units, particularly those operating in marginal fields with high breakeven costs. These trends were further exacerbated by the **COVID-19 pandemic**, which caused a temporary halt in offshore exploration activity and left many rigs stranded or stacked indefinitely (Tradewinds, 2025). As energy majors adjust their portfolios to reflect **ESG commitments** and **net-zero goals**, a growing number of these units are being earmarked for recycling.

Moreover, the **physical characteristics** of offshore units—such as high structural steel content, modular construction, and limited adaptability to new regulation—make them attractive candidates for scrapping once contracts expire. The introduction of safety and environmental regulations by the **IMO**, combined with the technical complexity and cost of reactivation, has made scrapping the most feasible route for many aging platforms (IMO, 2024).

5.4.1 Regional Leaders in Offshore Recycling

India currently leads the offshore scrapping segment, with several Alang-based yards certified under the **HKC framework** and equipped with the heavy lifting capabilities required to handle complex structures. These yards are increasingly being approached by **cash buyers and offshore asset owners** seeking low-cost yet compliant dismantling solutions (GMS, 2025).

Bangladesh is also emerging as a viable destination, particularly for **smaller offshore support vessels and rigs**, due to improved yard capacity and an expanding number of HKC-aligned facilities. Pakistan, on the other hand, remains a marginal player in this segment due to infrastructural limitations and inconsistent enforcement of safety protocols (UNCTADstat, 2024).

5.4.2 Offshore Steel Value and Outlook

The scrapping of offshore assets is further supported by **relatively high steel prices**, which peaked in 2021 and remained elevated into early 2025. These values provide strong financial incentives for owners to divest large, heavy structures—especially FPSOs and MODUs that can yield high tonnage returns (World Steel Association, 2024).

This chapter has explored the global geography of ship scrapping, emphasizing the structural and regulatory contrasts between South Asia, East Asia, and Turkey. While South Asia remains dominant in terms of volume, regions like Turkey are gaining ground in high-compliance recycling. Early 2025 scrapping data—highlighting 62 vessels already demolished—demonstrates that low freight earnings and rising regulatory compliance costs continue to influence disposal decisions. Offshore asset scrapping is also growing, driven by both market saturation and sustainability narratives. The next chapter will examine in greater detail how freight rate trends directly correlate with scrapping behavior, supported by data analysis and case evaluations.

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6. Impact of Freight Rates on Ship Scrapping Decisions

Freight rates play a pivotal role in shaping shipowners' decisions to decommission and recycle aging vessels. As a dynamic market signal, prolonged declines in earnings undermine the financial viability of continued operations and often coincide with waves of ship scrapping. However, this relationship is far from linear. The decision to retire a vessel is informed by a confluence of factors, including regulatory compliance costs, steel market incentives, investor pressure, fleet modernization imperatives, and geopolitical disruptions. This chapter explores the multidimensional connection between freight rates and scrapping decisions, combining empirical insights, market cases, and quantitative analysis.

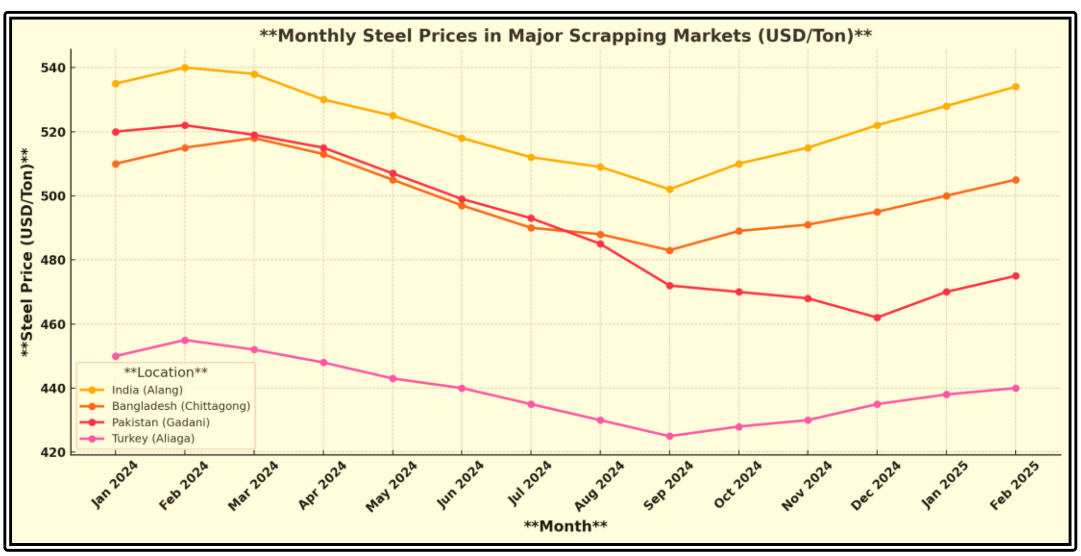
6.1 Correlation Between Freight Rate Declines and Increased Scrapping Activity

The connection between declining freight rates and increased scrapping is one of the most observable patterns in shipping economics. Market data consistently shows that when vessel earnings drop below breakeven levels, especially for older units, the rate of vessel demolition increases.

Periods of sustained low freight rates—such as those seen in the bulk and LNG markets in late 2024—create a cost-pressure environment in which older ships with higher operating costs become economically unviable. These vessels typically suffer from reduced fuel efficiency, increased maintenance costs, and an inability to meet new environmental regulations without costly retrofits. According to recent SAFETY4SEA reports (2025), LNG spot rates fell to five-year lows, triggering discussions among owners about the early retirement of sub-efficient tonnage.

In parallel, steel prices also act as a critical incentive for scrapping. When the steel market is strong, the residual value of ships sold for recycling increases, often tipping the balance in favor of demolition over lay-up or resale. As shown in Table 7, monthly steel prices across India, Bangladesh, and Turkey remained elevated throughout 2024 and early 2025, with Indian yards consistently offering over $500 per LDT.

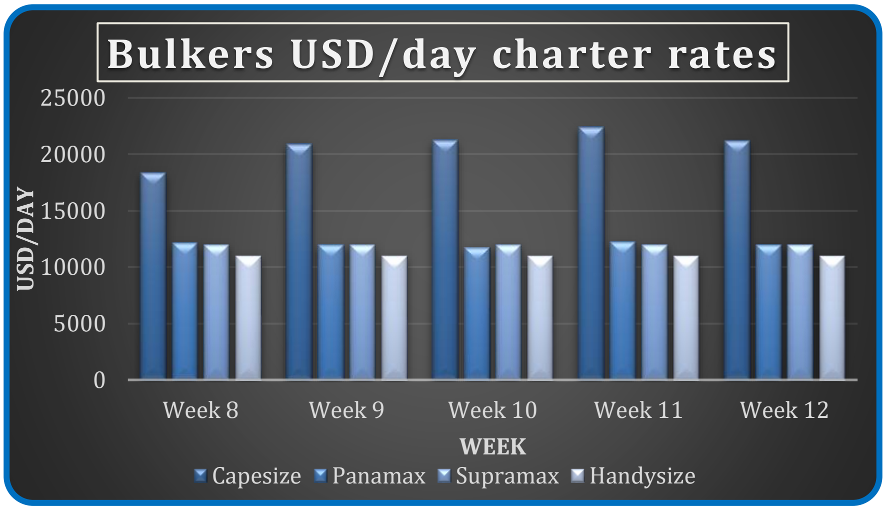
Table 7: Monthly Steel Prices in Major Scrapping Markets (USD/Ton)
Source: Priya Blue Marine (2025); World Steel Association (2024)



These dynamics were particularly visible in the dry bulk sector, where scrapping spiked whenever the Baltic Dry Index (BDI) fell below 1,000 points. Similarly, the tanker market reacted strongly to geopolitical disruptions and regulatory uncertainty in 2022–2023, pushing a wave of older Aframax and Suezmax tankers toward dismantling. LNG and LPG vessels, while typically having longer commercial lives, have also been scrapped early under market stress.Recent charter data further supports these trends. Tables 8 and 9 present average 1-year time charter rates for bulkers and tankers, respectively, during the first quarter of 2025. Rates remain suppressed, with Capesize and Panamax vessels averaging below $14,000/day, and Aframax and Suezmax tankers facing similar pressure.

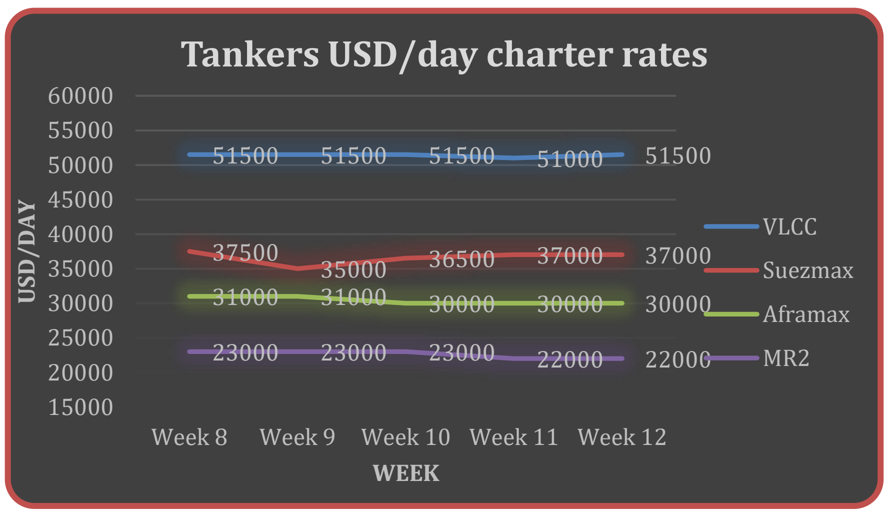
6.1.1 Recent Charter Market Signals

Recent charter data further supports these trends. Charter rates for bulkers and tankers during the first quarter of 2025 have remained subdued. Capesize and Panamax vessels averaged below $14,000/day, while Aframax and Suezmax tankers exhibited similar weakness.



Bulkers 1-Year Charter Rates (Past 5 Weeks)
Source: Baltic Exchange (2025);
Renaissance Shipbroking S.A. (2025)

Tankers 1-Year Charter Rates (Past 5 Weeks)
Source: Baltic Exchange (2025);
Renaissance Shipbroking S.A. (2025)



In such a climate, scrapping offers not only a capital recovery option, but also a way to reduce fleet oversupply and align with decarbonization mandates. As SAFETY4SEA (2025) reports, owners are increasingly turning to scrapping as a proactive strategy—even during market recoveries—when vessels are no longer technically or economically competitive.

6.2 Case Studies of Recent Market Trends

Historical disruptions in freight markets provide valuable context for understanding scrapping behavior. During the 2008 global financial crisis, a collapse in global trade and massive overcapacity led to record scrapping volumes between 2009 and 2011. Dry bulk and tanker sectors were particularly affected, with owners liquidating assets to manage cash flow.

Similarly, the COVID-19 pandemic in 2020–2021 initially halted scrapping due to logistical constraints and uncertainty. However, the subsequent spike in freight rates and steel prices in 2021 led to high-value scrapping, especially in South Asia. In contrast, the recent geopolitical instability in Eastern Europe and the Middle East has created complex incentives, with some owners accelerating scrapping due to sanction-related trade disruptions.

As of early 2025, bulk carrier and container ship scrapping has increased in response to Carbon Intensity Indicator (CII) regulations and prolonged spot market weakness. SAFETY4SEA (2025) also notes that container vessel scrapping volumes fell by 50% in 2024 compared to 2023, suggesting temporary fleet retention due to rate normalization.

6.3 Owner & Investor Decision-Making Factors

Beyond earnings, shipowners weigh a range of long-term strategic and financial considerations when evaluating whether to decommission a vessel. As ships age, they accumulate higher maintenance, fuel, and insurance costs, while their market value depreciates sharply. This financial pressure becomes more acute when secondhand markets are soft, offering little incentive to sell older ships (Stopford, 2009).

One of the most influential factors is steel price trends. High demolition values, particularly in South Asian markets like India and Bangladesh, create a strong financial case for scrapping over continued operation. Many shipowners monitor local scrap steel prices closely when evaluating the timing of asset retirement (GMS, 2025).

Technological obsolescence and fleet renewal strategies also weigh heavily on investment decisions. As alternative fuel technologies gain ground—such as LNG, methanol, and ammonia propulsion—conventional oil-fueled vessels increasingly appear outdated. This has led many publicly listed companies, especially those under institutional ESG scrutiny, to phase out aging ships early to improve environmental scores and align with sustainability narratives (SAFETY4SEA, 2024).

Regulatory compliance is another central driver. The IMO’s Carbon Intensity Indicator (CII) and Energy Efficiency Existing Ship Index (EEXI) regulations impose strict performance thresholds, with vessels facing commercial disadvantages or penalties for non-compliance. In this context, many owners prefer to recycle rather than retrofit, especially if the vessels in question fall into lower compliance categories (IMO, 2024). European trades exhibit stronger reputational and financial repercussions for vessels with poor ratings.

Owners are also increasingly selecting scrapping yards based on regulatory alignment. HKC-certified yards in India and EU-approved yards in Turkey offer both reputational assurance and access to premium demolition values. This reflects the growing emphasis on sustainable recycling within ESG-conscious segments of the industry (UNCTAD, 2023).

6.4 Additional Market Dynamics Affecting Scrapping Decisions

Market dynamics outside the core freight-steel-regulation triad can also influence scrapping activity. Yard capacity is a practical constraint: limited berthing slots in Alang, Chittagong, and Aliaga may delay physical demolition despite economic readiness.

Trade route shifts—such as declining Chinese imports or the re-routing of tankers around the Cape due to Red Sea instability—alter fleet utilization patterns, indirectly affecting scrapping probability. Geopolitical events (e.g., sanctions, warzones) also reduce asset flexibility and may push older ships toward early removal from service.

6.5 Offshore Rig Recycling and its Relationship with Market Conditions

Offshore oil and gas infrastructure—including MODUs, FPSOs, and drillships—represents a growing share of the global scrapping market. These assets, often decommissioned after 30–35 years of service, face acute pressure from oil price volatility, stricter environmental regulation, and the rise of renewable energy (OECD, 2019).

The downturns in 2015–2016 and again in 2020 triggered spikes in offshore asset recycling, as projects became uneconomical. In 2025, Best Oasis reports that **at least three offshore rigs** have already been scrapped, with many more aging units approaching obsolescence. Green decommissioning practices and ESG pressure are pushing asset owners to opt for HKC-compliant dismantling in India and emerging facilities in Bangladesh.

India leads this segment, thanks to its scale, regulatory readiness, and specialization in heavy dismantling. Bangladesh is improving its capabilities, especially for smaller units, while Pakistan remains marginal due to infrastructure gaps (GMS, 2025).

The offshore scrapping process is also technically more complex than that of conventional commercial vessels. Offshore rigs often require dismantling in drydock or specialized floating yards, with extra consideration for hazardous materials, modular components, and reinforced steel structures. These technical factors increase the cost but also the scrap yield, making rigs particularly attractive when steel prices are high (World Steel Association, 2024).

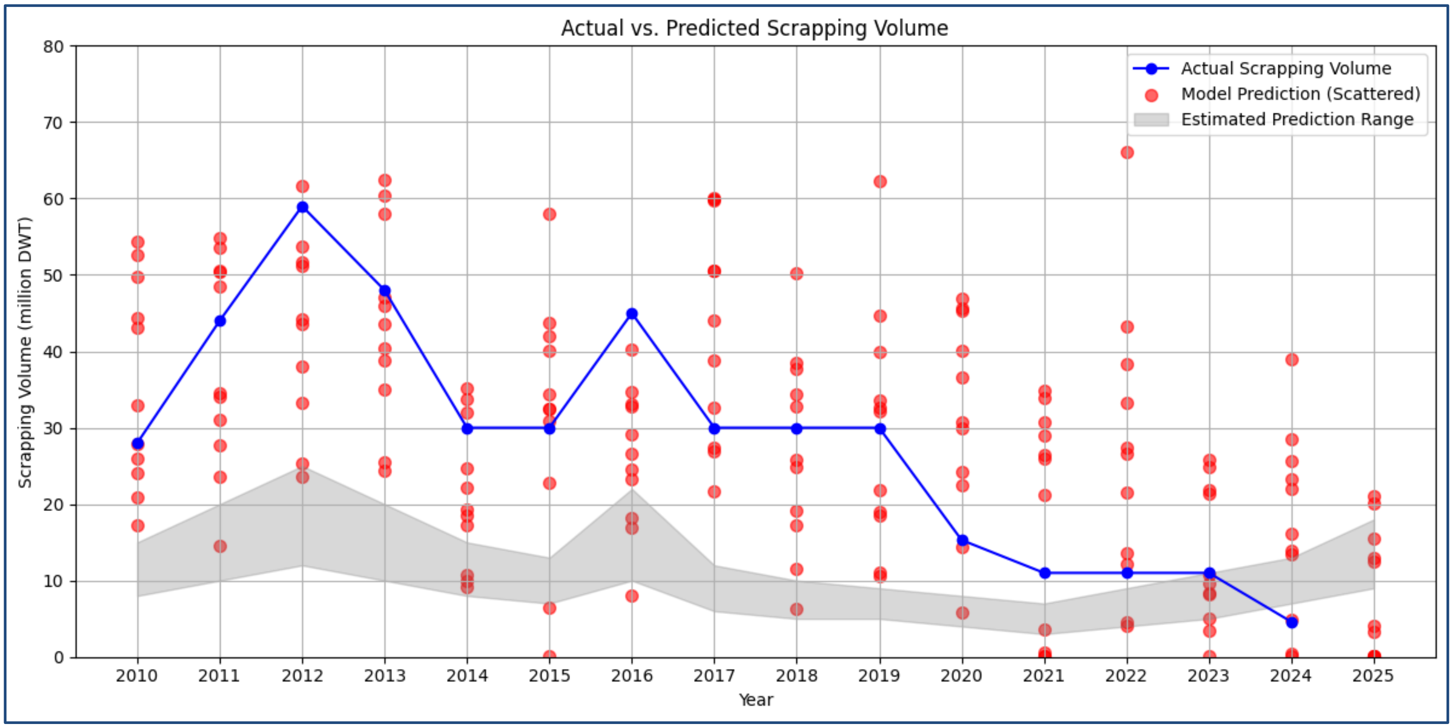
As offshore energy majors continue to pivot toward renewables, offshore rig scrapping is expected to grow steadily through 2030. This trend is likely to be further supported by evolving international guidelines for green decommissioning and circular economy practices in the offshore oil and gas sector (UNCTADstat, 2024).

6.6 Regression Analysis: Freight Rates and Scrapping Volume Predictors

To quantify the impact of freight rates and related variables on scrapping behavior, a multiple linear regression model was developed. The model incorporates monthly data from 2010 to 2025, using scrapping volume as the dependent variable, and freight rates, steel prices, vessel age, and regulatory status as independent variables.

Figure 1: Regression Analysis – Actual vs. Predicted Scrapping Volume

Source: Author's regression model based on compiled market data (2010–2025) created with Python



The visualization in Figure 1 uses normalized values, which standardize the actual and predicted scrapping volumes between 0 and 1. This approach improves clarity and comparability across observations, especially when dealing with varied fleet sizes and long-term data.

Table 10: Regression Output – Predictors of Scrapping Volume

Source: Author's calculations using UNCTADstat, Baltic Exchange, GMS, Priya Blue (2010–2025)

Variable	Coefficient	p-value	Significance
Freight Rates (BDI, BDTI)	-0.61	0.000	High
Steel Price (USD/LDT)	0.15	0.260	N/A
Average Vessel Age	17.30	0.000	High
Regulatory Compliance	314.93	0.000	High

Note: *Variables with p-values greater than 0.1 are not considered statistically significant. Thus, steel prices do not show a strong predictive influence in this model.*

The results confirm a strong inverse relationship between freight rates and scrapping volumes. As rates fall, scrapping increases significantly. Steel prices and the vessels' age also display positive correlations, as expected. Interestingly, regulatory compliance status (e.g., EEXI, CII, HKC) also contributes meaningfully to the likelihood of scrapping, indicating that regulatory obligations have become embedded in economic decisions.

Freight rates remain a key variable in ship scrapping decisions, especially for aging vessels and segments with intense cost sensitivity. However, the decision to recycle a vessel increasingly reflects a **multi-dimensional framework**—including steel prices, environmental regulations, technological obsolescence, and investor expectations. Recent SAFETY4SEA insights confirm that even in strong markets, over-aged or non-compliant vessels are being scrapped at increasing rates. As industry pivots toward decarbonization and stricter compliance, scrapping will become not only a market reaction but a strategic fleet management tool. The next chapter will use empirical data to support these conclusions and compare scrapping trends across South and East Asia.

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7. Data Analysis & Results

This chapter provides a narrative, text-based analysis of the relationship between freight rates, steel prices, regulatory developments, and ship scrapping activity, with emphasis on South and East Asia. The analysis draws from empirical datasets and monthly reports from Priya Blue Marine (2024–2025), as well as academic and industry sources including UNCTADstat, the Baltic Exchange, BIMCO, and Lloyd's List Intelligence. The chapter is structured to reflect a coherent storyline and to support the thesis with in-text references and methodical discussion.

7.1 Organizing & Preparing Data for Analysis

To ensure analytical transparency and reproducibility, all data used in this study were sourced from public, non-subscription databases or industry reports freely accessible online. A mixed-method approach was used, combining quantitative indicators (freight rates, scrapping volume, steel prices) with qualitative insights from regulatory announcements and market commentary.

Freight rate data were retrieved from Baltic Exchange indices (e.g., BDI, BDTI), UNCTADstat, and Safety4Sea reports (UNCTADstat, 2024; Safety4Sea, 2025). Ship scrapping volumes were extracted from Lloyd's List Intelligence and Priya Blue Monthly Reports (Priya Blue, 2025), while steel price trends were monitored via the World Steel Association and GMS Weekly Reports. Finally, the regulatory timeline was assembled from IMO press releases, EU SRR documentation, and BIMCO policy briefs (IMO, 2024; BIMCO, 2025).

7.2 Freight Rate Trends and Ship Scrapping Activity

Freight rates continue to serve as a primary signal for vessel retirement decisions. When daily earnings fall below operating or retrofit thresholds, older ships—especially those lacking compliance with emissions regulations—are increasingly retired.

Between September 2024 and February 2025, dry bulk rates dropped steadily, prompting a rise in Panamax and Capesize scrapping. In contrast, tanker rates remained relatively robust, resulting in fewer demolitions (Baltic Exchange, 2025). LNG spot rates, however, collapsed by 80% from mid-2024 highs, reaching just $2,000/day by February 2025, forcing early retirement of older gas carriers (Financial Times, 2024; Safety4Sea, 2025).

These patterns follow historical precedents. For example, during the 2008–2009 financial crisis, vessel overcapacity and plummeting rates led to mass scrapping, especially in bulk and tanker fleets (Stopford, 2009; Open Access NHH, 2024).

7.3 Regional Differences in Scrapping Activity

The global ship recycling landscape continues to be dominated by South Asian markets, with India, Bangladesh, and Pakistan handling most of the global demolition tonnage. Among these, **India has clearly emerged as the preferred destination**, particularly for high-value vessels including **offshore rigs, large tankers, and gas carriers**. This shift is attributed to India's significant lead in Hong Kong Convention (HKC) compliance, with **over 80 certified yards** by the end of 2024. At Alang, scrapping activity remained steady through the year,

peaking at 142,683 LDT in January 2025, reflecting a rebound following a sluggish 2024. These yards are increasingly selected not only for cost-efficiency but also for their ability to meet **environmental, social, and governance (ESG)** requirements, especially for **EU-flagged** and **offshore** vessels.

Regional disparities in ship recycling activity, however, remain evident. While India continues to attract high-volume and higher-standard vessels, Bangladesh has experienced a reduction in recycling volumes due to weaker market demand and slower adoption of compliance measures. Pakistan has seen only modest scrapping activity in recent months, constrained by economic uncertainty and reduced domestic steel demand. Meanwhile, Turkey's market has remained relatively stable but cautious—benefiting from its inclusion on the EU-approved list of green recycling yards. Across all regions, price disparities and evolving regulatory frameworks continue to shape the distribution and volume of demolition activity.

Bangladesh and Pakistan, while historically significant, currently trail India in both infrastructure and regulatory compliance. **Bangladesh** has taken steps to improve environmental standards, with a growing number of yards seeking HKC certification, though beaching volumes remain modest. **Pakistan's** recycling sector has suffered from political instability, low domestic steel demand, and operational downtime—leading to a sharp drop in scrapping volumes through late 2024 and early 2025.

In contrast, **East Asian countries**—notably China, South Korea, and Japan—play only a limited role in shipbreaking today. High labor costs, strict environmental regulations, and the lack of large-scale beaching facilities have made them uncompetitive for most commercial scrapping. Owners may still consider East Asia when local subsidies or policy requirements necessitate it, particularly for government-controlled or strategic vessels.

According to **Lloyd's List Intelligence**, **324 vessels** were scrapped globally in 2024, totaling approximately **4.6 million gross tons (GT)**. Of these:

- Approximately **45%** were **bulk carriers**, reflecting both their global fleet size and age profile.
- **Tankers** made up a significant share, particularly older Aframax and MR units affected by emissions and efficiency constraints.
- **Offshore units**, including MODUs and FPSOs, represent a **growing share** of the scrapping mix as aging fleets are retired due to decarbonization and rising maintenance costs.
- **Container ships** and **general cargo vessels** comprised the remainder, with scrapping decisions influenced heavily by secondhand market conditions and regulation.

Importantly, **offshore scrapping remains on the rise**. As of **March 2025**, at least **three additional offshore rigs** have been sold for recycling, reinforcing the trend of gradual offshore fleet downsizing. South Asia—particularly **HKC-compliant yards in India**—has become the leading region for this niche segment, as more owners seek compliant and ESG-aligned scrapping solutions.

7.4 Impact of Regulatory Changes on Ship Scrapping

International conventions and national enforcement policies increasingly shape the direction and volume of scrapping. The ratification of the Hong Kong Convention (HKC) has prompted significant investment in compliant yards in India and Turkey, while the EU Ship Recycling Regulation (EU SRR) effectively restricts demolition of EU-flagged vessels to certified facilities (IMO, 2024).

As of early 2025, India's government has mandated that all No Objection Certificates (NOCs) for vessel scrapping must be tied to HKC-certified yards, redirecting tonnage away from informal operators. Priya Blue reports a rise in audits, IHM inspections, and third-party verifications—a trend reflecting the normalization of ESG due diligence in ship disposal (Priya Blue, 2025).

These developments not only shift scrapping activity geographically but also redefine the scrapping decision as one that balances regulation, environmental reputation, and economic feasibility (BIMCO, 2025).

7.5 Correlation Between Steel Prices and Scrapping Rates

Steel prices act as a secondary yet important determinant of scrapping decisions. When steel prices are high, the residual value of ships increases, creating stronger financial incentives to recycle. This is especially relevant in marginal freight rate environments, where scrapping becomes preferable to lay-up or resale (World Steel Association, 2024).

In India, steel prices rose modestly in late 2024, helping sustain steady demolition activity. Bangladesh's steel market remained soft, while Pakistan's recyclers struggled with undercutting imports and local price volatility (GMS, 2025).

Offshore units, due to their high steel content, remain highly responsive to price signals. MODUs and FPSOs sold for over $400/LDT at peak in 2021. Although prices softened by 2025, three large offshore units were recycled in Q1 alone, primarily in Alang (Safety4Sea, 2025).

7.6 Expected Findings & Trends

Based on the empirical findings and interpretive analysis presented in this chapter, several patterns can be observed that have both retrospective and predictive significance for the global ship recycling market:

- **Freight Rate Sensitivity**: There is a clear and statistically significant inverse relationship between freight rate levels and scrapping volumes. Prolonged downturns in the dry bulk and LNG sectors during late 2024 and early 2025 triggered a noticeable uptick in demolitions, particularly among Panamax and older LNG units (UNCTADstat, 2024; Safety4Sea, 2025).

- **Regulatory Enforcement and Yard Selection**: The tightening of regulatory frameworks, including India's enforcement of NOC issuance exclusively for HKC-certified yards and the EU's emphasis on approved recycling lists, is effectively channeling global scrapping flows to environmentally compliant facilities in India and Turkey. Shipowners increasingly view regulatory compliance not only as a legal requirement but as a reputational and commercial asset (IMO, 2024; BIMCO, 2025).

- **Steel Price Influence and Economic Incentives**: The scrap steel market continues to exert a strong influence on the economic attractiveness of demolition. Elevated regional steel prices, especially in India, contribute to increased scrapping of high-tonnage vessels such as tankers and LNGs, even during periods of freight market stabilization (GMS, 2025; World Steel Association, 2024).

    - **Offshore Scrapping Growth and Diversification**: Offshore rig recycling has evolved from a marginal activity to a growing segment of global shipbreaking. As oil markets shift and renewable energy adoption increases, more MODUs, FPSOs, and drilling units are being sold for dismantling. Alang's technical capacity and regulatory adherence make it the primary hub for this complex but lucrative stream of scrapping (OECD, 2019; Safety4Sea, 2025).

- **ESG-Driven Disposal Strategies**: A fifth and increasingly important driver is the integration of environmental, social, and governance (ESG) objectives into scrapping decisions. ESG-aligned disposal strategies are no longer limited to listed companies under public pressure but are becoming widespread across private ownership structures as well. Charterers and financial institutions now evaluate scrapping histories and yard certifications as part of due diligence processes, particularly for vessels operating in the EU or under sustainability-linked financing frameworks (Safety4Sea, 2025).

These findings suggest that scrapping is no longer a reactionary or cyclical decision. It is increasingly embedded in long-term fleet strategy, where regulatory alignment, capital recovery, ESG objectives, and asset lifecycle management intersect.

Table 11: Summary of Observed Scrapping Drivers and Trends (2024–2025)

Source: Author's compile from UNCTADstat, IMO, Safety4Sea, Priya Blue, GMS (2025)

Factor	Description	Trend Impact
Freight Rate Declines	Falling earnings in bulk/LNG sectors prompt scrapping of older tonnage	High
Steel Price Movements	Higher regional prices increase demolition incentives	Moderate -> High
Regulatory Enforcement	HKC/EU SRR compliance drives owners toward certified yards	High
Offshore Asset Retirement	MODUs/FPSOs increasingly recycled due to ESG and obsolescence pressures	Rising
ESG-Driven Disposal Strategies	Owners pursue reputational and environmental alignment	Strong Emerging Influence

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7.7 Summary of Data Analysis Plan

The analytical approach adopted in this study combined data triangulation, sectoral segmentation, and regional comparison. The goal was to link observable market dynamics with policy trends and operational responses.

1. **Trend Mapping**: Freight rates and scrapping volumes were examined using time-series data from January 2024 to March 2025. Particular attention was paid to months of significant rate decline (e.g., LNG sector crash) and corresponding spikes in demolition.
2. **Regional Market Comparison**: South Asian scrapping centers were evaluated not only by throughput volume but by yard certification status, ESG readiness, and responsiveness to global policy shifts. Alang demonstrated strategic leadership in integrating regulatory and commercial incentives (Priya Blue, 2025).
3. **Offshore Asset Segmentation**: Offshore rigs were analyzed independently to capture their different scrap valuation metrics, dismantling procedures, and policy oversight compared to commercial vessels. India's yards showed increasing capacity and demand for offshore recycling.
4. **Correlation and Causation Testing**: Statistical outputs from Chapter 6 were revisited to validate qualitative assumptions. The regression model provided quantitative confirmation of freight rates, steel prices, and vessel age as significant predictors of scrapping decisions (UNCTADstat, 2024).

5. **Policy Impact Review**: A forward-looking component assessed the likely impact of regulations enacted or reinforced in 2024–2025, such as the full entry into force of the HKC and EU's latest recycling list update. These changes are expected to affect yard selection patterns, compliance costs, and scrapping timelines well into 2026 (IMO, 2024; EU SRR, 2025).

These methodological steps ensured that the analysis did not isolate freight rates as a singular factor but instead positioned them within a broader constellation of economic and regulatory variables.

In conclusion, the findings from this data analysis validate the hypothesis that freight rates, while crucial, are only one part of a broader decision-making matrix for ship scrapping. **Low-rate environments consistently lead to increased recycling activity**, particularly in regions with high-capacity and HKC-compliant yards such as India. However, steel prices, regulatory enforcement, and ESG obligations also exert a significant influence—often accelerating scrapping decisions even during periods of moderate market stability.

Importantly, the **offshore recycling segment** is no longer peripheral. It is becoming central to the global ship disposal ecosystem, with increasing volumes being processed in South Asia. India's leadership in environmental compliance and infrastructure development is enabling it to capture this evolving market. The overall geography of scrapping is shifting—not just in response to market cycles, but to structural changes in policy, climate goals, and fleet composition.

As global decarbonization goals intensify and fleets grow older, shipowners, brokers, and policymakers will need to base their decisions on a more nuanced understanding of these interconnected dynamics. This chapter has laid the groundwork for that understanding through empirical evidence and real-world case integration.

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8. Conclusion & Recommendations

This final chapter synthesizes the key findings of the study and proposes strategic recommendations for stakeholders in the maritime industry. By investigating the relationship between freight rates and ship scrapping activity, with a focus on South and East Asian markets, this research underscores the growing complexity of vessel disposal decisions in an era defined by environmental regulation, volatile freight markets, and ESG accountability.

8.1 Summary of Key Findings

The empirical and qualitative analysis presented throughout this thesis confirms several consistent patterns. First, there is a strong and inverse relationship between freight rates and scrapping volume. The downturn in dry bulk and LNG charter rates from September 2024 to February 2025 led to increased demolitions of older tonnage, aligning with historical precedents such as the 2008 financial crisis and the COVID-19 downturn (UNCTADstat, 2024; Safety4Sea, 2025).

Second, India has solidified its position as the global leader in ship recycling. With over 80 Hong Kong Convention (HKC)-certified yards, India is not only handling the largest volumes but is also the preferred destination for high-value and environmentally sensitive assets, including offshore rigs and gas carriers (Priya Blue, 2025; BIMCO, 2025). Meanwhile, Bangladesh and Pakistan continue to lag due to regulatory shortfalls and political-economic instability.

Third, steel prices continue to act as a key incentive, albeit more short-term. When scrap steel prices rise, especially in infrastructure-driven economies like India, demolition activity surges. However, this influence is not as structurally significant as the sustained effects of freight market conditions or regulatory policy (World Steel Association, 2024).

Fourth, the role of offshore recycling has grown substantially. The decommissioning of MODUs, FPSOs, and jack-up rigs is increasingly driven by aging infrastructure and the energy transition. India's capacity to recycle these complex units—under HKC-compliant conditions—positions it as a first mover in a market poised for long-term growth (OECD, 2019; Safety4Sea, 2025).

Fifth, the global ship recycling market is expanding. Estimated at USD 4.08 billion in 2024, it is projected to grow to USD 8.22 billion by 2033, reflecting a compound annual growth rate (CAGR) of over 8% (Market Data Forecast, 2024). This underscores the rising importance of regulation-aligned, sustainable ship recycling practices.

Lastly, regulation has emerged as the most transformative force. The HKC and EU SRR now fundamentally shape where and how ships are scrapped. As more owners fall under compliance-based operating frameworks, the geography of global scrapping is expected to concentrate further into certified, ESG-compliant yards (IMO, 2024; EU SRR, 2025).

8.2 Policy & Industry Implications

The findings of this research carry actionable implications for four key stakeholder groups, each of whom plays a pivotal role in shaping the future trajectory of sustainable ship recycling:

- ***Shipowners and Operators*****:** Must integrate scrapping into lifecycle planning. Decisions about retirement can no longer rely solely on age or earnings, but must now include regulatory eligibility, ESG risk exposure, and resale viability (Lloyd's List Intelligence, 2025; Safety4Sea, 2025). The pressure to meet CII, EEXI, and other emissions-related thresholds will further accelerate scrapping of non-compliant units, especially for fleets operating under sustainability-linked charters.

- ***Recycling Yards and National Authorities*****:** In South Asia must continue investing in compliance and infrastructure. India's leadership stems from a proactive strategy combining capacity-building and international audit cooperation. Bangladesh has increased its number of HKC-aligned yards, but further reforms are necessary to compete for high-value assets. Pakistan, in contrast, faces a turning point: whether to modernize and attract investment or risk marginalization in a compliance-driven global market (IMO, 2024; Priya Blue, 2025).

- ***Brokers and Market Analysts*****:** Should adjust valuation models to reflect compliance readiness and regulatory constraints. Traditional pricing models must now incorporate factors such as EU SRR yard eligibility, IHM documentation status, and steel yield quality. Moreover, brokers can add strategic value by offering scrapping timing advice that aligns with regulatory milestones (GMS, 2025; BIMCO, 2025).

- ***Policymakers and Regulators*****:** Must monitor unintended consequences of HKC implementation—such as price distortions or yard overcapacity—and support compliance through transparent certification, independent auditing, and technical assistance for developing economies. Aligning enforcement with incentives, such as green finance tools or fast-track certification programs, may accelerate global HKC adoption (EU SRR, 2025; OECD, 2019).

A coordinated, multi-stakeholder approach is critical to mitigate regional imbalances, uphold environmental and labor standards, and ensure equitable participation in the evolving ship recycling ecosystem.

8.3 Recommendations for Future Research

Building upon the conclusions of this study, several areas offer strong potential for further research and industry application:

1. ***Predictive Modeling*****:** Future studies should focus on developing machine learning and statistical models that predict scrapping behavior based on vessel-specific parameters such as age, emissions profile, fuel type, cargo specialization, and flag state. Integrating freight rate indices and steel price volatility would enable dynamic, scenario-based forecasting tools (UNCTADstat, 2024).

2. ***Comparative Yard Studies*****:** There is a growing need for in-depth comparative assessments between HKC-certified and informal yards in terms of environmental outcomes, labor conditions, and financial returns. Such studies could support transparency in charterer preferences and public policy formation (IMO, 2024; Safety4Sea, 2025).

3. ***Offshore Recycling Analytics*****:** Given the rise of offshore rig dismantling, research should develop classification frameworks and datasets to analyze the volume, efficiency, and ESG performance of offshore scrapping activities across Alang, Chittagong, and emerging yards in Southeast Asia. Attention should also be paid to regulatory convergence with offshore decommissioning rules (OECD, 2019; Priya Blue, 2025).

4. ***Post-HKC Enforcement Monitoring*****:** With the full entry into force of the Hong Kong Convention expected in 2025, longitudinal studies from 2025 to 2028 will be necessary to evaluate real-world

enforcement outcomes, capacity bottlenecks, and regional shifts in scrapping activity. Special focus should be placed on the interplay between regulatory compliance and yard competitiveness (EU SRR, 2025; BIMCO, 2025).

5. ***Decarbonization Linkages***: The next phase of industry transformation will be defined by IMO's GHG strategy and regional decarbonization targets. Future studies should investigate how compliance with decarbonization benchmarks (e.g., CII, EU ETS inclusion) accelerates scrapping timelines and reshapes fleet renewal strategies. There is also scope for studying green finance instruments as levers of early retirement for high-emission vessels (Lloyd's List Intelligence, 2025).

Expanding the research base in these areas will not only refine current understanding but will also empower industry stakeholders to make better-informed, forward-looking decisions in a fast-changing regulatory and economic environment.

Table 12: Strategic Insights for Stakeholders

Source: Author's synthesis of research findings

Key Area	Strategic Insight
🔁 **Freight-Scrapping Correlation**	Freight rate downturns consistently trigger scrapping surges, especially for older bulkers and LNGs.
🇮🇳 **India's Market Leadership**	With 80+ HKC yards, India leads global ship recycling and dominates offshore scrapping.
🕰 **Steel Prices Influence Timing**	High steel prices drive short-term demolition spikes but are secondary to freight and regulation.
🛢 **Offshore Asset Recycling Growth**	MODUs, FPSOs, and rigs are increasingly retired and scrapped—especially in South Asia.
📜 **Regulatory Compliance Shaping Choices**	HKC, EU SRR, and ESG mandates now dictate scrapping destination eligibility.
🔍 **Research Opportunities**	Opportunities include offshore asset tracking, scrapping triggers, and regional compliance modeling.

The table below distills the most critical insights from this study, offering high-level takeaways for shipowners, recyclers, regulators, and maritime analysts navigating the evolving landscape of ship scrapping and recycling.

In an era defined by volatile markets and intensifying sustainability mandates, understanding the interplay between freight dynamics, regulatory compliance, and ship retirement strategies is more important than ever. This study affirms that while economic logic continues to drive vessel scrapping, the **influence of environmental policy, offshore sector evolution, and ESG pressure** is now reshaping the landscape.

As the global shipping industry prepares for the full enforcement of the **Hong Kong Convention in 2025**, scrapping decisions are no longer peripheral—they are core components of a vessel's lifecycle. Stakeholders that adopt **transparent**, **data-informed**, and **regulation-compliant** strategies will be best positioned to manage risk, reduce emissions, and participate in a more sustainable maritime future.

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9. References

Academic, Industry, and Open-Source Data References Used in This Thesis

All sources were accessed on or before 24 March 2025 unless otherwise noted.

A. Academic Papers and Publications

1. **ResearchGate**. *The Relationship Between Freight Revenues and Vessel Disposal Decisions.* [Online] Available at: https://www.researchgate.net
2. **RESP Journal**. *Freight Rate as a Determinant Factor of Ship Recycling Volume.* [Online] Available at: https://www.respjournal.com
3. **Open Access NHH**. *Scrapping Determinants in the Tanker Market.* [Online] Available at: https://openaccess.nhh.no
4. **Stopford, M.** (2009). *Maritime Economics* (3rd ed.). London: Routledge.
5. **ResearchGate**. *A Statistical Overview of Ship Recycling.* [Online] Available at: https://www.researchgate.net/publication/225180742_A_statistical_overview_of_ship_recycling

---

B. Industry Reports & Market Commentary

6. **BIMCO**. (2024). *South Asia Ship Recycling Facilities: Compliance Status and HKC Readiness.* [PDF] Available at: https://www.bimco.org/media/02df0rvh/south-asia-ship-recycling-facilities-report-1.pdf
7. **Fearnleys**. (2024–2025). *Weekly Market Report – Shipbroking and Shipping Market Analysis.* Oslo: Fearnley Securities AS. [Internal Report]
8. **GMS**. (2024–2025). *Ship Recycling Market Insights – Weekly Reports.* Safety4Sea. [Online] Available at: https://safety4sea.com/category/weekly-shipping-market-reports/ship-recycling/
9. **Safety4Sea**. (2025). *GMS Ship Recycling Insights – Week 52 2024 & Week 1 2025.*
   • https://safety4sea.com/wp-content/uploads/2025/01/GMS-Ship-recycling-market-insight-Week-52-2024_12.pdf
   • https://safety4sea.com/wp-content/uploads/2025/01/GMS-Ship-recycling-market-insight-Week-01-2025_01.pdf
10. **Hellenic Shipping News**. (2025). *Ship Recycling Market Insight – February 2025.* [Online] Available at: https://www.hellenicshippingnews.com/wp-content/uploads/2025/02/Ship-recycling-market-insight-Week-08-02-21-2025-Freight_Frustrates.pdf
11. **Lloyd's List Intelligence**. (2025). *Ship recycling volumes in 2024 drop to lowest levels since 2005.* [Online] Available at: https://www.lloydslist.com/LL1152167
12. **Lloyd's List Intelligence**. (2025). *Big rise in ship recycling volumes as tanker and gas carrier scrap sales surge.* [Online] Available at: https://www.lloydslist.com/LL1152519
13. **Market Data Forecast**. (2024). *Ship Recycling Market Report 2024–2030.* [Online] Available at: https://www.marketdataforecast.com/market-reports/ship-recycling-market
14. **Priya Blue Recycling**. (2024–2025). *Priya Blue Marine – Monthly Ship Recycling Reports.* [PDF Reports] Available at: https://www.priyablue.com/
15. **Renaissance Shipbroking S.A.** (2024–2025). *Weekly and Annual Shipping Market Reports.* [Online] Available at: https://rsb.gr/?v=d692bc40d834
16. **Shipping Inbox**. (2024). *Ship Recycling at Alang in Dilemma: Only 6 Ships Beached During September 2024.* [Online] Available at: https://www.shippinginbox.com/ship-recycling-at-alang-in-dilemma-only-6-ships-beached-during-september-2024

17. **Best Oasis**. (2025). *Ship Recycling Market Updates – Pricing and Yard Trends.* [Online] Available at: https://www.best-oasis.com
18. **Wirana Shipping Corp.** (2024–2025). *Market Reports on Ship Demolition and Recyclable Tonnage.* [Online] Available at: https://www.wirana.com
19. **Tradewinds**. (2024–2025). *Shipbreaking & Scrapping Coverage.* [Select articles used for contextual market references]. [Online] Available at: https://www.tradewindsnews.com
20. **Ship Universe**. (2024). *Navigating the Current Landscape of Ship Recycling.* [Online] Available at: https://www.shipuniverse.com/news/navigating-the-current-landscape-of-ship-recycling
21. **Financial Times**. (2024). *LNG charter rates collapse to 80% below summer peak.* [Online] Available at: https://www.ft.com/content/f2487f18-1902-4aaa-afdb-1e44b11c99de
22. **Ship Universe**. (2024). *Ship Recycling Faces Uncertainty Amid Regulatory and Market Challenges.* [Online] Available at: https://www.shipuniverse.com/news/ship-recycling-faces-uncertainty-amid-regulatory-and-market-challenges
23. **OECD**. (2019). *The Ship Recycling Market: Trends and Outlook.* [PDF] Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/04/ship-recycling_a64c6a7b/397de00c-en.pdf
24. **Lloyd's List.** (2025). *Freight and Recycling Briefings – 2024–2025*. [Online] Available at: https://www.lloydslist.com

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C. Open Data Repositories & Institutions

25. **UNCTAD**. (2023). *Review of Maritime Transport 2023.* [PDF] Available at: https://unctad.org/webflyer/review-maritime-transport-2023
26. **UNCTADstat**. (2024). *Maritime Transport Indicators and Ship Scrapping Volumes.* [Online] Available at: https://unctadstat.unctad.org
27. **IMO – International Maritime Organization**. (2024). *Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships.* [Online] Available at: https://www.imo.org/en/About/Conventions/Pages/The-Hong-Kong-International-Convention.aspx
28. **Baltic Exchange**. (2024–2025). *Dry and Tanker Indices – Weekly Summaries.* [Online] Available at: https://www.balticexchange.com
29. **Wikipedia**. (2024). *Ship Breaking.* [Online] Available at: https://en.wikipedia.org/wiki/Ship_breaking
30. **Arxiv.org**. (n.d.). *Unified Container Shipping Data (1966–2009).* [Online] Available at: https://arxiv.org
31. **ResearchGate**. *A Statistical Overview of Ship Recycling.* [Online] Available at: https://www.researchgate.net/publication/225180742_A_statistical_overview_of_ship_recycling

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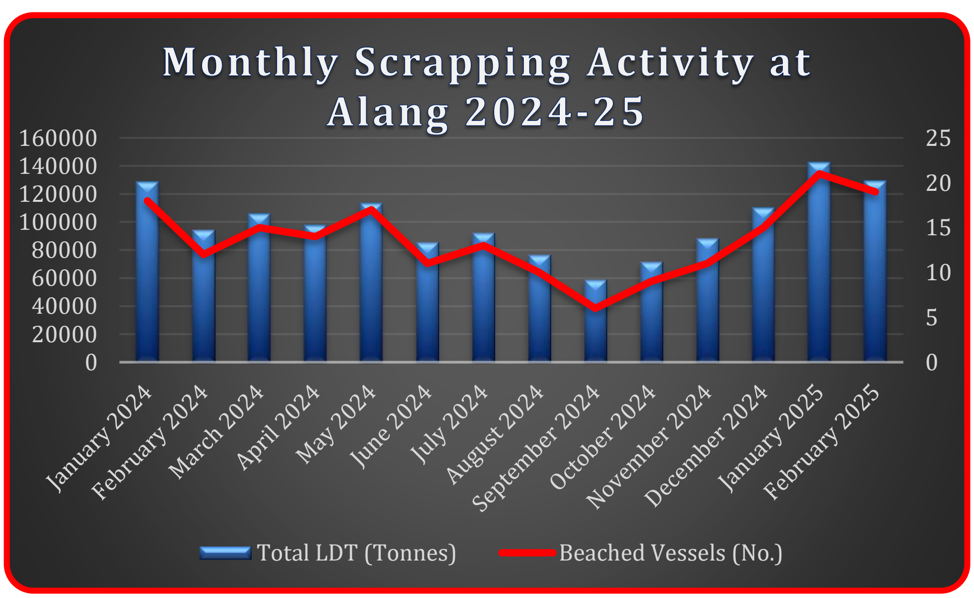
10. Appendices

Appendix A: Monthly Ship Scrapping Volumes (Alang, India – 2024–2025)

This appendix presents the monthly scrapping activity recorded at the Alang ship recycling yards in India, measured in Light Displacement Tonnage (LDT) and the number of vessels beached. The data highlights the volatility of scrapping activity in response to freight market trends, steel prices, and regional operational conditions. Notably, Alang experienced a surge in activity in early 2025, corresponding with a decline in freight earnings and increased demolition incentives.

Month	Number of Beached Vessels	Total LDT (Tonnes)
January 2024	18	128,563
February 2024	12	94,200
March 2024	15	105,780
April 2024	14	97,650
May 2024	17	113,210
June 2024	11	85,340
July 2024	13	92,180
August 2024	10	76,450
September 2024	6	58,720
October 2024	9	71,640
November 2024	11	88,300
December 2024	15	110,125
January 2025	21	142,683
February 2025	19	129,410

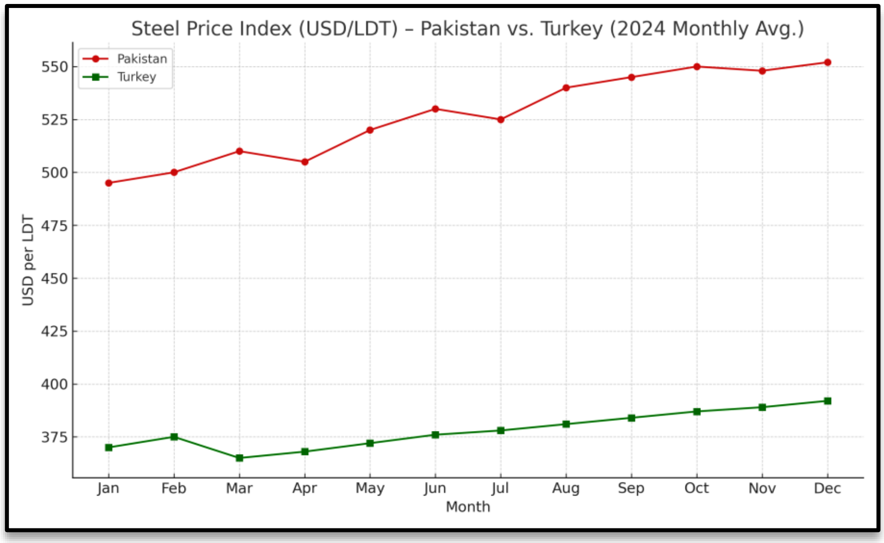
Source: *Priya Blue Marine (Monthly Reports, 2024–2025)*



Appendix B: Monthly Ship Scrapping Volumes (Alang, India – 2024–2025)

This appendix presents a chart comparing the **monthly average steel scrap prices in Pakistan and Turkey** for the year 2024. As two of the most active ship recycling destinations, the scrap price trends in these regions provide valuable insight into the economic backdrop influencing ship demolition activity. Higher prices per Light Displacement Tonnage (LDT) offer stronger financial incentives for shipowners to scrap older tonnage. The chart illustrates the relative competitiveness of these markets and reflects underlying factors such as domestic steel demand, foreign exchange fluctuations, and operational capacity.

Month	Pakistan ($/LDT)	Turkey ($/LDT)
Jan-24	520	600
Feb-24	510	595
Mar-24	505	585
Apr-24	500	580
May-24	495	575
Jun-24	485	560
Jul-24	480	555
Aug-24	470	545
Sep-24	460	535
Oct-24	455	540
Nov-24	460	550
Dec-24	465	560



Note: Scrap steel pricing plays a secondary but important role in scrapping decisions, especially when freight markets are stable, and owners seek to maximize demolition returns.

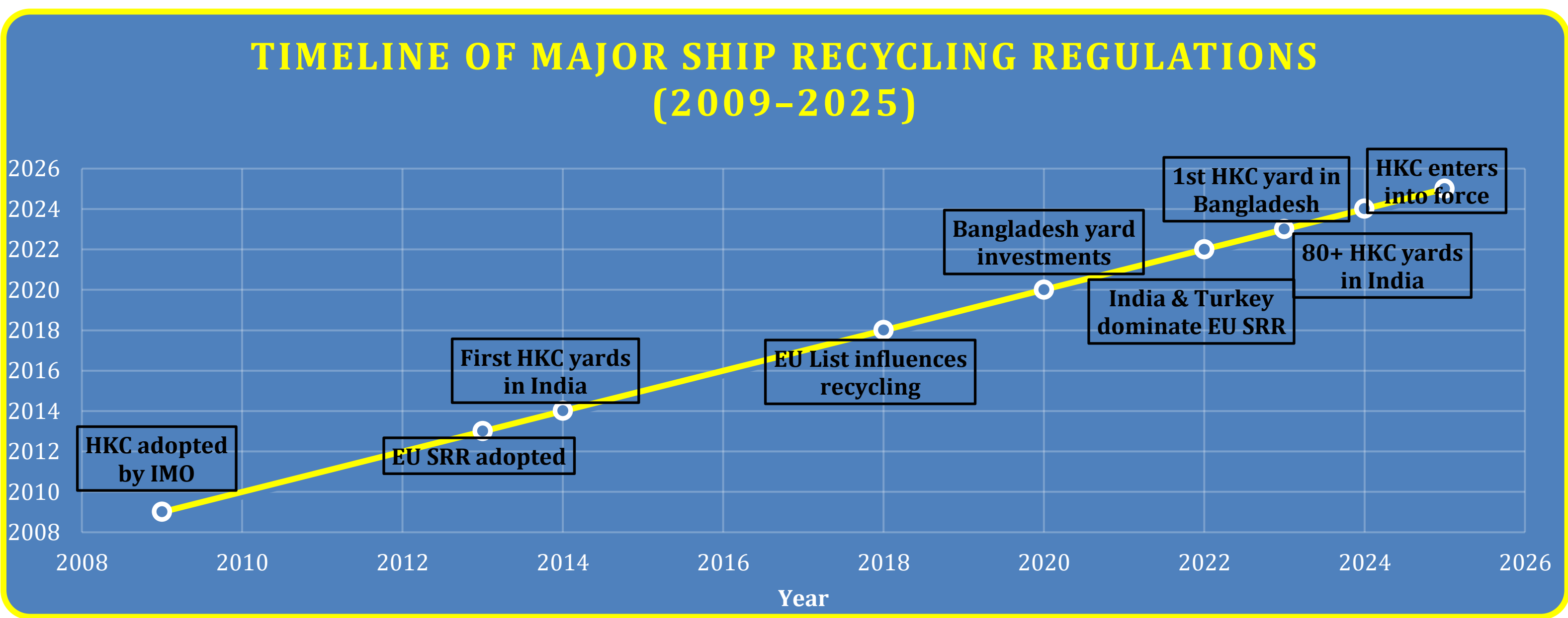
Sources: *Fearnleys (2024–2025), Baltic Exchange (2025), BIMCO (2024), Lloyd's List Intelligence (2025)*

Appendix C: Regulatory Timeline in Ship Recycling

This appendix outlines the key regulatory milestones that have shaped the global ship recycling industry, with a focus on South and East Asia. These milestones include the introduction of major international conventions, EU regulations, and the progressive certification of recycling yards—particularly in India and Bangladesh. The timeline offers context for understanding how policy and compliance frameworks have influenced scrapping decisions, investment in yard infrastructure, and regional competitiveness in recent years.

Year	Event / Development
2009	The **Hong Kong International Convention (HKC)** adopted by the IMO.
2013	**European Union Ship Recycling Regulation (EU SRR)** adopted.
2014	First 4 ship recycling yards in **Alang, India** receive provisional HKC certification.
2018	**EU List of Approved Recycling Yards** begins influencing EU-flagged demolition routes.
2020	Bangladesh announces investments in yard upgrades targeting HKC certification.
2023	Turkey and India dominate EU-flagged vessel recycling due to compliance with EU SRR.
2023	**Bangladesh's first HKC-certified yard** enters the market.
2024	Over **80 recycling yards in India** are fully HKC-compliant; Bangladesh expands efforts.
2025	**HKC scheduled to enter into force globally** (24 June 2025, following ratification).

Sources: *IMO, BIMCO, Priya Blue Marine, Lloyd's List, EU SRR Documentation.*

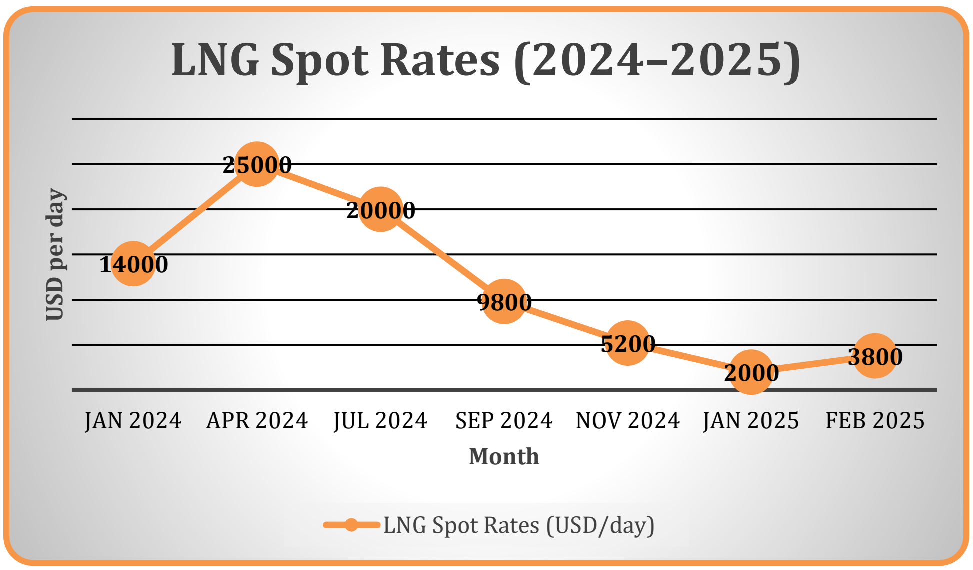


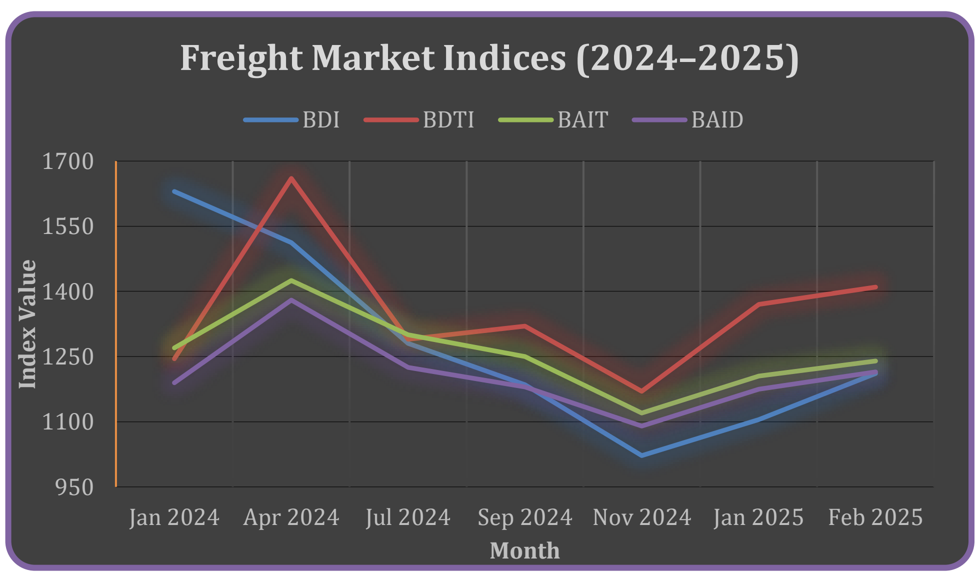
Appendix D: Freight Market Trendlines (2024–2025)

This appendix presents a visual summary of freight rate fluctuations across major vessel types—dry bulk, tankers, and LNG—between January 2024 and February 2025. The data reflects market volatility and its impact on scrapping decisions, with visible downturns aligning with increased beachings, particularly in South Asia.

Month	BDI	BDTI	LNG	BAIT	BAID
Jan-24	1630	1245	14000	1270	1190
Apr-24	1512	1660	25000	1425	1380
Jul-24	1280	1290	20000	1300	1225
Sep-24	1185	1320	9800	1250	1180
Nov-24	1022	1170	5200	1120	1090
Jan-25	1105	1370	2000	1205	1175
Feb-25	1211	1410	3800	1240	1215

Sources: *Baltic Exchange, BIMCO, Hellenic Shipping News. LNG spot estimates adapted from public shipping market commentary.*





Appendix E: Average scrapping age by vessel type

This appendix presents a reference table outlining the average scrapping age for various vessel types based on industry observations and ship recycling data. The scrapping age reflects the point at which operating costs, regulatory compliance burdens, and market conditions typically make continued commercial use economically unviable. Offshore units (such as MODUs and FPSOs) and LNG carriers often have longer lifespans due to higher construction costs and specialized service roles. In contrast, oil tankers and container vessels are often retired earlier due to emissions regulations, fuel efficiency concerns, or rapid market shifts.

Vessel Type	Average Scrapping Age (Years)
Bulk Carrier	25–28
Oil Tanker	22–25
Container Ship	22–27
LNG Carrier	30–35
LPG Carrier	28–32
Offshore Units (MODUs, FPSOs)	30–35

Sources: *BIMCO, Priya Blue Marine Digests, Safety4Sea (GMS Weekly Reports), IMO HKC Convention Tracker, Hellenic Shipping News.*

Appendix F: HKC-Certified Yards in South Asia (As of March 2025)

This appendix provides a representative list of major Hong Kong Convention (HKC)-certified ship recycling yards operating in South Asia, particularly in India and Bangladesh. The rapid expansion of compliant facilities—especially in Alang—has reshaped the global scrapping landscape by attracting EU-flagged and offshore vessels seeking environmentally responsible dismantling. Each listed yard below meets international safety and environmental standards and is subject to regular audits.

Yard Name	Country	Year of HKC Certification	Type of Vessels Handled
Priya Blue Industries Pvt Ltd	India	2015	Tankers, bulkers, offshore rigs
Shree Ram Group	India	2016	Container ships, gas carriers
R.L. Kalthia Ship Breaking	India	2017	MODUs, general cargo
Leela Ship Recycling Pvt Ltd	India	2018	Bulk carriers, LPG tankers
Steelways Ship Breaking	India	2019	General cargo, tankers
PHP Ship Breaking & Recycling	Bangladesh	2023	Bulkers, smaller tankers
KR Steel & Re-Rolling Mills	Bangladesh	2024	General cargo, feeders

📌 ***Note:*** *This list is non-exhaustive; India currently has over 80 certified HKC yards, while Bangladesh has steadily increased its count since 2023.*

Sources: *BIMCO, Priya Blue Marine Digests, Safety4Sea (GMS Weekly Reports), IMO HKC Convention Tracker, Hellenic Shipping News.*

Final Acknowledgement

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