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Evaluating Market Structure, Firm Behavior, And Sustainability In The Maritime Industry Using Scp Framework

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Abstract: The maritime industry plays a critical role in global trade but faces growing pressure to integrate environmental sustainability into its operations. This research analyzes the industry using the Structure-Conduct-Performance (SCP) framework to understand the relationship between market structure, firm behavior, and both economic and environmental performance. The study provides original value by extending the traditional SCP model to include environmental sustainability, addressing a critical gap in previous research. Key research questions include how market concentration, regulatory compliance, corporate environmental responsibility (CER), and technological innovation affect both profitability and sustainability. Using qualitative data from industry professionals and maritime educators, the analysis highlights that proactive regulatory compliance and high CER commitment drive superior economic and environmental outcomes. Firms that invest in green technologies enjoy enhanced performance, while those prioritizing short-term profits struggle with long-term competitiveness. The results offer practical insights for policymakers and industry leaders, emphasizing the need for inclusive market structures and stronger regulatory frameworks to support sustainability across the sector.

Keywords: Maritime Industry, SCP Framework, Corporate Environmental Responsibility, Sustainability, Green Technologies

1. INTRODUCTION

The maritime industry is one of the most vital sectors in the global economy, facilitating the transportation of goods and commodities across vast distances and serving as the backbone of international trade. Its operations directly influence global supply chains, economic development, and geopolitical relationships (Stopford, 2020). However, as the world confronts an urgent need for sustainable practices, industries with significant environmental footprints, such as maritime shipping, face mounting pressure to evolve (Smith et al., 2021). The maritime industry is responsible for approximately 80% of global trade by volume, yet contributes around 2–3% of global greenhouse gas emissions annually, highlighting its critical role in achieving decarbonization goals (Bouman et al., 2021).

This research seeks to analyze the intricate relationship between market structure, company behavior, and the broader implications of these elements on both economic performance and environmental sustainability within the maritime industry, using the Structure-Conduct-Performance (SCP) framework as a guiding model (Bain, 1951). Traditionally, this framework has been used to assess the economic efficiency of markets, competitiveness, and the resultant financial performance of firms. However, economic performance alone is no longer a sufficient metric for success, especially for industries with considerable environmental impacts (Cullinane et al., 2019). Sustainability has become a critical factor, driven by regulatory frameworks like the International Maritime Organization's

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(IMO) sulfur cap and global commitments such as the Paris Agreement (IMO, 2021; Psaraftis & Kontovas, 2020).

At the heart of this inquiry lies the concept of market structure, which refers to the organization of an industry based on the number of firms, the level of competition, and the extent of market power held by the key players (Notteboom et al., 2020). In the maritime industry, market structure is characterized by a few dominant firms that control a significant share of the global shipping capacity, creating an oligopolistic environment (Shi et al., 2022). Such concentration often leads to behaviors aimed at maintaining market dominance, such as price-setting, strategic alliances, mergers, and acquisitions (Andersson & Iakovou, 2020). These behaviors can have far-reaching implications not only for the financial performance of the firms involved but also for environmental sustainability, as dominant firms may prioritize profits over reducing emissions unless compelled by regulations (Bakshi & Arora, 2022).

Company behavior, or conduct, in the SCP framework refers to the strategies and decisions made by firms within an industry. In the maritime sector, this encompasses a wide range of activities, including investments in green technologies, compliance with regulatory standards, and corporate social responsibility (CSR) initiatives (Chang et al., 2021). This research specifically focuses on Corporate Environmental Responsibility (CER), reflecting the commitment of maritime companies to sustainable practices, such as reducing carbon emissions, optimizing fuel efficiency, and adopting green shipping technologies (Cullinane et al., 2019). Companies that lead in sustainability often enjoy long-term benefits such as cost savings from improved fuel efficiency, enhanced reputations, and compliance with environmental regulations (Bouman et al., 2021). Conversely, firms that neglect sustainability risk financial penalties, loss of market share, and reputational damage (Papanikolaou & Shinohara, 2021).

2. LITERATURE REVIEW

The Structure-Conduct-Performance (SCP) framework has long served as a foundational model in industrial organization, offering a structured way to analyze how market structures influence firm behavior, and in turn, how this behavior impacts overall industry performance (Bain, 1951). Traditionally, the SCP framework was utilized primarily in economic studies to assess the degree of competition within industries, predict company behavior in various market structures, and evaluate the resultant economic outcomes. However, as global priorities shift toward sustainability, particularly in industries with significant environmental footprints, the scope of the SCP framework has evolved (Fagerberg et al., 2020).

Market structure is the cornerstone of the SCP framework, referring to the characteristics that define how an industry is organized, including the number of firms, their relative sizes, barriers to entry, and the degree of product differentiation (Notteboom et al., 2020). In the context of the maritime industry, which is often described as oligopolistic, market structure profoundly influences competitive dynamics and firm behavior. The industry is dominated by a few large firms that control significant shares of global shipping capacity, and this concentration of market power affects both the pricing strategies and operational decisions of these firms (Shi et al., 2022).

However, more recent research has extended these ideas to explore how market structure impacts not only economic outcomes but also environmental performance. The maritime industry's concentrated market structure raises critical questions about the role of dominant firms in shaping environmental practices (Roe et al., 2021). Some studies suggest that larger firms, due to their scale and financial resources, may be better positioned to invest in environmentally sustainable technologies and practices, such as green shipping technologies and alternative fuels (Papanikolaou & Shinohara, 2021). On the other hand, dominant firms may have less incentive to adopt sustainability measures if they perceive them as costly and if there is little competitive pressure to do so (Psaraftis & Kontovas, 2020).

Firm behavior, or conduct, is the second component of the SCP framework and refers to the strategic decisions firms make in response to market structure. In the maritime industry, company behavior encompasses a wide range of activities, including pricing strategies, investment in technology, corporate governance, and environmental management (Chang et al., 2021). Research on Corporate Environmental Responsibility (CER) within the maritime industry often centers on the role of regulatory frameworks in shaping firm behavior. Governments and international organizations, such as the International Maritime Organization (IMO), have introduced regulations aimed at reducing the environmental impact of shipping, such as the IMO's sulfur cap (IMO, 2021).

In addition to regulatory factors, market forces drive firm behavior toward environmental sustainability. Competitive pressures can push firms to adopt efficient practices, particularly if customers, investors, and stakeholders demand greener solutions (Roe et al., 2021). Firms prioritizing environmental sustainability often benefit from enhanced reputations, greater customer loyalty, and cost savings (Cullinane et al., 2019).

The third element of the SCP framework is performance, traditionally measured in terms of economic outcomes such as profitability, market share, and efficiency. However, as

environmental sustainability has become a critical concern, performance now includes environmental indicators, such as carbon emissions and fuel efficiency (Bouman et al., 2021).

3. METHOD

This research employs a qualitative approach to explore the relationship between market structure, company behavior, and their impact on both economic performance and environmental sustainability within the maritime industry. The study is framed within the Structure-Conduct-Performance (SCP) paradigm, a model that traditionally examines how the structure of a market influences firm behavior and how these behaviors, in turn, affect overall industry performance (Bain, 1951). In this case, the SCP framework is extended to incorporate environmental sustainability as a key component of performance, alongside traditional economic indicators such as profitability and market share (Cullinane et al., 2019).

The research methodology is structured around two main phases: data collection through expert interviews and qualitative analysis of the findings. The target population for this research consists of two key groups within the maritime industry: maritime professionals who hold leadership roles as entrepreneurs, officers, and managers in port and shipping industries, and lecturers who specialize in maritime science and vocational programs for seafarers. These groups were chosen for their expertise in both the operational and educational aspects of the maritime industry, ensuring that the data collected provides a comprehensive view of how market structure and firm behavior influence both economic and environmental outcomes (Shi et al., 2022).

In total, 10 participants were selected for the interviews: five maritime professionals and five lecturers. The maritime professionals provide insights into the real-world challenges and strategies employed by firms in the industry, particularly in relation to competitive dynamics, regulatory compliance, and corporate environmental responsibility. The lecturers, on the other hand, offer a more academic perspective, focusing on the theoretical underpinnings of market structure and behavior, as well as the role of education and training in shaping the next generation of maritime professionals. This dual perspective allows for a nuanced analysis of how market structure and behavior are linked to both economic performance and environmental sustainability (Notteboom et al., 2020).

The data collection process involves semi-structured interviews with the selected participants. Semi-structured interviews are chosen to allow for flexibility in the conversation while ensuring that key topics are covered consistently across all interviews (Kallio et al., 2016). The interviews are designed to explore several core themes, including the concentration

of market power in the maritime industry, the influence of regulatory frameworks on company behavior, the adoption of green technologies and sustainable practices, and the balance between economic profitability and environmental responsibility. The interview questions are open-ended, encouraging participants to share their experiences and perspectives in depth, while also providing the flexibility to explore emerging topics that may not have been anticipated during the planning stages of the research.

In addition to interviews, secondary data is collected from industry reports, regulatory documents, and company publications. This data is used to contextualize the findings from the interviews and provide additional insights into the broader trends and challenges facing the maritime industry (Stopford, 2020). The secondary data also serves as a validation tool, helping to corroborate the information provided by the interview participants and ensuring that the analysis is grounded in real-world data.

Once the data collection process is completed, the qualitative data from the interviews is transcribed and analyzed using thematic analysis. Thematic analysis is a method used to identify, analyze, and report patterns (themes) within data (Braun & Clarke, 2006). In this research, thematic analysis is used to categorize the data according to the key elements of the SCP framework: market structure, company behavior, and performance (both economic and environmental). The analysis focuses on identifying common themes across the interviews, as well as any divergent views or unique insights that may offer new perspectives on the research questions.

The qualitative nature of this research allows for a deep exploration of the complex relationships between market structure, firm behavior, and performance, particularly in relation to environmental sustainability. By focusing on the perspectives of both industry professionals and academic experts, the research provides a comprehensive view of the challenges and opportunities facing the maritime industry in its efforts to balance economic growth with environmental responsibility (Chang et al., 2021). This research is conducted with the understanding that the findings will be context-specific, focusing on the maritime industry and its particular challenges. However, the insights gained from this study may also be applicable to other industries with similar market structures and environmental impacts, providing a broader understanding of how market dynamics influence sustainability in the industrial sector.

4. RESULTS

This section presents the research findings, structured around the five core indicators that drive the analysis of market structure, company behavior, and their implications on both economic performance and environmental sustainability within the maritime industry. The results reveal the effectiveness, efficiency, and productivity of maritime firms, particularly regarding sustainable economic practices and their alignment with the Structure-Conduct-Performance (SCP) framework. Scoring has been assigned based on qualitative assessments and performance metrics, using a scale of 1-10, where 9/10 indicates high effectiveness and efficiency in aligning with both economic and environmental sustainability goals.

Market Concentration in the Maritime Industry:

The first indicator evaluates the degree of market concentration within the maritime industry, examining the dominance of key players and its effect on competition, innovation, and environmental practices.

The findings show that the maritime industry is highly concentrated, with a few large firms controlling the majority of global shipping capacity. These firms operate within an oligopolistic market structure, which has both positive and negative implications for the industry's competitiveness and environmental sustainability.

Key Findings:

- Market concentration scores 8/10 for its role in fostering stable, long-term investments in sustainable technologies. Larger firms have more financial resources to invest in innovative solutions, such as fuel-efficient ships and green shipping practices.
- However, competition is limited due to the dominance of these few players, which may reduce incentives for smaller firms to adopt innovative practices. This concentration can slow the industry's overall progress toward sustainability.

Comprehensive

Table 1: Market Concentration and Economic and Environmental Performance

Market Concentration	Economic Impact	Environmental Impact	Score (1-10)
High concentration (Top 5 firms control 70% of capacity)	Stable profits and long-term investments	High capacity for sustainable innovation (green technologies)	8/10
Medium concentration (Smaller players)	Competitive pressure reduced, limited resources for innovation	Limited adoption of sustainable practices due to financial constraints	6/10

The table demonstrates how larger firms in a concentrated market are more capable of adopting sustainability practices due to financial stability, while smaller firms may lag in environmental performance due to constrained resources.

Regulatory Influence on Conduct:

This indicator examines the role of international and national regulations in shaping the behavior of maritime firms, especially regarding environmental compliance and sustainability practices.

The results indicate that regulatory frameworks, such as the International Maritime Organization's (IMO) sulfur cap and carbon emission regulations, play a critical role in shaping firm behavior. Firms with proactive compliance strategies tend to outperform their competitors both economically and environmentally.

Key Findings:

- Firms that adopted regulatory measures early scored 9/10, demonstrating high efficiency in balancing economic and environmental goals.
- Companies that delayed compliance scored lower (6/10), experiencing higher compliance costs and missed opportunities for efficiency gains through sustainable practices.

Comprehensive

Table 2: Regulatory Compliance and Firm Performance

Regulatory Compliance	Economic Performance	Environmental Performance	Score (1-10)
Early adopters (proactive compliance)	Lower compliance costs, enhanced reputation	Significant reduction in emissions, high adoption of green technologies	9/10
Late adopters (reactive compliance)	Higher costs due to retrofitting, lost market share	Delayed impact on environmental sustainability, minimal green innovation	6/10

The table highlights that firms adopting early regulatory compliance not only gain an economic edge but also lead in environmental sustainability, while those delaying compliance face higher economic and environmental costs.

Corporate Environmental Responsibility (CER):

Corporate Environmental Responsibility reflects the extent to which firms prioritize sustainability in their operational strategies, encompassing emission reductions, energy efficiency, and waste management. Firms that integrate CER into their core business models tend to achieve better results in both economic and environmental performance. The data reveal

that firms scoring 9/10 on CER also show marked improvements in profitability and stakeholder relationships, reflecting the growing importance of sustainability in maritime business operations.

Key Findings:

- Companies with high CER commitments score 9/10, showcasing effective integration of sustainability into their business models, leading to cost savings through fuel efficiency and waste reduction.
- Firms with low CER engagement score 5/10, as their lack of sustainability initiatives results in higher operating costs and reduced competitiveness.

Comprehensive

Table 3: Corporate Environmental Responsibility and Firm Outcomes

Corporate Environmental Responsibility (CER)	Economic Performance	Environmental Performance	Score (1-10)
High CER commitment (integrated sustainability)	Significant cost savings through energy efficiency	Substantial reduction in emissions, positive corporate image	9/10
Low CER engagement (minimal sustainability efforts)	Increased operating costs due to inefficiency	High emissions, negative public perception	5/10

The table illustrates the link between high CER and strong performance in both economic and environmental aspects, showing that sustainability efforts can lead to cost reductions and improved competitiveness.

Technological Innovation and Green Shipping:

Technological innovation, particularly in the development and deployment of green shipping technologies, is a key driver of both economic performance and environmental sustainability. Firms that invest in innovative technologies, such as fuel-efficient engines, alternative fuels, and optimized logistics systems, tend to outperform those that rely on outdated methods. The results demonstrate that technological adoption is a critical differentiator in the maritime industry's sustainability efforts.

Key Findings:

- Firms that lead in technological innovation score 9/10 for both economic and environmental performance, as they experience reduced fuel costs and lower emissions.
- Firms lagging in technological adoption score 6/10, facing higher operational costs and failing to meet sustainability targets.

Comprehensive

Table 4: Technological Innovation and Sustainable Performance

Technological Innovation	Economic Impact	Environmental Impact	Score (1-10)
High innovation (adoption of green technologies)	Reduced fuel costs, increased market share	Significant reductions in emissions, efficient resource use	9/10
Low innovation (reliance on traditional methods)	Higher operational costs, reduced competitiveness	High emissions, inefficient use of resources	6/10

The table demonstrates how firms that adopt green technologies can achieve both cost efficiency and superior environmental performance, underscoring the role of innovation in sustainable maritime practices.

Interplay Between Profitability and Environmental Sustainability:

The final indicator examines the balance between profitability and sustainability in maritime operations. The results show that firms that strategically invest in both economic growth and environmental sustainability can achieve a "win-win" outcome. The analysis reveals that firms scoring 9/10 successfully manage to align profitability with sustainability, benefiting from cost savings, enhanced corporate reputations, and long-term competitive advantages. Conversely, firms that prioritize short-term profitability over sustainability face declining competitiveness in an increasingly regulated market.

Key Findings:

- Firms that balance profitability and sustainability score 9/10, showing high effectiveness in long-term planning and resource management.
- Firms that prioritize profit over sustainability score 5/10, experiencing short-term gains but long-term challenges due to regulatory and market pressures.

Comprehensive

Table 5: Profitability and Environmental Sustainability

Profit-Sustainability Balance	Economic Performance	Environmental Performance	Score (1-10)
High balance (integrated approach)	Long-term profitability, enhanced stakeholder relationships	Significant emissions reductions, resource efficiency	9/10
Low balance (profit-driven, short-term focus)	Short-term profitability, declining competitiveness	High emissions, inefficient resource management	5/10

This table illustrates the importance of integrating sustainability into profit-driven strategies for long-term success, highlighting the risks of ignoring environmental factors in favor of short-term financial gains.

The findings of this research underscore the critical role that market structure, regulatory compliance, corporate environmental responsibility, technological innovation, and the balance between profitability and sustainability play in shaping the economic and environmental performance of firms in the maritime industry. Firms that lead in these areas, scoring 9/10 on the SCP framework, demonstrate high levels of efficiency, innovation, and sustainability, positioning themselves for long-term success in a highly competitive and increasingly regulated global market. Conversely, firms that neglect these factors face higher operational costs, reduced competitiveness, and greater environmental impacts, as reflected in their lower scores. The results highlight the importance of adopting a holistic approach to business strategy, where economic and environmental goals are not seen as conflicting but complementary, ensuring the sustainability of the maritime industry in the face of growing global challenges.

5. DISCUSSION

The research findings present a compelling narrative on how the maritime industry operates within the framework of the Structure-Conduct-Performance (SCP) model, with a particular emphasis on environmental sustainability and its alignment with economic performance. The results suggest that the SCP framework remains a powerful lens through which the dynamics of market structure, firm behavior, and industry performance can be understood, especially as the maritime sector grapples with increasing regulatory pressures and stakeholder demands for more sustainable business practices.

Market Structure and Its Implications

Market concentration is a defining characteristic of the maritime industry, where a small number of large firms control a significant portion of global shipping capacity. This oligopolistic structure inherently influences the competitive dynamics within the industry, and the results show that this concentration has both positive and negative implications. On one hand, the large firms in this industry are well-positioned to lead investments in green technologies and sustainable practices due to their significant financial resources and market power. These firms, scoring 8/10 in terms of their capacity to drive sustainable innovations, are able to absorb the high capital costs associated with developing and adopting technologies that improve fuel efficiency and reduce emissions. However, the downside of such market

concentration is a reduction in competitive pressure, which can lead to complacency among dominant firms. When competition is limited, firms may have less incentive to continuously innovate or improve their environmental performance beyond what is required by regulations. This creates a scenario where smaller firms, which may lack the financial resources to invest in cutting-edge technologies, are unable to compete on sustainability, thereby widening the gap between large and small players in terms of environmental and economic performance.

The results demonstrate that while larger firms benefit from economies of scale in adopting green shipping technologies, smaller firms are more vulnerable to the financial and regulatory pressures associated with sustainability initiatives. This dichotomy suggests that the industry as a whole may struggle to achieve sector-wide sustainability goals unless regulatory frameworks and market incentives are adjusted to support smaller firms in their sustainability efforts. Without such adjustments, market concentration could lead to a two-tier system where larger firms thrive and innovate, while smaller firms are left behind, unable to keep pace with the demands of sustainable business practices.

Regulatory Influence on Firm Behavior

The role of regulation in shaping firm behavior cannot be overstated, and the results clearly indicate that firms that proactively comply with environmental regulations perform better both economically and environmentally. Regulatory frameworks, such as those set by the International Maritime Organization (IMO), have created a baseline for environmental performance by mandating the reduction of emissions and the adoption of cleaner fuels. Firms that anticipate and comply with these regulations early on, scoring 9/10 in this area, not only avoid the financial penalties associated with non-compliance but also gain a competitive advantage through enhanced reputations and operational efficiency. This finding highlights the importance of regulatory foresight in the maritime industry. Firms that view regulation not as a burden but as an opportunity to innovate and improve their environmental performance are better positioned to succeed in an increasingly sustainability-conscious market. These firms benefit from cost savings associated with energy efficiency, reduced fuel consumption, and lower emissions, all of which contribute to their overall profitability. Moreover, by integrating sustainability into their core strategies, these firms are able to build stronger relationships with stakeholders, including customers, investors, and regulators, who are increasingly prioritizing environmental responsibility. In contrast, firms that adopt a reactive approach to regulation, waiting until the last possible moment to comply, score lower (6/10) in both economic and environmental performance. These firms incur higher costs due to the need for retrofitting and compliance measures, and they miss out on the long-term benefits of early adoption, such as

enhanced operational efficiency and market differentiation. This reactive approach not only puts firms at a financial disadvantage but also undermines their ability to compete in a market that is progressively moving toward sustainability as a key performance metric.

Corporate Environmental Responsibility and Firm Outcomes

Corporate Environmental Responsibility (CER) has emerged as a critical determinant of both economic and environmental success in the maritime industry. The research findings show that firms that score highly on CER (9/10) outperform their competitors in several key areas, including cost savings, operational efficiency, and stakeholder engagement. These firms have successfully integrated sustainability into their business models, demonstrating that environmental responsibility can be a driver of profitability rather than a hindrance. One of the key insights from the results is that high CER engagement is directly linked to economic benefits. Firms that prioritize sustainability not only reduce their environmental impact but also achieve significant cost savings through improved fuel efficiency and waste management. These firms are able to lower their operating costs by optimizing their use of resources, which in turn enhances their profitability and long-term viability. In an industry where fuel costs account for a significant portion of operational expenses, the ability to reduce fuel consumption through green technologies and sustainable practices provides a substantial competitive advantage.

Additionally, firms with high CER scores enjoy improved reputations, which can translate into stronger relationships with customers, investors, and regulators. In today's business environment, where sustainability is increasingly valued, firms that demonstrate a commitment to environmental responsibility are more likely to attract investment and customer loyalty. This shift reflects a broader trend in the market, where environmental performance is becoming as important as economic performance in determining a firm's success. Conversely, firms that neglect CER, scoring 5/10, face higher operating costs and reduced competitiveness. Their lack of engagement with sustainability initiatives results in inefficiencies that not only harm the environment but also erode their profitability. These firms are less likely to attract environmentally conscious investors and customers, which further weakens their market position. The findings suggest that firms that fail to integrate sustainability into their operations are at a growing disadvantage in a market that is increasingly driven by environmental performance.

Technological Innovation and Sustainable Performance

Technological innovation is a critical driver of both economic and environmental performance in the maritime industry. The research findings demonstrate that firms that invest

in green technologies, such as fuel-efficient ships, alternative fuels, and advanced logistics systems, score highly (9/10) in terms of both profitability and sustainability. These firms are able to reduce their operating costs by optimizing their fuel use, while simultaneously reducing their carbon emissions and other environmental impacts. The adoption of green technologies is not only a response to regulatory pressures but also a proactive strategy for long-term competitiveness.

Firms that lead in technological innovation are able to differentiate themselves in the market by offering more sustainable shipping solutions, which is increasingly valued by customers and regulators alike. These firms are also better positioned to adapt to future regulatory changes, as they have already made significant investments in reducing their environmental footprint. However, the research also reveals that there is a significant disparity between firms that are leaders in technological innovation and those that are lagging behind. Firms that have not yet adopted green technologies, scoring 6/10, face higher operational costs and are less competitive in a market that is shifting toward sustainability. These firms are at risk of falling behind as regulatory pressures increase and customers demand more environmentally responsible shipping solutions. The findings suggest that technological innovation is not just a competitive advantage but a necessity for long-term survival in the maritime industry.

Balancing Profitability and Sustainability

One of the most important findings of this research is the demonstration that profitability and sustainability are not mutually exclusive. Firms that score highly (9/10) in both profitability and environmental performance have found ways to balance these two goals, showing that sustainable business practices can drive long-term economic success. These firms have adopted a holistic approach to business strategy, where environmental responsibility is integrated into their core operations rather than treated as a separate or secondary concern. This balance between profitability and sustainability is achieved through several key strategies, including investment in green technologies, proactive regulatory compliance, and high engagement with CER. By reducing their environmental impact, these firms are able to lower their operating costs, improve their reputations, and attract investment and customer loyalty. The findings suggest that sustainability is not just a moral or regulatory obligation but a strategic advantage that can enhance a firm's competitiveness and profitability in the long term. In contrast, firms that prioritize short-term profitability over sustainability, scoring 5/10, face significant challenges. While they may achieve short-term financial gains by avoiding the costs associated with sustainability initiatives, these firms are at a growing disadvantage as the market shifts

toward environmental responsibility. They face higher regulatory costs, reduced operational efficiency, and a weaker market position, as customers and investors increasingly favor firms that demonstrate a commitment to sustainability. The research suggests that short-term profitability strategies are unsustainable in the long run, as they fail to account for the growing importance of environmental performance in the maritime industry.

The research findings provide a comprehensive understanding of how market structure, regulatory compliance, corporate environmental responsibility, technological innovation, and the balance between profitability and sustainability influence firm performance in the maritime industry. Firms that score highly in these areas are well-positioned to succeed in a market that is increasingly driven by sustainability, while those that neglect these factors face growing challenges. The SCP framework proves to be an effective model for analyzing the complex relationships between market structure, firm behavior, and industry performance. By incorporating environmental sustainability into the performance dimension, this research extends the traditional SCP model and provides valuable insights into how firms can navigate the challenges of sustainability in a highly competitive and regulated market. the maritime industry is at a critical juncture, where firms must find ways to balance profitability with environmental responsibility to ensure their long-term success. The findings of this research highlight the importance of adopting a proactive and integrated approach to sustainability, where economic and environmental goals are not seen as competing but complementary. This balance will be key to the future success of the maritime industry as it faces increasing pressure to reduce its environmental impact while continuing to drive global trade and economic growth.

RECOMMENDATION

Based on the findings and discussion of this research, several recommendations can be proposed to enhance both the economic performance and environmental sustainability of firms operating within the maritime industry. These recommendations are tailored to address the key areas identified in the research, including market structure, regulatory compliance, corporate environmental responsibility (CER), technological innovation, and the balance between profitability and sustainability. The goal is to ensure that the maritime industry remains competitive and economically viable while meeting the growing demands for environmental stewardship.

Encouraging Inclusive Market Structures

The concentration of market power in the hands of a few dominant firms presents both opportunities and challenges for the maritime industry. While these large firms are well-

positioned to invest in green technologies and lead sustainability efforts, smaller firms often struggle to keep up due to financial constraints and limited resources. To address this disparity, it is recommended that industry stakeholders, including regulatory bodies and policymakers, take steps to create a more inclusive market structure that allows smaller firms to participate more actively in sustainability initiatives. One approach could be to implement financial incentives or subsidies specifically aimed at supporting smaller maritime companies in adopting green technologies and improving their environmental performance. By offering targeted financial support, policymakers can help level the playing field and encourage greater industry-wide participation in sustainability efforts. Furthermore, collaborative partnerships between larger and smaller firms could be promoted to facilitate knowledge-sharing and resource-pooling, allowing smaller firms to benefit from the technological advancements and best practices pioneered by larger firms. Additionally, fostering competition within the industry by reducing barriers to entry could incentivize all firms to innovate and improve their sustainability practices. Increased competition may drive firms to differentiate themselves through more efficient and environmentally friendly operations, ultimately leading to better economic and environmental outcomes across the industry.

Strengthening Regulatory Frameworks and Compliance

Regulation plays a pivotal role in shaping the behavior of maritime firms, particularly regarding environmental sustainability. The research findings indicate that firms that adopt a proactive approach to regulatory compliance not only outperform their competitors economically but also lead in environmental performance. Therefore, it is recommended that governments and international regulatory bodies, such as the International Maritime Organization (IMO), continue to strengthen environmental regulations while ensuring that compliance measures are clear, enforceable, and aligned with sustainability goals. However, it is equally important to ensure that the regulatory burden on firms is manageable, particularly for smaller companies. Regulations should be designed to promote innovation and sustainability without imposing excessive financial strain on businesses. One way to achieve this balance is to provide flexible regulatory frameworks that offer firms different pathways to compliance based on their size, resources, and operational capacity. For example, smaller firms could be given more time to comply with new regulations or provided with technical assistance to help them meet environmental standards.

Governments should also consider implementing market-based mechanisms, such as emissions trading systems or carbon taxes, that incentivize firms to reduce their environmental impact while allowing them the flexibility to choose the most cost-effective way to achieve

compliance. These mechanisms can create financial incentives for firms to invest in green technologies and adopt sustainable practices, further driving innovation and environmental performance.

Promoting Corporate Environmental Responsibility (CER)

The research clearly demonstrates that firms with high levels of Corporate Environmental Responsibility (CER) are not only more environmentally sustainable but also achieve better economic outcomes, such as cost savings and improved stakeholder relationships. Therefore, it is recommended that maritime firms prioritize CER as a core component of their business strategies, recognizing that environmental responsibility is increasingly linked to long-term profitability and competitiveness. To promote CER, firms should adopt a holistic approach to sustainability that integrates environmental goals into all aspects of their operations, from fleet management and logistics to energy use and waste reduction. This could involve setting clear sustainability targets, regularly measuring and reporting on environmental performance, and engaging with stakeholders—such as customers, investors, and regulators—to demonstrate their commitment to sustainability.

Leadership within maritime firms should also recognize the importance of creating a culture of sustainability that encourages employees at all levels to contribute to environmental goals. Training programs and initiatives that promote environmental awareness and innovation should be implemented to ensure that sustainability is embedded into the company's day-to-day operations. Moreover, firms that are already leading in CER should engage in industry-wide collaboration and share best practices with other maritime companies, particularly smaller firms that may lack the resources to develop their own sustainability initiatives. By working together, the industry as a whole can accelerate the transition to more sustainable business practices, benefiting both individual firms and the broader global environment.

Investing in Technological Innovation

Technological innovation is one of the most important drivers of sustainable performance in the maritime industry. As the research shows, firms that invest in green technologies, such as fuel-efficient ships and alternative fuels, are able to significantly reduce their environmental impact while improving their profitability through operational efficiency. Therefore, it is recommended that maritime firms continue to prioritize investment in innovative technologies that enhance both economic and environmental performance. Firms should actively seek out and adopt emerging technologies that can reduce their carbon footprint, such as wind-assisted propulsion, hydrogen-powered ships, and energy-efficient logistics systems. Additionally, firms should collaborate with technology providers, research institutions, and other industry

stakeholders to stay at the forefront of innovation and ensure they are well-positioned to meet future regulatory and market demands for sustainability.

To support technological innovation, governments and industry associations should provide incentives, such as tax credits or research grants, that encourage maritime firms to invest in the development and deployment of green technologies. Public-private partnerships could also be established to facilitate large-scale innovation projects, such as the creation of zero-emission shipping corridors or the development of ports that are optimized for sustainable maritime operations.

Balancing Profitability with Sustainability

One of the key findings of this research is that profitability and sustainability are not mutually exclusive but can, in fact, be complementary. Firms that successfully balance economic growth with environmental responsibility achieve long-term competitive advantages through cost savings, enhanced reputations, and stronger stakeholder relationships. As such, it is recommended that maritime firms adopt an integrated approach to business strategy, where both profitability and sustainability are treated as essential and interconnected goals. Firms should recognize that short-term profit-driven strategies that neglect sustainability are increasingly unsustainable in a market that values environmental responsibility. Instead, they should focus on long-term planning that incorporates both economic and environmental objectives. This may involve making upfront investments in green technologies and sustainable practices that pay off over time through reduced operational costs and increased market share. To ensure the success of this integrated approach, maritime firms should regularly evaluate their performance across both economic and environmental dimensions. By measuring and reporting on key performance indicators (KPIs) related to profitability, energy use, emissions, and waste, firms can identify areas for improvement and make informed decisions that enhance both their financial and environmental outcomes.

Collaborative Industry Initiatives for Sustainability

Finally, it is recommended that the maritime industry adopt a collaborative approach to sustainability, recognizing that the challenges of environmental responsibility cannot be addressed by individual firms alone. Industry-wide initiatives, supported by both public and private stakeholders, are essential for achieving significant progress in reducing the environmental impact of maritime operations. Collaborative efforts could include industry-wide commitments to reduce emissions, the establishment of shared sustainability goals, and joint investment in research and development (R&D) for green technologies. Industry associations, such as shipping alliances and trade organizations, should play a key role in

coordinating these initiatives and facilitating dialogue between firms, regulators, and other stakeholders.

By working together, the maritime industry can overcome the barriers to sustainability, such as high costs and technological challenges, and accelerate the transition to more sustainable business practices. This collective action will not only benefit individual firms but also contribute to the global effort to combat climate change and protect the marine environment. the maritime industry is at a pivotal moment where the integration of sustainability into business strategies is no longer optional but essential for long-term success. The recommendations provided here—encouraging inclusive market structures, strengthening regulatory frameworks, promoting CER, investing in technological innovation, balancing profitability with sustainability, and fostering industry-wide collaboration—are aimed at helping firms navigate the challenges of sustainability while ensuring economic viability. By adopting these strategies, the maritime industry can achieve both environmental responsibility and economic prosperity, contributing to a more sustainable and competitive future.

6. CONCLUSION

This research has provided a comprehensive analysis of the maritime industry through the lens of the Structure-Conduct-Performance (SCP) framework, with a particular emphasis on the integration of environmental sustainability and economic performance. The findings demonstrate that market concentration plays a critical role in determining the ability of firms to invest in green technologies and adopt sustainable practices, with larger firms benefiting from economies of scale. However, smaller firms often face barriers to participation in sustainability initiatives, highlighting the need for inclusive market structures and financial support. Regulatory compliance emerged as a key driver of firm behavior, with proactive compliance linked to superior economic and environmental outcomes. Corporate Environmental Responsibility (CER) was also shown to be a critical factor in driving profitability, as firms with strong CER commitments enjoyed cost savings, improved stakeholder relations, and enhanced reputations. Technological innovation, particularly in green shipping technologies, was identified as a crucial component of long-term success in the industry. This research underscores the importance of balancing profitability and sustainability in the maritime sector. Firms that integrate environmental responsibility into their core strategies are better positioned to succeed in a competitive, regulation-driven market, achieving both economic viability and environmental stewardship.

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