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# *Integration Strategies of Shipping Enterprises under Environmental Regulations from Perspective of Resource-Based View*

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***Abstract:*** Against the backdrop of increasingly stringent global climate change and environmental protection requirements, shipping enterprises, as a vital component of global trade, face significant pressure from environmental regulations. This paper analyzes the impact of environmental regulations on the integration strategies of shipping enterprises and their underlying mechanisms from the perspective of the Resource-Based View (RBV). As representatives of high carbon emission industries, shipping enterprises must integrate internal and external resources based on their unique characteristics to address the growing stringency of global environmental policies. This study reveals that the formulation of environmental strategies for shipping enterprises is driven by both environmental regulations and resource integration, emphasizing the critical role of integrating technological resources, fleet size, external collaboration, and financial resources in responding to environmental regulations. Based on case analysis, this paper further elucidates the pathways through which shipping enterprises can achieve long-term competitive advantages via green technological innovation and strategic cooperation, exploring how companies can optimize resource allocation under environmental regulations to reduce operational costs and carbon emissions. Finally, this paper summarizes the practical application value of integration strategies for shipping enterprises and offers suggestions for future research.

***Keywords:*** Shipping Enterprises, RBV, Environmental Regulations, Integration Strategies.

## 1. Introduction

For now, climate issues are becoming increasingly severe. Climate change, primarily global warming, has become a challenge that the entire world must face together. Against this backdrop, various countries have formulated carbon reduction regulations for different industries.

According to the International Maritime Organization's (IMO) Fourth Greenhouse Gas Study, the shipping industry currently accounts for 3.3% of global carbon dioxide emissions, with ship emissions alone reaching one billion tons, making up 2.7% of the global total [1]. As such, shipping enterprises play a key role in global carbon reduction targets. As a crucial link in global trade, the stable operation of shipping enterprises is vital to the global economy. Driven by global trade demands and the development of globalization and international commerce, shipping companies must not only handle traditional transportation tasks but also manage complex international networks and cross-border

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logistics [2]. This means that shipping enterprises operate and manage businesses across multiple countries or regions, typically maintaining offices and operational facilities at numerous global ports to ensure the worldwide transport of goods. Their customers come from all over the world, including import and export companies and multinational corporations from various countries. Therefore, shipping enterprises must comply with the commercial regulations, tariff policies, and environmental regulations of different nations, especially regarding carbon emissions and environmental protection policies. Environmental regulations imposed by international organizations, as well as those from various countries and regions, represent significant risks and pressures for shipping enterprises [3]. Thus, environmental regulations considerably influence the decision-making of shipping enterprises. If shipping enterprises fail to develop scientifically sound and effective strategies based on specific environmental regulations, a uniform environmental strategy will clearly be insufficient to cope with the complex and ever-changing environmental regulations across different countries and regions. Additionally, given that shipping enterprises are asset-heavy, with long asset lifecycles such as those of ships, their strategic decisions need to be made cautiously, as the cost of adjusting the overall strategic decision-making is extremely high. Therefore, in the face of increasingly stringent environmental policies, shipping enterprises must adopt effective environmental strategies based on their characteristics to reduce operating costs, increase financial returns, enhance competitiveness and market share, and minimize legal risks, thus adapting to the new market environment. External environmental policies are a significant factor influencing the environmental strategies of shipping enterprises. In academic terms, such environmental policies created by governments to achieve environmental protection goals are referred to as environmental regulations.

Current academic research has already touched upon this area. For instance, based on new institutionalism theory, Li Yina et al. [4] categorize environmental regulations into mandatory and incentivized environmental regulations, demonstrating that both have a significant positive impact on a company's environmental strategy, which in turn indirectly influences its economic performance. Similarly, Cao Hongjun et al. [5] suggest that, from an external perspective, both mandatory and incentivized environmental regulations positively influence a company's environmental strategy. Furthermore, from an internal perspective, a company's innovative capacity within its internal environment significantly promotes green innovation, which indirectly positively affects the company's environmental strategy.

The formulation of environmental strategies is influenced by various factors. Shipping enterprises, in particular, must craft environmental strategies tailored to their characteristics to meet diverse environmental policies. Existing studies and literature have discussed the factors that influence companies in formulating reasonable environmental strategies in response to environmental regulations [4, 5]. They have also explored how companies integrate their resources to make optimal environmental strategic decisions. However, such research is largely confined to industries such as manufacturing. Currently, few studies specifically analyze how shipping enterprises, considering their unique characteristics, integrate resources and capabilities to formulate the best environmental strategic decisions. This paper analyzes the impact and mechanisms of environmental regulations on the integration strategies of shipping enterprises from the perspective of the Resource-Based View (RBV), aiming to promote emission reduction efforts within the shipping industry. The following sections of the paper are divided into four parts: the first part reviews the literature, clarifies and explains basic concepts, and constructs a theoretical model; the second part discusses the main research methods of the paper; the third part presents the main conclusions and recommendations; and the fourth part summarizes the content and discusses the limitations of the study.

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## 2. Literature Review

### 2.1. Environmental Regulations

Environmental regulations are aimed at protecting the environment by regulating behaviors that pollute public environments. These regulations encompass a series of policies and measures implemented by governments to achieve environmental protection goals. Currently, mainstream environmental regulations can be categorized into two primary types: command-and-control regulations and market-based incentives. Command-and-control regulations set specific emission standards or production requirements that companies must follow to meet environmental objectives. Academically, it is believed that command-and-control regulations have a significant positive impact on corporate green innovation in the short term, though their long-term effects remain controversial [6]. The impact of command-and-control regulations on energy-saving and emission-reduction efficiency varies across different stages [6]. From a corporate perspective, command-and-control environmental regulations in China are mainly reflected in the form of administrative environmental penalties. Existing studies suggest that such regulations, by imposing penalties, can significantly increase a company's environmental investment and strengthen green technology innovation [7]. Therefore, we can infer that command-and-control environmental regulations positively impact corporate environmental strategies through administrative penalties.

Market-based incentives, on the other hand, encourage companies to reduce pollution emissions through economic means, such as subsidy policies and environmental taxes. These incentives offer flexibility and long-term effectiveness in promoting energy saving and emissions reduction, significantly fostering the development of green innovation over time [8]. China's current environmental regulations are largely market-based, primarily reflected in carbon tax policies and carbon reduction subsidy programs [9]. The carbon tax is considered an effective market mechanism aimed at reducing emissions by raising the cost of carbon emissions, thereby promoting a low-carbon economic development model [10]. Research shows that low carbon tax rates have a limited impact on the Chinese economy but can effectively slow the growth of CO2 emissions [10]. Differentiated carbon tax policies are believed to expand the market share of low-carbon and environmentally friendly products, fostering the growth of eco-friendly enterprises [11]. China's environmental subsidy policies are mainly manifested through tax incentives and financial subsidies. Tax incentives reduce or exempt taxes to encourage companies to invest in environmental technologies and projects, including tax exemptions for the development and transfer of environmental technologies, as well as tax incentives for energy-saving and emission-reduction products [12]. Financial subsidies directly provide companies with funding to support the research, construction, and operation of environmental projects. Such subsidies help alleviate cost burdens and increase corporate participation in environmental projects [13].

Current academic research indicates that carbon tax policies, as part of market-based environmental regulations, can significantly improve corporate financial performance and behavior, enhance motivation for research and green innovation, improve internal and external expectations, and drive corporate green transitions [14]. Additionally, government subsidies have been shown to significantly promote green transitions, with the resource attributes of subsidies helping alleviate corporate financing constraints, thereby encouraging reasonable environmental strategic decision-making [15].

### 2.2. Environmental Strategy

The environmental strategy of a company refers to the series of policies, measures, and action plans formulated and implemented to reduce negative impacts on the environment and enhance

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environmental performance during production and operational activities. Current academic discourse identifies several main types of environmental strategies: compliance strategy, efficiency strategy, innovation strategy, market-driven strategy, and integrated strategy.

The compliance strategy ensures that companies adhere to laws and regulations, meeting basic environmental standards. This is the most fundamental environmental strategy, primarily aimed at avoiding legal risks and fines [16]. The efficiency strategy seeks to lower costs by improving resource utilization efficiency and reducing waste emissions. This approach not only aids in environmental protection but also enhances the company's economic benefits [17]. The innovation strategy involves actively developing and applying new environmentally friendly technologies and products to achieve higher environmental standards and market competitive advantages. This strategy often requires substantial investment in research and development but can yield long-term returns [17]. The market-driven strategy focuses on launching environmentally friendly products and services to meet market demand and consumer awareness of environmental issues, thereby enhancing the company's brand image and market share [18]. The integrated strategy combines environmental strategies with the company's overall business strategy, considering environmental, economic, and social benefits in pursuit of sustainable development [19]. Current research suggests that command-and-control environmental regulations encourage companies to adopt compliance strategies by imposing legal risks and financial pressures [6, 7], while market-based regulations, such as carbon tax policies and government subsidies, help companies lower costs, prompting greater focus on efficiency and green technology innovation in strategic decision-making [13-15]. However, there is limited research discussing the impact of environmental regulations on corporate integrated strategies.

## 2.3. Resource-Based View Theory (RBV)

The Resource-Based View (RBV) is a strategic management theory that emphasizes the importance of a company's internal resources in forming competitive advantages.

RBV serves as a crucial theoretical framework in the field of strategic management, first proposed by Wernerfelt in 1984 [20]. He defined resources as both tangible and intangible assets that a company can possess over an extended period and argued that anything capable of providing a competitive advantage or disadvantage—such as brand reputation, intellectual capital, skilled employees, social capital, and internal management processes—falls under the category of resources. The growth and competitive advantage of a company depend on its ability to allocate and utilize its internal resources effectively [20]. In 1991, Jay Barney further developed this theory by systematizing the core concepts of RBV and introducing the VRIO framework, categorizing resources based on four characteristics: value, rarity, inimitability, and organization [21]. This work laid the foundation for RBV.

The VRIO framework serves as a tool within RBV for assessing a company's resources and capabilities, helping to identify which resources can provide sustainable competitive advantages. It analyzes whether a company's resources possess the potential to create and maintain a competitive edge through four key dimensions: value, rarity, inimitability, and organization. If resources meet the VRIO criteria, the company can achieve sustainable competitive advantage, maintaining its leading position over the long term.

Effective resource integration is a significant aspect of RBV theory, which posits that a company's competitive advantage is determined by its internal resources. By integrating and leveraging valuable, rare, inimitable, and organized resources, and focusing on its unique heterogeneous resources, a company can cultivate its core competitive capabilities, fostering sustainable growth.

Given that shipping enterprises are characterized by concentrated heavy assets, effectively utilizing and integrating their unique resources to respond to environmental regulations and make rational environmental strategic decisions is one of the primary objectives of this study.

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# 3. Integration of Internal and External Resources in Shipping Enterprises

## 3.1. Characteristics of Shipping Enterprises

Shipping enterprises primarily provide services for the spatial displacement of goods, which constitutes their core business. These enterprises typically operate on a global scale, involving multiple countries and regions. The environmental taxes resulting from the environmental laws imposed by various countries, regions, and organizations constitute a significant part of shipping companies' financial expenditures and operating costs. However, as previously mentioned, shipping enterprises face environmental regulations from different countries and regions. Any adjustments in a company's environmental strategic decisions entail substantial costs. Therefore, integrating internal resources based on their characteristics to make appropriate environmental strategic decisions to reduce carbon emissions is a crucial operational indicator for shipping enterprises [22].

Shipping enterprises tend to formulate corresponding environmental strategies in response to pressures from external environmental regulations to save costs and effectively manage these regulations. Their specific environmental strategies often encompass various aspects such as green production, energy conservation and emissions reduction, and low-carbon logistics.

Firstly, shipping enterprises implement green production to reduce carbon emissions, which involves the greening of the production process. This is manifested in the development of more suitable navigation efficiency systems for shipping enterprises, identifying the most fuel-efficient routes, and ensuring that vessel machinery remains in a low-load state for optimal environmental efficiency [23]. With advancements in information technology, shipping companies increasingly rely on digital and automation technologies to improve efficiency, such as automated terminals, intelligent ship management systems, and advanced logistics and information management systems (e.g., GIS). These technologies can effectively reduce carbon emissions and minimize unnecessary environmental pollution fines or taxes. Secondly, under the influence of external environmental regulations, shipping companies tend to make strategic decisions to invest in green ship equipment [23]. In the face of significant regulatory pressures, shipping enterprises are inclined to invest in low-energy and new-energy vessels to minimize carbon emissions. Moreover, a current challenge in the modern shipping industry is the transition from a "port-to-port" operational model to "door-to-door" logistics services [24]. By making green plans throughout the logistics transport process and making life-cycle decisions for goods that must be transported by sea, shipping companies can effectively reduce unnecessary carbon emissions [24].

## 3.2. Resource Characteristics

### 3.2.1. Internal Resource Characteristics

From the perspective of resource forms and attributes, corporate resources can be divided into tangible and intangible resources [25]. Tangible resources include, but are not limited to, physical assets such as raw materials, equipment, and facilities [25]. Intangible resources encompass non-physical assets such as brand reputation, patents, information, technology, and corporate culture [26].

For shipping enterprises, tangible resources mainly refer to visible physical resources such as vessels, port facilities, and cash on hand. The scale of a shipping company's fleet, the number and types of vessels (e.g., container ships, bulk carriers, tankers), and the level of modernization are core factors determining its transportation capacity and service flexibility. A flexible fleet composition and strong transportation capabilities are essential tangible resources for shipping companies [27]. Additionally, port facilities and logistics networks, such as owned or partnered port infrastructure, logistics distribution networks, and warehousing facilities, significantly impact operational efficiency and customer service levels, making them crucial tangible resources for shipping enterprises.

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Shipping companies typically have sufficient capital, financing capabilities, and cost control abilities, which are key to coping with market fluctuations, acquiring new vessels, and expanding operations. These aspects are also vital tangible resources for shipping companies. The intangible resources of shipping enterprises include technological capabilities, internal control systems, and upstream and downstream resources. The use of information technology (e.g., digital platforms, cargo tracking systems, intelligent shipping) and automation technology enhances operational efficiency and reduces waste of human and material resources. Technologies such as smart route planning and energy recovery on vessels can save navigation distances, thereby reducing fuel consumption, which lowers operating costs while decreasing carbon emissions. Internal control systems are one of the important internal resources of shipping enterprises [28]. The internal control environment includes corporate culture and management capabilities, forming the foundation for establishing and implementing internal controls. Furthermore, upstream and downstream resources, particularly long-term cooperative relationships with key stakeholders, are also significant internal resources for shipping enterprises [29]. Being an indispensable part of the global supply chain, maintaining good external relationships with upstream and downstream companies helps shipping enterprises acquire more information and support, lower operating costs, and indirectly reduce energy consumption and carbon emissions.

### 3.2.2. External Resource Characteristics

The external resources of a company can be classified according to the rarity aspect of the RBV theory's VRIO framework, distinguishing between rare resources and common resources [21].

In the external resources of shipping enterprises, rare resources mainly include long-term cooperative customer relationships, unique technological resources, and exclusive partnership resources. The shipping market experiences cyclical fluctuations, exposing shipping companies to significant market risks (such as oil price volatility and freight rate fluctuations). Long-term cooperative customer relationships can provide stable freight order demand over time, thus enhancing the operational stability of shipping companies. Under the pressure of external environmental regulations, shipping enterprises increase their investment in green and energy-efficient vessel technologies. Consequently, these companies collaborate with research institutions, universities, and technology firms to gain external technical support or partnerships, which represent rare external resources for shipping companies. Additionally, exclusive partnership resources also qualify as rare resources for these enterprises. Shipping companies typically establish strategic collaborations with port operators, logistics firms, and other related industries to form integrated supply chain external resources. For instance, long-term cooperation with ports can ensure priority for loading and unloading operations and preferential port fees, especially in major global trade ports (such as the Suez Canal, the Red Sea, and the Panama Canal). Maintaining close cooperation with shippers or freight forwarding companies can stabilize cargo sources, reduce empty transportation rates, and foster long-term partnerships.

The common resources among the external resources of shipping enterprises mainly include external policies and regulations, general supplier resources or information resources, and external financial resources. The external policies and regulations relevant to shipping enterprises encompass political policies, economic conditions, environmental regulations, etc. [30]. External policies and economic situations can fluctuate with broader environmental influences and may serve as beneficial external resources for shipping companies. Common supplier resources or information resources are prevalent in the market and can be shared or substituted by multiple enterprises. Financial resources include bank loans, investment funds, and government subsidies. Shipping companies collaborate with banks or financial institutions to secure low-interest loans or financing channels, providing

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funding support for their expansion. Additionally, financial backing from external shareholders or strategic investors is also an important external resource for shipping companies.

### 3.2.3. Integration Strategies of Shipping Enterprises

In response to increasingly stringent environmental regulations (such as the International Maritime Organization's IMO sulfur cap and carbon emission policies), shipping companies need to leverage their unique resources to meet these challenges. For shipping enterprises, these rare resources include unique technological capabilities, fleet size, flexible shipping capacity, financial resources, exclusive external partnerships, and policy resources.

Based on the previously mentioned resource-based view (RBV) theory, a company's competitive advantage derives from both internal and external rare resources, which must possess characteristics that are difficult to replicate or substitute [21]. However, possessing rare resources alone is insufficient to ensure long-term competitive advantage in a dynamic market environment. Integrating the dynamic capability theory, it becomes clear that companies must not only have rare resources but also the ability to rapidly adjust, reorganize, and integrate these resources to respond to fast-changing external environments and uncertainties, thereby maintaining their competitive edge [31].

To sustain competitive advantage, shipping enterprises must recognize that relying solely on these resources may not be enough to navigate the complex and changing external landscape. Particularly under increasingly stringent environmental regulations, depending on just one resource could lead to limitations. For instance, if a shipping company solely relies on unique technological resources, it may incur excessive research and development costs in the short term, hindering comprehensive green transformation. Similarly, relying only on a large fleet size or flexible shipping capacity might yield temporary benefits but will not suffice against long-term, escalating environmental regulations, ultimately risking obsolescence in the face of growing regulatory pressures.

To avoid the limitations of depending on a single resource, shipping enterprises can integrate their technological resources with their fleet capacity to ensure a smooth renewal of the fleet and achieve greening. Specifically, shipping companies can collaborate with research institutions, ship manufacturers, and technology firms to jointly develop new low-emission, energy-efficient vessels and technologies. By integrating external technological resources, enterprises can accelerate their green transformation driven by regulations. For traditional vessels that cannot be phased out in the short term, companies can invest in or develop green retrofit technologies or use low-sulfur fuels to reduce pollutant emissions, ensuring these vessels remain compliant and competitive under environmental regulation pressures.

Moreover, changes in environmental regulatory pressures demand that companies innovate not only at the technological level but also conduct comprehensive resource integration in finance, operations, and supply chain management. To achieve green shipping, shipping enterprises need vessels that use low-emission fuels and require modifications to existing ships. This necessitates not only technological innovation (such as developing new low-emission technologies) but also substantial financial support. Additionally, the process of renewing and upgrading vessels requires flexible adjustments in route planning, enabling smooth transitions during green transformation. Therefore, shipping enterprises must realize comprehensive resource integration in financial resources, operations, and supply chain management to effectively promote environmental protection. Specifically, they can adopt green financing strategies, actively seeking external funding support such as green loans, eco-friendly bonds, or government subsidies to reduce the financial pressure of investing in new technologies or green vessels. In terms of operations, shipping enterprises can screen upstream and downstream partners to optimize supply chains for greening. This includes collaborating with green ports to prioritize access to eco-friendly fuel supplies or other green services, ensuring compliance with environmental regulations during operations. Additionally, by

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implementing green shipping measures (such as using sustainable fuels and optimizing routes) in partnership with suppliers within the supply chain, shipping companies can lower overall operating costs and enhance their responsiveness to environmental regulations. Shipping enterprises can also provide diversified transport solutions tailored to various environmental regulations, forming a diversified strategy. Given the significant differences in environmental regulations and customer demands across global markets, companies need to integrate their internal shipping resources with external policies and partnerships, adjusting their strategies based on the environmental requirements of different markets. Shipping enterprises can offer differentiated green shipping services according to varying environmental standards in different markets, investing in vessels with diverse capacities to provide tailored services; at the same time, they can extend the lifespan of traditional vessels in markets where strict environmental requirements have not yet been implemented. This strategic flexibility benefits resource optimization, allowing companies to gain competitive advantages in different market environments.

Thus, integrating diverse rare resources is a necessary path to achieving strategic goals. Shipping enterprises cannot rely solely on any specific rare resource to ensure long-term survival in the face of environmental regulations. When confronting environmental regulations, they can depend on their unique resources such as technology, capital, fleet, and exclusive external partnerships to make optimal strategic decisions through technological upgrades, strategic collaborations, and policy responses. By integrating resources and effectively combining different rare resources into an integrated strategy, these resources can generate synergies, enabling enterprises to respond to short-term regulatory pressures while achieving sustainable development advantages in long-term competition [22].

## 4. Findings and Conclusions

### 4.1. Summary of Perspectives

This study focuses on the integration strategies adopted by shipping enterprises in response to increasingly stringent environmental regulations. Shipping companies address the challenges posed by these regulations by integrating scarce internal and external resources, such as unique technological capabilities, flexible shipping capacity, fleet size, financial resources, and exclusive external partnerships.

By analyzing the integration strategies of shipping enterprises under the pressure of environmental regulations and combining this with the RBV theory, the following core viewpoints can be derived: In the face of external regulatory pressures, shipping enterprises need to leverage their internal and external scarce resources to gain competitive advantages and formulate optimal strategic decisions through resource integration. Integration strategies serve as an effective means for shipping companies to cope with environmental regulatory pressures, helping them reduce compliance costs while achieving sustainable development advantages in long-term competition.

The VRIO framework proposed by Barney emphasizes the value, rarity, inimitability, and organization of resources [21]. In the context of shipping enterprises, scarce resources such as technological capabilities and fleet size meet these criteria, enabling companies to stand out in competition. However, this study further points out that merely possessing these scarce resources is insufficient to ensure long-term competitive advantage for shipping companies. They must also possess the capability to integrate these resources to respond to the rapid changes in environmental regulations. Many scholars, such as Cao and Chen [5], Yang and Cheng [8], and Du and Chen [7], have discussed the impact of environmental regulations on enterprises, but there has been little in-depth analysis of their specific effects on the integration strategies of shipping companies. Existing research has primarily focused on single aspects of compliance costs and technological innovations,

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as well as certain adjustments made by shipping enterprises in response to environmental regulations. This study further reveals the critical role of integration strategies in how shipping companies respond to environmental regulations, particularly regarding the integration of internal and external resources. The analysis not only broadens the scope of research on environmental regulations but also resonates with previous core viewpoints on scarce resources in enterprises, highlighting the interactive relationship between internal resources and external regulations.

## 4.2. Case Analysis: P Company's Integration Strategy Response to Environmental Regulations

Company Background: P Company, a shipping firm based in Singapore, is one of Asia's largest container shipping companies, committed to reducing carbon emissions and achieving sustainable development through the adoption of the latest green shipping technologies. In the face of increasingly stringent environmental regulations, P Company needs to optimize its fleet, enhance fuel efficiency, and employ new technologies to address these challenges. The following parts illustrate its resource integration and strategic responses.

### 4.2.1. Integration of Technological Resources and Fleet Resources

P Company is responding to the increasingly stringent Carbon Intensity Indicator (CII) standards for vessels by implementing operational and technical measures to improve its CII performance. Based on this, P Company has developed a delivery plan for LNG dual-fuel new ships. The company plans to deliver eight LNG dual-fuel vessels between the fourth quarter of 2024 and 2025, including four 14,000 TEU and four 8,000 TEU container ships. P Company's dual-fuel LNG vessels are equipped with GTT membrane LNG tanks that maintain LNG at -162 degrees Celsius, significantly reducing carbon emissions from fuel. These technologies enable P Company to become the first company in Asia to invest in LNG dual-fuel container ships.

In addition to investing in multiple dual-fuel LNG vessels, P Company is conducting a series of technological innovations and testing green fuels, exploring the use of ammonia, methanol, and other green fuels. These technological explorations not only reduce sulfur emissions but also hold potential for future use of new fuels. P Company is collaborating with technology companies to test carbon capture and storage (CCUS) technologies and establish a cooperation framework for ammonia fuel refueling. The company has also completed tests of biofuels (such as B10 and B24) and plans to test algae biofuels in the future. This technological upgrade helps P Company maintain competitiveness under future international environmental standards.

### 4.2.2. Integration of External Cooperative Resources

In terms of external cooperative resources, P Company forms a robust network of external resources through collaboration with multiple parties to obtain technical support, optimize green fuel supply, and enhance logistics services. These partnerships assist P Company in achieving technological breakthroughs, reducing costs, and improving the efficiency of its global supply chain.

P Company has established long-term cooperative relationships with several port operators, particularly in green port services and fuel supply. Notably, P Company has signed a memorandum of understanding (MOU) with a port authority in Singapore to jointly develop sustainable shipping solutions. This collaboration includes not only the supply of green fuels but also the optimization of port facilities, aimed at reducing carbon emissions during port operations.

P Company actively participates in green alliances and international organizations, advancing green shipping projects in collaboration with leading global shipping companies and environmental organizations. In its partnership with the Global Maritime Decarbonization Center (GCMD), P

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Company has closely collaborated on signing and testing a framework agreement for ammonia fuel refueling. This cooperation not only positions P Company at the forefront of green fuel usage but also grants the company more influence in the formulation of international environmental standards.

In terms of logistics supply chains, P Company's long-term relationships with logistics companies, freight forwarders, and upstream and downstream suppliers help optimize the environmental performance of its entire supply chain. By collaborating with logistics suppliers, P Company ensures that every aspect of the cargo transportation process meets green standards.

Through close cooperation with technology companies, port operators, logistics suppliers, research institutions, and international green alliances, P Company has formed a strong external cooperative network. This collaboration not only provides P Company with technical support and fuel supply guarantees but also helps optimize supply chains and transportation processes globally, further reducing carbon emissions. By integrating external cooperative resources, P Company is able to maintain a leading position in responding to environmental regulations and advance its long-term goal of achieving net-zero emissions by 2050.

### 4.2.3. Integration of Financial and Policy Resources

In terms of financial and policy resources, P Company actively leverages various external resources to support its green transformation, ensuring competitiveness in the face of increasingly stringent environmental regulations. P Company obtains funding support through green financing to bolster its environmental protection and technology upgrade projects, thereby accelerating the greening of its fleet. Green financing is a funding method specifically designed to support sustainable projects, typically including low-interest loans, green bonds, and environmental protection funds. Through this financing approach, P Company can alleviate the financial pressure associated with investments in new technologies and green vessels, particularly when investing in costly dual-fuel LNG vessels or developing carbon capture technologies for ships.

In addition to green financing, P Company also benefits from government subsidies that are specifically aimed at supporting corporate investments in environmental protection technologies and green energy. By participating in carbon reduction projects in countries like Singapore, P Company has received corresponding policy support and financial subsidies. These subsidies not only reduce the company's operating costs but also expedite the implementation of environmental protection projects. Furthermore, when P Company acquires dual-fuel LNG vessels or tests biofuels, these subsidies provide a financial buffer, enabling smoother technology transitions.

Through green financing and government subsidies, P Company fully utilizes external conditions regarding financial and policy resources, providing a solid funding and policy guarantee for its environmental transformation. This multi-faceted resource integration allows P Company to continuously advance the application of green technologies and reduce carbon emissions, ensuring long-term competitiveness in the future shipping market amidst increasingly stringent environmental regulations.

### 4.2.4. Summary

P Company's integration strategy exemplifies how shipping companies can enhance competitiveness and achieve sustainable development goals in the face of increasingly stringent environmental regulations by integrating internal and external resources.

As a shipping company, P Company confronts carbon emission restrictions from the International Maritime Organization (IMO), global carbon tax policies, and various environmental regulations from different countries. Under such external environmental pressures, relying solely on a single resource, such as technology or fleet size, proves inadequate to meet the growing regulatory demands.

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Therefore, resource integration becomes crucial. By integrating technological resources, external partners, and financial and policy resources, P Company can reduce compliance costs while attaining long-term competitive advantages. This resource integration aids P Company in enhancing its green technology innovation capabilities while ensuring its leading position in the global market.

In its resource integration process, P Company has adopted multi-level and multi-faceted strategies: it has invested in dual-fuel LNG vessels, developed carbon capture technologies, and collaborated with research institutions to explore future green fuels like ammonia and methanol, effectively integrating ship technology with emerging environmental technologies. P Company has established long-term cooperative relationships with port operators, technology companies, and government agencies. Through these collaborations, it has achieved effective integration of external resources in green supply chain management and eco-friendly fuel supply. P Company actively utilizes policy resources such as green financing and government subsidies, reducing the costs of investing in environmental protection technologies through green loans, carbon trading, and policy incentives.

P Company's integration strategy indicates that shipping companies, when facing increasingly stringent environmental regulations, must rely on the integration of both internal and external resources. By effectively integrating scarce internal and external resources, they can meet the challenges posed by environmental regulations and secure lasting competitive advantages and sustainable development. This highlights the importance of integration strategies in addressing environmental challenges. The integration of resources not only helps companies lower operational and compliance costs but also enhances their technological innovation capabilities, providing them with a competitive edge in future green transformations. P Company's practices demonstrate how shipping companies can promote sustainable development and respond to changes in global environmental policies through the integration of technology, external cooperation, and policy support.

## 5. Conclusion

This paper focuses on the theme of "The Impact of Environmental Regulations on Shipping Companies' Integration Strategies and Mechanisms," utilizing the Resource-Based View (RBV) theory to explore how shipping companies can adapt to and address increasingly stringent environmental regulations through the integration of scarce internal and external resources. The study highlights the resource integration strategies employed by shipping companies in response to environmental regulations, concluding that they cannot rely solely on a single resource. Instead, by integrating multiple scarce resources such as technological resources, fleet size, flexible capacity, financial resources, and exclusive external partnerships, shipping companies can maintain long-term competitive advantages. This paper also offers resource integration suggestions for shipping companies in areas such as resource technology integration, green financing strategies, green optimization of supply chains, and diversified transportation strategies.

This study expands the application of RBV theory within shipping companies, delving into how these firms integrate scarce internal and external resources to tackle environmental regulations. It provides a new perspective on the applicability of RBV theory, particularly in the context of high carbon emissions and capital-intensive industries. Traditional RBV theory often focuses on manufacturing or service sectors, while this research extends its applicability to the shipping industry. Additionally, this paper reveals how environmental regulations influence corporate integration strategy decisions and presents the dynamic process through which companies integrate resources to respond to external environmental pressures. This addresses a gap in the existing literature regarding the systematic study of how the shipping industry copes with volatile and stringent environmental policies. Specifically, the analysis of integration strategies in technology, finance, and collaboration enriches the academic understanding of environmental strategy theory. Existing literature has

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primarily focused on how companies address environmental regulations through single resources or technologies, whereas this paper emphasizes the importance of resource integration, particularly in terms of strategic flexibility in response to diverse global environmental policies.

Furthermore, this paper provides significant practical insights for shipping companies, especially in how to cope with increasingly stringent international environmental regulations. Shipping companies should achieve integration between technology investment and resources, increase investment in green technologies, and actively integrate internal technological resources with external partners, such as research institutions and technology companies, to collaboratively develop low-emission vessels and fuel technologies. Additionally, shipping companies need flexible fleet management and strategic planning, formulating differentiated fleet management strategies based on various countries' environmental policies, investing in new energy vessels, and extending the lifespan of traditional vessels to balance operations and compliance.

This paper also holds relevance for policymakers, particularly in the formulation and implementation of environmental regulations. Governments should encourage technological innovation and collaboration through policy support, promoting partnerships between shipping companies and research institutions or technology companies to further develop green technologies and low-emission solutions. They should also provide necessary funding and technical support to facilitate the research and application of green vessels. Policymakers should consider different markets and company sizes, offering flexible carbon tax policies and green financing incentives to help firms transition smoothly to low-carbon economic models. Especially under the regulatory frameworks of organizations like the International Maritime Organization (IMO), policymakers should strengthen international cooperation to ensure a smooth transition to green practices in the global shipping industry.

However, this paper does have certain limitations. First, the research is primarily based on the existing theoretical framework of RBV, and future studies could consider incorporating additional theories for supplementary validation. Second, the analysis mainly concentrates on the integration of internal and external resources in shipping companies, while the analysis of specific strategies for responding to external policy changes is somewhat limited. Future research could further explore how shipping companies adjust their integration strategies according to the environmental policies of different countries and regions. Additionally, this paper relies more on theoretical analysis and lacks empirical data support. Subsequent research could validate the conclusions of this study through actual case studies and data analysis, exploring the differentiated integration strategies of shipping companies in varying market environments [1].

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