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Research on Management Issues and Mechanism Innovation of Ship Registration Port during Ship Operation Stage

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Abstract: ***Safety production is a matter of people's well-being and overall economic and social development. Since the 18th Party Congress, General Secretary Xi Jinping has attached great importance to the work of production safety, repeatedly emphasizing the need to improve the mechanism of risk prevention and resolution, insisting on preventing and resolving major safety risks at source, and strengthening the governance of production safety in key areas such as transportation to curb the occurrence of serious accidents. Strengthening the management of a ship's port registry in accordance with the law can enhance the essential safety level of ships, which is an important element to accelerate the modernization of China's maritime governance system and governance capacity. The research on the key issues and mechanism innovation of the management of ship's port of registry of operating ships is an important part to realize the safety management of the whole chain of ships based on the whole life cycle concept. Starting from the operation stage of ships, this paper proposes to build and improve the intelligent management platform of the port of registry, build the management gate-keeping system of non-system shipping companies, and build the comprehensive quality management system of registered ships, to explore the establishment of credit-based ship It will explore the establishment of credit-based supervision mechanism for ships at the port of registration, improve the management level of ships at the port of registration from the source, and help build a new pattern of water safety governance.***

Keywords: Operating ships; Registry port management; FSQC.

1. INTRODUCTION

In October 2022, The report of the 20th National Congress of the Communist Party of China pointed out that it is important to adhere to safety first and prevention first, establish a framework for greater safety and emergency response, improve the public safety system, and promote the transformation of the public safety governance model towards prior prevention. Promote special rectification of production safety risks and strengthen safety supervision in key industries and fields.

Article 94 of the 1982 United Nations Convention on the Law of the Sea, "Obligations of the Flag State", sets out in seven paragraphs the obligations of the flag State. According to paragraph 1 of the Convention "Each State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag; paragraphs 2 to 7 deal mainly with flag State regulations on maritime safety, such as registration of ships, jurisdiction over ships and crews, seaworthiness of ships, investigation of maritime casualties and navigational accidents. Flag State control means that the competent maritime authorities of each State carry out supervision and inspection of their ships in accordance with their legislation to ensure that all ships flying their flag comply with the applicable provisions and requirements of international conventions. At the same time, in accordance with relevant domestic laws and regulations and other mandatory provisions, effective management and control are exercised over ships that have been legally registered and have obtained a ship's certificate of nationality. Measures such as ship registration, ship inspection and licensing, and FSC inspection are generally taken to ensure that all ships flying their national flag comply with the applicable provisions and requirements of the Convention.

Therefore, in the current context of China's efforts to strengthen the source management of transport vessels, and urge waterway transport enterprises to implement the main responsibility of vessel management and maintain the stability of the water transport safety situation, it is significant to conduct research on the key issues of ship registration port management for vessels in the operation stage. The current administrative authorities need to solve the outstanding problems of the current source management of transport vessels under the premise of ensuring the legitimate rights and interests of administrative counterparts, explore the establishment of a credit-based mechanism for registry port vessel management, improve the level of registry port vessel management from the source and help build a new idea of water safety supervision.

2. PROBLEMS WITH THE MANAGEMENT OF PORTS OF REGISTRY DURING THE OPERATIONAL PHASE OF A SHIP

Based on the requirements of international conventions for flag states to achieve effective management of ships, and in accordance with the requirements of the Work Safety Law, the Maritime Traffic Safety Law and other relevant laws, the Ministry of Transport of the People's Republic of China has made a series of deployment requirements in recent years to strengthen the safety management of ships' ports of registry. Port of registry management is a model for maritime administrations to improve the safety management and technical condition of ships operating in their jurisdictions by making

reference to the flag state management and strengthening the source management and comprehensive management of ships registered in their jurisdictions. At present, the maritime administration authorities around China have made a lot of useful explorations in the management of the port of registry, such as the focused tracking system for ships, the integrity management system for shipping companies and ships, the safety management interview system, etc. However, the shortcoming is that an effective integrated quality management system has not yet been formed for ships in the operation stage, and the management of the port of registry has not been studied holistically and globally. Only through the construction of a comprehensive quality management system for ships can we further enrich the connotation of ship registration port management, explore the key aspects of maritime safety in practice and design an appropriate maritime supervision mechanism.

At present, there are the following problems in the management of ship registration ports in China during the ship operation phase, Firstly, there are many high-risk vessels, engineering vessels in violation of regulations, engineering vessels without safety management certificates, and a larger number of vessels have been punished. There are problems such as older vessels in poor condition and insufficient maintenance, and more vessels have been detained as a result. There were problems such as a high offline rate of AIS, a low reporting rate of safety information and inadequate maintenance for small dangerous chemical vessels.

Secondly, due to the non-systematic phenomenon of registered ships, more ships are managed by non-systematic companies, most of which are managed by single-ship companies. In particular, most of the single-ship companies do not have shore-based personnel such as marine affairs and mechanical affairs, and the company's contact personnel often change, and the place of operation often changes, which makes management implementation more difficult for the port of registration. The common non-system ship company is mainly the dirty oil and water recycling operation unit, ship rubbish disposal unit, small coastal tourist boat company and other small shipping enterprises. The enterprise scale is small, operating business scope is diverse, ship condition is poor, safety management is not standardized, traditionally is the focus of maritime safety supervision and one of the difficult points.

Thirdly, the management level of shipping companies needs to be improved, and the learning ability of crew members on digital management needs to be improved. Shipping companies should focus on issues such as ship inspection, repair and maintenance, and ship manning during the ship operation phase.

In the latter part of the paper, we will mainly focus on the perspective of maritime administrative supervision, and propose realistic and feasible management measures, to provide effective suggestions and solutions to enhance the effectiveness of ship safety management and promote the healthy and orderly development of the shipping market.

3. MECHANISMS FOR SOLVING THE PROBLEMS OF REGISTRY PORT MANAGEMENT DURING THE OPERATION PHASE OF SHIPS

3.1 Construct and improve the intelligent management platform of the ship registration port

The development of digital technology can improve the management level of the ship's port of registry, gather ship operation data status, make dynamic supervision of ships and create the essential safety of the ship's port of registry. Currently, some of China's ports, such as the Taizhou Port of Registry management platform, have already achieved the goal of digitalizing and visualizing ship management, which has to some extent strengthened the consciousness of responsibility of shipping companies as the main body of management. The intelligent platform adopted and operated by Taizhou Maritime Bureau is the first full-factor management platform for ship registration ports in China, which can realize real-time tracking during the operation stage of ships, querying relevant registration information at any time and classifying and grading management, which has strong significance for the management innovation of ship registration ports in China.

In terms of data, nearly 100 shipping companies and thousands of ships have registered and used the intelligent platform since it was officially launched one year ago, which can significantly improve the management level of shipping companies and the management efficiency of ship registration ports in the operation stage. The platform can collect information related to ship registration, monitor AIS data during the operation phase, supervise the maintenance of ship operation information at any time, enhance the visibility of data during ship operation, achieve real-time supervision and urge shipping companies to continuously improve the level of ship safety management. The synchronous registration rate of port vessels reaches over 99% and nearly 1,000 vessels' photo information is visible on the wisdom platform. 85% or more of AIS is online in real-time and nearly 1,000 vessels can be monitored at any time on the wisdom platform. The online management of ship certificates through the wisdom platform enables early warning of the imminent expiry of certificates and urges shipping companies to carry out inspection and registration. At the same time, the platform has also completed more than 15,000 ship safety operation process inspections, recorded more than 1,000 ships' administrative penalty information and FSC inspection information, and marked key management ships as being out of the ship's port of registry.

Relying on the intelligent ship registration port management platform, it can grasp the safety operation condition of shipping enterprises in real time, enhance the maritime supervision efficiency during the operation stage of ships, and make the ship registration port management efficiency significantly improved. It can achieve the management objectives of finding receiver

companies for deregulated ships and eliminating escapes from supervision for long-term escaped ships, eliminating the situation of ships escaping from supervision and management. Through dynamic monitoring and regular spot checks of operating vessels, high-risk vessels and low-standard vessels can be flagged, and hidden navigational hazards can be identified and rectified promptly, steadily improving the quality of registered vessels.

Establishing a full factor intelligent management platform for ship registration ports can facilitate internal management of ship registration ports. In addition, each port of registry can improve important data statistics on nationality certificate invalidation, inspection certificate invalidation, and non application for nationality on the basis of existing smart platforms, improve the visualization data statistics level of the platform, and clearly reflect the data and standards that affect ship quality. Helping to promote the comprehensive implementation of online management for ships, by standardizing processes such as information transmission and staffing management, and achieving universal process traceability; Camera recording of ship drills, ship visits and inspections, achieving visualization of key processes; By classifying and grading, and automatically labeling key ships, significant risks can be controlled.

In summary, the management of ship registration ports in China can be carried out in accordance with relevant requirements for promoting high-quality development of shipping companies, and in-depth research can be conducted on improving the digital management of ship registration ports. Through the establishment of ship operation safety management system and high-quality application of information management platform, enterprises will have more sense of gain, so as to achieve the goal of Intrinsic safety port of registry management.

3.2 Building a management gate-keeping system for non-system shipping companies

In China, many shipping companies have not established safety management systems according to the Safety Management Rules (ISM and NSM Rules) formulated and implemented by the Ministry of Transport, and these companies are called non-system shipping companies. These companies have more problems in safety management, and ship accidents are frequent, which is the key point and difficult point of water traffic safety management at present. Therefore, in the process of daily ship registration port management, we should focus on prior daily supervision and audit work through precise law enforcement. Based on the data of the ship registration port platform, the identification criteria and management measures should be clarified, and according to the existing assessment results, emphasis should be placed on supervising vessels of key concern, shipping companies of key concern and shipping companies to be observed, effectively using window periods such as ship registration and system audit, issuing short-term valid nationality certificates as required by the ship registration port management, guiding shipping companies to strengthen the management of vessels of key concern and orderly retiring high-risk and low-standard vessels.

At the same time, each port of registry should manage and arrange according to classification, and hold different themed symposiums based on different types of ships for various illegal situations such as coastal engineering ships, small liquid cargo ships, and small sea vessels. Targeted safety management suggestions should be proposed to the company, and shipping companies should be urged to strictly implement compliance requirements. Through strict management of the actual situation, promote the company to improve its management level. For newly registered and newly entered ships, comprehensively verify the implementation of the company's port of registry management requirements. For those that are not fully implemented, timely urge the company to rectify. The maritime regulatory authorities should supervise and inspect the safety management of non system companies, establish relevant supervision and inspection systems in accordance with laws and regulations such as the Maritime Traffic Safety Law, the Inland River Traffic Safety Management Regulations, the Safety and Pollution Prevention Management Regulations of Shipping Companies, and the Domestic Waterway Transport Management Regulations, attach great importance to the daily supervision of non system companies, and implement the main responsibility for safety production.

3.3 Building an integrated quality management system for registered ships

3.3.1 Hong Kong Flag State Quality Control System

The Hong Kong Flag State Quality Control (FSQC) system is a systematic post management system that differs from regular supervision and inspection of ships. It determines the frequency of inspections based on specific information from the ship management company, the ship itself, crew members, and classification society. It is supported by a scientific software system in terms of auxiliary evaluation[1]. The FSQC system was introduced in 1999 and belongs to the daily supervision mechanism of the competent authority. The purpose is to identify the root cause of the decline in the quality level of ship safety management, which is a systematic management system. The essence of FSQC is to ensure the fulfillment of the responsibilities of the competent authority by supervising the implementation of the main responsibilities of relevant parties. Unlike the management model of regular supervision and inspection of ships (such as their original flag state supervision annual inspection), whether a ship needs to undergo FSQC inspection and inspection frequency depends on four aspects: the shipping company, the ship itself, crew members, and classification society.

(1) The shipping company: the safety management performance of the company and its record of accidental casualties on the ships it manages, and the date of the last FSQC inspection of other ships belonging to the company;

(2) Vessel: the status of the vessel's port state supervision inspection record, the age of the vessel, and the type of vessel. where older ships, ships with port state supervision detention records, and certain specific types of ships such as bulk carriers and general cargo ships will receive priority attention from ports;

(3) Crew: level of crew literacy;

(4) Recognized Organizations (RO): The Marine Department's assessment of the RO responsible for the survey and audit of the vessel.

Once a ship FSQC inspection has been carried out, the relevant shipping company, RO and Recognised Security Organisation (RSO) will be required to follow up and rectify the issues identified during the inspection. If deficiencies in ship management are identified during the inspection, a Certificate of Document of Compliance (DOC) audit or an additional Ship Safety Management Certificate (SMC) audit will be carried out by the ship's management company or the ship to facilitate effective action on the underlying issues and preventive measures.

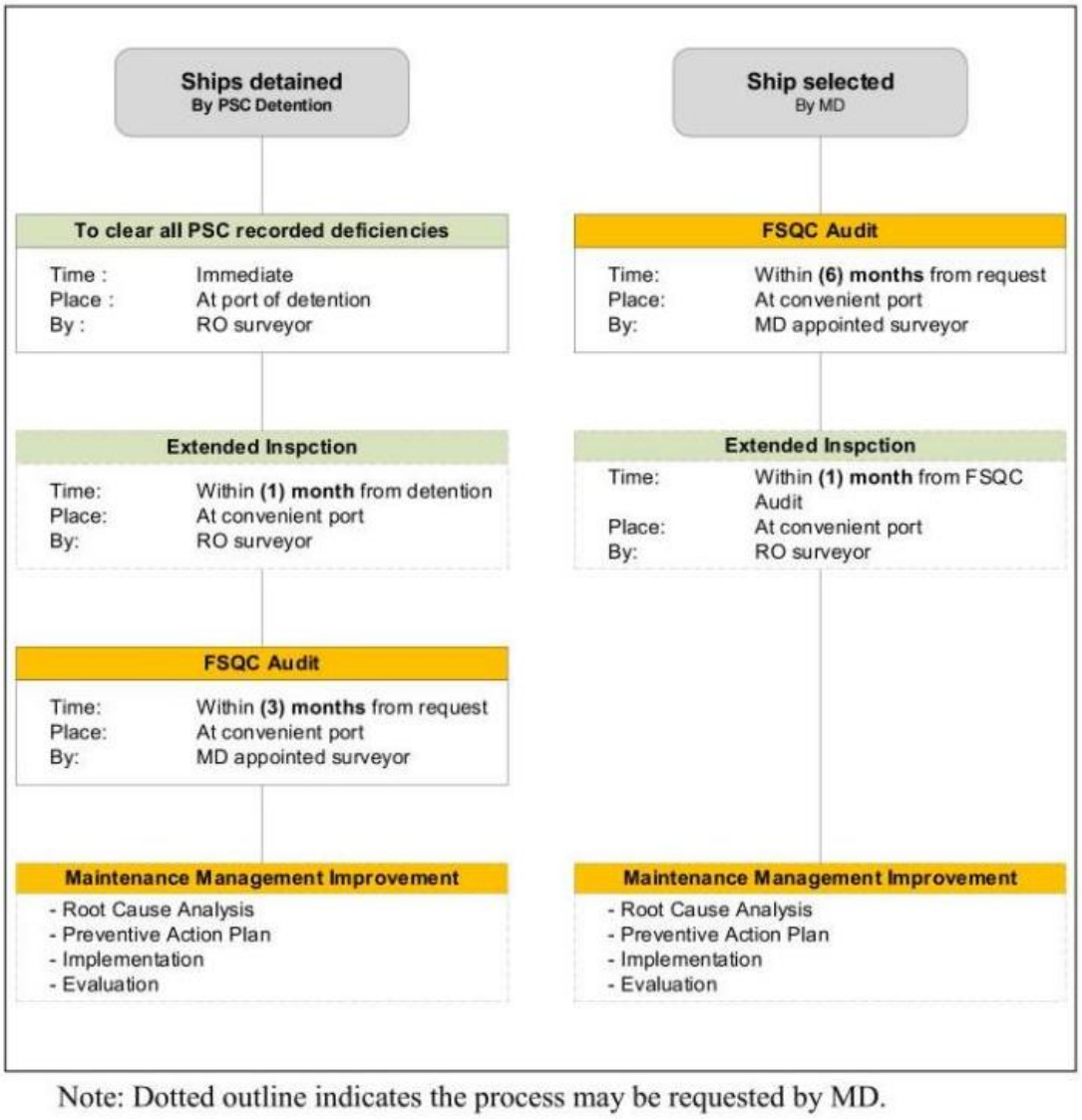

Figure 1: Process Map of FSQC System [2]

There are two modes of FSQC in Hong Kong: one is to implement FSQC audits for ships stranded during PSC inspections after correcting defects; The second is for the Maritime Safety Department to select about 10% of the ships for FSQC audit based on certain standards. The special feature is that the audit location in Hong Kong is convenient for ports, and the enforcement personnel are designated surveyors by the Marine Department. The reason why Hong Kong is able to conduct audits at convenient ports is that they are equipped with a regional support team that can provide local shipowners with various services such as fleet quality management, ship registration, and strengthening communication with regional port authorities. Currently, there are seven different regional offices in Hong Kong, each of which can provide quality management for Hong Kong flag vessels within its coverage.

Therefore, China can learn from it in the following ways: Firstly, maritime management agencies should cooperate and conduct audits at the ports where ships dock. For example, if a ship is registered at Port A and the convenient port is Port B, the FSQC audit can be conducted by the maritime management agency of Port B (which has a good understanding of the ship management company in Port B and facilitates the qualification audit of the local company). Then, Port B shares the corresponding data with Port A, which not only facilitates the audit of the ship's registry port but also facilitates the daily operation of the ship.

Secondly, Hong Kong has implemented FSQC audits for ships stranded at PSC ports after correcting defects. The form that can be used for reference in China is to implement FSQC audits for ships stranded at FSC ports after correcting defects. As the Flag State Control (FSC) is conducted for Chinese domestic navigation ships, it is the most direct and effective Supervisory control means for Chinese domestic navigation ships. At the same time, it also grants multiple rights to ships in flag state security inspections, such as delaying ship schedules, detention and prohibiting departure, restricting entry, and restricting operations. Among them, detention during flag state security inspections is the most common and direct handling measure. Due to the existence of local protectionism in the maritime department, some port maritime management agencies often strictly enforce laws on non local vessels in order to protect local vessels when implementing detention measures, resulting in a much larger number of detained vessels than local vessels. Due to inconsistent law enforcement standards among various departments, laws and regulations provide qualitative rather than quantitative descriptions of defects, such as the severity, what constitutes severity, and to what extent there is a lack of unified law enforcement standards. There are different interpretations of certain regulations between different port maritime management agencies in China or between maritime departments and ship inspection agencies, which may result in different treatments for the same defect in different ports. So it is more important to unify standards and share data among different ports.

Thirdly, the FSQC audit includes spot checks, which first identify potential problematic ships and identify any repetitive system management deficiencies. Promote relevant management companies to actively identify and correct problems, spontaneously inspect the existing problems of other ships, and then solve and verify them on their own. The standard for sampling inspection, as mentioned earlier, can be taken from ships that do not meet the conditions. The annual inspection rate in Hong Kong is approximately 10%, which can be used as a reference for domestic maritime bureaus.

3.3.2 Building a multi-level key ship management system by drawing on FSQC

The number of ships registered in the current maritime system is large, and if the supervision is carried out according to the requirements of the ship management methods of the port of registration without screening and dividing the focus, the workload will be extremely heavy, requiring a lot of manpower and material resources, which will inevitably affect the efficiency of the ship management of the port of registration. In order to carry out ship management effectively, we may try to manage ships at the port of registry in a graded manner, list out the supervision priorities of ships at the port of registry and carry out work in a targeted manner, to achieve the effectiveness of ship management at source.

This article studies the examination elements of the "Ship Comprehensive Quality Management System" (such as ship safety supervision, ship inspection, company management, crew management, pollution prevention management, accidents, illegal penalties, etc.) and the evaluation proportion. It is recommended to learn from the Hong Kong flag state quality management system to comprehensively construct China's "Ship Comprehensive Quality Management System", and incorporate the examination results into credit management in the field of maritime supervision. It is recommended to classify the ships at the port of registry based on their advantages and disadvantages from five aspects: shipping companies, shipbuilding enterprises, crew literacy of ship inspection agencies, and ship situation. Corresponding scores should be given to list key regulatory targets, strengthen the management of inferior ships and companies, and focus on "key ships", in order to prevent low-quality ships from entering the market from the source and eliminate regulatory blind spots.

(1) Classification of shipping companies

Among the various types of existing shipping companies, they have great disparities in terms of financial strength, safety awareness and management level, etc. We can make use of the existing regulatory system to grade the shipping companies in our jurisdiction according to their credit management status.

Class I shipping companies: In good management condition.

Class II shipping companies: average management status.

Class III shipping companies: in poor management condition.

(2) Classification of shipbuilding enterprises

While ship inspection agencies have graded shipbuilding enterprises according to their production capacity, as maritime regulators we should grade shipbuilding enterprises in terms of the quality of their production and their ability to monitor themselves:

Class I shipbuilding enterprises: Large and medium-sized shipbuilding enterprises with running quality management systems.

Class II shipbuilding enterprises: Large and medium-sized shipbuilding enterprises that do not operate a quality management system.

Class III shipbuilding enterprises: small (individual) ship repair yards.
With the above classification of shipbuilders, when it is known that a ship comes from a particular shipyard, a preliminary assessment of the quality of construction of that ship can be made.

(3) Classification of ship inspection agencies

Ship inspection is an important means to control the quality of ship construction and an important link to ensure that the ship is in seaworthy condition during operation. The standard of ship inspection and the level of ship inspection can reflect the quality of ship inspection of each ship inspection institution. Therefore, according to the high and low standards of ship inspection and the quality of ship inspection of each ship inspection institution, we can classify the ship inspection institutions as follows:
Class I ship inspection agency: classification society

Class II ship inspection agency: Local ship inspection agency

From this, the quality of the ship's inspection can be initially judged according to the ship's inspection agency to which the ship belongs, and thus the quality of the ship's construction and seaworthiness can be initially evaluated.

(4) Crew Literacy Classification

Due to the mobility of crew members, it is difficult to effectively track specific crew members and classify them, but it is possible to take into account the factors of safety hazards caused by the level of crew members on the ship and the ship's company to which the crew member currently belongs and to assign a corresponding score to the ship and ship's company's class score. The factors to be taken into account are: whether there have been any accidents caused by crew misconduct within two years; whether there have been any deficiencies in crew operational checks within one year; whether there have been any deficiencies in crew performance checks within one year; whether there has been any fraudulent use of crew certificates within two years; whether there has been any use of forged crew certificates within two years; whether there has been any use of crew certificates across classes within two years. (The criteria for specific crew qualities and the weighting may be arranged according to the circumstances in practice)

(5) Classification of ship conditions

Firstly, the age of the ship. Consider whether the ship's age is greater than 12 years. Secondly, the ship type. Considering the differences in the nature of activities and risks involved in different ship types, it is also necessary to differentiate in evaluation. Among them, Chemical tanker, oil tankers, liquefied gas tankers, Bulk carrier, passenger ships and container ships with high risks will be given special points. Thirdly, ship detention records. Fourthly, ship accident records. Ship accident records can indirectly reflect the condition of the ship, the actual operational level of the crew, and the management level of the shipping company. Therefore, the review of ship accident records, accident types, and ship accident investigation reports is necessary, especially for ships that have recently experienced major accidents similar to collisions. This indicator is evaluated based on whether a ship has experienced a general or higher level accident within two years.

Drawing inspiration from FSQC to build a multi-polar key ship management system, the total score of a specific ship at its registered port can be calculated based on its affiliated shipping company, shipbuilding enterprise, ship inspection agency, and ship situation. Classify and assign scores based on 5 aspects.Assuming that the overall quality of the ship is better and the score is lower, ships below a certain value can be subject to regular quantitative sampling inspection, which means that ships at the port of registry can be subject to sampling supervision and inspection according to a fixed period and a certain proportion. The specific data can be determined based on the specific situation of the class of ships in this registration authority. For ships with scores greater than or equal to a certain value, i.e. those in poor condition, a comprehensive inspection shall be conducted, and a comprehensive supervision and inspection shall be conducted on the full coverage of such ships at the port of registry.

4. CONCLUSION

In summary, by building a multi-polar key ship management system, strengthening information utilization, and achieving precise allocation of law enforcement resources, some of the problems in ship registration port management during the ship operation phase can be addressed in a targeted manner. Due to the current limited regulatory resources and the difficulty in eradicating prominent illegal behaviors, through the coordination and promotion of key supervision and smart supervision, we will strengthen data mining analysis, intelligent perception of risk hazards, and risk prediction of related parties, and use the limited regulatory resources in key areas. By referring to the practices of Hong Kong Flag State Quality Control (FSQC) system, it can help to establish a safety evaluation index system for China's ship registration, and use Big data to evaluate the safety of

ships, shipping enterprises, ship inspection agencies and crew members.Through mechanism innovation, it can help to strictly control the registration of low-quality ships and ship safety review, and transform "strict prevention" into "taking advantage of the situation", thus helping to improve the level of Intrinsic safety of ships.

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