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## Implication of model regulations on domestic ferry safety on China's ferry safety legislation and Maritime Safety Administration's supervision

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**WORLD MARITIME UNIVERSITY**

Dalian, China

**IMPLICATION OF MODEL REGULATIONS  
ON DOMESTIC FERRY SAFETY ON CHINA'S  
FERRY SAFETY LEGISLATION AND  
MARITIME SAFETY ADMINISTRATION'S  
SUPERVISION**

**By**

**PANG YI**

**The People's Republic of China**

A dissertation submitted to the World Maritime University in partial

Fulfillment of the requirements for the award of the degree of

**MASTER OF SCIENCE**

**In**

**MARITIME AFFAIRS**

**(MARITIME SAFETY AND ENVIRONMENTAL MANAGEMENT)**

2022

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## DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

Signature: ..... Pang Yi.....

Date: .....2022.6.28.....

Supervised by: .....Jialin Han.....

Supervisor's affiliation: .....Dalian Maritime University.....

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## **ABSTRACT**

Title of Dissertation: **Implication of Model Regulations on Domestic Ferry Safety on China's Ferry Safety Legislation and Maritime Safety Administration's Supervision**

Degree: **Master of Science**

Ferry plays a great role in facilitating people's transportation and serving economic and social development. However, due to the differences in economic development level, domestic legislation and safety supervision, the safety situation of ferry transportation in many countries in the world is not optimistic. The safety risks and hidden dangers in ferry transit are still widespread, and safety accidents occur from time to time. In order to improve the safety level of domestic ferry transit and reduce the occurrence of safety accidents, IMO adopted the Model Regulations on Domestic Ferry Safety at the 105th meeting of the Maritime Safety Committee in April 2022. The regulation is a non-mandatory document, which aims to provide a reference for each country to improve domestic ferry safety legislation and identify the existing deficiencies. This paper studies the background and significance of the Model Regulations on Domestic Ferry Safety, identify the shortcomings of domestic ferry safety in China by comparing the regulation and referring the advanced ferry safety management experience at home and abroad, and puts forward corresponding recommendations, so as to provide reference for domestic legislature and regulatory departments.

**KEYWORDS:** Ferry safety, regulation, Safety Management System

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## **LIST OF ABBREVIATIONS**

<b>ARF</b>	<b>ASEAN Regional Forum</b>
<b>CEF</b>	<b>Connecting Europe Facility</b>
<b>CCTV</b>	<b>Closed-Circuit Television</b>
<b>COLREG</b>	<b>International Regulations for Preventing Collisions at Sea</b>
<b>EU</b>	<b>European Union</b>
<b>ESCAP</b>	<b>Economic and Social Commission for Asia and the Pacific</b>
<b>FSC</b>	<b>Flag State Control</b>
<b>FTA</b>	<b>Federal Transit Administration</b>
<b>IMO</b>	<b>International Maritime Organization</b>
<b>Inland Water Traffic Safety Regulation</b>	<b>Regulations of the People's Republic of China on the Administration of Traffic Safety on Inland Waters</b>
<b>ISM Code</b>	<b>International Management Code for the Safe Operation of Ships and for Pollution Prevention</b>
<b>ITCP</b>	<b>Integrated Technical Cooperation Programme</b>
<b>MSC</b>	<b>Maritime Safety Committee</b>
<b>MSA</b>	<b>Maritime Safety Administration</b>
<b>Maritime Traffic Safety Law</b>	<b>Law of the People's Republic of China on Maritime Traffic Safety</b>

<b>MRDFS</b>	<b>Model Regulations on Domestic Ferry Safety</b>
<b>NPC</b>	<b>National People's Congress</b>
<b>NSM Code</b>	<b>National Management Code for the Safe Operation of Ships and for Pollution Prevention</b>
<b>Production Safety Law</b>	<b>Production Safety Law of the People's Republic of China</b>
<b>RITA</b>	<b>Research and Innovative Technologies Administration</b>
<b>SMS</b>	<b>Safety Management System</b>
<b>TEN-T</b>	<b>Trans-European Transport Networks</b>
<b>TCRP</b>	<b>Transit Cooperative Research Program</b>
<b>USCG</b>	<b>The United States Coast Guard</b>
<b>US</b>	<b>United States</b>
<b>VTs</b>	<b>Vessel Traffic Service</b>



## CHAPTER 1 INTRODUCTION

### 1.1 Background

Ferry has been an important transportation mode for transporting passengers and goods since ancient times. With the development of the times, people's transportation mode has changed greatly, and so has ferries. But, in many areas with dense network of waterways, ferry still plays an important role in people's daily life and constitutes a lot to the world's economy. According to statistics, the global ferry industry contributes the economic impact of more than 60 billion US dollars, and provides more than 1,100 thousand jobs opportunities in 2019 (INTERFERRY, 2021).



		 <b>GDP</b> (\$bn)	 <b>Jobs</b> (000s)
<b>Direct impact</b>	Americas, Europe, Oceania*	13.6	141
	Africa & Asia**	3.4	77
<b>Supply chain and worker spending impacts</b>	Americas, Europe, Oceania*	31.8	437
	Africa & Asia**	11.5	446
<b>Total</b>	<b>Indicative World total</b>	<b>60.3</b>	<b>1,101</b>

Table 1-1 Economic Impact of the Global Ferry Industry

Source: INTERFERRY

However, due to the differences in economic development level, domestic legislation and safety supervision, the safety situation of ferry transportation in many countries is far from being optimistic. The safety risks and hidden dangers of ferry transportation are still common, and accidents occur from time to time.

In order to improve the safety level of domestic ferry transportation and reduce the occurrence of accidents, in April 2022, International Maritime Organization (IMO) adopted the draft resolution of the Model Regulations on Domestic Ferry Safety (MRDFS) at the 105th session of the Maritime Safety Committee (MSC). The MRDFS is a non-mandatory regulation for domestic ferries, which is drafted by the IMO secretariat with China's active participation. The regulation aims to provide effective reference for member states during the process of ferry safety legislation .

As a specialized agency of the United Nations and the regulatory body for coordinating and managing international maritime safety and pollution prevention, IMO has made remarkable achievement in promoting maritime safety and preventing pollution on a global scale. Admittedly, domestic ferries are only bound and managed by domestic laws, and are not bound by international laws or conventions, but the introduction of MRDFS on ferry safety management will promote the international community to pay more attention to ferry safety and lay a good foundation for standardizing domestic ferry safety legislation and management; Further strengthen international cooperation in ferry safety management, and promote exchanges, cooperation and experience sharing among countries, which will help build a co-constructed, co-governed and shared ferry safety governance system; Further enhance China's participation and influence in international maritime affairs; What's the most important is that it sheds lights on countries, especially developing countries, to make adequate legislation on ferry safety.

China's achievements in the establishment of national governance system have attracted the attention of the world. At the same time, as a country boasting various ferries, China is facing a complex situation in ferries with a wide range of problems, which has been typically seen in ferry management. China not only has many good experiences that can be shared with other countries, but also has many deficiencies to

be rectified. Against the background of the introduction of the MRDFS, studying the impacts of the regulations on China's domestic ferry safety legislation and maritime supervision will help further compare and analyze the current situation of China's ferry safety legislation and supervision, and actively absorb and learn from foreign advanced experience and practices, so as to provide effective reference for China's domestic legislature and maritime authorization.

## **1.2 Significance and objectives**

This paper mainly studies the impacts of the MRDFS on China's ferry safety legislation and supervision, deeply analyzes the current situation of China's ferry safety management, finds out the shortcomings of current legislation and supervision compared with the MRDFS, and actively draws lessons from the mature legislation and supervision experience of developed countries to strengthen international cooperation, and provide useful reference for the establishment and improvement of domestic ferry safety legislation and supervision system. At the same time, it will also help share China's experience in ferry safety legislation and supervision with the international community, and reflect China's deep participation in international maritime governance and actively provide China's solution for the improvement of ferry safety.

## **1.3 Literature review**

### **1.3.1 Domestic literature review**

Domestic research on ferry safety management is mainly divided into crew management, ferry management, ferry risk management, the application of information technology in ferry management and the integrated management of ferry transportation.

#### **1.3.1.1 Crew management:**

The research on crew management is mainly reflected in the following aspects. Shao Yue, Ma Nan and Qiu Chunxia analyzed the safety quality of the crew of the Yangtze River Ferry in Jiangsu, and put forward the problems of large flowability, aging structure and poor comprehensive professional quality of the ferry crew (Shao et al., 2020). Sun Baoquan and Xiao Xianghong mainly studied the adaptability between the quality of inland river crew and the development of water transportation. The basic status of the quality of inland river crew can be embodied in the general low quality of crew, the lack of professional skills and practical operation experience, and the weak awareness of safety. The countermeasures to improve the quality of crew members can be illustrated in improving the social status of crew members, protecting the legitimate rights and interests of crew members, strengthening the management of crew training, strictly implementing the relevant provisions of examination and certification, strengthening the management of crew members by shipping companies, and establishing a complete crew information service system (Sun & Xiao, 2010). Huan Zhaoping, Wang Chao and Zhang Sizhong also studied the low quality of inland river crew and related reasons, and put forward corresponding countermeasures (Huan, 2017). The conclusions are also similar. Hu Sihui studied and constructed the competency training model of Yangtze River crew from the perspective of shipping market demand according to the competency based theory (Hu, 2017).

### **1.3.1.2 Ferry-place and ferryboats management:**

Most domestic scholars put forward countermeasures by studying the current situation, existing problems of ferry management and its corresponding causes. By using the theory of public administration and drawing on the good experience of other regions in China, Zheng Zhefeng put forward some management measures, such as regulating collision prevention, implementing the main responsibility of

enterprises, enhancing the ability of seafarers to perform their duties, strengthening the application of information technology and coordinating the allocation of ferry resources (Zheng, 2018). Wu Yuehui proposed to build a multi-agent collaborative ferry safety management system, so as to realize the management concept of transforming ferry safety management from traditional "control type" to social collaborative "service type" (Wu, 2015). Fang Qing carried out research through safety management theory, public choice theory and new public service theory, and put forward countermeasures such as standardizing the management of shipping companies, strengthening the management of ships and crew, phasing out and updating old ships, strengthening maritime supervision and establishing a cross-strait supervision cooperation mechanism (Fang, 2016). Liu Shunlin focused on the definition of the rights and responsibilities of various government departments in the safety supervision of ferry-place and ferryboats, and put forward measures to clarify the responsibilities of various departments by improving local ferry legislation, and bring the ferry safety management into the assessment of the safety production responsibility system of government departments (Liu, 2016).

### **1.3.1.3 Risk management:**

Xu Siyu uses the fuzzy logic theory to construct the coupling correlation model of ferry transportation risk factors, and studies the quantitative relationship between risk factors and ferry navigation state, so as to actively manage the ferry transportation risk (Xu, 2018). Ye Sa used the method of fuzzy comprehensive evaluation to establish a ferry risk evaluation model to study the important factors affecting ferry safety (Ye, 2013). Zhou Lianguo used Bayesian network to establish model of the passenger ferry navigation risk, so as to predict the change trend of the overall risk of passenger ferry navigation (Zhou, 2016). Chen Mingguang and others used the analytical method of Formal Safety Assessment (FSA) to analyze and study

the navigation environment or ferry risk in their jurisdiction, and conducted quantitative and qualitative analysis on ferry related issues, so as to scientifically evaluate the risk of ferry (Chen, 2018).

#### **1.3.1.4 Application of information technology:**

Cheng Yaokun and others studied the ferry information supervision system based on video monitoring technology, convolutional neural network technology and deep learning target detection technology, so as to realize the real-time video monitoring of the ferry cabin and the detection of the life jackets wearing behavior of ferry passengers (Cheng, 2021). Hao Jingbao studied the design of inland river comprehensive safety monitoring system which can realize many functions, such as fire risk monitoring, weather monitoring, overload detection, safety monitoring and so on (Hao, 2021).

#### **1.3.1.5 Ferry transportation integration:**

Zeng Wei and others studied and analyzed the current situation of public transportation management of water passenger ships, including water buses, ferry-place and ferryboats, summarized the existing problems and reasons of public transportation management of water passenger ships in some areas of China, and put forward suggestions and measures in safety management (Zeng, 2020). Jiang Rui and others analyzed the current situation and problems of ferry safety management in some regions of China, and the study believes that ferry public transportation reform can clarify the public service attribute of ferry and help to solve the deep-seated problem of insufficient safety funds and development funds in ferry management (Jiang et al., 2015).

### **1.3.2 Review of foreign literature:**

#### **1.3.2.1 Crew management:**

In terms of crew management, relevant foreign studies mainly focus on vocational training system, curriculum design, program construction and other aspects. For example, Gray has studied the education and training of marine crew for foreign vocational training modes (Gray, 2003). Takimoto proposed that the education of maritime institutions and the education and training of shipping companies should be organically linked through social networks, so as to form a closed-loop management and promote the improvement of the professional skills of the crew (Takimoto, 2016). Sirris and S.Sokolov both proposed to improve the effect of crew training through the vivid and attractive way of game modeling (Sirris & Nikitakos, 2007; Sokolov et al., 2017). In terms of improving the professional reputation of crew members, Turker investigated the crew's "turnover intention" and its antecedents, and proposed that the company should further improve seafarers' salary, improve the occupation satisfaction of crew members, recruit fresh graduates, strengthen the training of self-owned crew members, and retain more skilled crew members by purchasing insurance (Turker, 2007). Seneila and Kalvaitiene put forward the opinion that shipowners or employers should take appropriate measures to reform the supply of crew in the future and promote a healthy and sustainable development of the shipping industry (Sencila & Kalvaitiene, 2018).

#### **1.3.2.2 Risk management:**

Foreign scholars prefer to study ferry cases by means of digital information technologies. It is mainly reflected in: studying the ferry model, making statistics on accidents, analyzing the main factors leading to accidents, and making targeted prevention and emergency plans. Ozowicka studied the rapid evacuation method in case of ferry fire (Ozowicka & Nikoficzuk, 2001). Aiming at the problem of land automobile transportation, Matsuo and others studied the Choice Model of changing automobile transportation mode to medium and long-distance ferry transportation,

and put forward the improvement measures of ferry service (Matsuo & Hukuda , 1997). By analyzing the data of passenger ferry companies, Lu & Yang analyzed and verified the impact of safety climate and safety behavior by using hierarchical regression analysis, and studied how to improve the safety of ferry operation in five main aspects: safety policy, safety motivation, emergency preparedness, safety training and safety communication (Lu & Yang, 2011).

The Netherlands has established a national database of ship accidents since. The Dutch government launched the "Inland Navigation Safety" plan. The purpose is to establish an evaluation model for cost-benefit analysis and investment and construction decision-making. They also established a generalized linear model to predict the probability of accidents through the method of binomial distribution. The British government first put forward the Formal Safety assessment (FSA), and this method was adopted by International Maritime Organization (IMO) in 2002 for the use in its rule-making process, and now it have been widely used by many scholars in studying safety issues (Du & Fu, 2007).

In summary, domestic scholars mainly focus on the research on personnel and system, legislation, operation norms and other aspects, while foreign scholars focus on using digital means to analyze ferry accidents and ferry risk factors, and quantitatively analyze various risk factors by establishing mathematical models, so as to assess the risk. Then it provides reference for emergency management department to formulate emergency plans and prevention and control measures. In recent years, more and more domestic scholars also tend to use mathematical modeling to analyze the risk of ferry transportation. Until now, none scholar at home or abroad have studied how the MRDFS would influence the domestic legislation and supervision. This is mainly because MRDFS is still a rather new regulation, and there are so many uncertainties to be verified.



## **1.4 Research content and methodology**

### **1.4.1 Content of research**

The main research content could be described as follows:

The study begin with the introduction of the background of MRDFS, including its main content, main principle and how member states can utilize it to improve their domestic ferry safety. Moreover, the study focus on the current situation of China domestic ferry safety and refer to the advanced experience in ferry safety at home and abroad, especially experience on ferry system construction, diversified development of ferry transportation and the implementation of safety management system, which are the weak parts of our nation. Finally, the author would provides some suggestions on improving China's ferry safety legislation and supervision on the basis of this study.

### **1.4.2 Research methodology**

This paper studies the current situation and experience of domestic ferry management by methodologies of case analysis, literature analysis, social investigation and comparison analysis. Through the research and analysis of relevant literature home and abroad, with the combination of the author's work experience, this paper combs the current situation of domestic ferry safety legislation, the problems and reasons in supervision. On this basis, from the perspective of meeting the basic travel needs of the people, improving the construction of government governance system and governance capacity, and optimizing the formulation and implementation of government policies. With the goal of realizing safe ferry, this paper compares and analyzes the deficiencies in China's ferry safety legislation and maritime supervision based on the MRDFS, and refers to the international advanced ferry management experience, finally provide some suggestions on improving the

legislation for domestic legislature and optimizing the supervision.

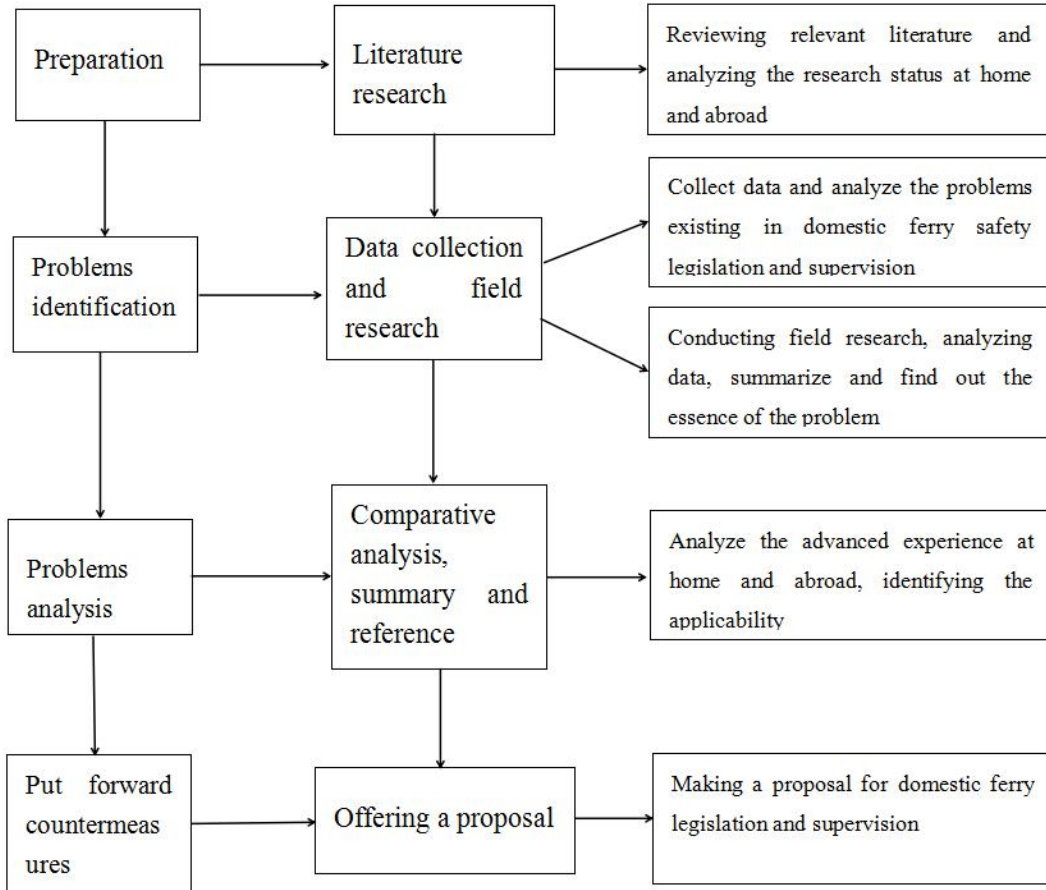


Figure 1-1 Research methodology of this paper

Source: The Author

### 1.5 Summary of this chapter

This chapter mainly introduces the significance and purpose of this study, reviews the research status of ferry safety at home and abroad, and also introduces the research contents and research methods of this study.

## **CHAPTER 2 BACKGROUND OF MODEL REGULATIONS ON DOMESTIC FERRY SAFETY**

### **2.1 Case study of ferry accidents**

On August 9, 2021, in Bailong water area, Beihai City, Guangxi, China, a raft carrying 61 people capsized, resulting in 8 deaths and many injuries. The vessel involved in the accident was not a registered ferry boats, but a small fishing boat. Non ferry vessels actually assume the function of ferry transportation. The ship's structure, life-saving equipment and personnel qualification do not meet the relevant requirements of ferry transportation (Souhu, 2021). What's worse, the ship has been seriously overloaded , the driver and passengers can't handle it correctly after the accident. All of these factors contribute to this severe ferry accidents.

On June 29, 2020, a Bangladesh ferry boat carrying more than 50 people capsized in river Buriganga in Dhaka after a collision with another ferry boat, leading to more than 30 casualties and a dozen of people missing. Bangladesh Inland Water Transport Authority's confirmed that the capsized ferry boat was certified to ferry operation and was not overloaded, claiming that the negligence of the crew was the main cause. But the lax safety regulations, badly maintained vessels and the incompetent crews are believed to be the main hidden dangers for ferry safety of this country (World Asia, 2020).

On May 26, 2021, a wooden vessel broke into two part and sunk when heading from Niger State to Kebbi State of Nigeria. It was reported that the vessel was carrying about 200 persons, but the capacity is only 80 persons. The overloading was believed to be the main reason of this accident (Clippers PL, 2021).

The aforementioned cases are only a microcosm of the ferry safety accidents that occur every year all over the world. According to statistics, about 60,000 people have lost their lives in ship accidents in the past 50 years, among which the death rate

of ferry safety accidents has reached 93%. Nowadays, there are still more than 1000 people die in ferry safety accidents every year in the world. It is worth noting that developing countries are high incidence areas of ship safety accidents, 94% of all accidents and 97% of all fatalities occurred in developing world countries (Abigail & Roberta, 2016).

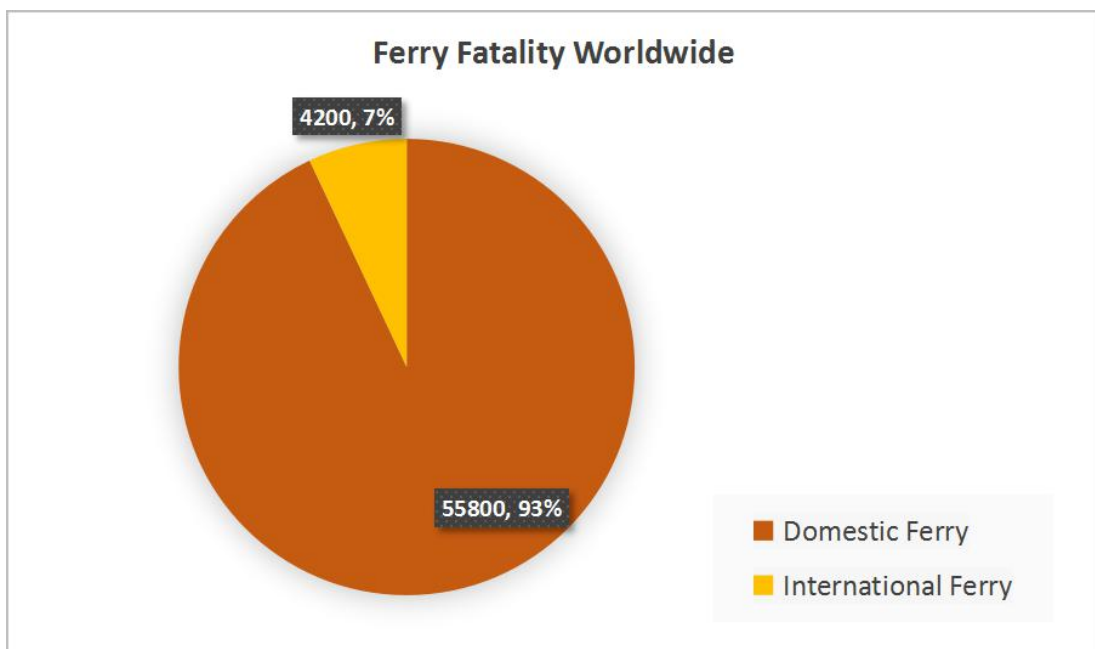


Figure 2-1 Ferry Fatality Worldwide

Source: INTERFERRY

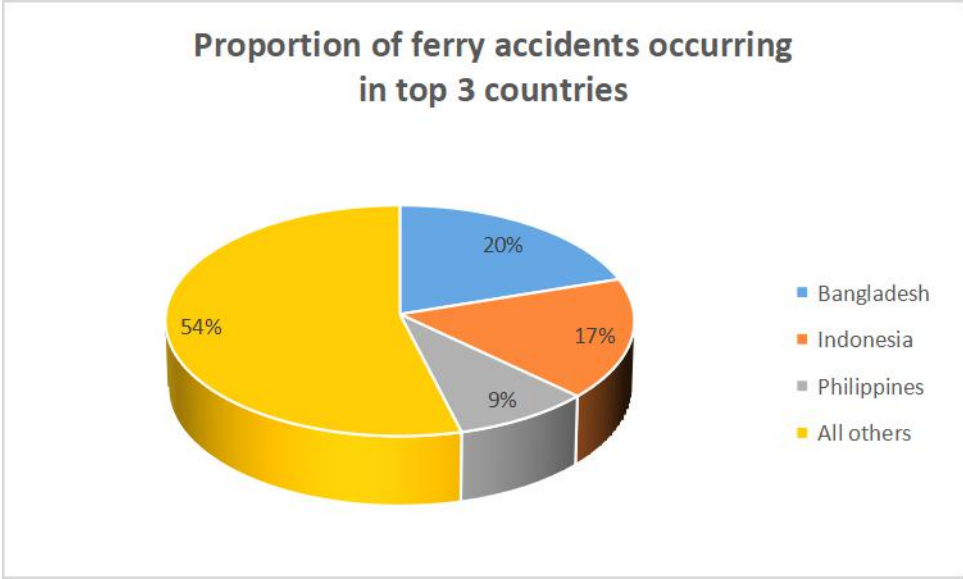


Figure 2-2 Proportion of ferry accidents occurring in top 3 countries

Source: World Bank

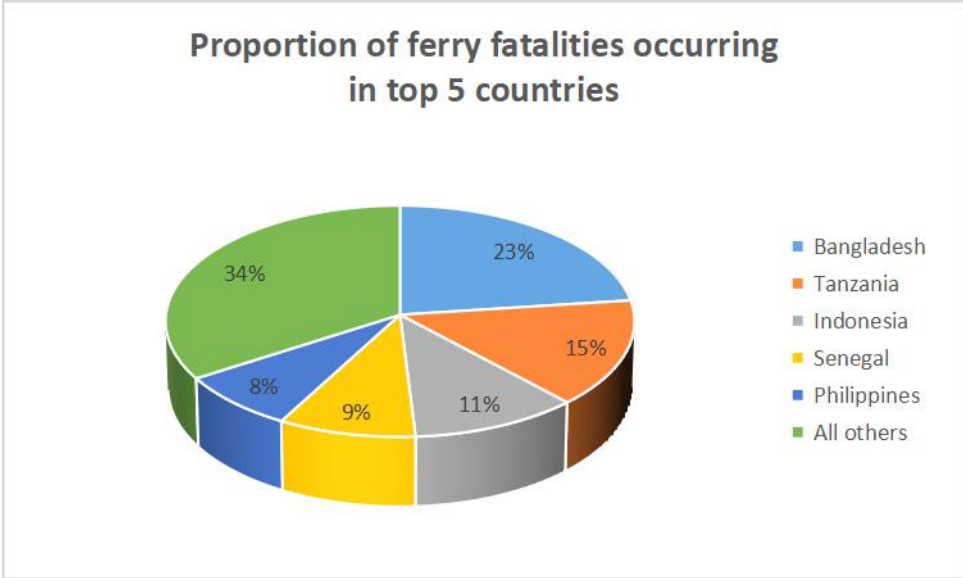


Figure 2-3 Proportion of ferry fatalities occurring in top 5 countries

Source: World Bank

The common causes of ferry safety accidents mainly consist illegal carrying of

passengers by non-ferry ships, incompetence of crews, defects in ship design and structure, inadequate ship maintenance, lack or unqualified lifesaving equipment, overloading, illegal loading of dangerous goods, sailing in bad weather, etc. (MSC, 2019). However, all these problems can be attributed to the insufficiency of domestic ferry safety legislation, lax domestic regulation for ferry safety and the inadequate supervision of regulatory authorities. On the one hand, the legislation and supervision level of ferry safety is closely related to a country's economic development level. Due to the relatively backward economic development level, the investment in ferry safety is far from being sufficient. On the other hand, the impact of a country's safety culture on ferry safety is also very important. At present, the international ferry safety situation, especially in developing countries, is still very daunting. Therefore, it is urgent and necessary to improve domestic ferry safety legislation and strengthen ferry safety supervision. However, it should be noted that the unbalanced level of economic development, backward level of scientific and technological development and limited resources limit the investment of developing countries in ferry safety legislation and supervision to a great extent. Therefore, it is necessary to call for attention to ferry safety at the international level and help developing countries carry out capacity-building.

## **2.2 Efforts made by IMO**

Since its establishment, IMO has done a lot of work in ensuring maritime safety and environment protection. Until now, there are more than 50 international maritime conventions and protocols have been promulgated by IMO (IMO, 2022). These conventions have become the backbones for international maritime safety and pollution prevention, and effectively stemmed shipping accidents and promoted the international community to achieve the goal of "safer shipping, cleaner oceans". In particular, as one of the four pillars of IMO, SOLAS has played an important role in

regulating the navigation safety of international ships. Since the sinking of the Titanic, governments have responded quickly and formulated SOLAS 1914. After several updates and amendments, the Convention has been continuously reviewed and improved to ensure that it can keep up with the development of the shipping industry (IMO, unknown). However, it should be noted that SOLAS is usually only applicable to ships engaged in international voyages, but not to ships of domestic voyages. Therefore, there are no uniformly applicable international provisions for ferry ships engaged in domestic voyages. In order to improve domestic ferry safety and reduce casualties, IMO has formulated a series of standards on this regard. In addition, for a long time, IMO has maintained close cooperation with relevant organizations (ESCAP, INTERFERRY, WFSA), various countries, especially those in the Asia Pacific region, and jointly held many ferry safety forums and training courses on ferry safety capacity-building with them, which have achieved good results (IMO, unknown).

### **2.2.1 Model Ship Safety Regulations**

During 2005 to 2015, IMO have been endeavoring to deliver a model regulation on non-convention ships, which is named Model Ship Safety Regulations (GlobalReg). IMO intended to provide a model regulation for nations to incorporate into their national legislation so as to fill the vacancy on safety of ships which are not covered by SOLAS. In order to help nations to establish comprehensive regulations to cover different types of ships, the GlobalReg provides a recommended framework of a national legislative and regulatory system. Though it's presented in the form of national legislation, but it can also be used as the regional agreement between neighbouring counties, especially which are the member parties under the same PSC MOU. The GlobalReg is a comprehensive modular set of standards including some technical regulations for different type of non-convention ships and procedural

regulations for maritime authorities' aspects (IMO, 2013). The GlobalReg is a good start for IMO to tackle the problem of domestic ferry safety.

### **2.2.2 Guidelines on the Safe Operation of Coastal and Inter-Island Passenger Ships**

Following the step of GlobalReg, the Guidelines on the Safe Operation of Coastal and Inter-Island Passenger Ships is an instrument developed by IMO to cover the domestic ferry safety. The guideline was adopted in the conference on the enhancement of safety of ships carrying passengers on non-international voyages held in Manila on 24 April 2015. Unlike the GlobalReg, the scope of the guideline is intended to fill the gap of national laws, regulations and other requirements on domestic passenger ships. The addressed problems mainly focus on the purchase of second hand ships for entering into domestic passenger service, switch in operating limits, the conversion or modification of domestic passenger ships, passenger counting and voyage planning. The guideline not only provides prescriptive regulations on the aforementioned four aspects, but also provides a comprehensive checklist for considered issues before a ferry entering into service. The check list comprises many details requirements of ferry, including structure, stability, fire-fighting equipment, life-saving appliances, the qualification of crews, whether conditions, communication between crews ashore and afloat as well as emergency response etc.

This guideline together with Manila Statement are the outcome of the conference. The conference strongly recommend states to use this guideline on domestic in-land passenger ships. Generally, it provide a good instruction and reference for many states on this regard.

### **2.2.3 Model Regulations on Domestic Ferry Safety**

#### **2.2.3.1 The process of developing MRDFS**



Other than GlobalReg and Guidelines on the Safe Operation of Coastal and Inter-Island Passenger Ships, IMO have maintained close cooperation with various nations and stakeholder on domestic ferry safety, and they have delivered series of action plan (Rahim, 2021). But all of this still can't stop the occurrence of ferry accident. With the suggestion of member states, at the 101th session of IMO Maritime Safety Committee (MSC 101), the committee agreed to include a new agenda item to MSC 102 on Measures to improve domestic ferry safety under the existing output OW 33 (Finalization of a non-mandatory instrument on regulations for non-convention ships). And the committee decided to finalize the MRDRS with four sessions (IMO, 2019).

The developing of Model Regulations on Domestic Ferry Safety is the priority in the recommended schedule of the committee, and other affiliated items include providing guidance on the incorporation of MRDFS into national laws, developing online training courses and strengthening technical assistance to countries needed. The committee also invited member states to contribute to this work programme. In order to push the plan forward, the secretariat had reviewed various of guidelines, action plans and risk identification practice as well as conducting a broad survey on this regard, then concluding a comprehensive list of the main causes of domestic ferry accident (as showed in table 2-1). On the basis of the comprehensive list, the secretariat provided a basic structure of the MRDFS accordingly for further expansion (IMO, 2019). Focusing on the basic structure of MRDFS, the secretariat, China and many other nations as well as stakeholders contributed actively to the drawing up of the MDRFS, also they will carry out detailed deliberation in the next few session of MSC meetings. It's worth to notice, as the outcome of the joint meeting of 20 member states of IMO and United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the Bangkok Declaration on Enhancing Domestic Ferry Safety in Asia and the Pacific Region and the

Development of Model Regulations on Domestic Ferry Safety further promote the process (IMO, 2015). At MSC 103, the committee support the draft MRDFS in principle and agree to establish an expert group at MSC 104 for further developing the regulation based on the previous work (IMO, 2021). Finally, with the efforts of all participants, MSC 104 approved the draft of MRDFS, and the committee adopted it in MSC 105 in April 2022 (IMO, 2022).

<b>Order Number</b>	<b>Title</b>	<b>Order Number</b>	<b>Title</b>
1	domestic ferries unfit for purpose	18	unclear demarcation of responsibilities
2	impracticable conversions of second-hand craft to domestic ferries	19	poor shore-side support
3	impracticable modifications of second-hand ferries to domestic ferries;	20	poor bridge management
4	stability issues, particularly lack of damaged stability data	21	ignorance of navigational warnings
5	overloading	22	inadequate maintenance programmes
6	overcrowding	23	inadequate guidance on handling of emergencies;
7	shortage and/or unreachability of life-saving equipment	24	inadequate provision of aids to navigation
8	poor quality of life-saving equipment	25	inadequate maintenance of aids to navigation
9	poor passenger management	26	complacency

Order Number	Title	Order Number	Title
10	improper stowage of cargo	27	lack of all-encompassing legislation on domestic ferry safety
11	improper carriage of dangerous goods	28	overlapping legislation on domestic ferry safety
12	lack of crew competence	29	scattered legislation on domestic ferry safety
13	undeclared mass on board	30	absence of legislation on domestic ferry safety
14	sailing in bad weather	31	absence of key definitions
15	lack of safety culture	32	alleged corruption
16	lack of enforcement	33	apparent corruption
17	lack of compliance	34	corruption

Table 2-1 Non-exhaustive apparent causes lead to accidents

Source: MSC 102-8 - Report on the progress made since the last session of the Committee (Secretariat)

### 2.2.3.2 Difficulties on the way forward

IMO and its member parties as well as relative stakeholders are keen to develop a global standard for domestic ferry safety, and they all actively contributed their ideas. But different individuals have different ideas, so the deliberation process is rather intense.

On the one hand, during the consultation, some stakeholders suggest that the MDRFS should be issued by IMO and other stakeholders jointly, since there's precedence of issuing such joint instruments for IMO. The claimer indicated that a

joint regulation would be conducive to improving its enforcement, implementation and capacity building. Furthermore, the secretariat also proposed to develop a standalone convention on domestic ferry safety (IMO, 2019).

Other debatable issue is that whether the MRDFS should be a prescriptive regulation. For instance, Indonesia recommended that the MRDFS should refer to the Guidelines on the Safe Operation of Coastal and Inter-island Passenger Ships not Engaged on International Voyages, and it should be a non-prescriptive regulation. Indonesia argued that different countries have different situations, prescriptive regulation would not be helpful for individual countries to develop flexible legislation based on their own circumstance (Indonesia, 2020). Also, they believe that goal-based is a good approach for developing technical standards. On the contrary, some participants such as Islamic Republic of Iran and INTERFERRY believe that the more prescriptive language in MRDFS would improve its enforcement and implementation, because a lax regulation wouldn't lead to a good compliance (Iran, 2020; INTERFERRY, 2020). Islamic Republic of Iran proposed to incorporate specific requirements on the structure, machinery, equipment, firefighting appliances and life-saving appliances etc. (Iran, 2020)

Even though there are so many divergences between various participants, IMO still pushed forward the process, in MSC 103, the committee concluded with the draft MDRFS for consultation, and the committee finally came to a consensus on the approval.

### **2.2.3.3 Main content and characteristics of MRDFS**

**Main content:** The MRDFS includes the requirements on structure, machinery, equipment, manning, registration, survey, certification, safety management and governance, search and rescue for ferry safety etc. It provides a framework regulation on domestic ferry safety for incorporation into national legislation and

may serve as a basis for intergovernmental agreements. And we should notice that it focuses on ferry safety only but doesn't include any provisions on facilitation, security and pollution (IMO, 2021).

**Characteristic:**

First, it's not a mandatory instrument; every country can voluntarily deploy this regulation so as to improve their domestic legislation. It's a useful reference for various countries to review their national legislation and identify the existing gap. And every country can make their own decision on whether or not to adopt the regulation and to what extent should they apply based on their domestic circumstances (IMO, 2021).

Second, MRDFS can be defined as a goal-based instrument to a great content, because most of the provisions in this regulation are general requirements but not specific technical requirements (IMO, 2021). This would give countries more flexibility to issue their national legislation according to their geographical conditions, economic conditions, culture and nature of people (Indonesia, 2020). While for some special aspects, it also provides other stringent approaches by referring to the existing mandatory instruments of IMO. For instance, the stowing requirements on Dangerous Goods shall refer to IMDG Code, and the requirements on High-speed Domestic Ferry and Nuclear Domestic Ferry shall refer to SOLAS Chapter X and SOLAS Chapter VIII respectively (IMO, 2021).

Third, it inherits the essence of the previous work of IMO, which includes the GlobalReg and the Guidelines on the Safe Operation of Coastal and Inter-Island Passenger Ships. It can be seen that many of the elements of the previous two instruments have been integrated into the new regulation (INTERFERRY, 2021).

**2.3 Results achieved and existing problems**

For a long time, IMO has maintained close cooperation with Member States and

stakeholders. And they have jointly issued a series of instruments on domestic ferry safety, holding several relevant forums, assisting developing countries in capacity-building, which has achieved good results. Although a series of instruments issued by IMO, including GlobalReg, Guidelines on the Safe Operation of Coastal and Inter-Island Passenger Ships and MRDFS (IMO, unknown), however these instruments are not mandatory. But they did provide an effective reference for developing countries to improve domestic ferry safety legislation, and help them identify their gaps and defects. In this process, IMO has enhanced and consolidated the good cooperative relationship with various countries and organizations. What's more, they have successfully attracted the attention of the international community to domestic ferry safety. All these have laid a good foundation for improving domestic ferry safety.

#### **2.4 Future work direction of IMO**

However, it should be noted that there is still a long way to go to improve domestic ferry safety, and there are still many problems and deficiencies which need further consideration. On the one hand, the newly issued MRDFS, like many previous IMO documents on ferry safety, is not mandatory. This would hinder its implementation and compliance efficacy to a great extent. The Secretariat also considers further developing a standalone mandatory convention or incorporating this regulation into SOLAS on this basis (IMO, 2021), but this needs to be based on the effective evaluation of the implementation effect of the current MRDFS, and needs the follow-up and evaluation carried out by IMO. On the other hand, some developing countries are restricted by the backward level of economic development, insufficient awareness and investment in ferry safety, and the lack of experience, technology and resources on domestic ferry safety legislation (IMO, 2019). Therefore, the work direction of IMO should mainly focus on the following aspects:

First, IMO should continuously carry out research and analysis of ferry safety risks, so as to improve the awareness and attention of developing countries on ferry safety, which is the also the fundamental measure to improve domestic ferry safety. The collected information will play a very important role in IMO's following evaluation so as to revise the regulation accordingly. Second, IMO should continue to maintain close cooperation with various countries and stakeholders, especially strengthen technical cooperation and provide corresponding technical support to countries in need, which is an important means to make up for the shortage of resources caused by the imbalance of regional economic development. Third, IMO should develop the manual for MRDFS, so that countries can make better use of the regulation to improve their legislative level of domestic ferry safety (IMO, 2019). Fourth, developing online training courses for ferry safety is necessary. Online training courses are a low-cost training method, which can solve the problem of insufficient funds and resources in developing countries to a certain extent (IMO, 2021). And flexible training methods would also play an important role in improving the safety awareness, knowledge and operation skills a of crews on board and ashore. Final but not least, IMO should continue to follow up and pay attention to the implementation of MRDFS in various countries. At the same time, each country should give IMO positive feedback at this regard. The feedback information includes the implementation of the regulation in the process of domestication, the difficulties encountered, the help needed and its shortcomings. In addition, IMO should cooperate with various countries and relevant organizations to establish a ferry safety database (INTERFERRY, 2021) . Because the holistic database is the basis for risk assessment and analysis.

## **2.5 Summary of this chapter**

This chapter introduces the recent typical cases of ferry safety accidents at home

and abroad, analyzes the deep-seated causes behind the accidents, and then introduces efforts made by IMO to improve domestic ferry safety, including a series of instruments that have been formulated. MRDFS is the latest achievement of IMO to improve domestic ferry safety. This chapter also focuses on the development process, contents and characteristics of MRDFS, summarizes the achievements and shortcomings of IMO in improving domestic ferry safety, and puts forward suggestions on the future work direction of IMO.



## **CHAPTER 3 CURRENT SITUATION AND EXISTING PROBLEMS OF DOMESTIC FERRY SAFETY**

### **3.1 Current status of domestic ferry safety legislation**

After many years of development, legislation on domestic ferry safety in China has been established at the national level. At the national level, relevant laws and regulations regulating the safety of ferries include Production Safety Law of the People's Republic of China (Production Safety Law), Law of the People's Republic of China on Maritime Traffic Safety (Maritime Traffic Safety Law), Regulations of the People's Republic of China on the Administration of Traffic Safety on Inland Waters (Inland Water Traffic Safety Regulation) and Regulations on Safety Management of Inland River Ferry and Ferry-places (Inland River Ferry Regulation). The first two have higher legal status, both of which are laws approved and adopted by the National People's Congress (NPC) and its Standing Committee. While The Inland River Traffic Regulation was promulgated by the State Council, the effectiveness is second to the first two. Then the Inland River Ferry Regulation is a departmental regulation issued by the Ministry of Transport, and its effectiveness is the weakest among the above-mentioned laws and regulations.

#### **3.1.1 Production Safety Law**

The Production Safety Law is the basic law governing production safety in China. It mainly stipulates the basic principles of production safety, the rights and obligations of workers, supervision and management, rescue and investigation, and legal responsibilities. Although the law is not a special law regulating the safety of ferry transportation, the principle of "Those who manage industry must manage safety; Those who manage business must manage safety; Those who manage production and operation must manage safety" (NPC Standing Committee of the PRC, 2021) is put forward by the law, which clarifies the basic direction of safety

supervision. As a part of safe production, the ferry industry shall be governed by the provisions of this law.

### **3.1.2 The Maritime Traffic Safety Law**

For a long time, the domestic legislatures believe that ferries refer to ships transporting passengers and goods on inland rivers. Therefore, the Maritime Traffic Safety Law has no relevant provisions on ferries for a long period of time. On September 1<sup>st</sup>, 2021, the newly amended Maritime Traffic Safety Law officially came into force. The new Maritime Traffic Safety Law has expanded from the original 53 articles to 122 articles, which is more scientific and comprehensive than the previous one. The content of the new Maritime Traffic Safety Law on ferry is mainly concentrated in the chapter of "safety of maritime passenger and cargo transportation", which introduces the concept of sea ferry-place for the first time, including the establishment of maritime ferry-place, the setting of ferry routes and the provisions on suspension of ferry transportation in poor weather conditions(NPC Standing Committee of the PRC, 2021). The newly added provisions fill the legal gap of sea ferry-place and solves the problem that competent authorities in some areas who failed to set up sea ferry-place for the lack of legal basis.

### **3.1.3 Inland Water Traffic Safety Regulation**

Compared with the Maritime Traffic Safety Law, the content of this regulation on ferries and ferry-place is much more comprehensive. The main contents related to ferry transportation in this regulation cover the division of rights and responsibilities of various departments of inland water traffic safety supervision, ships, floating facilities and crew, navigation, berthing and operation, supervision of dangerous goods, ferry-place management and legal responsibilities. It is worth mentioning that the regulation stipulates that local people's governments at or above the county level should establish and improve the responsibility system for inland river traffic safety

management, and township people's governments must establish and improve the ship safety responsibility system of administrative villages and ship owners, which is of positive significance to clarify the main responsibility of local governments in ferry safety. Chapter V of the regulation also stipulates the establishment or cancellation of ferry-places, the qualification of ferry staff, the inspection and certification of ferry boats, the delimitation of ferry routes and the suspension of ferry transportation in poor weather conditions (State Council of the PRC, 2019).

### **3.1.4 Inland River Ferry Regulation**

As mentioned above, the Inland River Traffic Regulation provides the principled requirements for the management of ferry transportation, but it is not clear and specific, and its practicability is comparatively low. On the basis of the former, the Inland River Traffic Regulation provides more detailed provisions on ferry safety at all aspects. The regulation specifies the approval, establishment and daily management of ferry, ferry boats inspection, registration and certification, supervision and inspection as well as legal responsibilities. According to the principle of hierarchical responsibility and local management, the regulation clarifies that the Ministry of Transport is in charge of the national inland river traffic safety management; The government at the county level shall be responsible for the examination and approval of ferry-place establishment and designation of relevant department to be responsible for the implementation of safety management; The Township People's Government shall implement safety management of township ferries; The Maritime Authority at all levels shall establish a management system for the supervision and administration of ferry safety (Ministry of Transport of the PRC, 2014). Generally speaking, the Regulation establishes a systematic management and supervision mechanism on the safety of ferry transportation.

### **3.1.5 Laws and regulations related to ferry boats inspection and**

### **certification as well as crew's training, examination and certification**

In addition to the above laws and regulations, there are also laws and regulations related to ferry boats inspection and certification as well as crew's training, examination and certification in China. The ferry boats inspection shall be subject to the Technical Rules for the Statutory Inspection of Inland Ships, the Technical Rules for the Statutory Inspection of Small Inland Ships, the Technical Rules for the Statutory Inspection of Domestic Seagoing Ships and the Technical Rules for the Statutory Inspection of Small Coastal Ships. The registration and certification of ferry boats shall be subject to the Regulations of the People's Republic of China on Vessel Registration and Measures of the People's Republic of China on Ship Registration. Regulations of the People's Republic of China on Seafarers, the Rules of the People's Republic of China on the Administration of Crew Training and the Rules of the People's Republic of China on the Competency Examination and Certification of Sea Going Vessel Crew Members shall apply to the training, examination and certification of ferry crew members. In addition, some local governments have also promulgated corresponding local regulations on the management of ships and crew members in accordance with the actual situation of their jurisdictions. At present, the domestic laws and regulations on ship and crew management have been almost finalized, which has laid a good foundation for ensuring the seaworthiness of ships, the competency of crew and the safety of ferry transportation.

### **3.2 Current situation of domestic ferry safety supervision**

At present, there are several departments take responsibilities on domestic ferry safety management and supervision. The county government, township government, maritime authority, transportation authority and police department all have certain responsibilities for ferry safety. Each department performs its own duties to ensure

the stability of ferry safety to a certain extent.

### **3.2.1 Responsibilities of each regulatory department**

Among the previously mentioned laws and regulations related to ferry transportation, the Inland Water Traffic Safety Regulation and the Inland River Ferry Regulation provide the provisions on the responsibilities of county governments, township governments, maritime authority and transportation authority in the safety management and supervision of ferry transportation. However, the responsibilities of police departments in the safety supervision of ferry transportation are not clearly defined in these laws, nor are the "designated departments" clearly defined. According to the provisions of relevant laws, the author sorts out the responsibilities of these departments in the management and supervision of ferry safety. The responsibilities of each department are as follows:

#### **3.2.1.1 Local people's governments at or above the county level**

The local people's governments at or above the county level shall be responsible for the approval of the establishment and cancellation of ferry-places; Organizing and leading the safety management of inland river ferry within its jurisdiction, establishing and improving the ferry safety management responsibility system, and designating relevant department to supervise and inspect the safety of ferries and ferry-places; leading and coordinating the rescue work of ships in distress, and mobilizing all forces to actively participate in the rescue.

#### **3.2.1.2 Township People's Government**

Township People's governments are responsible for establishing and improving the ship safety responsibility system of administrative villages and ship owners; Implementing the safety management responsibility system of ferry boats, crew and passenger quota; Arranging the special personnel for the implementation of water

traffic safety management; Urging ship owners, operators and crew members to abide by laws, regulations and rules related to inland river traffic safety.

#### **3.2.1.3 Maritime authority**

The maritime authority is responsible for supervising the process of ship construction and inspection, and for the registration and certification of ferry boats; ; for the registration and certification of ferry crew, and supervising the training and examination of crews; for supervising and managing the water traffic safety of ferries, ensuring the seaworthiness of ships and the competence of crew members, and identifying and penalizing illegal acts of ferry transportation; investigating and dealing with water traffic accidents; As an important member of the Rescue Co-ordination Center, it cooperates with other members to carry out maritime search and rescue.

#### **3.2.1.4 Authority of transportation**

The Ministry of transport is in charge of the national inland river traffic safety management. The competent transportation departments at all levels are responsible for the management of the licensing or filing of passenger ship transportation; for establishing the supervision system related to the licensing of waterway transportation, and investigating and dealing with those who engage in relevant activities without administrative license; for the construction, management and maintenance of ferry infrastructure.

#### **3.2.1.5 Police department**

Police department at all levels are responsible for the public security management of ferry boats and ferry-places within their jurisdiction and the handling of violations against public security.

#### **3.2.1.6 Designated department**

There is a concept enshrined in the Inland Water Traffic Safety Regulation and the Inland River Ferry Regulation, which is the "Designated Department". It is designated by the local people's government at or above the county level, but who should be the "Designated Department" has not been specified. The "Designated Department" shall establish and organize the implementation of the ferry safety inspection system, and urge relevant parties to immediately eliminate or rectify the ferry safety hazards found in the supervision and inspection in due time .

### **3.2.2 Daily supervision of ferry safety**

The above laws constitute the legal framework of China's ferry safety. Those laws establish a governance pattern of ferry safety under the joint management of multiple departments such as maritime authority, transportation authority, police and local governments at all levels. In this process, all departments perform their respective duties and cooperate in management, which ensures the effective implementation of all links of ferry safety management to a certain extent.

#### **3.2.2.1 Daily supervision of Maritime Authority**

According to the author's working experience in the Maritime Safety Administration (MSA), the MSA will make an annual patrol plans according to the situation within its jurisdiction every year. The patrol plans will be designed on the monthly basis, and all ferry-places in the jurisdiction will be covered by the patrol plans to achieve full coverage. For key ferry-places with many ships and large passenger flow, the frequency of patrol will be appropriately increased. Taking the author's workplace of Beihai MSA as an example, the usual patrol mode is mainly vehicle patrol. They patrol at least once a week for key ferry-places and at least once a month for other ferry-places. Combined with on-site patrol, the maritime department will carry out on-site inspection of ships. The inspection items include self-inspection of ships before departure, ship certificates, manning, cargo securing

and pollution prevention measures. In addition, the key ferry-places under the jurisdiction have been equipped with high-definition surveillance cameras, with which the personnel on duty can monitor the situation on site in real time in the duty room and pay close attention to whether the ferry is overloaded, mixed loading of people and vehicles, illegal night navigation and other illegal acts. It is worth mentioning that the maritime department usually pays close attention to the meteorological and hydrological conditions, and timely sends meteorological early warning information to the village committee and ferry operators. In case of extreme weather such as cold wave, strong wind and typhoon, the maritime authority will implement navigation restrictions in accordance with the regulations, suspend the operation of all ferries and require them to do a good job of fastening and securing.

#### **3.2.2.2 Daily supervision of local governments at all levels**

According to legal requirements, the township government shall implement the safety management responsibilities of township ferries and ferry-places. In accordance with the requirements of Inland River Ferry Regulation, the Township People's Government shall establish a “tally and go” counting and documenting mechanism for ferries with large ferry traffic flow, and accurately record the loading of people and goods. Therefore, the Township People's government generally arranges ferry management personnel to be on duty every day at ferries with large ferry flow, which is mainly responsible for the implementation of the “tally and go” counting and documenting mechanism, maintaining the on-site ferry order and putting an end to illegal acts of ferry. For ferries with relatively small ferry flow, the township government usually doesn't have to arrange personnel to be on duty on site. The maintenance of ferry order depends more on the supervision of the village committee and the conscious compliance of the operator.

It is worth mentioning that whenever there are holidays, the county government



will organize a joint inspection team composed of the MSA, the Transportation Bureau, the Tourism and Sports Administration and the Emergency Management Bureau etc. to carry out centralized inspection on the safety of ferry transportation under its jurisdiction. The inspection contents include the potential safety hazards of ferry-places, ferry boats and crews. Each department will point out the problems from their professional point of view and summarize the problems found and report them to the county government. The county government again asked relevant departments to implement the rectification. In addition, the MSA, the Transportation Bureau and government departments at all levels have also established a collaborative management mechanism. No matter which department finds problems in daily supervision, it will timely notify the government department and relevant competent departments, and deal with the potential dangers of ferry safety in time under the coordination of government departments.

### **3.3 Problems in domestic ferry safety**

At present, there are several domestic ferry safety management and supervision departments. The county government, township government, maritime department, transportation department and public security department all have certain responsibilities for ferry safety. Each department performs its own duties to ensure the stability of ferry safety to a certain extent.

#### **3.3.1 Problems in legislation**

##### **3.3.1.1 The definition of ferry is not clear**

In order to facilitate management, it is necessary to clarify the definition of ferry in law. The domestic ferry safety legislation of many countries give a clear definition to ferry, and MRDFS also provides the definition for ferry (IMO, 2021), that is:

Domestic ferry means a craft of any type and construction, using any

means of propulsion, primarily used for the carriage of passengers and their belongings, including accompanied or unaccompanied freight units, over water only within domestic waters and certified as such by the competent authority.

In addition, the definition of high-speed ferry in MRDFS refers to the definition of high-speed passenger ship of SOLAS Chapter X (IMO, 2021). However, the domestic laws related to ferry safety do not give a clear clarification to ferry. The author referred to aforementioned domestic laws related to ferry safety, and only the Maritime Traffic Safety Law and the Inland River Ferry Regulation have the interpretation of ferry related concepts. Among them, Inland River Ferry Regulation defines both ferry and ferry-place. For ferry, the definition given in the regulation is "ferry refers to the ships that transports passengers, vehicles and goods between inland river ferry-places according to the approved route" (Ministry of Transport of the PRC, 2014). Compared with the old version, the newly revised Maritime Traffic Safety Law of the People's Republic of China introduces the definition of "maritime ferry-place", but does not explain the definition of "ferry". However, there is no definition of ferry and ferry-place in the Inland Rivers Traffic Regulation.

In addition, the Inland Ferry Regulation only cover the management of inland river ferries and ferry-place, but now the concept of marine ferry-place is introduced, but the marine ferries and ferry-places are not covered by relevant management regulations. The author believes that a clear definition of the concepts of ferry transportation in legislation would help clarify the scope of management and supervision. Therefore, it is very necessary to clarify the related concepts in domestic legislation.

### **3.3.1.2 Insufficiency of local legislation**

Although China's ferry safety legislation has been relatively comprehensive at the national level, while the ferry safety legislation at the provincial and municipal levels in some areas is still insufficient (Liu, 2016). Most of the legislations at the national level set general provisions, some of which are not practicable (Chen, 2018), and unclear in reference. Further clarifying and refining the legislation at the national level through local legislation is conducive to the specific implementation of these provisions. For example, Inland Traffic Safety Regulation and Inland Ferry Regulation both stipulate that the people's government at the county level should designate relevant departments to supervise and inspect the ferry safety, and the determination of "designated department" should be clarified through local legislation. In addition, it is also very necessary to further clarify the responsibilities of MSA, Transportation Bureau, Police, and government departments at all levels in ferry safety supervision through local legislation (Liu, 2016).

At present, some domestic provinces such as Guangdong, Fujian, Zhejiang, Jiangsu and Liaoning have issued provincial ferry safety legislation, but some provinces are still lagging behind. For example, Guangxi still has no provincial ferry safety law. Beihai City, Guangxi Province, where the author works, issued the Measures for the Administration of Township Ships in Beihai City in 2021, which consists of some specific management measures for township passenger ferries, and has strong feasibility. Before that, the city mainly relied on the legislation at the national level in the management of ferries. Due to the weak operability of these instruments, the government of Guangxi Zhuang Autonomous Region also issued some government confidential documents to guide the management of passenger ferries in villages and towns. However, these government confidential documents are not laws and regulations after all, and their legal effect is controversial. There is also a great risk of administrative litigation for law enforcement departments to apply government confidential documents instead of laws and regulations as the basis for

law enforcement.

### **3.3.1.3 The entry threshold of ferry operation is too low**

In order to improve the safety management level of domestic ferry transportation, Article 12 of MRDFS states that the competent authority must ensure that effective safety management systems and safety governance mechanisms are established on board and on shore (IMO, 2019). However, the qualification of ferry operation in China is loose, so there is generally no effective safety management system and safety management mechanism in domestic ferry operation.

The Domestic Waterway Transportation Regulations stipulate that the operation of waterway transportation business must obtain the qualification of Enterprise Legal Person, be equipped with marine superintendent and technical superintendent, and have a sound safety management system (State Council of the PRC, 2013). However, the annex of the regulation also stipulate that "the administrative regulations of passenger ships carrying less than 12 passengers and passenger ferries in townships can be formulated separately by the people's governments of provinces, autonomous regions and municipalities directly under the central government" (State Council of the PRC, 2013). Obviously, the regulation separates the management of township passenger ferries and other waterway transportation business qualifications. All provinces and cities can formulate corresponding regulations according to their own conditions, while the threshold of ferry operation is usually set lower in local laws and regulations. For example, Guangxi has formulated the regulations of Guangxi Zhuang Autonomous Region on the Administration of Waterway Transportation, which stipulates that the township passenger ferry transportation shall be subject to filing management (Standing Committee of Guangxi People's Congress, 2012), which means that the operation of township passenger ferry does not need to have the qualification of enterprise legal person like other waterway transportation. In fact,

like Guangxi, many domestic provinces have loose regulations on the business qualification of township ferry transportation. Generally speaking, Township ferry transportation can be operated by self employment.

In addition, domestic laws do not require passenger ferries and their operators to comply with the requirements of Regulations of the People's Republic of China on the Administration of Safe Operation and Pollution Prevention of Ships (Ministry of Transport, 2018). It means that ferry operators and ferries are not necessary to establish a safety management system. It can be seen that the loose access mechanism of domestic legislation for ferry operation is not consistent with the requirements of MRDFS, which also leads to the lack of scientific and standardized management of domestic ferry operation and the difficulty of improving ferry safety management.

### **3.3.2 Problems in management**

#### **3.3.2.1 The absence of safety culture**

The absence of safety culture is one of the main causes of ferry safety accidents (IMO, 2019), so this is also one of the problems that MRDFS is committed to solving. Article 3 of MRDFS states that the competent authority shall establish an effective mechanism to promote and strengthen safety culture in ferry operation (IMO, 2021). The research of some scholars shows that safety culture directly affects the safety behavior of service personnel, which is conducive to reducing the occurrence of accidents (Hernoet al.,2020). But in fact, the safety culture is actually what is lacking in the domestic ferry operation. The natural attribute of domestic ferry is the root of the absence of safety culture in the ferry industry (Ma, 2021). We should notice that township ferry account for a significant segment in the domestic ferry market (Sun & Xiao, 2010), and it serves rural groups as a supplement to other road traffic (Zheng,

2018). Generally, the education level of ferry operators and crew members is not high (Shao et al., 2020), and the aim of ferry operators is to pursuing profits. Nevertheless , inadequate attention to safety, unavailability of an effective safety management system and lack of safety training for employees resulted in the weak awareness of crews (Sun & Xiao, 2010). In a word, the lack of safety culture makes it difficult to improve the safety management level, and the risks in ferry transportation cannot be fundamentally mitigated.

### **3.3.2.2 Insufficient safety investment**

With the gradual improvement of domestic land transportation, including bridges and other infrastructure, people's dependence on ferry transportation has reduced, and the status of ferry transportation has been gradually marginalized. In addition, most domestic ferry operators are in decentralized contracting mode, and the contractors are mostly small companies or self-employed person. Constrained by the business scale and management level, their profitability is quite limited. Therefore, most ferry operators are not willing to invest in safety. Taking Hepu District of Beihai where the author is now working as an example, there are 19 ferries operating locally, all of which are Township passenger ferries, of which the maximum passenger capacity is 80 people, the minimum passenger capacity is only 8 people, most of which are small ferries with a passenger capacity of 20 to 30 people, of which 6 wooden passenger ferries are still in operation (as showed in Figure 3-1). Most of these ships are over 10 years old. Although the condition of the hull can basically meet the requirements of ship survey, the daily maintenance of the ship, including the maintenance of the hull, machinery and equipment, fire-fighting equipment and emergency equipment, is not satisfactory. When carrying out Flag State Control (FSC), the maritime authority will require the ferry operators to rectify some deficiencies within the specified time, but the rectification is not satisfying,

because the cost of equipment maintenance and renewal is quite a lot of expense for them. Therefore, the lack of safety investment has become a major problem in ferry safety.



Figure 3-1 A small wooden ferry in Qixing ferry-place in Hepu District of Beihai City

Source: The author

### 3.3.2.3 Inadequate ferry infrastructure

Due to the insufficient attention of local governments and relevant authorities, the infrastructure construction of many township ferry-places in China is still backward (Liu, 2016). Taking the Beihai city as an example, there are seven township ferry-places in operation in the city. But only one ferry-place has been built with ramp hardening for passengers boarding and disembarking, roofed ferry stop and aids to navigation for ferries, and only two of them are equipped with maritime

surveillance cameras. Other ferry-places basically do not have any supporting ferry facilities except the ferry-place nameplate. Most ferry-places still use the natural slope bank as the channel for passengers to get on and off the ship (as showed in Figure 3-2), which are not equipped with fire-fighting and life-saving facilities as required. At present, the backward ferry facilities in China pose potential safety hazards, and cannot meet the people's growing demand for a better life.



Figure 3-2 Beiyu ferry-place in Hepu District of Beihai City

Source: The author

### **3.3.3 Problems in supervision**

#### **3.3.3.1 Unclear hierarchical responsibilities of regulatory authorities**

Unclear demarcation of responsibilities is another problem in domestic ferry safety identified by IMO. Domestic ferry safety supervision involves many



departments, including local governments at all levels, Maritime Authority, Transportation Bureaus, Emergency Management Bureaus and Police etc (Liu, 2016). Domestic ferry safety legislation does not clarify the responsibilities of each regulatory department. Therefore, the responsibilities of each regulatory department intersect with each other, and the boundary is difficult to delimitate. The diversification of management system would probably lead to information asymmetry, resulting in the disconnection of supervision between various departments, and it is difficult to form a joint force of supervision (Liu, 2016). Some regulatory authorities do not understand their responsibilities in ferry safety supervision and believe that the responsibility of water traffic safety supervision only belongs to MSA. So the relationship between MSA and other authorities has been that of "one's own wishful thinking" in supervision. In addition, the limited law enforcement means of the MSA also limits the effective implementation of supervision to a certain extent. For example, for the disposal of the illegal act of driving a ferry without a license, MSA can only impose a fine on the illegal party according to law, while the administrative penalty of political detention must be implemented by the Police, which requires the MSA and the Police department to establish an efficient and coordinated law enforcement mechanism. However, from the perspective of practice, the joint law enforcement of cross departments in ferry safety supervision still needs to be strengthened.

### **3.3.3.2 Lack of digitalized supervision means**

There is still much room for improvement in the adoption of digital supervision means for ferry safety by the MSA. At present, MSAs basically relies on the supervision mode of on-site inspection combined with video monitoring. The on-site inspection is generally carried out in accordance with the patrol plan. The frequency of patrol will be increased in important periods such as holidays, but it is impossible

to stay on the site all day long. By the application of closed-circuit television (CCTV) , MSAs can realize the real time monitoring of ferry-places, but the full coverage of all ferries has not achieved. Therefore, there is still a large "blind area" in the traditional maritime supervision means.

In addition, the full-time "ferry administrator" arranged by the township government at the ferry-place with large ferry traffic flow is on duty every day to implement the "tally and go" counting and documenting mechanism, and its supervision method is also the traditional way of visual inspection. The single and backward supervision can be interpreted as the inefficiency of the current supervision mode and the insufficient control capability of overloading of ferries(Zheng, 2018). For example, the occurrence of overloading couldn't be controlled effectively with the monitoring and surveillance with one's naked eyes when the flow of passengers is large and the flow speed of passengers and vehicles is fast.

### **3.3.3.3 Difficulty in the implementation of penalties**

For a long time, domestic laws have imposed severer penalties on illegal acts of inland river ferry, even severer than the same illegal acts at sea. To some extent, the severe penalty standard reflects the Chinese government's determination to crack down on illegal acts of ferry transportation. In the past, it does play a certain deterrent role in illegal acts of ferry transportation, but the excessive amount of fine has also brought many difficulties to its real implementation.

For example, the Inland River Traffic Regulation stipulates that "if a ship overloads goods and passengers, the Maritime Authority shall order it to make corrections and impose a fine of more than RMB 20,000 and less than RMB 100,000.." (State Council of the PRC, 2019). According to the author's working experience, it is difficult to implement the sanction for the illegal act of inland river

ferry in practice due to the excessive amount of fine. Since ferry is generally operated by small companies or self-employment, the operating income of ferry is not high, and some even rely on government subsidies to survive, the excessive amount of penalty is unbearable for them. In addition, many ferries are important means of transportation for local people, and it is difficult to order the suspension of ferries. Therefore, the author believes that the excessive amount of fine for illegal acts of ferry transportation is inappropriate, and the management method of "punishment instead of management" in the past is also undesirable.

### **3.4 Summary of this chapter**

This chapter mainly introduces the current situation of domestic ferry safety legislation, management and supervision, and identify the main gaps existing in domestic ferry safety by comparing with MRDFS.

## **CHAPTER 4 EXPERIENCE AND BEST PRACTICE IN THE MANAGEMENT OF DOMESTIC FERRY SAFETY AT HOME AND ABROAD**

This chapter introduces the experience and practices of ferry safety management at home and abroad, analyzes and refines then summarizes the experience and practices that can be referred to in the management of domestic ferry safety.

### **4.1 Foreign ferry experience and practice**

Developed countries such as the European Union (EU) and the United States (US) pay attention to the overall planning of the ferry industry and incorporate ferry into the planning and layout of national and regional transportation network construction. The EU and the US are committed to building a convenient multimodal transport network with the effective combination of ferry and land transportation. Ferry has become a supplement to land transportation and can effectively alleviate land traffic congestion. Developed countries actively expand a variety of ferry service forms to meet the diversified needs of passengers. So, ferry can achieve good economic and social benefits. In addition, developed countries also pay attention to the implementation of the safety management system of ferry operation companies.

#### **4.1.1 Experience and practice of EU**

In terms of infrastructure construction, in 2013 and 2014, the EU issued the Trans-European Transport Networks (TEN-T) and the Connecting Europe Facility (CEF) programmes respectively. The two development plans aim to promote the construction of transportation network and infrastructure in the EU region, break the bottleneck of regional and technological development, and realize the coordinated development of regional society and economy. On the basis of these two development plans, the EU has launched a series of investment projects for ferry

transportation. These investment projects mainly include the technological upgrading of ferries to reduce pollution emissions, so as to make ferry transportation safer, cleaner and efficient. In addition, relevant investments are also made in the Motorways of the Sea proposed by the EU in 2012 to promote the construction of efficient multimodal transport. From 2008 to 2016, the EU had invested € 1 billion in ferry, of which € 306 million was used for the research on ferry. (Marco & Angelo, 2016)

In terms of legislation, on the one hand, the EU has uniformly formulated Directive 2009/45/EC of the European Parliament and of the Council on Safety Rules and Standards for Passenger Ships. in which passenger ships are divided into four grades A, B, C and D according to different sea areas transited by ships, and detailed technical standards and safe operation requirements for passenger ships are stipulated in terms of construction, stability, machinery and equipment, electrical equipment, fire prevention and life-saving appliances. On the other hand, legislation of EU also requires ships and shipping companies to comply with the requirements of International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code). In addition, in accordance with the provisions in the Athens Convention of 1974, the EU has clarified the liability and insurance matters of passengers carried by sea through legislation to ensure that the loss of passengers in maritime traffic accidents can be compensated. (Marco & Angelo, 2016)

The EU attaches great importance to the integrated construction of ferry transportation. Through the infrastructure construction undertaken in recent years, many EU countries have built completed multimodal transportation systems, which can realize fast transfer between ferry and land transportation modes such as subway, bus and railway. Especially in urban areas, passengers can easily reach their destination without using private cars. The integration of ferry transportation

improves the mobility of urban traffic and effectively alleviates the congestion of land traffic. In the suburbs, ferry operators operate in small boats according to service demand to serve commuters and tourists, which is more flexible. EU ferry operators can be divided into public owned and licensed private companies. Usually, operators will realize economies of scale by optimizing the fleet. The government will provide subsidies to those unprofitable ferry companies, and the expenses would fall on EU State Aid. In addition, the government also provides subsidies for ferry companies providing intra-island service to ensure the convenience of people's travel among the islands. (Marco & Angelo, 2016)

#### **4.1.2 Experience and practice of Venice**

Although Venice is within the jurisdiction of the EU, the typicality of its water traffic management model is worth discussing specifically. Venice, the Italian water city, is famous for its unique water scenery. The scattered islands and dense water network determine that water transportation is the most important means of travel. Water transportation not only meets the travel needs of local people, but also is an important carrier of local tourism. Venice has a completed water transportation system, with five different water transportation modes, including Gondola, ferry (Tragheti), water Taxi, Alilaguna and ACTV water bus system. As we all know, Gondola is a unique traditional manual paddle boat in Venice which has no fixed route and follows flexible schedule. It is mainly used for sightseeing. The ferry is the main means of transportation across the urban canal, which is a small motor boat with luxurious decoration, equipped with fire-fighting and lifesaving appliances, and whose flexible driving route can provide convenient and fast services for passengers. Alilaguna is a kind of water taxi specially connecting the historical urban area of Venice with key transportation points such as airport and cruise terminal, and provides routes around the historical urban area of Venice. ACTV water bus system

is the most widely used and economical water transportation mode, whose route covers the historical urban area of Venice and connects the nearby islands. The navigation route can not only meet the daily travel, but also serve the special purpose of sightseeing. Venice's multi-level water public transport design meets the travel needs of various groups. Scientific planning and reasonable layout enable each water transport mode to realize high efficiency and maximize economic and social benefits. (Xu, 2019)

Venice has developed water transportation, but the complexity of the marine traffic environment also brings great challenges to navigation safety. The limited river width, many bridges, dense traffic flow and the impact of bad weather are all problems to be faced. For this purpose, Venice has developed a modern operation management system, called Orione, which can realize the functions of radio communication with ships, hydro-meteorological condition monitoring, river navigation condition monitoring, ship dynamic tracking and so on. By using this system, public transport companies and competent authorities can grasp the situation of ships and docks in real time, and take corresponding measures in time in case of channel congestion, bad weather and other adverse situations (Chai, 2014). Venice has realized the accurate and efficient management of complex water transportation by using digitized means.

#### **4.1.3 Experience and practice of the US**

In terms of ferry legislation, provisions on domestic ferry are stipulated in Title 46 of the United States Code of Federal Regulations , including requirements on ship design, construction and operation. This act clearly stipulates that the Coast Guard under the U.S. Department of Homeland Security is responsible for the safety supervision of all domestic ships, including ferries. The United States Coast Guard (USCG) is responsible for the certification of ferries and crew members, the

formulation of safe operation procedures for ferry transportation, and regularly carrying out safety inspection on ferries to ensure the seaworthiness of ships and the competency of crew members (US, 2018). In addition, each state would issue policies on financial support for ferry transportation according to the actual situation, and stipulated the land use issues for ferry wharf and environment protection requirements (Anthony, 2012).

Passenger ferries, automobile ferries and water taxi are the main service modes of operation in the United States. According to the business entity, it is mainly divided into three modes: public-owned, private-owned, or public/private operations. Public ferry system is operated by the government which mainly exists in areas with underdeveloped transportation network. Due to the small passenger flow in these areas, private ferry is generally difficult to make a profit. Therefore, it is operated by the government to meet people's travel demand. Private ferry is a completely private company which is usually in areas with large demand for ferry service. The operator's income is relatively stable and can realize independent operation and be responsible for its own profits and losses, but this type of operation does not enjoy government subsidies. The third one is public-private partnership, the operators of which are also private companies. However, due to the low passenger flow in the region, it is difficult to operate sustainably only by ferry revenue, so the government would provide the operator some subsidies. (Anthony, 2012)

The US attaches great importance to the ferry study. In 2000, the US Congress appointed Research and Innovative Technologies Administration (RITA) to carry out a study entitled The National Ferry Study, which covers a series of issues in ferry operation, including new ferry operations, fast ferry opportunities, and alternative fuels. In addition, The Transit Cooperative Research Program (TCRP) was established under the proposal of the U.S. Department of Transportation. The project



is jointly carried out by the three departments of Federal Transit Administration (FTA), the National Academy and Transit Development Corporation. The research scope of the project is very broad, incorporating planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices in the transportation industry. These studies provide a scientific basis for the government to formulate policies, carry out ferry planning, capital investment and so on. (Anthony, 2012)

Governments incorporate ferry transportation into the construction planning of urban transportation system, so as to achieve a good pattern of common development of multiple transportation modes. In the planning and construction of ferry transportation, governments take ferry as an organic supplement to land transportation, provide people with more travel options, and effectively ease the pressure of land transportation, so as to make the whole transportation system run more smoothly and efficiently. For example, many ferry routes between New York and Connecticut provide convenient multimodal transit services for intercity rail, intercity shuttle bus and vehicular access. Governments also pay attention to the driving effect of ferry transportation on the peripheral economic development. As a part of the multimodal center, ferries has become the catalyst for regional economic development and realized the virtuous cycle of "double promotion" of ferry transportation and urban economic development. (Anthony, 2012)

In terms of safety investment, ferry operators pay attention to the training of crew and the maintenance of ships, so as to pass the stringent safety inspection carried out by the USCG every year. Ferry operators have a fixed investment in crew training every year to improve the crew's professional skills and safety awareness. In terms of ship maintenance, in addition to the daily maintenance of ships, ferry companies will arrange shipyard repair every year to ensure that ships maintain good

conditions. (Anthony, 2012)

After the 9 • 11 incident, the US authorities began to pay attention to the construction of emergency response system, and incorporated ferry into an important part of urban emergency capacity-building plan. Ferry operators must participate in safety training and emergency drills organized by authorities which are borne by operators. Through regular training and drills, ferry system has played an important role in large-scale personnel transfer, flood fighting and patient rescue. (Anthony, 2012)

#### **4.1.4 Experience and practice of the Republic of Korea**

The Republic of Korea shared its experience in passenger ship safety management in the form of an informative proposal at the MSC 105 (Korea, 2021). According to the requirements of Korean Marine Transportation Act, domestic passenger transport companies must establish operation management procedures approved by the competent authority. The Korean government has formulated Operational Management Regulations, which draw on the main structure of the International Safety Management Code and expand on this basis. The regulation defines the safety management objectives, safety management policies, responsibilities of personnel on board and on shore, designated personnel on shore and the establishment of operation plans on passenger ships. The content is detailed and operable.

The safety management of domestic passenger ships in the Republic of Korea adopts a three-layered management system. Domestic ferry operators in Korea must first formulate the company's safety management system in accordance with the requirements of Operational Management Regulations and submit it to the competent authority for review. The safety management system must consider factors such as

ship tonnage, operation route and structure. And the safety management system documents approved by the authority must be placed on board as required. Then, the compliance of Operational Management Regulations must be subject to the monitoring of vessel operation managers from independent public institution. Finally, the maritime authority shall supervise the ferry operators and vessel operation managers.

Operational Management Regulations and three-layered management system constitute the basic mode of ferry safety management in South Korea. By mandating the ferry operators to establish a safety management system, and then ensuring the effective operation of the company's safety management system through the multi-level monitoring system, this management mode is consistent with the requirements of the ISM Code and MRDFS.

## **4.2 Domestic ferry experience and practice in China**

In recent years, some areas in China have effectively improved the level of ferry safety management by completing local ferry safety legislation, implementing ferry public transportation reform and application of digitalized supervision means. This part mainly introduces the experience of Guangdong Province and Jiangsu section of the Yangtze River in this regard.

### **4.2.1 Experience and practice of Guangdong province**

In terms of legislation, in 2016, the people's Government of Guangdong Province promulgated the Measures for the Safety Management of ferries and Ferry-places in Guangdong Province, which defines the responsibilities of county-level governments, township governments, Maritime Authorities, Departments of Transportation at all levels and Emergency Management Bureau in the management and supervision of ferry safety. It is worth mentioning that the

Measures stipulate that "people's governments at all levels shall incorporate ferries and ferry-places into the regional integrated transportation system to ensure the investment for the safety of ferries and ferry-places. The finance at higher levels shall give support to the renewal, transformation and maintenance of ferries and ferry-places in underdeveloped areas according to the financial situation and actual needs." (Guangdong Provincial People's Government, 2016) This means that the Guangdong provincial government has incorporated ferry transportation into the regional integrated transportation system from the perspective of local legislation, clarified the public transportation attribute of ferry transportation, and provided policy and financial guarantee for the construction of ferry industry. The measures also stipulates that "the ferry operator shall establish a management system for the safe transportation of ferries and ferry-places, organize internal safety inspection, and regularly carry out safety education and training for ferry-places staffs, ferry crews and ferry workers." (Guangdong Provincial People's Government, 2016) Thus, it provides a legal basis for the standardized management of ferry operation.

In terms of ferry reform, in recent years, some cities in Guangdong Province have tried to start ferry public transportation reform, of which Guangzhou is the typical one. Guangzhou started the first water bus route for trial operation in 2007. Water bus has the functions of commuting and sightseeing, and has high operation efficiency. At present, it has become the main operation mode of water passenger transport in Guangzhou. At present, Guangzhou has 14 water bus routes, 27 licensed docks, 43 passenger ships, and a total mileage of 54.66 kilometers. It has become the fourth public transport system in Guangzhou after buses, taxis and subways, and has played an important role in alleviating land traffic pressure and serving citizens. However, as the attribution of public transport, the ticket price of water bus is generally 1-2 yuan. It is difficult for the operating company to make a profit only by

the ticket price income. In recent years, the Guangzhou municipal government has provided financial support to Guangzhou Ferry Company in terms of wharf construction and ship construction. At the same time, it has also provided some subsidies, and encouraged the company to expand business to increase revenue (Tu, 2020).

In terms of ferry construction and design, Guangzhou issued the Master Plan of Guangzhou Comprehensive Transportation Hub (2018-2035), which incorporated the development of water buses into the overall plan for the development of urban transportation network. The plan puts forward that "the plan takes the urban (suburban) railway and urban rail as the main body, and jointly constructs the hub connection transportation network with urban trunk roads and water buses; promotes the integration of water buses and urban construction, and strengthens the coverage of major areas and tourist attractions." (Guangzhou Municipal People's Government, 2019)

In terms of safety supervision, the Maritime Authority organically combines on-site supervision and digital supervision means to achieve accurate and efficient supervision. On the one hand, the Maritime Authority timely identify the potential safety hazards of ferries and ferry-places through normalized spot inspection. Especially in key periods such as holidays, the Maritime Authority will carry out comprehensive safety inspection on all passenger ships in advance, including the qualification of crews, machinery and equipment, fire-fighting and life-saving appliance and drills, so as to ensure that the crew are competent and the ship is seaworthy (Guangdong MSA, 2021). On the other hand, the Maritime Authority improves the efficiency of safety supervision by deploying digital supervision means. At present, Guangdong Maritime Safety Administration has completed the construction of a variety of digital supervision means. In addition to CCTV video

monitoring system and Vessel Traffic Service (VTS) system, Guangdong Maritime Safety Administration has also established a supervision and command system, which uses big data technology and integrates multiple functions such as crew management, ship management, navigation management, administrative sanction, hydro-meteorological information query. Through the comprehensive use of CCTV video monitoring system, supervision and command system, VTS and other information systems, the Maritime Authority can conduct real-time monitoring on the dynamics of key terminals and key ferry sections, and master the navigation status of ships and the order of channels in real time. In addition, the Maritime Authority also pays close attention to the hydro-meteorological information, and timely releases the suspension information to the ferry operation companies in case of bad weather. The use of digital supervision means has realized rapid remote data interaction, and greatly improved the efficiency of the Maritime Authorities' supervision of ferry safety.

#### **4.2.2 Experience and practice of Jiangsu section of the Yangtze River**

The Jiangsu section of the Yangtze River is one of the busiest sections of water traffic in China. The Yangtze River section of Jiangsu Province has high traffic density and complex navigation environment, which puts forward higher requirements for ferry safety management (Wei, 2006).

In terms of legislation, the Ministry of Transport has formulated corresponding department regulations for water traffic management according to the special navigation situation of the Yangtze River. In 2017, the Ministry of Transport of the people's Republic of China promulgated the Special Provisions on the Management of Water Traffic Safety on the Yangtze River Trunk Line (Ministry of transport of the P.R.C., 2017). The main contents of the regulation consists ship navigation, water traffic control, anchorage safety management, ship trial management, legal liability,

etc. it is a special provision for the water traffic safety management of the Yangtze River. In addition, in 2021, the Ministry of Transport of the people's Republic of China promulgated the revised Regulations on Ship Routing System in Jiangsu Section of the Yangtze River. The regulation makes detailed provisions on the route delimitation and navigation rules of Jiangsu Yangtze River section, in which the contents of navigation rules fully draw lessons from the International Regulations for Preventing Collisions at Sea, 1972 (COLREG 1972). According to the requirements of the regulation, the river crossing ferry is a give-way vessel, and should actively avoid vessels running normally in the specified traffic separation and recommended route. The regulation also delimits recommended routes for large ships and small ships respectively. The regulation effectively restricts the navigation behavior of ferries, and plays a positive role in regulating ship navigation, improving navigation efficiency and reducing ship accidents (Ministry of transport of the P.R.C., 2021).

In terms of ferry safety management, the ferry companies in Jiangsu section of the Yangtze River enhance the capacity on risk management through the use of digital monitoring system, so as to effectively prevent and reduce water traffic accidents. In 2018, Jiangsu Provincial Department of transportation and Jiangsu Maritime Safety Administration jointly issued the Specification on the Construction and Operation of Ferry Operator's Shore-based Monitoring System for the Yangtze River. According to the requirements of the specification, the ferry companies must establish a shore-based control center and equip qualified personnel on duty to monitor the whole process of ferry navigation through the shore based monitoring system (Jiangsu Provincial Department of Transportation, 2018). The shore-based monitoring system of ferry companies integrates modern information technology means such as location sensing, hydro-meteorological monitoring, video monitoring, mobile Internet and intelligent analysis, which can enable the personnel on duty to

grasp the information and environmental conditions of ferry production in real time, implement dynamic monitoring and pre-alarm on the ferry (as showed in Figure 4-1), and command, dispatch and comprehensively control the ferry behavior (China, 2022). The system can not only monitor the meteorological and hydrological information, but also monitor the loading and navigation dynamics of ships. Once the meteorological and hydrological conditions are not suitable for sailing, or the ship is overloaded, unbalanced loading or there is a risk of collision (exceeding the set value), the system will automatically send an early warning, and the crew and shore based personnel on duty can receive the alarm information in time to intervene in the dangerous situation (China,2022).

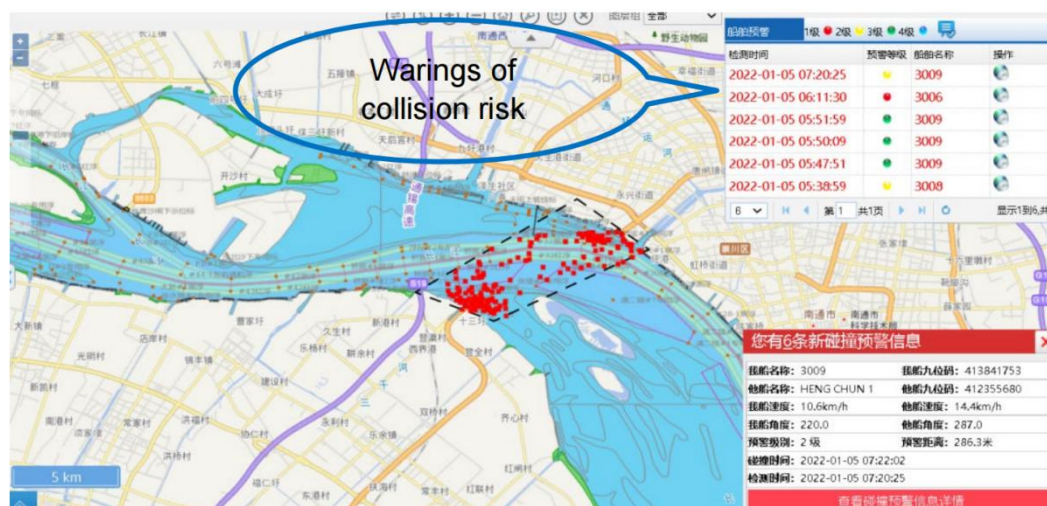


Figure 4-1 System warning of ferry collision risk

Source: MSC 105-INF.16 - Information on strengthening shore-based information autonomous monitoring to improve ferry safety (China)

In addition, the competent authorities actively promote the upgrading and transformation of Yangtze River Ferry to improve the safety level of ferry transportation. For example, the competent authorities promote the hull coloring and marking transformation of ferries, and improve the identification of ships by coloring the hull appearance with yellow and orange, so that passing ships can identify the



crossing ferries as soon as possible and take collision avoidance measures in time, so as to effectively reduce the risk of collision (China, 2022). The competent authorities also promote the use of life-saving equipment specially developed for Yangtze River ferries on board, so as to quickly transfer passengers in case of accidents, so as to reduce casualties (China, 2022).

### **4.3 Discussion**

The practice and experience of ferry safety management at home and abroad are mainly summarized as paying attention to the top-level design of ferry industry, the diversified development of ferry service modes, the implementation of safety management system and the application of digital supervision technology.

On the one hand, the EU, the US and other countries pay attention to the top-level design of ferry development planning. The the EU and the US invest a lot of money in ferry research every year. Scientific research provides a reliable basis for policy-making and capital investment. Both the EU and the US have incorporated ferry into the regional and national transportation network construction layout, and clarify the status of ferry from the height of national policies. Therefore, policies, funds and resources for ferry can be guaranteed in these countries and regions. Through scientific planning and design, domestic ferry and land transportation can achieve more convenient transfer, and convenient multimodal transport makes ferry a convenient and reliable mode of transportation. Therefore, ferry can effectively ease land traffic congestion. In contrast, the positioning of ferry transportation in China is not clear. Domestic laws have separated ferry transportation from other water transportation, and ferry transportation has not been included in the national transportation network construction plan. Therefore, the development of ferry transportation is difficult to be guaranteed in terms of policies, funds and resources, resulting in insufficient investment in ferry safety and unoptimistic safety situation.

At present, Guangdong Province has incorporated ferry transportation into the regional integrated transportation system through local legislation, and clarified the public transportation attribute of ferry, which should be learned by other regions in China.

On the other hand, the diversified development of ferry industry in developed countries such as the EU and the US is commendable. In the EU and the US, in addition to the traditional ferry mode, water buses, water taxis and mixed business forms with transportation and tourism functions have been well developed. The diversified development of ferry can not only meet the diversified needs of passengers, fully tap the potential market, improve the overall efficiency of ferry, but also increase the revenue of ferry industry and realize good economic and social benefits. In this respect, Venice's multi-level water passenger transport system sets a very successful example. China's domestic ferry business model is comparatively traditional and single. At present, except for the water buses that have been operated in a few cities, the ferry service in most regions of China still stays in the traditional business mode. A single and traditional ferry business model can't meet the needs of multi-level groups, and it is difficult to improve the efficiency of ferry, which is not conducive to the sustainable development of ferry industry.

In addition, it is another characteristic of developed countries to emphasize on the implementation of safety management system in ferry operation company. Legislation of EU requires that ships and shipping companies must comply with the requirements of the ISM Code. According to legislation of the Republic of Korea, ferry operators must establish safety management system and implement the three-layered monitoring system. In contrast, the entry threshold requirements of domestic laws for ferry operation are comparatively low in our country. Ferry operators do not need to have the qualification of enterprise legal person, and usually individuals can carry

out ferry operation, all of which contributes to the non-existence of safety management system, and naturally it is difficult to establish and implement the corresponding safety management mechanism.

Finally, the application of digital supervision means effectively improves the efficiency of ferry safety supervision. In the safety supervision of ferry transportation in Venice, Guangdong Province of China and Jiangsu section of the Yangtze River, the supervision departments and ferry operation companies have strengthened the static and dynamic supervision of ferry transportation through the comprehensive use of digital supervision means, improved the efficiency of information interaction, effectively identified the risks in ferry transportation, and thus reduced the occurrence of accidents. It is worth noting that the application of digital supervision means requires not only the construction of shore based facilities, but also the improvement of corresponding supporting facilities for ships, such as AIS, VHF, CCTV video monitoring system, etc. At present, the shore based infrastructure in most areas of China is imperfect, and the ferry facilities are backward. There is still much room for improvement in the application of digital supervision means of ferry supervision in our nation.

#### **4.4 Summary of this chapter**

This chapter mainly analyzes the good experience and practice of ferry safety management at home and abroad. Developed countries and regions such as the EU and the US pay attention to the top-level design of ferry development planning, the diversified development of ferry service modes, the safety management system of ferry companies has been well implemented, and the digital supervision means have been effectively used. These aspects are lacking in China's domestic ferry safety management. At present, Guangdong Province, Jiangsu section of the Yangtze River and other regions in China have effectively improved the level of ferry safety

supervision by improving local ferry safety legislation, implementing ferry public transportation reform and using digital supervision means in recent years. There experience is also worth learning.

## **CHAPTER 5 RECOMMENDATIONS ON IMPROVING DOMESTIC FERRY SAFETY**

Ferry has played an important role in meeting the people's need of transportation and serving the economic and social development, but the domestic ferry safety situation is not optimistic, and the ferry safety risk still exists. Laws on domestic ferry safety are not comprehensive, safety culture is absent, safety investment is insufficient, and the responsibilities of regulatory departments are not clarified, which have become the main obstacles to the safe operation and development of ferry sector. By comparing the provisions of MRDFS and actively learning from the experience of ferry safety management in developed countries, the author puts forward the following recommendations to improve the domestic ferry safety in China:

### **5.1 Recommendation**

The author believes that in order to solve the deep-seated problems of domestic ferry safety, we should first improve the domestic ferry safety legislation and clarify the responsibilities of various regulatory departments; Then we must strengthen the top-level design of ferry transportation to provide policy, capital and resource guarantee for the development of ferry sector; After that, it's necessary to implement the safety governance mechanism and safety management system to improve the safety management level of ferry operation companies; In addition, the supervision department should apply digitalized supervision means to improve the supervision level of ferry transportation; Finally, we should strengthen international exchanges and cooperation to achieve complementary advantages, mutual benefit and win-win results.

#### **5.1.1 Improving the domestic legal system of ferry safety**

The domestic legislature should actively evaluate the domestic ferry safety legislation against the provisions of MRDFS, apply the provisions and technical standards of MRDFS according to China's national conditions, and promote the establishment and improvement of the domestic ferry safety legal system.

On the one hand, the definition of ferry should be clarified in domestic legislation. At present, the definition of ferry related concepts in domestic laws is not clear. ferry safety laws and administrative regulations of national level such as Maritime Traffic Safety Law, Inland Water Traffic Safety Regulation and Inland River Ferry Regulation are the legal basis for the development of the ferry sector and the legal basis for authorities to perform their regulatory duties. The definitions of ferry related concepts in legislation are conducive to clarifying the attributes of the ferry sector, providing correct guidance for governments to formulate development policies for the ferry sector, and also helping clarify the scope and demarcation of ferry safety supervision, so as to better implement the laws and regulations related to ferry safety.

On the other hand, the domestic legislature should complete the formulation of supporting administrative regulations related to the new Maritime Traffic Safety Law as soon as possible. Since the newly revised Maritime Traffic Safety Law in China has come into effect, it introduces the concept of "sea ferry-place". The original Inland River Ferry Regulation can no longer meet the requirements of the new situation. The provisions should be revised as soon as possible and new provisions on the safety management of ferry should be formulated to cover the safety management of inland river and maritime ferry.

In addition, we should strictly enforce the ferry operation access system, improve the threshold of ferry operation access, and ensure that ferry operators can establish and implement an effective safety governance mechanism and safety

management system. At present, the low entry threshold for ferry operation in China leads to the lack of motivation of ferry operators to carry out safety management, the weak willingness to invest in safety, and the weakening of ferry safety management ability, which is not conducive to the improvement of ferry safety management. Domestic legislative bodies shall, consider revising the Regulations on Domestic Waterway Transport in due course to unify the provisions on the qualifications of domestic commercial passenger transport and township passenger ferry transport in accordance with the level of domestic economic development.

In addition, local governments should actively improve the construction of local legislation, further refine the national level legislation through local legislation, formulate more operational local regulations and their implementation rules (Liu, 2016), clarify the "designated departments" in the Inland Water Traffic Safety Regulation and the Inland River Ferry Regulation, and clarify the township governments, maritime authorities, transportation authorities, Police department and "designated departments" which are responsible for the supervision of ferry safety. The clearer responsibilities of the regulatory authorities would help to form a joint force in the safety supervision of ferry transportation, so as to improve the efficiency of the safety supervision of ferry transportation.

### **5.1.2 Emphasizing ferry planning and design at the national level**

Government departments should increase investment in ferry sector. First of all, they should organize and carry out research on ferry transit, including comprehensive research on the planning, service mode, operation, infrastructure, equipment maintenance, human resources, policies, management practices and economies of scale driven by ferry transit, so as to provide a scientific and reliable basis for policy formulation and capital investment. In addition, government departments should actively promote the upgrading of ferries and ferry-places, accelerate the elimination

of existing ferries with old age and poor safety conditions, and build standardized ferries according to the ferry standardized ship types published by the local transportation authorities. At the same time, we should speed up the planning and construction of ferry infrastructure, especially for township ferries, we should build and improve ferry ramp hardening, navigation aids facilities, life-saving appliances, boat waiting kiosks, parking lots and other infrastructure. In the construction of ferry infrastructure, full consideration shall be given to the needs of safety and the convenience of effective connection with other land transportation.

Government departments should incorporate ferry transportation into the national transportation network planning and construction layout, clarify the attributes of ferry as public transportation, provide the same policy support and resource allocation as land transportation (Jiang, 2015), and provide favorable guarantee for the construction of ferry transportation in terms of policy, capital and resources. Actively build an integrated transportation network that effectively connects water transportation and land transportation, realize convenient multimodal transport, make ferry an organic supplement to urban land transportation, provide diversified choices for people to travel, and effectively alleviate urban traffic congestion. Pay attention to the economies of scale driven by ferry transportation, and make the multimodal transport center a catalyst for economic development.

Actively develop a variety of ferry service modes. On the basis of the traditional ferry service mode, vigorously develop water buses, water taxis and new ferry business mode combining both transportation and tourism functions, so as to meet the needs of diversified consumer groups, improve the comprehensive efficiency of ferry, fully explore the consumption potential of the ferry market, and achieve favorable economic and social benefits.

Gradually eliminate backward transport capacity, and form a ferry market



pattern dominated by state-owned capital and fully participated by private capital. State owned capital should play a leading role in the operation of ferry transportation market and become a powerful guarantee for the development and stability of ferry transportation system. Especially in remote areas, the passenger flow is limited, and it is difficult for private-owned ferry to make profits through fare income. Public institutions subordinate to local governments or state-owned ferry companies should gradually acquire and merge private ferry companies in these areas, and gradually eliminate the current decentralized contracting mode of township passenger ferry. The state-owned companies or institutions shall be responsible for the overall management of regional ferries and ferry-places, and the existing ferry crew members shall be employed through competition. The training of crew members shall be strengthened to improve their safety awareness and professional skills. The overall management of ferry by local governments or state-owned companies will help to realize corporate management and large-scale operation, so as to improve the management efficiency and profitability of ferry operation and realize a virtuous cycle of ferry safety management.

### **5.1.3 Implementing the ferry safety governance mechanism and safety management system**

From the experience of developed countries, the implementation of safety governance mechanism and safety management system can effectively improve the safety management level of ferry transportation and reduce accidents. Statistics show that since the implementation of ISM Code, the safety and pollution accidents of international navigation ships have been significantly reduced. Therefore, the domestic legislature has introduced National Management Code for the Safe Operation of Ships and for Pollution Prevention (NSM Code) on the basis of ISM Code, which has improved the safe operation level of domestic ships to a certain

extent. The domestic legislature shall revise the National Management Code for the Safe Operation of Ships and for Pollution Prevention in accordance with the requirements of MRDFS in due time, unify the provisions on passenger ferries and passenger ships, and ensure that an effective safety governance mechanism and safety management system are established on shore and on board. The qualified ferry operators shall be required to establish a safety management system, and the unqualified ones shall be at least required to establish a safety management system and gradually improve the construction of the safety management system.

ISM rules and NSM rules are designed to reduce casualties and environmental pollution, and provide practice and safe working environment for safe operation of ships. By establishing a safety management system, risks of ships, personnel and environment can be assessed and corresponding prevention and control measures can be established to continuously improve the safety management technology of ship and shore based personnel. The training on ISM rules and NSM rules shall be carried out for the management personnel of domestic ferry operation companies to enhance their understanding of the safety management system, improve their safety awareness, and strive to create a good safety culture in the ferry companies. The ferry operation companies shall establish, operate and maintain Safety Management System (SMS), complying with the regulations to ensure that personnel, ships, operations, emergency and SMS documents can be effectively controlled, and ensure the implementation of conventions, regulations and other mandatory provisions. The ferry operation companies shall establish internal audit procedures and management audit procedures to urge the company to constantly correct the existing defects and continuously improve the safety management level. The competent department shall regularly review the company's management system to ensure the effectiveness of the company's safety management system, so as to realize closed-loop management.

#### **5.1.4 Deploying digitalized supervision means to improve the supervision level of ferry transit**

At present, the ferry safety supervision in most parts of China still stays in the traditional way of visual inspection. The use of digitalized supervision means is insufficient. The authorized department is difficult to achieve round-the-clock supervision, and the ferry safety risks cannot be controlled timely and effectively. We should actively introduce digitalized technology in the ferry sector, strengthen the upgrading of ferry shore based infrastructure and ferry ships, and improve the modernization level of ferry safety supervision.

Gradually promote the use of AIS, VHF, CCTV, radar and other technologies in ferries, improve the construction of corresponding shore based supporting facilities, strengthen the information exchange of ship to ship, ship to shore, master the production information and environmental conditions of ferries in real time, implement dynamic monitoring and early warning for ferries, timely intervene in dangerous behaviors in ferry navigation, and reduce the occurrence of safety accidents. Actively promote the use of shore based digitalized supervision system of ferry companies, integrate the use of digitalized technical means such as AIS, VHF, CCTV, radar, etc. to master the operation and safety management information of ferries and ferry-places in real time, command, dispatch and comprehensively control the ferry behavior, and realize the centralized storage, unified management and statistical analysis of all kinds of information, so as to effectively prevent the safety risks of ferry. (Jiangsu Provincial Department of Transportation, 2018)

The regulatory authorities should promote the use of life jacket detection and tracking technology and face recognition technology on ferries, and strengthen the control of illegal acts such as the ferryboat crews and passengers not wearing life jackets as required and overloading (Liu, 2016). The regulatory authorities shall also

establish a unified ferry information release system to release ferry schedule information, meteorological and hydrological information, traffic control information and safety tips to the public for easy reference.

The maritime authorities should make full use of the opportunity of the current construction of “Overall Elements” VTS, strengthen the supervision ability for ferries and ferries-places. Through the use of big data, we can collect industry information such as ships, crew members, companies, ports, pilotage and agencies, integrate the supervision information of MSA, Transportation Bureau, local government, police department and other departments, master the dynamic information such as ship navigation, ferry-places, hydro-meteorology and navigation environment, gather the static information such as crew management, ship management and company management, and realize the accurate and efficient management of ferries and ferry-places through digitalized means. By doing this can we establish a water traffic safety supervision pattern of co-construction, co-governance and sharing. (MSA, 2021)

#### **5.1.5 Following the latest developments in the IMO and strengthening international exchanges and cooperation**

At present, IMO has adopted MRDFS at the 105th session of MSC, and an explanatory manual and online training course on this regulation will be developed later. China should continue to pay attention to the latest developments of the IMO on ferry safety, actively take actions in accordance with the provisions of MRDFS, make full use of MRDFS and its explanatory operation manual as well as online training courses, improve domestic ferry safety legislation, strengthen the training of ferry practitioners, and improve the safety awareness and professional skills of practitioners. In addition, China should continue to actively participate in the formulation of international standards for ferry safety, offer advice and

recommendations to IMO, and continuously have China's say in international maritime affairs.

At the same time, China should also actively participate in the Integrated Technical Cooperation Programme (ITCP) established by IMO and make full use of its international exchange and cooperation platform. Continue to strengthen bilateral and multilateral intergovernmental cooperation through international cooperation and exchange platforms such as ASEAN Regional Forum (ARF) Workshop on Ferry Safety and ARF Training on Ferry Safety Capacity Building. Organize the exchange and discussion on ferry safety, carry out the exchange and sharing of domestic legislation, management and supervision experience on ferry safety, promote the international ferry safety research, identify the deficiencies in domestic ferry safety, and fully learn from the advanced ferry safety management experience of developed countries. In addition, we should also assist developing countries in Southeast Asia and Africa to carry out capacity-building, share China's management experience in ferry safety, realize resource sharing and mutual benefit, and jointly improve the level of ferry safety management.

## **5.2 Summery of this chapter**

On the basis of the previous research contents, this chapter, in view of the problems existing in the legislation, management and supervision of domestic ferry safety, fully compared with the provisions of MRDFS and learned from the advanced experience at home and abroad, proposed to improve the domestic ferry safety legal system, emphasize the national level ferry planning and design, implement the ferry safety governance mechanism and safety management system use digital supervision means, pay attention to the latest developments in the IMO and strengthen international exchanges and cooperation.

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