

# Comparison of maritime safety management modes and measures for main inland waterways in China, US, and EU

Ma Minglu<sup>1</sup>, Wu Jing\*<sup>2,1</sup>

<sup>1</sup>China Waterborne Transport Research Institute, Beijing, 100088, China

<sup>2</sup>North China Electric Power University, Beijing 102206, China

---

**Abstract:** Main inland waterways are geographically and economically important for many countries for transportation. They connect districts surrounding a given core economy and in many cases, link parts of the world by sea. Highways and railways tend to become saturated due to traffic, but inland waterway transport still has considerable room for growth. Effective safety management and proper management measures can make inland waterways safer, cleaner, and more efficient. This study provides an overview of maritime management practices comparing and contrasting China, US, and EU main inland waterway safety management. Subsequent research on enhancing measures related to maritime management can benefit from this study.

**Keywords:** Main inland waterway, Maritime safety management, Management modes and measures

---

## 1. BACKGROUND

Major countries attach considerable importance to inland waterway transportation, since it is safe, reliable, multifunctional, and eco-friendly. The US government invests heavily in inland waterway construction and maintenance every year, with more than 40,000 km of navigable waterways across the country. Most of the navigable waterways are in the eastern half of the US, in which the commercially important waterways consist of the Mississippi River system. The EU has 28 member countries, 18 have inland waterway transport systems and 16 are connected with waterway system. More than 29,000 km of navigable waterways, 400 ports and terminals have been constructed along Danube River, Rhine River and other international river system. China has massive and complicated inland waterway networks, with 127,100 km of navigable waterways, which are becoming increasingly essential to economic growth. The main navigable waterway include Yangtze River system, Pearl River system and Grand Canal etc. Based on these navigable river system, China invests to develop several national economic belts.

To prevent the potential risk from the increasing transportation volume, Chinese governors, experts and scholars begin to focus on management modes and measures from countries with similar navigable conditions. Through comparison study, an overview of maritime management practices can be provided as a reference to government in each country if they want to make some adjustment or promotion to the present management.

## 2. CHINA INLAND WATERWAY MANAGEMENT

### 2.1. Management modes

---

\* E-mail: wujing.108@wti.ac.cn

The authority for China maritime safety management can be divided into central and local authority. Central authority consists of the Ministry of Transport of the People's Republic of China (MOT) and its expatriate institutions. Four administrations of the MOT: Waterborne Transport Administration, Maritime Safety Administration (MSA), Transport Service Administration, and Safety and Quality Supervision Administration, are jointly responsible for maritime safety management and policy making for inland waterways, and ensuring that vessels comply with domestic and international regulations pertaining to safety and pollution prevention. Expatriate institutions include the Changjiang River Administration of Navigational Affairs (in charge of the Yangtze River) and the Pearl River Administration of Navigational Affairs (in charge of the Pearl River). Local authority management modes vary by province.

The Yangtze River is directly regulated by central authority and the Pearl River is regulated both centrally and locally. Other inland waterways are under the jurisdiction of respective local governments.

## **2.2. Management measures**

### **2.2.1. Vessel management**

#### (1) Vessel inspection

The rules of vessel inspection enacted by the MOT are strictly implemented in every inland waterway, and inspection is performed by the recognized organization, China Classification Society.

#### (2) Vessel technical standards

The Chinese government promotes standardization for inland vessels, with various technical standards depending on specific waterway conditions.

#### (3) Vessel age

China's Old Transport Ship Management Regulation stipulates mandatory retirement for ships that have reached a certain age.

#### (4) Passenger transportation

ID based ticket booking is required for inter-province inland waterway passenger transportation over 60 km, which is the baseline for local government compliance. More stringent measure can be adopted if the local government considers it necessary.

### **2.2.2. Inland mariner management**

The MSA promulgates rules for inland mariner management with detailed requirements. For example, an inland mariner should be from 18–60 years old (16 for trainee), and inland mariners can obtain a license after passing a basic safety training exam organized by the MSA.

### **2.2.3. Hazardous chemical transportation management**

National, local, and industry standards all contain various guidelines related to transportation of hazardous chemicals, which are not completely unified.

Therefore, to avoid conflicts among the standards, the MOT has prohibited toxic and some dangerous chemicals. All 355 toxic chemicals listed by the MOT can also be found in the European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN), and in the 49<sup>th</sup> part of the Code of Federal Regulations (CFR).

### **2.3. Legal system**

There are three important legal characteristics regarding China inland waterways.

- (1) Most major changes regarding safety policies and standards are generated after major accidents.
- (2) Collisions and discontinuities among laws and regulations tend to be increasingly serious.
- (3) Documents promulgated by the MOT, MSA, and other authorities have the same standing as regulations: violation of these documents is viewed as a legal violation.

## **3. US INLAND WATERWAY MANAGEMENT**

### **3.1. Management mode**

United States maritime safety management follows a collaborative framework, with cooperation between the US Department of Transportation (DOT), St. Lawrence Seaway Development Corporation (SLSDC), military (US Coast Guard (USCG), and Army Corps of Engineers), and local authorities.

In terms of maritime safety management, DOT is the policy making administration; USCG has authority over marine safety regulations as well as search and rescue, marine environmental protection, ice breaking, and maintenance of navigation aids; and the Army Corps of Engineers is in charge of harbor and waterway construction and maintenance [1,2].

The USCG is part of the US “armed forces”, and is the main authority for maritime law enforcement.

### **3.2. Management measures**

#### **3.2.1. Vessel management**

- (1) Vessel inspection

As in China, inspection is conducted by the recognized organization, American Bureau of Shipping, and vessel integrity and equipment are inspected during construction and throughout its lifespan [2].

#### **3.2.2. Inland mariner management**

According to 46<sup>th</sup> part of the Code of Federal Regulations (CFR 46), USCG is responsible for inland

mariner management. In practice, mariner training has been delegated to maritime academies, other training organizations, and non-profit organizations, with USCG retaining authority for certification and assessment, and approving and supervising training classes. The US standard for inland mariner watchkeeping directly follows from the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers, the standard for mariners at sea.

### **3.2.3. Hazardous chemical transportation management**

CFR 49 does not prohibit toxic or dangerous chemical transport, but does include specific regulations on hazardous chemicals transportation management.

### **3.3. Legal system**

Under the US legislative system, US Congress compiles all statutory laws every six years. Most legal provisions on shipping are centrally listed under Shipping CFR 46. All parts of CFR 46 are available to the public.

Most major changes to safety policies and standards are generated after major accidents.

## **4. EU INLAND WATERWAY MANAGEMENT**

### **4.1. Management mode**

Maritime safety management in the EU is conducted by three authorities: EU authorities, including the Mobility and Transport Commission (MTC) and the Europe Maritime Safety Administration (EMSA); international organizations, including the Central Commission for Navigation on the Rhine (CCNR); and member country governments and their departments.

The MTC is responsible for waterway and vessel standards, and import and export laws. The EMSA, deals with maritime safety and pollution prevention, and is a technical organization without executive staff [3].

The CCNR formulates and modifies relevant laws and regulations concerning navigation safety, supervises implementation of these laws and regulations, and proposes systematic standards and recommendations for the Rhine waterway, vessel standards, navigational requirements, and technical specifications. Since it exercises its power through ministerial meetings, CCNR resolutions are enforced politically.

EU inland waterway management authorization has significantly more layers than US and China, including country, state, and city authorities. Private companies are also involved in daily safety management, assuming part of the responsibility.

### **4.2. Management measures**

#### **4.2.1. Vessel management**

##### (1) Vessel inspection

Inspection is conducted by a few classification societies. Inspection results impact the navigational district the vessel belongs to.

##### (2) Vessel technical standards

Technical standards for vessels in the EU are unified by law, providing minimum requirements for each district. However, vessel standardization is voluntary rather than compulsory. There are five EU navigation districts. Four are controlled by EU law and the R district, representing the Rhine, is controlled by the Mannheim Convention and supervised and inspected by CCNR.

##### (3) Vessel age

Compulsory retirement is not enforced for vessels in EU inland waterways, and it is not uncommon to see active vessels more than 50 years old. Therefore, inspection is correspondingly rigorous to ensure warranty of seaworthiness.

##### (4) Passenger transportation

Inter-country inland passenger transportation is required to register passenger nationality and name, which must be submitted to a competent government information system in an emergency situation.

#### **4.2.2. Inland mariner management**

The EU recommends requirements to member countries, allowing them to implement them in a way consistent with their own circumstances.

To curb unfair competition in inland waterways, seafarer qualification certificates are valid in all EU member countries, provided the minimum directive requirements are met.

A medical examination must be conducted every year, to ensure mariner's physical and mental health. Mariners must also pass a prescribed major subject expertise test, and member countries can make special provisions regarding mariners on passenger transport ships.

Training organization management by maritime agencies focuses on recognition of quality standard systems. The process of accreditation is rigorous. Due to competency training and academic education integration, there are no strict supervisory measures of training processes, aside from professional skills training and other special training.

Member countries have taken measures to improve mariner social status and working environments. Some countries also subsidize inland mariner training. After obtaining the required training certification, inland mariners can gain €25,000 as a reward.

Inland mariner watchkeeping standards in the EU are formulated based on the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers.

### **4.2.3. Hazardous chemicals transportation management**

The ADN contains detailed requirements concerning transportation of hazardous chemicals. Fourteen dangerous chemicals are prohibited. According to mandatory directive 96/35/EC, a dangerous goods consultant is required to give advise and supervise transportation.

### **4.3. Legal system**

EU law can be divided into directives, regulations, decisions, recommendations, and opinions. Most major changes to safety policies and standards are generated after major accidents.

The MTC initiated fitness checks of overall legislation in place to evaluate whether the regulatory framework for an entire policy sector is fit for purpose, and various ambiguities, overlaps, and inconsistencies have been discovered [4].

## **5. CONCLUSIONS**

Commissions within the EU and international organizations, such as CCNR, cooperate to take actions to ensure inland waterway safety and cleanliness. Generally, there is sufficient room in the legislative, executive, and judiciary for member countries to only comply with minimum safety requirements and make their own additions based on local situations.

In the US, the federal government provides a broad mandate for the USCG, hence law enforcement is highly unified. Boundaries between different federal departments, as well as the legislature, executive, and judiciary, are fixed and precise [5].

In China, inland waterways are governed by central and local authorities, and legislation and executive documents may not be consistent in various ways. To reduce potential risk generated by these inconsistencies, central government tends to adopt stringent and detailed management measures for critical inland waterway aspects, including vessel inspection, vessel standardization and retirement, mariner training, and hazardous chemical transportation.

China, US, and EU have similar in legislation revision, that most improvements are generated only after major accidents. To change this passive situation, governments should take active steps for risk identification and management. Changes based on legislation or administration studies could reduce the number of major accidents in the future.

### **Acknowledgments**

I am grateful to my colleagues Xu Liansheng and Wang Guobo, who helped me with the research for this paper.

This research was funded by the National Key Technology Research, the Development Program of the Ministry of Science and Technology of China (2015BAG20B01; 2015BAG20B04), and the National

Natural Science Foundation of China (41501561).

## References

- [1] Khandpur. "*The U.S. Marine Transportation System*", Proceedings of the Marine Safety & Security Council, Volume 68 Issue 2, pp. 6-10, (2011).
- [2] Gordon English and David Hackston, "*Safety Profile of the Great Lakes*," Research and traffic group, 2014, Ottawa.
- [3] EFIN Group, "*A new institutional framework for the European inland navigation*," EFIN Group, 2004, Paris.
- [4] Tractable Engineering, "*Support study for the fitness check evaluation of passenger ship safety legislation*," Tractable Engineering, 2015, Brussels.
- [5] George Clack, "*Outline of the U.S. legal system*," Bureau of International Information Programs the United States Department of State, 2004, Washington.