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WORLD MARITIME UNIVERSITY

Dalian, China

**STUDY ON THE OPTIMIZATION OF MARITIME
SUPERVISION SYSTEM IN CHINA MSA**

By

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The People's Republic of China

A research paper submitted to the World Maritime University in partial
Fulfillment of the requirements for the award of the degree of

**MASTER OF SCIENCE
IN
MARITIME SAFETY AND ENVIRONMENTAL
MANAGEMENT**

2016

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DECLARATION

I certify that all the material in this research paper 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 research paper reflect my own personal views, and are not necessarily endorsed by the University

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ACKNOWLEDGEMENTS

Forty six top students and outstanding maritime law enforcement officials, from all walks of life, came together to Dalian branch of the World Maritime University, it is my honor to spend one and a half years' time with them in such a beautiful campus at Dalian Maritime University. My classmates and me are like a family, and we study and live together very happily. During the study, we experienced a lot with each other, sharing both happiness and sorrow together; however, we were successful at last. We have a large team of excellent teachers, all of whom are teaching their specialties. Thank you for widening our mind, expanding our view and enriching the theoretical basis. All of you are very helpful to our future life and work!

I also thank Guangdong MSA so much for your consistent support and cooperation in the writing and completion of my investigation, who not only provided a lot of data, but also showed and explained the supervisory system, which made me full of confidence to finish this paper, and the thesis could have a better reflection on the current situation of maritime supervisory system.

I would also like to thank Mr. Zhao and Ms. Wang for the service during the study period, as well as the logistical support they provided which ensured my smooth study at school. I can be glad to meet you. I'm so lucky to meet you, my dear friends.

Appreciation also goes to professor Zhang Yingjun, who accompanied me during the graduate design period with strict and concentrated effort. I like him based on his erudition, enthusiasm and hearty talks and conversation with students by sincere urges.

Lastly, I would also like to thank my company to provide me with this opportunity to full-time study for one and a half years. I am so grateful to my wife. who is always very supportive to me.

ABSTRACT

Title: Study on the Optimization of Maritime Supervision System in China MSA

Degree: MSc

Maritime sector is on behalf of the government in accordance with the law of water traffic safety supervision and management of the competent authority. The trend of economic globalization has promoted the development of Marine economy and prosperity, the maritime management as to ensure the safety of water in the development of government behavior, to maintain the water traffic safety, maintaining the order of shipping market is critical.

The existing maritime regulation level already cannot adapt to the needs of the development of the situation, all kinds of deep contradictions gradually highlights, the maritime management puts forward new challenge, therefore, how to optimize the Maritime Supervision System, as well as adapt to the new situation and requirement of supervision in China MSA, has become a topic worth exploring.

Maritime regulation system has endured multiple transformations, but not complete, especially has yet to resolve the problem that caused low efficiency of the administrative supervision, resource waste. overstaffing in organizations, unclear responsibility, low job satisfaction badly hampered superintendence level. In addition, due to the current maritime supervision system software cannot solve the problem of

data island, there are single function business soft-wares which not only waste resources and increase workloads, but also severely hinder the construction of information and intelligence.

This paper started with the current situation of China MSA, analyzed the maritime regulatory system, methods, using literature studies, comparative studies, summarize and analyze research methods, aimed at the problems in maritime management and supervisory methods, based on the system background, and monitoring technology, put forward the perfect maritime management and operational advice.

Key Words: optimizations of supervision; maritime institutional reform; maritime management; modern means of supervision.

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LIST OF ABBREVIATIONS

CPC	Communist Party of China
CCTV	Closed Circuit Television
CHINA MSA	Maritime Safety Administration of the People's Republic of China
Direct MSA	Direct Maritime Safety Administration
HR	Human Resources
ILO	International Labor Organization
IMO	International Maritime Organization
J2EE	Java 2 Platform Enterprise Edition
FSC	Flag State Control
Guangdong MSA	Guangdong Maritime Safety Administration
MOT	Ministry of Transport of the People's Republic of China
PSC	Port State Control
PSCO	Port State Control Officer
PKI	Public-Key Infrastructure
SOA	State Oceanic Administration People's Republic of China
SSL	Secure Socket Layer
VHF	Very High Frequency
VTs	Vessel Traffic Service System

Chapter 1 Introduction

1.1 Background

With the world's rapid economic growth, the shipping industry has witness great changes, making coastal navigable waters traffic density increasingly intensive, and that is why people have higher expectations and stricter demands on them, What's more, the Third Plenary Session of the eighteenth Central Committee of the Communist Party of China has made a decision to launch the Reform of China's management system, the supervision and administration and rapid response capability of the maritime administrative institutions at all levels have been notably enhanced, and some new ways to maritime regulation have been brought in, the maritime administrative institutions at all levels actively develop intelligent monitoring system such as CCTV, voice auto broadcast VHF supervision information. But there will still be a long process to improve the application of technology and maritime management. The maritime system reform still has much room for improvement. Compared with other law enforcement agencies, such as Traffic Cop and Frontier Check Organ, the law enforcement officials at grassroots level still rely on the traditional backward method for waterborne traffic safety managements, with a high cost and low efficiency. Especially when the maritime institutional reform was finished at 2013, the number of the law enforcement officials at grass roots has been reduced. The contradictions between the rising regulatory pressure and shortage of expenditure are sharpening; therefore, how to optimize the Maritime

Supervision System, as well as adapt to the new situation and requirement of supervision in China MSA, has become a topic worth exploring.

1.2 Objectives

The main purpose of this study is to find adverse factors that exist in the maritime safety administration, by analyzing the current status of development of the maritime regulatory system and means, and to find the deeper reasons for troubling the maritime supervision means and system background of management issues. Finally, the author puts forward some practical suggestions to improve the current regulatory system.

1.3 Methodology

First of all, the relevant literature and maritime institutions at all levels around the meeting report were reviewed as much as possible. The data comes from the government official website or journal. Furthermore, a large amount of reliable data come from Guangdong MSA which is the most representative maritime bureau for the maritime business quantity and species by deeply investigation. The maritime professionals demonstrated how to use government system function model of ship superintendence and law-enforcement boats to relevant waters for patrol. Based on the locale research, all the data of investigation could mirror the maritime supervision situation and the problems existing in MSA's work.

1.4 Structure of dissertation

This dissertation consists of five chapters. Chapter one is commenced with the background information of China MSA and whole research background, with a brief introduction on the research significance and the research framework; and discloses China MSA's present situation and regulatory methods by introducing Guangdong MSA's Regulatory measures. Chapter two provides an in-depth analysis from the maritime institutional reform and the problems existing in the regulatory process, including regulatory effectiveness, staff motivation, the flaws of the regulatory system and so on. Chapter three puts forward some constructive management suggestions. Chapter four provides Some suggestions for technique optimization based on theory analysis and practical review. Finally, chapter five includes is the conclusion.

Chapter 2

The overall analysis of China MSA's present situation and regulatory means

This chapter introduces the status quo of maritime regulations and the trend of maritime institutional reform in recent years, introducing the Guangdong MSA case study that is used as an example to reveal the problem of ship maritime inspection, and trying to find the crux of the problem.

2.1 Analysis of the overall situation of maritime supervision

2.1.1 Maritime regulatory system

Maritime management organization is established to solve the contradiction between the development of shipping economy and the requirements of shipping safety and the environmental protection. It is a competent authority to exercise the administration of shipping safety and maintain the national sovereignty. The maritime institutional reform is from executive careers to civil servants in 2013, but at the same time, there is a great change in China sea surveillance policy: with a restructuring of China's top oceanic administration was restructured, unification of the coast guard forces of the Ministry of Public Security, the fisheries law enforcement command of the Ministry of Agriculture, and the maritime anti-smuggling authorities of the General Administration of Customs. SOA often is called China Coast Guard in the process of law enforcement at sea. China MSA is continuing with her duties maritime safety administration functions. (COUNCIL, 2013)

2.1.2 The MSA system and regional administrative system are not unified.

The areas of open waters and ports, inter-provincial channels are vertically managed by the central government which sets 14 Regional MSAs(Fig.2.1), and the other navigable waters are managed by the local government MSA which is comprised of 32 local maritime bureaus(Fig.2.2). The administrative management system of Regional MSAs is not unified, for example, the Yangtze MSA is led by Changjiang River Administration of

Navigational Affairs MOT and China MSA, while Guangdong MSA is directly led by China MSA. The administrative systems of the local MSA are not only manifold, but complicated: some are directly led by the local government, while some are led by the Transportation Bureau City. (Mengxin, 2014)



Fig.2.1: The Organizational Structure of Regional MSAs

Source: China MSA. (2016). Maritime Safety Administration of the People's Republic of China. <http://en.msa.gov.cn/index.php?m=content&c=index&a=lists&catid=329> , Government Websites, China MSA.

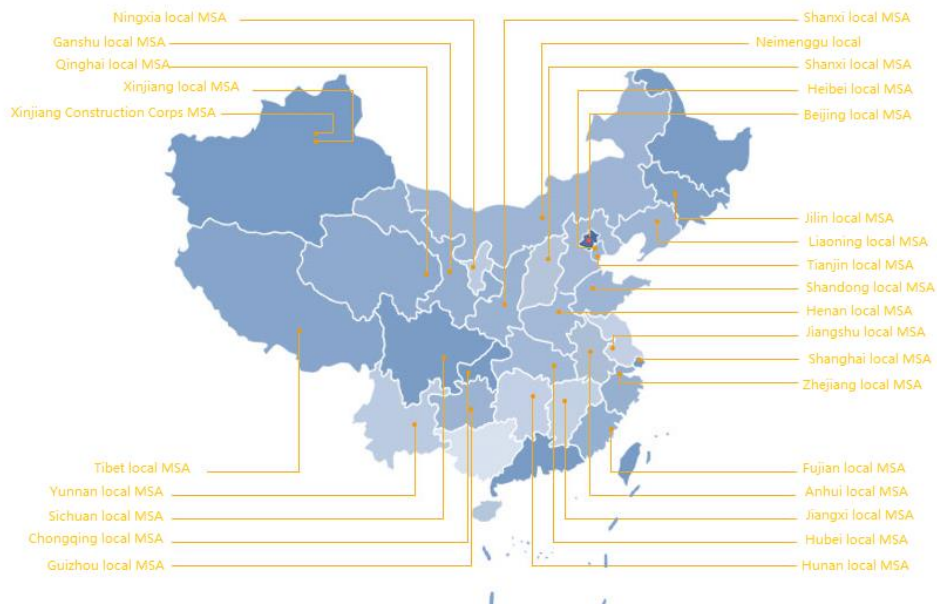


Fig.2.2: The Organizational Structure of The local MSAs

Source: China MSA. (2016). **Maritime Safety Administration of the People's Republic of China.**
<http://www.msa.gov.cn/page/orgList.do?channelId=1A6AF631-40EA-4679-9DF7-C1E8B257781F#difang>,
 Government Websites, China MSA.

2.1.3 The functional division of the maritime administrative institutions at all levels

From the perspective of government institutions, China MSA system works at Four-level Management: MOT MSA, Regional MSAs, Branch MSA and Marine Department. The functional divisions are different: MOT MSA is characterized as macro management, regional MSAs are given priority to with integrated management; the business management is the main work of Branch MSAs, and the main duties and responsibilities

of Marine Department are on-site supervision and management for water carriage safety transportation. Take Guangdong MSA for example, the hierarchy is shown in Fig.2.3.

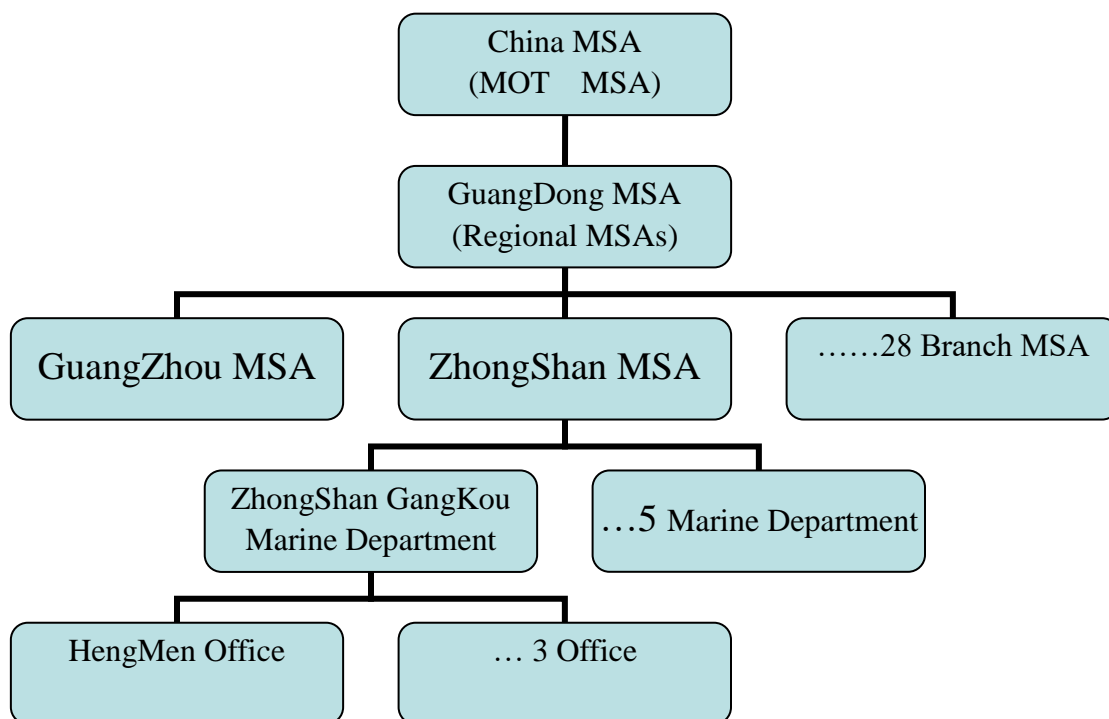


Fig.2.3: Guangdong Maritime Safety Administration Organization Chart

Source: Huawei. (2013). **The maritime institutional reform.** *Maritime law enforcement personnel training materials*, Unpublished lecture handout, Guangdong MSA, China

2.2 The problem determination on the maritime system

2.2.1 The configuration of Maritime administration power is not reasonable.

The core content of maritime management system are maritime management power and management function of the configuration. At present, the government power of China MSA includes the maritime administrative legislative power, the maritime

administrative permission, the maritime administrative coercive power, the maritime administrative punishment. The problems existing in power disposition cover the following aspects: One is the lack of high-level maritime administrative legislative power, the maritime institutions in maritime legislation, only the right of normal documents formulated, permissions and law making suggests no regulations. Huge expanse of sea and numerous maritime management activities need more legal controls not just the various domestic regulatory documents. Therefore, it is difficult for maritime administration institutions to guarantee to effectively perform their duties and exercise their functions and powers unless they are authorized a higher level configuration of legislative power. (Li YingTao, 2008)

2.2.2 The incompatibilities of government institutions to the development of shipping have become increasing apparent.

The present government institution of China MSA is consistent with demarcation of national administrative zones, Regional MSAs are set up in the provincial administrative regions, Branch MSAs are set up in the municipal boroughs, and the county level are the resident agencies (Hongping, 2004). But the areas of rivers or the sea are the geographic units for maritime governance which don't have the one to one corresponding relations with administrative regions. For example, as China's first and the world's third longest river, the Yangtze river flows through seven provinces and two municipalities, which is the only waterway traffic thoroughfare throughout the eastern, central and western parts of China, the 2100-kilometer-long main channel from

Chongqing to Anhui is Changjiang MSA's jurisdiction, but the more than 3,000-kilometer-long distributary channel is the local maritime bureau's municipalities; the border of some provincial and municipal administrative district boundaries are the centerline of rivers; in other words, the channel is divided into the left and right areas which are under different MSA's jurisdictions. (Jun, 2015) The designation of the jurisdiction area for each maritime administration organization based on the administration precinct violates the integrity of the maritime management. It could lead to the distribution of resources waste, and could not form into a joint force in the face of monitoring work, especially not conducive to marine rescue work. What's more, the independence of the regional MSAs and local MSAs could lead the ship sailing on the same channel has to accept the different management styles and increase the ship's operation costs, reducing the efficiency of administrative management. (Jun L. , 2013)

2.2.3 The multiple layers of China MSA institutions are not conform to the trend of administrative management institutional reform.

The current system is generally divided into five layers(as is shown in Fig. 2.3): MOT MSA, Regional MSAs, Branch MSA, Marine Department, Office. The five-layers institutions lead to conflict with different layers' responsibilities, the ring upon ring examine and approve of administrative permission lower efficiency of administration. What is worse, that is a waste of resources. With the completion of the transformation of central government, the transformation of the local government have been launched since 2003 in order to avoid the tediousness of ring upon ring examination and approval, and enhance its efficiency, but the institution of China MSA has not changed.

The super-ministry reform which aims at integrating government organizations, proposed at the 17th NPC, directs China's administration system reform to the right path and brings forward new opportunities. (Wuhan university of technology, 2013)The super-ministry reform is to restructure government institutions by cutting overstaffed organizations, reduce the difficulty of coordination between departments by streamlining the central-government bureaucracy into fewer but stronger agencies to cut red tape. In addition, it is helpful to resolve the main problems existing in the operation of powers of decision-making, execution and supervision which is due to unclear boundaries of power, weak supervision and system imperfection. (Shuyan, 2010)

2.2.4 The process of Maritime management lack necessary supervision and monitoring mechanisms.

The biggest disadvantage of the current MSA system is that decision making, implementation and supervision of the public policies are still handled within the same agency, and this has caused a lot of limitations, such as only focusing on a decision-making and enforcement process, ignoring setting special system of administrative supervision. It has become our common sense that the loss of power supervision inevitably leads to corruption. (Feng, 2015)

Through many years' exploration and study, China has established a set of power supervision mechanism, but not conforming to the MSA system, for example, the free judgment for maritime administrative punishment has a large scope for its development

and is often abused in the enforcement. The general supervision system of executive power can not effectively develop supervisory function in China MSA, due to the defects in the responsibility, power and accountability, as well as the lack of supervision by public opinion.

2.2.5 Maritime laws and regulations system are not sound, limiting the maritime supervision.

The legal bases of maritime law enforcement are listed in lines containing: “Law of The People's Republic of China on Road Traffic Safety”, “Environmental Protection Law of the People's Republic of China”, “Law of the People's Republic of China on the Prevention and Control of Water Pollution”, “Regulations of the People's Republic of China on The Prevention of vessel- Induced Sea Pollution” and so on, which is one of the fundamental bases, “Maritime Traffic Safety Law of the People's Republic of China” has went into effect for 33 years, since January 1, 1984. For the maritime laws and regulations' backwardness and lack of system, the maritime supervision encountered so many difficulties, such as the fines being too low to serve as a disincentive. Therefore, establishing a perfecting law system and updating the ideas of law are top priority for China MSA. (Yun, 2012)

2.2.6 The assignment of responsibility is not clear, and overlapping function crossing and conflict among laws are more and more.

Under the MOT, China MSA is the competent authority to exercise the administration of shipping safety and maintain the national sovereignty, and the main responsibilities include: supervising waterborne traffic safety and preventing pollution from ships, administrating the survey of ships and off-shore facilities, administering seafarers and pilots' training, examination and certification, supervising waterborne traffic order and navigation condition, investigating and handling waterborne traffic accidents and cooperate with maritime rights protection law enforcement action. (MSA, 2016) SOA has the similar duties: it should stop the illegal act of ship such as posing a serious threat to both sea life and water quality, and investigation of evidence. (SOA, 2016)

As is suggested above, the assignment of responsibility is not clear, thus easily leading to buck-passing among departments. For example, China MSA has both the ability and the responsibility of investigating and handling waterborne traffic accidents and ship pollution accidents. When the accident happened in the main navigation channel no matter the vessel is the merchant ship or fishing boat (MSA, The Introduction of China MSA, 2016), the State's fishery administration has sweeping investigative powers to the the accidents of fishing vessels happened outside of trunk line routes. The contention is that there was no clearly defined regulation such trunk line routes. (Zhang Xia, 2010)

2.3 The analysis of China's current maritime regulatory methods

At present, China's maritime supervision measures are divided into five contents, including navigation management, ship management, crew management, risk management, accident and emergency. (The optimization of the ship Regulatory measures, 2016) This paper takes Guangdong MSA as an example to illustrate the Chinese maritime regulatory means for the following reasons; Guangdong MSA is one of the top three oceanic areas' MSA, and has the jurisdiction of over 1/7 of the sea area of the country. The length of coastline is 4,176 kilometers, which is about one fifth of the country's coastline. The Length of navigable inland waterways is 13,600 kilometers, which is about one an eighth of the country (Fig.2.4); Guangdong MSA has 92 marine departments, the type and amount of supervision business rank front in the whole country (Fig.2.5).

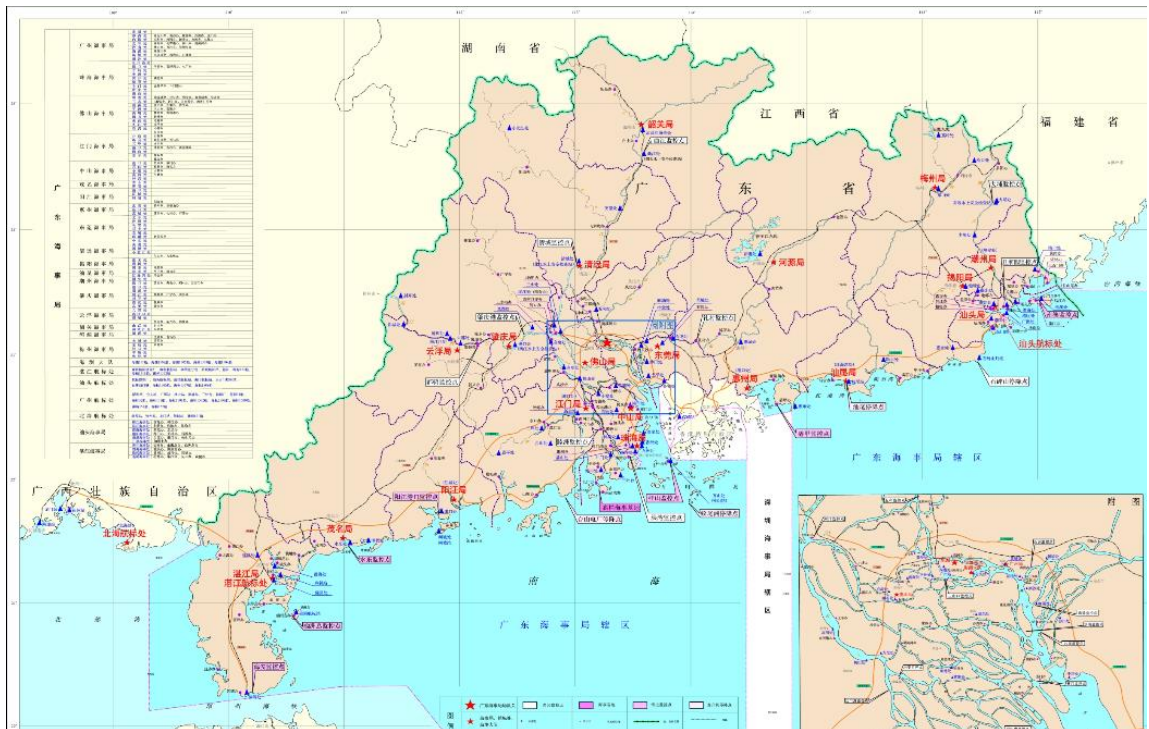


Fig.2.4 Guangdong Maritime Safety Organization Illustrations Chart

Source: Guangdong. (2013). *Guangdong Maritime Safety Organization Illustrations Chart*. The Institutions and control plan of Guangdong MSA
<http://www.gdmsa.gov.cn/gd/ShowArticle.asp?ArticleID=338>

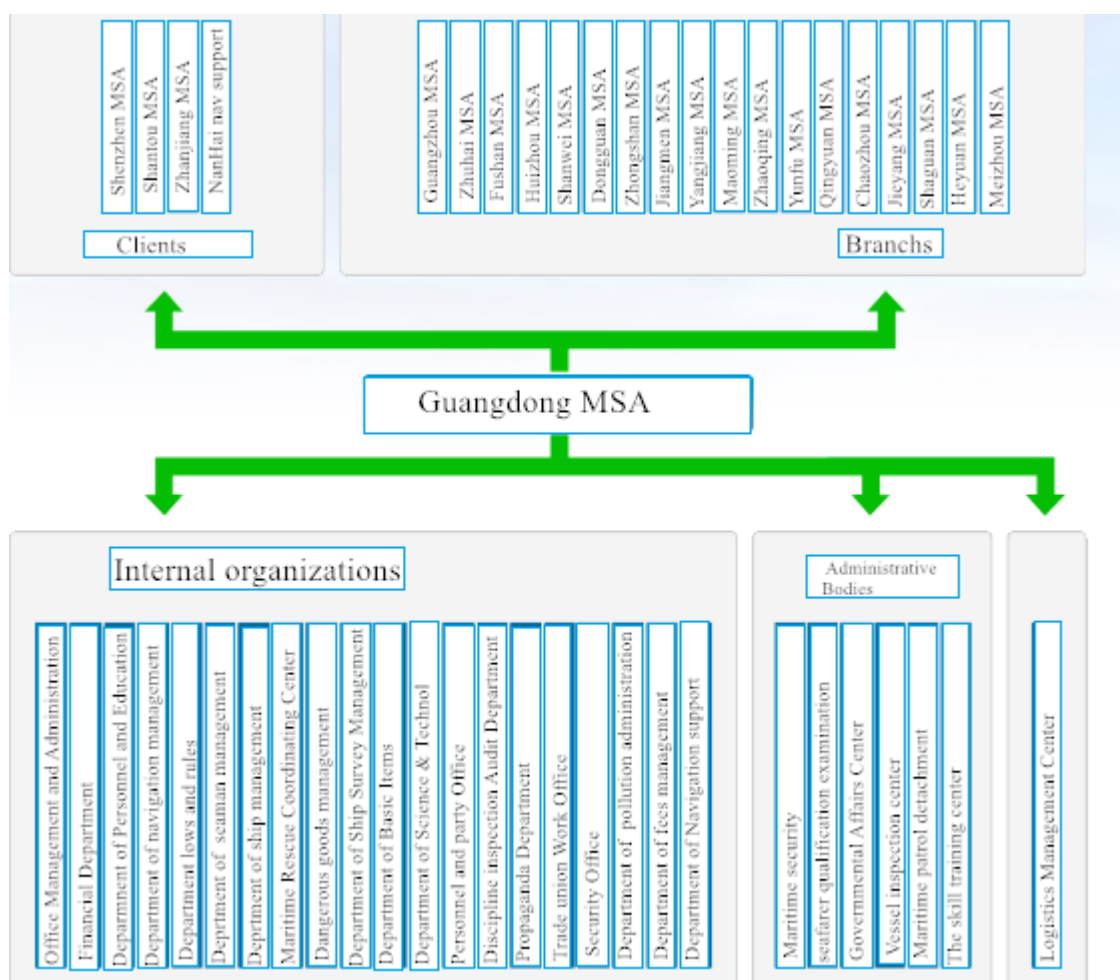


Fig.2.5 :Guangdong Maritime Safety Organization Illustrations Chart

Source: Guangdong. (2013). *Guangdong Maritime Safety Organization Illustrations Chart*. The Institutions and control plan of Guangdong MSA
<http://www.gdmsa.gov.cn/gd/ShowArticle.asp?ArticleID=337>

2.3.1 Regulatory methods of Guangdong MSA

Regulatory methods of Guangdong are divided into dynamic and static supervision. Maritime dynamic regulation refers to the maritime administration, responsible for the supervision and inspection on navigation environment, the ships, which are engaged in navigation, berthing, and operations, as well as the implementation of the prevention of water traffic safety and pollution prevention control against emergency management and emergency response actions.

Navigation management refers to the maritime traffic safety management institutions implementing the management on the ships behavior, environmental conditions, according to the relevant state laws, regulations and administrative rules and regulations, the main management methods include regulation management, vessel traffic management, on-site cruise control, navigation mark management, order of water traffic management and organization, navigation security, and so on.

Daily patrol inspection: this is an active search behavior of maritime administration organization in accordance with the law of jurisdiction waters, on-site inspection of ship complied with the requirement of the channel, route, the ships' routing system, collision avoidance rules, the pilot, traffic control and other related safety regulations. It is to ensure the safety of navigation environment; water construction works on whether there is violation of the regulations on safety and pollution prevention; monitoring water wireless radio communication order to decide whether there is any infringement of our country's sovereignty and maritime rights and interests.

The navigation environment is the objective existing external environment of sailing ship's safety, and the stand or fall of navigation environment have a huge impact on marine traffic safety. Traffic environment refers to the required conditions of ship facilities sailing or anchoring on the water, including on the surface of the water, under water, above water, along the coast to influence the safety of water traffic.

PSC refers to the Port State carrying out the monitoring and control on the foreign ships which enter the Chinese port according to the standards prescribed by the relevant international conventions, to ensure that the ship and its equipment, manning and operation are in accordance with the applicable international standards.

FSC is a ship inspection program that is carried out by China MSA for the safety inspection on the ships with Chinese flags, in order to ensure the vessels are in accordance with the local regulatory requirements and the relevant international conventions. The main bases for inspection are the International Conventions, ILO conventions, and Chinese laws. The focus of the inspection is mainly on the certificate of the legal crew manning and treatment.

Ship Reporting Systems: Sailing in a certain area, the naval ships should provide navigation information to the report center by using a certain communication program. The information is used for distress, search, and rescue, transportation, weather forecast, prevention of marine pollution and so on.

2.3.2 The static regulation plays an important role in the source management.

Administrative license regulation is the main means of static regulation, including in and out of the license of the port the ship registration, vessel inspection certificate, dangerous goods declaration, garbage disposal, the shipping company to check, the crew the examination and certification, and so on.

Ship registration is an important way of supervision and control of the ship's safety and management, and the purpose is to get the goal of protected property by preventing marine environmental pollution, through the establishment of the real contact between ship and the flag state.

The supervision on the quality of vessel inspection is an important means for effective regulation on the inspection authority for shipping and engineering used by China MSA. The ships examination bureau is a recognition organization, which obtains the recognition of qualifications, and has the right of inspection and certification of vessel. China MSA is responsible for inspecting the organization. Before issuing a certificate, the ship's examination bureau should make sure that the ships, offshore installations, the materials and equipment, technical conditions are in accordance with the requirements of ship inspection specifications and regulations of the international convention, national laws and regulations, technical standards based on inspecting the hull structure, safety performance, power plant, safety equipment, the inspection and testing of materials and components.

Ships entering and leaving the port management means that before temporary entrance and leaving the unopen port or coastal water areas, the foreign vessels shall apply for visas from local MSA with the help of their agencies.

With the development of science and technology, the major ports around China have established the VTS that integrate the resources of AIS base station, radar, CCTV, VHF and terminal communication facilities. The purpose is to monitor ships sailing in the harbor or port, and provide the necessary safety information, to help the ship's voyage. The system software can provide the navigation data such as position, course, speed, routes, which could help the crew and the watchkeepers of MSA to make an informed judgment.

2.3.3 Analysis on the trend of maritime regulatory means reform within China's coastal waters

Many experiences from the maritime administrative institutions at all levels show that the traditional supervision mode and process cannot effectively exam, identify, control or manage the navigational risks. More and more people are realizing that the maritime business system's soft wares, which have run for many years, have accumulated a large amount of ship data. The data resources can be integrated, further digged and transformed to get more reliable and valuable information for safety supervision. Therefore, some Regional MSAs want to design a new software platform in order to

achieve the goal of the intelligence and science, which is called “intelligent building” or “wisdom regulation”.

Wisdom regulation means to build a the new pattern of maritime safety administration by means of information technology. Comprehensive use of information technology in the area of maritime supervision and increasing utilization of social monitoring resource are the ways to promote the safety information integration and sharing, in order to improve the efficiency of supervision. (Chen, 2015)

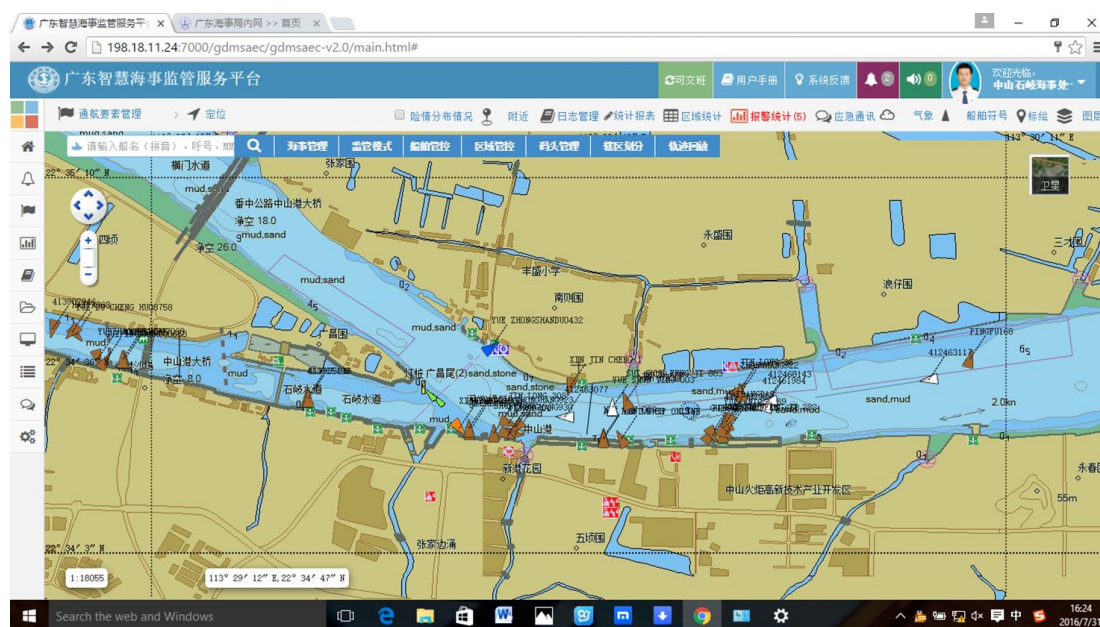
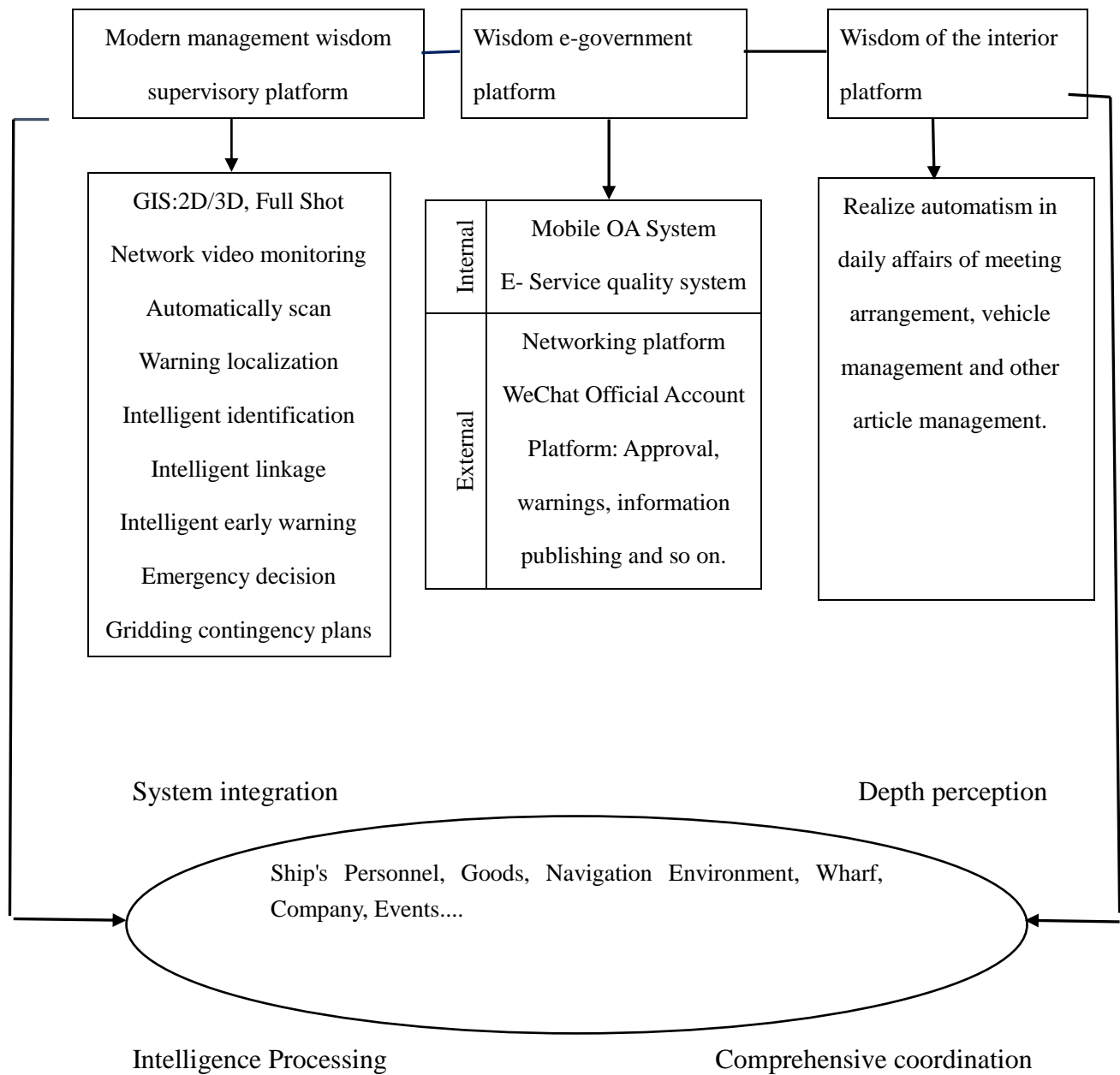


Fig.2.6: Guangdong Maritime Wisdom Supervisory Service Platform Chart

Source: Guangdong. (2016). *Guangdong Maritime Wisdom Supervisory Service Platform Chart*. The screenshot of Wisdom Platform

The core of “wisdom regulation” is the informationization building, putting the security elements into digital ones and carrying on the processing. Guangdong MSA is a representative; as its affiliations, Zhongshan MSA has run the software in a test which is named Guangdong Maritime Wisdom Supervisory Service Platform(hereinafter referred to as Wisdom Platform) as shown in Fig.2.6. Following the maritime information systems and SOA framework, the J2EE standard is based on the maritime big data, cloud computing and integration of multiple functions such as dynamic regulation of ships, marine salvages and vessel pollution accidents from Internet of Things Wisdom Platform. The advantages are intelligence and information fusion which could lower human investment and increase the speed of emergency reflection, The whole system architecture is shown in the Fig.2.7.

Fig.2.7 The system architecture of Wisdom Platform



Source: ZhongshanMSA (2015). *Guangdong wisdom construction of maritime safety administration*, China MSA, 5(65) Guangdong, China.

2.3.4 The system function introduction of Wisdom Platform

Wisdom Platform has four major regulatory functions: the waters of the regulatory, Ship's safety regulation, seasonal safety supervision, navigation safety regulation, which covered almost any possible requirement of managing business processes. The import details appear as is shown in Table.1

Table.1 Table of the platform functions

Table of the platform's function				
function blocks No	The waters of the regulatory	Ship safety regulation	Seasonal safety supervision	Navigation safety regulation
1	Bridge area water safety regulation	Ferry-boat transport safety regulation	Tropical cyclones	Electronic cruise
2	Dock area regulatory	High-speed passenger ship safety regulation	Storms and strong wind	Traffic control
3	Anchorage safety regulation	Water tourist area safety regulation	Fog	Ecort saftety regulation
4	Construction areas regulation	Ship in and out of the port visa regulation	Flood season began	
5	Navigation locks	Dangerous goods	Dry	

	water areas regulation	vessels safety regulation	seasons	
6	Underwater pipelines regulation	Sand carrier safety regulation	Long holiday weekend	
7	Water intakes regulation	Foreign ships safety regulation		
8		Ship sea trial area safety regualtion		
9		Detained ship control		

Source: ZhongshanMSA (2015). *Guangdong wisdom construction of maritime safety administration*, China MSA, 15(65) Guangdong, China.

Each function module could automatically check the ship's certificate data and set different regulatory rules according to the need of the regulation, the displacement of the alarm, and provide recommendation of water safety supervision, especially the powerful statistical functions, which can provide data support for the inspection plan.

2.4 The trends of maritime supervision means and the reform of regional maritime institutions are not unified.

2.4.1 There is no unified development planning for maritime business system.

Reports indicate that there are two important actions in Shanghai MSA. One is to greatly promote the use of Electronic Government software, the goal is to improve administration efficiency and service level in order to facilitate the masses and supervision. The second is to develop Mobile terminal for law enforcement. In other words, the software is developed to provide information for law enforcement personnel on the spot, and advantages of software are information query and file management. In contrast, the wisdom of Guangdong MSA regulation platform is the comprehensive regulatory system software, and its characteristics is data integration techniques. The video frequency and data signals are transmitted to the software which integrates several system's software, such as "ship registration system", "inspection and certification system of the ship". All data are used to help the observers to determine whether the ship has violations or defects.

Thus, the ideas of system design are different: Shanghai MSA focuses on providing information support to field of law enforcement personnel, and the software, which is developed by Guangdong MSA, is used to provide reference information for decision makers.

2.4.2 There are many different kinds of system software, and the functions are relatively independent.

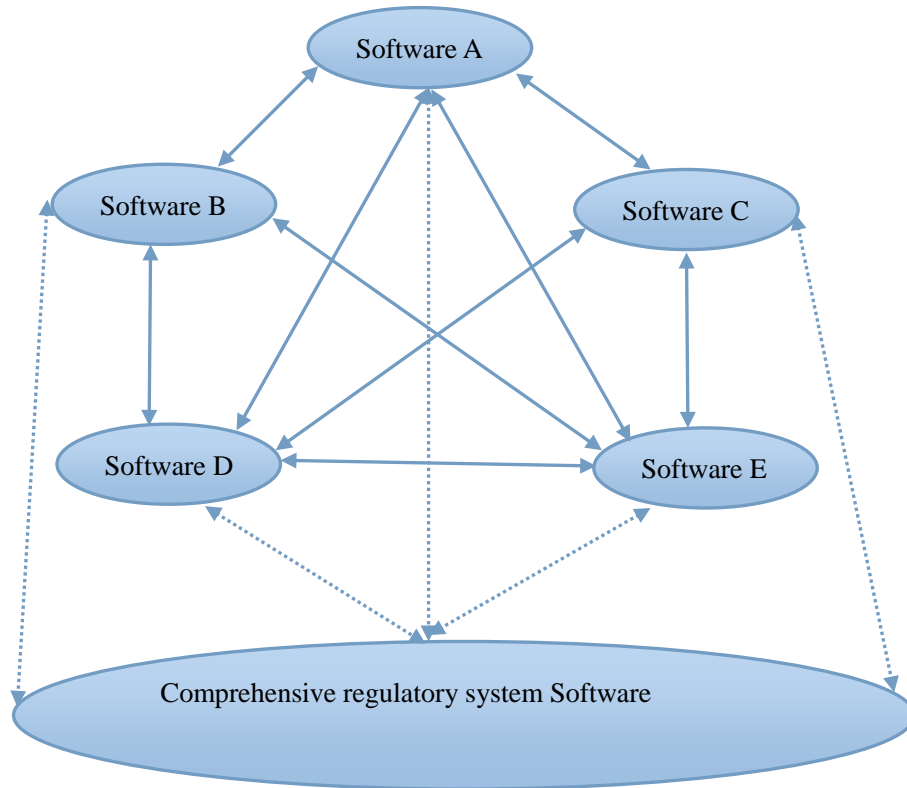
Maritime business systems, which cover the every maritime work, are various, almost every management content or business has its own operating system, which is developed

by MOT MSA, or regional MSAs. During the last several years, the MSA of provinces and cities are developing systems and software. For example, MOT MSA has developed the following system: “Inland River Crew Management System”, “Vessel Crew Management System”, “Ship Management System”, “Ship Registration System”, “Ship Identification Number Management System”, “Maritime Accident Investigation and Handling Analysis System”, “Ship Inspection and Certification System”, “Maritime Business Data Statistics System”, “E-visa System” and so on. The above systems are used by the maritime administrative institutions at all levels, as well as the “OA system”, “Mobile Terminal for Law Enforcement”, “Administrative Punishment”, “Dangerous Goods Declaration System”, “AIS monitoring and control system of the south China sea”, “CCTV monitoring system”, “Crew the examination and certification system”, “ship security system” are developed by the regional MSAs. The reason for this is that it has not carried on the feasibility analysis to the system development, and has not made the system’s whole plan in this foundation. The maritime administrative institutions at all levels are not harmonious, causing fluctuations between business systems which are not compatible.

The independent operation of various kinds of business software relatively are not conducive for data exchange and sharing. The software is running alone in good condition, and the accumulation of a large number of business data and lack of unified standard causes the difficulty in data sharing. (Yong, 2009)

2.4.3 This sets up a vicious circle of increasing myopia, with more system software, and increasing difficulty of data sharing.

Fig.2.8 The diagram of communication



Source: the Author (2016) Guangdong, China.

As can be seen in Fig.2.8, the five kinds of software need ten lines of communication, and each additional system requires five additional channels of communication. In practice, things aren't so simple: to establish five channels of communication are more difficult than to build a new system itself. Therefore, compared with the integrated

database resource, the maritime administrative institutions at all levels prefer to develop a new software rather than integrate database resource.

2.4.4 The “Data Island” phenomenon makes it difficult and ineffective to be integrated with other applications.

“Information island” refers to the relatively independent maritime business system database, good internal communication data transmission, external data is not compatible, and relies on an artificial way to intervene. (Bertalanffy, 1987)

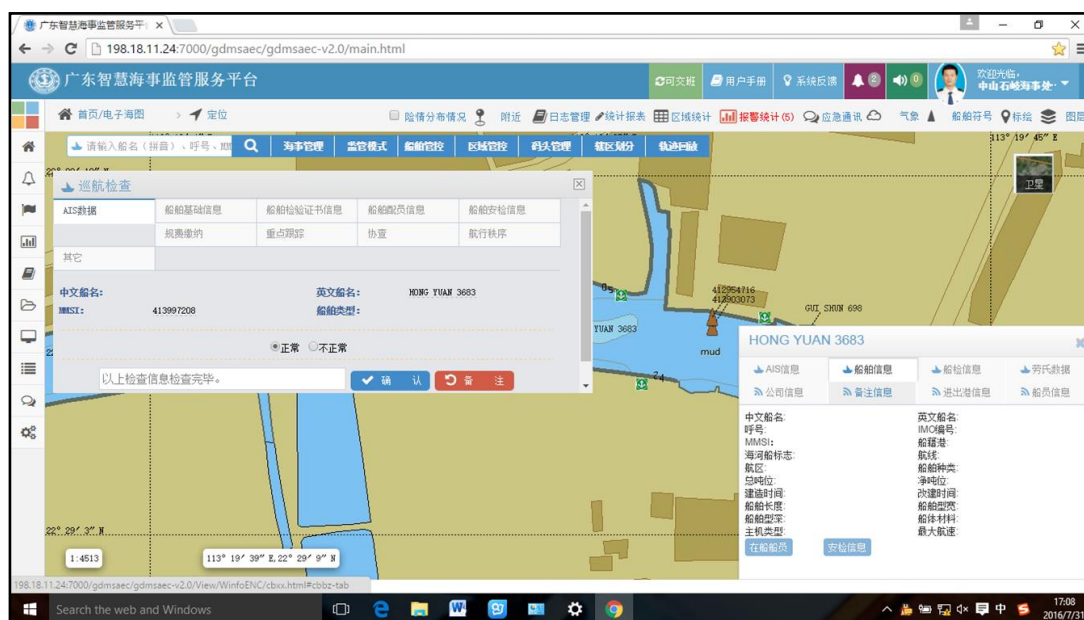


Fig.2.9 Guangdong Maritime Wisdom Supervisory Service Platform Chart

Source: Guangdong. (2016). *Guangdong Maritime Wisdom Supervisory Service Platform Chart*. The screenshot of Wisdom Platform

The different data and programs lead to different systems and produce information which has different meanings. The computer can't automatically recognize of these differences. The companies which undertake the development and maintainment of the system softwares are not willing to share the database schema of their products with the purposes of maximizing their economic benefits, the “Information Data” comparison can only be done manually by the people, which will cause a decrease of work efficiency. For example, ZhongChuang engineering Co., Ltd is responsible for the maintenance and management of the ship registration system database entrusted by the MOT MSA, and the wharf owners are responsible for the Port CCTV monitoring data. The types of data are determined by the devices. (Wei, 2013) Considerations are for the sake of their own interests, and they are not willing to cooperate to provide information. and China MSA lacks this ability to obtain the dock video monitoring data without the cooperation of Port Management Authorities, as is described below:

- The information which comes from the different system software cannot be shared and lead to repetition of effort.
- The verification and consolidation of data need to be done by hand as well.
- The doubt of the accuracy of data between departments, which leads to the contradictions.
- Important data management department is equivalent to have special powers. It is difficult to control, and may even lead to power abuse for personal gains.
- The difficulty of data aggregation will influence the decision. As shown in Fig.2.9, the data dearth doesn't necessarily stop, the informations of the ship are blank.
- Greatly increasing the amount of system maintenance personnel to maintain and high maintenance cost.

- The continued accumulation of a large number of redundant data and garbage data, may not only increase the storage costs, but also easily to cause confusion information.
- The inconsistency of the data information is against the exchange between different regions.
- The complex software of inner system reduced working efficiency.

The disadvantage is summed up in the phrase ‘Lack of consistency, duplicate data entry’.

2.5 Maritime system reform lead to the inappropriate use of human resources.

The adjustment and reform of the structure and organization of China MSA were finished in 2013. The management of post setting had a big change. The Section Marine Department has abolished authorized the directors of office and the leaders of Law Enforcement Team, although the purpose is to alter the bureaucratic style. Only the director and deputy chief of Marine Department are left. The HR of law enforcement power has weakened, and more resources are put into authority offices whose main work are to hand out orders and provide business coaching for the front-line law enforcement officers. Direct influence is that the number of generals is larger than that of soliers. There is a close relationship between the employees’ sense of fairness and their initiative in work in a organization (Miao, 2015). The stress of work and unmanageable workloads could affect their working enthusiasms of the law enforcement personnel directly or indirectly. According to Zhongshan MSA's website, the total number of Zhongshan MSA staff is 112, and the number of the law enforcement officials at grass roots is 45, the proportion is below 50%, compared to the 90% business volumes, the share is too little. Data also showed that in fact the proportion is less than 30 percent.

2.6 The incentive policy based on the current maritime institutional is not scientific.

A rapid expansion of universities over the last decade has resulted in more and more new graduates' and young crew's entry into maritime team. According to the stipulation of Civil Servants Law, China has carried out the national united wage system which combines the duty with the rank. The wage system of China MSA has a close connection with the duty, due to the fact that only a few workers could enjoy new level treatment coming from advancement in ranks. (Jieming, 2014) The lawlessness can happen for many reasons, and the basic one is that only a self-regulating body can exist when it's a non-regulating body.

The job promotion is the only channel for law enforcement officials to enjoy a better treatment. The number of leadership positions remainse unchanged unless the department grade has been changed. The numbers of youth feels chances of getting the promotion is getting less and they are easy to grumble. A survey of 24 to 35 year olds in China MSA has found that 70% of them are dissatisfied with their career planning. (Gaoju, 2013)They think the wage promotion channels is not scientific, however hard you may work, your wages stagnated. In other words, the current incentive mechanism of the effect is not obvious.

The number of leadership positions accounts for 35% of the total number of position in Zhongshan MSA. There are officers under-24s and 35s but the biggest challenge is where are they going to get the opportunities for promotion in the next few years. (Gaochang, 2015) Many youths are the backbones of business technology and do the majority of the

work, but the wages are the lowest in the maritime bureau. The longer,they stay, the more likely they are to lose motivation and confidence.

Chapter 3

Puts forward some constructive management suggestions.

3.1 Reforming maritime system is the key to dispel regulatory barriers from origin.

3.1.1 The principles of “Four Unifications” are key to management solution.

Maritime management system should adhere to the four unifications: unified set of institutions, unified configuration and functions, unified management standards, and unified law enforcement. Only the realization of the four reunifications can provide better management and service, as well as improve people's satisfaction. Our country's maritime institutions shall also follow the principle of unified performance management reform.

In order to achieve the objective of using the minimal of administrative costs in exchange for the biggest effect, China MSAs should reduce the hierarchical levels in institutions, optimize the organizational structure, unify management system and running mechanism standards, as well as improve the working efficiency. The specific

measures are using the personnel to find a better way to simplify the affairs-handling program, rise work efficiency, provide convenience to the masses, conduct an extensive research and analysis. From the national level, the organization reformand indicates the path to victory of revolutions for simplifying government agencies.In my opinion, simplifying government agencies doesn't mean that we have to reduce the number of personnel, but to be more scientific and make better use of human resources, making more social contributions. (Zhaozhong, 2001)

3.1.2 Integrating government organizations into a comprehensive unified law enforcement.

The US marine expert Burnet believes that the State should set up a specialized marine management committee, formulate unified Marine development policy, and coordinate various marine departments to carry out a comprehensive marine management. According to the direction of Maritime development in the future study, World Maritime University points out that Maritime authorities should shifts their focus gradually from the traditional safety management of the ship to provide safety information service and Navigation Guarantee for shipping companies, and maritime law enforcement will be gradually extended to the ocean. The famous scholar Pro Ma believe that the state parties should fulfill the convention in good faith and bring the domestic law in line with the international agreements, promoting global maritime administrative cooperation, and advancing uniform rules. A growing number of professionals in Asia and the West is declaring that the maritime officials should be devoted to improving the level of shipping information technology, as well as upgrade

the maritime security facilities in order to support the development of the world's shipping safety. (Honghai, 2014)

The successful experience of developed countries is the unification of maritime management system which is also the inevitable result of the market economy, such as the United States Coast Guard. Because of its large volume, long haul distance, low cost and the characteristics of relatively safe environmental protection, the waterway transportation occupies a large share in the world trade and transportation. Relatively sluggish, the subjective reason is that many people think inland transportation is more important than waterways in thought, and the insufficiency of investment on the fundamental construction of shipping is an objective factor. The lagging of managing system of bulk management and regional segmentation also restricts the development of the shipping economy. Therefore, promoting the reform of maritime affairs management, fully understand the connotation of the maritime management and constructing an comprehensive unified system could optimize the Maritime Supervision System in China from the source.

In the aspect of administrative law enforcement, the western developed countries adopt a unified comprehensive law enforcement measure. The established management mode that meets the needs of comprehensive Marine management system, and one law enforcement team performs multiple inspection functions. The common practice is a relatively concentrated administrative punishment, merging many overlapping systems of accountability. There are three advantages as follows: First, it can not only greatly save the cost of law enforcement, but also to streamline institutions and personnel;

Second, it is conducive to the improvement of the traffic law enforcement image, convenient to the administrative person concerned, and beneficial to overcome intrusive or law enforcement; Last but not least, it can eliminate the multi-sectoral accrual of fork, the disadvantages of mutual restriction and conflicting policies from different departments.

3.2 Establish a unified standard of on-site enforcement procedures in order to avoid the lax law enforcement

Whether the selective application of law goes rational and legal or not depends on its positive or negative value. The report of unannounced visits shows that at present the phenomenon of selective and tent towards interest law enforcement exist everywhere. Despite these different excuse such as PSC, FSC or not having enough hands, nothing could mend these defects or cover them up, which remains to have a bad consequence including low operation efficiency and poor service. The imperfectness of law enforcement standardization should be solved by legislation, and the mal-enforcement of law can be solved by case auditing.

On August 5, 2015, issued by the general office of the state council, “the notice about promoting random inspection specification matter later regulatory” (hereinafter referred to as the "notice ") promoted the work deployment for the standard of random inspection regulatory. The propose is to solve the problem such as the wayward inspection and law enforcement, judicial injustice, lax law enforcement. The maritime administrative institution shall take the following measures: one is to make a random spot check list.

Nobody could check the the review content in the absence of provisions in laws and regulations without special authorization. The content which often leads to hazardous consequence can raise the proportion of random sampling in the inspection work. The second is to build a real-time and stochastic supervisory mechanism model, and the reconnaissance missions should be randomly allocated to PSCOs, with stricter laws and regulations in order to put the power of administrative discretion in its proper place, curb the rent-seeking behaviour; The third is to determine the ratio and frequency of the inspection according to the type of ship, cargo, tonnage, and so on. The fourth is to establish a assessment-and-feedback system, with a scientific use of data.

3.3 Improve the institutional construction

3.3.1 Improve the level of business management, establishing the corresponding management system.

The Maritime informationization level not only depends on whether advanced information application system is built, but also depends on the good management. The data collection, storage, cleaning and maintenance work are the most important basic work affecting the data quality. Connected with the practical situation, the unified procedures and standards could provide some technical support for the operators, ensuring that the system operators know the operation process clearly; Establishing a strict data monitoring system could avoid errors of data entry due to the post rotation; Setting the permissions of system operating account, is aimed to avoid the cases that no historical record and reference after the data has been modified or deleted afterwards; There are many problems in databases, such as redundant data, missing data, uncertain

data, inconsistent data, and so on, and these are the barriers to knowledge discovery. It is necessary to set a data encryption security by using the SSL protocol to provide authentication, data encryption, and data integrity, in a PKI. It is important to establish a system of personal responsibility with clear job responsibilities, to formulate rules and regulations of penalties and rewards, creating a good management system.

3.3.2 Establish and perfect the maintenance system of maritime business system.

A survey found that many original MSAs believe that only the information infrastructure is the key content of the maritime information construction, and the lack of maintenance planning leads to the high budgets hardware and software. During the running system of some big software, the establishment of Standard Operation Procedures of submission, processing and result feedback would help prevent a lot of people from reporting the same error. The classification of problem is not clear between technical problems or software failures. System upgrades are frequent, and the lack of version control procedure, system upgrade instructions or manuals increase the operating personnel's difficulties. The valuation of the system of the business lies in its operation results of whether its business objectives are achieved. It is important to clear the rights and responsibilities of business data maintenance, make sure that the business system has the functions such as advance warning, process control and monitoring, the management of disaster backup, audit module combines artificial intelligence technology and set up rigorous data quality supervision mechanism.

3.3.3 Establish a supervision means evaluation mechanism

The importance and popularity of software evolution increases as more and more successful software systems become legacy systems. It is important to finish and improve the system and mechanism to monitor, evaluate and control the software quality, create the environments, and provide conditions for intelligent supervision better. The evaluation mechanism of software plays an important role in the development of software. The specific content is to conduct an in-depth assessment on business software and means of supervision based on meeting established metrics, to make relevant recommendations. There are two evaluation indexes: One is human resource reduction, and the transformation of scientific and technological achievement is a key linkage in which science and technology forms the productive force. The Wisdom Platform has not been evaluated and entered into service in 2015. (Yu, 2015) According to the practical running situation, the Wisdom Platform has little impact but adds the workload due to the designated persons for individual posts. In addition, many officers mutter about the unreliable data which cannot be referenced directly. The second indicator is to improve emergency response capabilities, and one of the most important responsibilities is to supervise waterborne traffic safety and preventing pollution from ships, investigating and handling waterborne traffic accidents, ship pollution accidents, as well as search and rescue at sea. Therefore, China MSA should have a rapid emergency response capability and the handling capability.

3.3.4 Establish the mechanism of performance evaluation

The government performance evaluation theory is the instruction, according to the basic characteristics of the Marine department public and target requirements, combining the problems existing in the maritime safety administration, and regular evaluation of maritime business system implementation:

◎Control related public service commitment, work flow, the operation rules, service time limit, service standards to evaluate, to ensure an effective implementation of marine services.

◎Strengthening the external evaluation or mass supervision mechanism. Evaluation of Maritime service quality should be in accordance with the administrative person concerned and their expectations, so that it can show the service quality of MSA. The maritime administrative institutions at all levels shall provide various channels for mass supervision,including blogs, e-mails, social networks and text messages.

◎Evaluation conducted by the independent third party is a very good choice for the fairness, honesty and consistency of assessment process.

◎Reinforcement for the application of assessment outcome: we should pay enough attention to the assessment outcomes, to improve workflow, perfect service system, and feed back information timely to the broad masses.

Chapter 4

Some suggestions for technique optimization based on theory analysis and practical review

4.1 Take measures to prevent Information and Resource Island

In order to eliminate the “Information Island”, it is necessary to understand the reasons. The lack of data exchange and synergy among different business units leads to the information’s inconsistency with each other. For example, in the process of ship registration, if the ship registration system software can directly import information coming from the vessel inspection and certification system, that can avoid duplication input and input errors. What’s more, that can also streamline the ship registration processes. But in reality, this is very difficult. The “Ship registration system” and “the vessel inspection supervision system” belong to two different functional departments, and partial data caliber is inconsistent. For example, the types of machinery automation, hull material information do not have a unified standard in the two system softwares, which can not be directly used for data exchange

4.2 Standardization is the basic strategy to eliminate Information Island

The standardization of information system shall comply with the following principles: the first is the Unified Principle, which could ensure the internal logical consistency, and then, the information can be transferred between different systems; the second is the abstraction principle, standardized information system must achieve

sufficient abstract design level, in order to satisfy the caller identification. Otherwise, new development of the system may not be able to be identified; the third is the complete system expansion, because only one company can not complete system expansion, and the complete system expansion can be coordination between different systems; the last principle is the Rule of extensibility, designed for the future, because it will be here sooner than you think.

In order to solve the problem about Data Island, the intact scientific the informatization standard system which has been a well-accepted development practice, Its main tasks are: data standardization, process standardization, information standardization, function data standardization, software design standardization.

Chapter 5

Conclusion

Although there are many problems of Chinese maritime supervision both in terms of system software and the human resource allocation and supervision methods. However, as long as we can realize the existing problems and try to improve, the Chinese maritime supervision will be the biggest optimization. Therefore, we should continue to improve maritime institutional reform, making it more conformable to requirement of regulation, explore the rational allocation of human resources, establish the effective mechanism of rewards and punishment in order to arouse the enthusiasm of law enforcement personnel, improve the evaluation mechanism of regulation means and the development of the

software platform, make supervision system more in line with the actual needs of regulation, and conduct an integration of the system data to establish a unified database.

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