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WORLD MARITIME UNIVERSITY

Dalian, China

**ANALYSIS ON THE CONSTRUCTION OF
MARITIME INVESTIGATION TEAM IN
CHINA**

By

REN ZHENGKUN

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 ENVIRONMENT MANAGEMENT)

2021

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:

Date:

Supervised by:

Supervisor's affiliation:

ACKNOWLEDGEMENT

Learning in MSEM project is coming to an end. Looking back on this learning experience, I have too much emotion to express. Although the time is not long and the courses are intensive, I deeply feel that all the efforts are worth it. After this period of study, I have learned a lot both in life and work, and also learned a lot of valuable knowledge and experience from the students around me.

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I would also like to thank Prof. ZHAO JIAN and Mrs. ZHAO LU. During their study in our school, you have provided various subsidies for our students, both in life and study, so that our learning process can go smoothly.

Finally, I would like to thank WMU and DMU for providing this opportunity for me to improve myself. All my family and friends who have helped me in my dissertation writing and past study, you have made me feel the warmth of home at any time and any place. Thank you very much.

ABSTRACT

Title of Research paper: **Analysis on the construction of maritime investigation team in China**

Degree: **MSc**

Maritime investigation is the basis of maritime safety administration and an effective way to promote maritime transformation and upgrading and improve the management level. The maritime investigators are the key factors affecting the work of maritime investigation. Strengthening the construction of maritime investigation team can better resolve social conflicts and disputes, avoid mass incidents, and maintain social fairness and justice. The high risk of shipping requires the government to formulate strict maritime safety regulations and carry out maritime safety administration. Strengthening the construction of maritime investigation team is the top priority of China's maritime investigation work in the future. The construction of the maritime investigation team is related to the long-term stable development of the maritime system, and also related to whether each maritime investigator can fully develop their potential and improve their quality, so as to adapt to the rapid development of the industry.

At present, in China, the status of maritime investigation team restricts the development of maritime investigation and the level of maritime investigation. There are many problems in the construction of China's maritime investigation team. For example, some departments simply understand the team construction as the setting of personnel policy, and they believe too much in concept and practice in the past;

There is no clear post setting, and they have multiple responsibilities; Due to the lack of incentive mechanism, the salary level and the contribution and value of the investigators can not be reflected equally, which leads to the low enthusiasm of the investigators; The training of investigation management can only be compulsory, etc. These problems are in contradiction with the construction goal of China's maritime investigation team and the demand of talents for their own development. They not only cause the waste of human resources, but also cause a large number of brain drain of maritime investigation team, resulting in the stagnation of the development of maritime investigation.

This dissertation analyzes the new opportunities and situation faced by the construction of China's maritime investigation team, summarizes the current situation of the construction of China's maritime investigation team, and objectively evaluates the problems existing in the construction and development process. Based on the theory of human resource management in public sector and the experience of maritime investigation team construction in some developed countries, this dissertation puts forward some countermeasures to solve the problems of maritime investigation team construction in China.

KEYWORDS: Maritime investigators; Maritime investigation team; Team construction; Human resources

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LIST OF ABBREVIATIONS

| | |
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| MOT | Ministry of Transport of the People's Republic of China |
| IMO | International Maritime Organization |
| SOLAS | International Convention for Safety of Life at Sea |
| MSA | China Maritime Safety Administration |
| VTS | Vessel Traffic Service |
| AIS | Automatic identification System |
| JTSB | Japan Transport Safety Board |
| KMST | Korean Maritime Safety Tribunal |
| NTSB | National Transportation Safety Board |
| USCG | United States Coast Guard |
| MCA | Maritime and Coastguard Agency |
| MAIB | Marine Accident Investigation Branch |
| CCS | China Classification Society |

Chapter I. Introduction

To study the construction of maritime investigation team, first of all, we must accurately grasp the meaning, structure and role of maritime investigators and maritime investigation team, so as to deeply understand the significance of the research on the construction of maritime investigation team, better analyze the problems existing in the construction of maritime investigation team, and put forward effective suggestions for improvement. Because maritime investigation can not do without high-level maritime investigators, and the ability and quality of maritime investigators directly determines the result of accident handling, but also affects the quality of maritime administration. Therefore, the maritime bureau of the MOT proposes to establish a professional and independent maritime investigation team in China from top to bottom, led by the maritime bureau and supported by the local maritime bureaus.

1.1 Background

Nowadays, talents are the most critical strategic resources of a country in the international competition. It is very important for the development of a country to strengthen the construction of talents. Today, with the rapid development of maritime industry in the world, talents are the foundation, the power to promote the continuous development of maritime industry, and the future and hope of maritime industry. Maritime investigation talent team is the fundamental to improve the level of accident investigation.

1.1.1 International maritime

IMO has always attached great importance to maritime investigation. In order to promote the development of maritime investigation in various countries, IMO has issued a series of regulations, resolutions and guidelines to guide countries to carry out maritime investigation. In January 2010, "Adoption of the code of the international standards and recommended practices for a safety investigation into a marine casualty or marine incident"(Casualty Investigation Code) came into force and incorporated into SOLAS Convention. The entry into force of the code has changed the situation that many countries have always been dominated by administrative investigation after the occurrence of maritime accidents. At present, developed countries (such as Australia, the United States, Canada, the United Kingdom, etc.) have quite mature research on the classification and competency standards of maritime investigators. In practice, the maritime investigation in most developed countries is carried out by completely independent or relatively independent investigation and analysis institutions according to the principle of separation of rights and responsibilities.

1.1.2 China Maritime

With the great leap forward development of China's economy, China's coastal areas have become the busiest water areas in the world. In recent years, although the safety situation of China's maritime traffic is good as a whole, the trend of large-scale ships has led to more and more losses in a single accident. The major accidents of maritime traffic have not disappeared, and the safety administration still needs to be strengthened. The quality of maritime investigators directly affects the quality of maritime safety administration. Therefore, it is urgent for China to establish a

high-level maritime investigation team to match the development of its maritime industry.

At present, China's maritime investigation team can not handle the maritime traffic accidents alone well. At the same time, there is not enough speaking right in international affairs. The main reason is that the construction of China's maritime investigation team is not perfect, and the fundamental reason is the lack of enough talents in the maritime investigation team, which has become the biggest obstacle to the development of China's maritime investigation.

1.2 Objectives

Maritime investigation is characterized by professionalism, internationality and strong policy. Therefore, maritime investigators are required to have a high level of knowledge and ability. For a long time, the frequent turnover of personnel and the lack of high-end talents in China's maritime investigation team have seriously hindered the progress of maritime investigation. In order to improve the administration system of maritime safety, improve the administration ability, accelerate the transformation and upgrading of China's maritime industry, so as to achieve the goal of continuously improving the level of maritime traffic safety management, comprehensively strengthening the construction of maritime investigation team has become the focus of maritime investigation work. This dissertation intends to use the theoretical knowledge of human resource management in the public sector, under the framework of China's existing system, combined with the characteristics of maritime investigation, referring to the ideas and achievements of international maritime investigation team construction, points out the problems existing in the construction of China's maritime investigation team, and puts forward

feasible suggestions to solve the problems.

1.3 Current studies

Nowadays, there are few researches on human resource management of maritime system in the world. However, some scholars' research on human resource management of public sector can be used for reference, especially the research on the management of civil servants has achieved rich results. And some researches in China focus more on the research of investigation techniques and means, or on the personnel training of some local maritime administrations.

1.3.1 Literature review of abroad

Max Weber, the father of organization theory, has made great contributions to the establishment of Western Classical Management Theory, and civil service system is rooted in his theoretical foundation. He advocated the division of labor according to positions and functions and the separation of powers at different levels. In that historical period, the theory played a positive role in the management of government organizations. However, with the advent of the era of globalization, this management system has shown more and more disadvantages. For example, the government is inefficient, especially in the face of emergencies, lack of adaptability. There is no fundamental guarantee for the implementation of political democracy, ignoring the individual feelings of the public. Since the 1980s, due to the emergence of the new public management theory, countries began to carry out government reform, and introduced the concept of enterprise management into government management. It mainly starts from two aspects: reforming the relationship between the government

and the market externally. The government entrusts some non core services it needs to provide to external professional enterprises in the form of "outsourcing", so as to reduce government expenditure and improve the quality of government services. At the same time, it also delimits a clear scope of government power. In the internal, introduce the management concept of enterprises, reform the concept of government management, simplify the organizational settings, increase information disclosure, and let more clients actively participate in decision-making. In personnel management, the implementation of personalized performance management, respect for talent, pay attention to people-oriented, so that the role of performance guidance has been greatly played. The employment system shall be implemented and labor contracts shall be signed with civil servants. At the same time, strengthen the system construction, pay attention to cultivate and strengthen the administrative consciousness and service consciousness of civil servants, create a good image of civil servants, and show the good mental outlook of modern civil servants in practical work.

In the early 1990s, David Osborne and Ted Gaebler put forward ten principles of entrepreneurial government, which provided a new theoretical perspective for the civil service reform and a plan for the personnel reform of government departments; Robert B. Denhardt and Janet V. Denhardt criticized the defects of entrepreneurial government theory, put forward seven principles of new public service and defined the role of civil servants; B. guy Peters systematically evaluated the global government reform movement, summarized the six characteristics of traditional government, put forward four new models of government governance, and proposed the reform of civil service system. These views and suggestions have guiding significance for the construction of maritime investigation team in China.

At present, the developed countries in the maritime field have established a maritime investigation system in line with the purpose of maritime investigation proposed by

the international maritime organization. Specifically, first, all countries have set up relatively independent maritime investigation agencies. These national agencies have independent maritime investigation departments and professional personnel, which ensure the effective development of maritime investigation to the greatest extent; Second, the purpose of maritime investigation is consistent, that is, to find out the cause of the accident, to put forward suggestions for improving safety management, and to avoid the recurrence of similar accidents; Thirdly, the process and results of maritime investigation should be made public; Fourth, advanced technical support.

1.3.2 Literature review of China

In terms of 2011 to 2021, a total of 260 papers with the theme of "maritime investigation". There were 28 papers with the theme of "maritime investigators" and 52 papers with the theme of "maritime talents", including 21 papers on "maritime talents training".

In the literature on the training of maritime investigators, the introduction to the investigation of maritime accidents edited by Professor Fu Yuhui of DMU (2001) puts forward specific requirements for the competency standards of maritime investigators; Professor Chen Guohua and Zhang Huawen of South China University of Technology (2009) have carried out relevant research on the hierarchical training of accident investigators; Huang Zhi et al. (2010) discussed the characteristics of China's maritime investigation system, analyzed the current situation of maritime investigators, and deeply analyzed the problems existing in the training knowledge system of China's maritime investigators, and then put forward corresponding suggestions; Huang Zhi and Weng yuezong (2010) discussed the training knowledge system of China's maritime investigation.

As for the construction of maritime talent team, Tian Yi (2011), Ji Hong (2011), Chen Dengke (2016), Fu Jingjing (2016) and Chu Weice (2016) respectively studied the talent team construction of local maritime administrations, but did not specifically involve the team construction of maritime investigators. Deng Xiaolei (2016) analyzed the training of China's maritime staff and how to carry out the training.

In terms of maritime investigation, Huang Jie (2016) studied the differences and existing gaps between China and the United States in maritime investigation, and put forward suggestions for learning and improvement; Wang Shanwen (2016) compared the maritime investigation systems of various countries, analyzed the problems existing in China's investigation work, put forward suggestions on establishing a maritime investigation team, and put forward suggestions and opinions on other issues. Diao Xuesong (2019) analyzed the differences and gaps between China's maritime investigation system and the regulations required by IMO, this paper puts forward some suggestions on the reform of China's maritime investigation system, including the construction of a professional maritime investigation team. However, these studies are not dedicated to the construction of maritime investigation team, but only focus on one point.

1.4 Methodology

The literature review of this dissertation is through the Internet, WMU and DMU library information query and extensive collection of information related to this topic and then summarized, and then fully understand the history and development status of the problem, and its related research results and experience provide sufficient theoretical support for the writing of this dissertation. According to the theory of human resource management and the specific situation of the dissertation, combining

the theory with practice, this dissertation puts forward the specific methods suitable for the research of this dissertation. In the process of writing the paper, through visiting a number of relevant departments, representative selected some relevant staff of human resources department and maritime investigation workers, recorded and sorted out their opinions and suggestions. At the same time, participated in the expert discussion, discussed the problems in the research, and put forward practical methods. The purpose of using the experience summary method in this dissertation is to find out the advantages of the foreign maritime investigation team by analyzing and summarizing the advanced practices and experience of the foreign maritime investigation team, compare the current situation of the construction of China's maritime investigation team, and strive to draw a conclusion in line with the objective reality.

1.5 Structure of dissertation

This paper is divided into five chapters. The second chapter reveals the necessity of the research through the investigation and statistics of the work of the maritime investigation teams of China's maritime administrations at all levels. The third chapter summarizes the experience of the countries that have made outstanding achievements in the field of maritime investigation, and emphasizes the necessity of building a maritime investigation team. In the fourth chapter, according to the existing conditions in China, through the combination of public sector human resource management and other related theories, the countermeasures to further strengthen the construction of China's maritime investigation team are put forward. The last one is the summary and conclusion of the whole paper.

Chapter II. Analysis of the current situation and problems of the construction of China Maritime Investigation Team

In recent years, the number of personnel of China's maritime investigation team has increased, and their comprehensive quality has also been greatly improved. This is not only the improvement of the national policy level, but also the local maritime departments have made a lot of efforts. All regions have established their own regulations, adopted evaluation means and encouragement methods to encourage maritime investigators to work actively and stabilize the team, and most of them have achieved remarkable results. However, there are still some deficiencies in the team construction. Analyzing the causes of these problems is more conducive to put forward countermeasures to solve the problems.

2.1 Measures and effects of China's maritime investigation team construction

China MSA is under the unified management of the MOT, which is divided into two branches: one is MSA, under which there are 14 directly subordinate bureaus, under which there are branches or entrusted management units, and under which there are local maritime departments; The other is the local maritime bureaus, which are managed by the transportation departments of various provinces and cities. There are 28 local maritime bureaus in China, and each local bureau has its own local maritime department. The statutory functions of the two organizations are the same, but their jurisdictions are different.

2.1.1 Basic situation of China's maritime investigation team

China's maritime investigation involves the investigation and handling of maritime accidents in all waters under the jurisdiction of the state, including China's territorial waters, inland navigation, ports, docks, etc. Therefore, as maritime investigators, if they want to be competent for the special work of maritime investigation, they should not only master the professional knowledge related to maritime investigation, such as ship collision avoidance, ship maneuvering, turbine management, etc., but also master the relevant technology of maritime investigation, such as collision trace analysis, maritime investigation evidence, etc., at the same time, they should also have the knowledge of law, psychology in order to participate in the international maritime investigation better, they should have the knowledge of system engineering, and track the new trends of international maritime investigation(Fu Yuhui, 2004).

According to the requirements of international maritime conventions and domestic laws, as well as the needs of safety production and safety administration, maritime investigators are endowed with certain powers and undertake corresponding obligations. For example, they can enter the scene of the accident to investigate and collect evidence with the law enforcement certificate; they can use the recorder, camera, video recorder and other legal equipment for forensic investigation; they can consult and copy some original documents of the persons and vessels involved, and require the parties to sign for confirmation; they are required to adhere to the principles of fairness, objectivity, timeliness and comprehensiveness to conduct the investigation, and then write the investigation report(Editorial department,2015,p17). The ultimate purpose of these powers and obligations is to ensure the objectivity and authenticity of the investigation conclusions. At the same time, the law stipulates that in order to ensure that investigators can better perform their duties within their

business scope, the training of investigators in legal knowledge and professional knowledge should be strengthened.

The particularity of maritime investigation requires that maritime investigators should have a high level of ability and quality. Having a sound knowledge structure and considerable professional ability is one of the important conditions for investigators to carry out investigation activities smoothly. As maritime investigators, they should not only have high political and ideological quality, but also have excellent professional quality, such as maritime related legal knowledge, reconnaissance psychology knowledge, investigation technology, etc; also should have the corresponding business ability, such as good memory, strong adaptability, keen observation and so on.

In order to accurately grasp the current situation of the construction of China's maritime investigation team, understand the basic quality of the personnel of the investigation team, and provide accurate basis for the construction of China's maritime investigation team, I adopted the way of questionnaire survey, and made the "personal questionnaire of maritime investigation", which involves the age, education background, major, administrative level, etc. of the respondents. From the aspects of personal expected salary, training content and evaluation methods, the career vision of the youth in the industry is investigated.

As of March 29, 2021, there are 138 senior foreign-related maritime investigators and 662 intermediate foreign-related maritime investigators; Among the non foreign maritime investigators, there are 30 senior officers, 295 intermediate officers and about 1500 assistants. The status quo of this team of marine investigators is as follows:

(1) Age structure

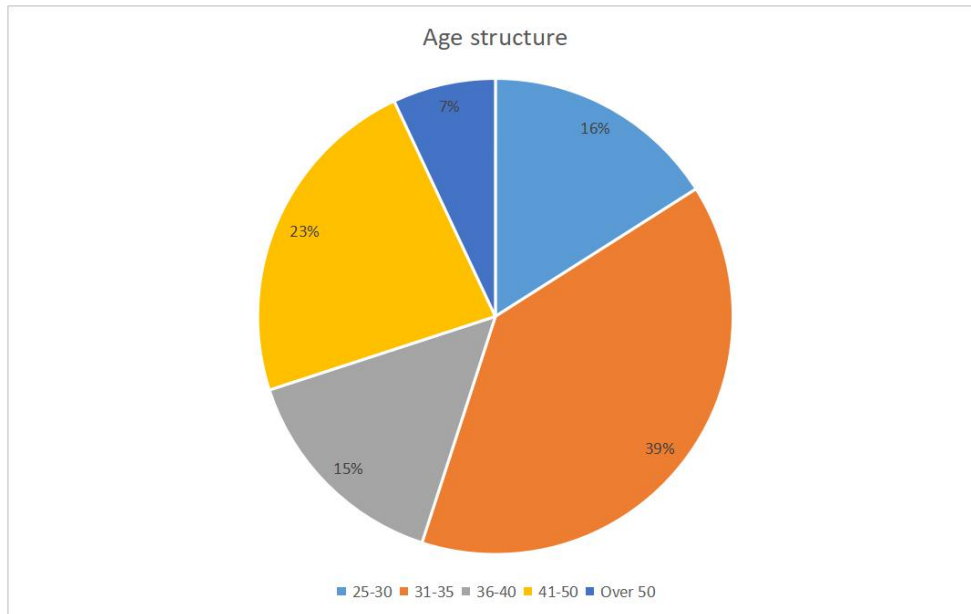


Figure.2.1 Age structure

According to the statistical data of the questionnaire, it can be seen from the figure.2.1 that according to the age structure, the number of China's maritime investigators between 31 and 35 years old is the largest, with 70% under 40 years old and the least over 50 years old (only 7%).

(2) Educational background

According to the statistical data of the questionnaire, it can be seen from figure 2.2 that the educational background of China's maritime investigators is mainly undergraduate (accounting for 73%), followed by master's degree and junior college degree (7% and 6% respectively), and doctoral degree and other account for 2% respectively.

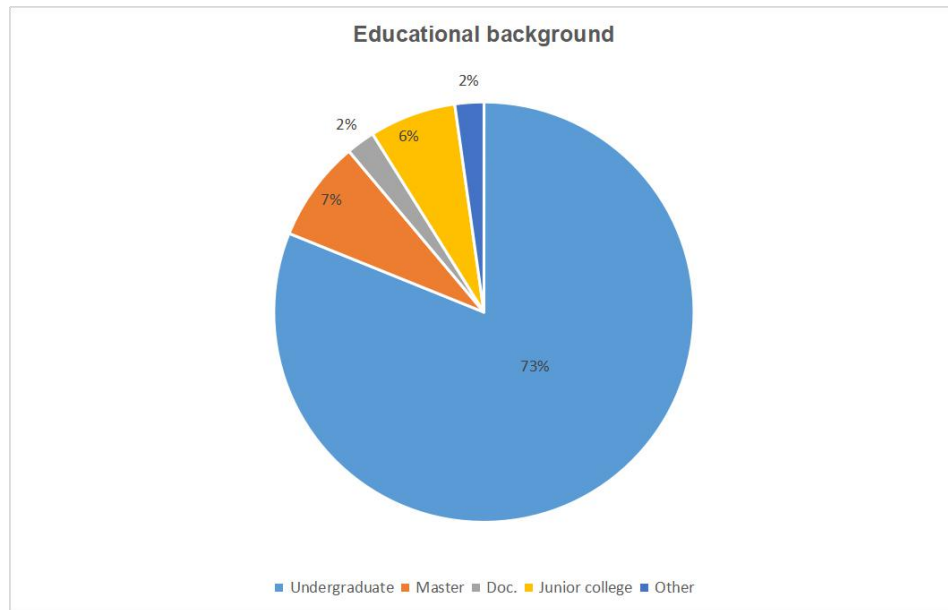


Figure.2.2 Educational background

(3) Professional background

According to the statistical data of the questionnaire, the professional background structure of the maritime investigator is shown in figure 2.3. It can be seen from the figure that nearly half of China's current maritime investigators are navigation technology majors, 14% are marine engineering majors, one fifth are maritime administration majors, and 87% are maritime related majors. This proportion reflects that at present, most of China's maritime investigators have maritime related professional background.

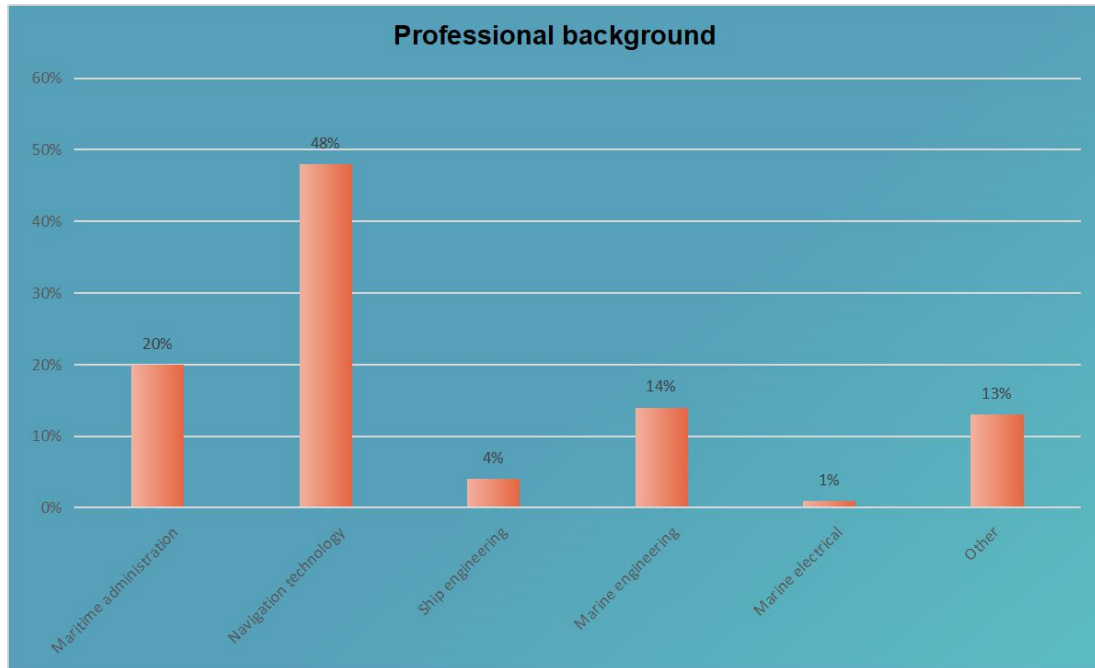


Figure.2.3 Professional background

(4) Distribution of working years

According to the statistical data of the questionnaire, the distribution of years of maritime investigators engaged in work is shown in figure 2.4. It can be seen from the figure that one third of the maritime investigators have been engaged in the work for 5-10 years, and the proportion of working for 10-15 years and more than 20 years is about one fourth.

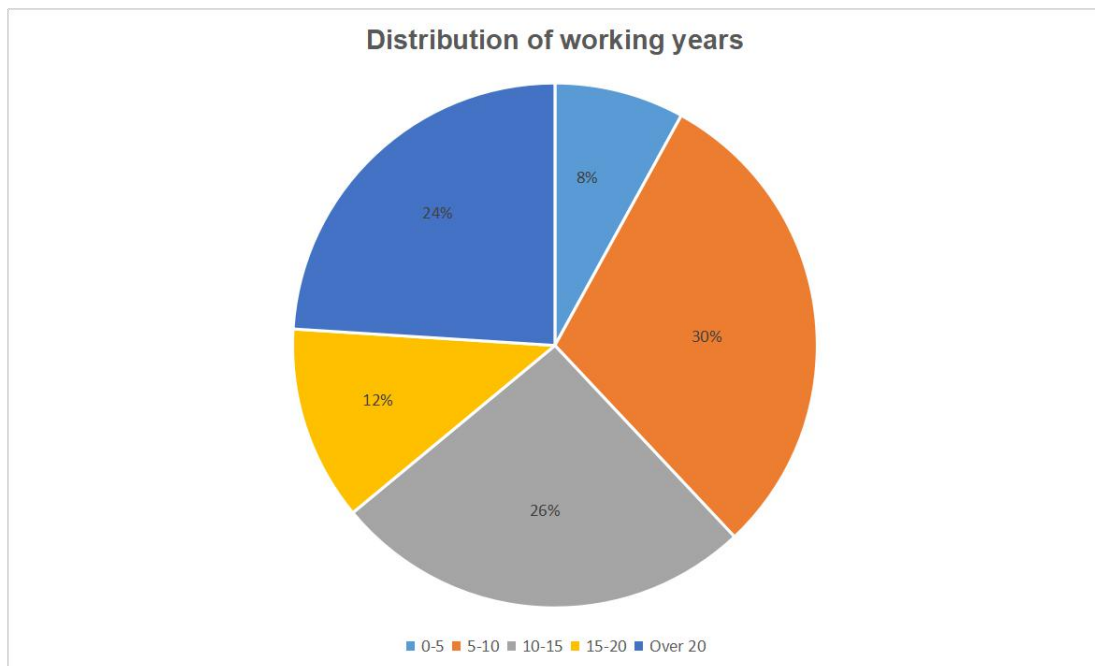


Figure.2.4 Distribution of working years

(5) Maritime qualifications

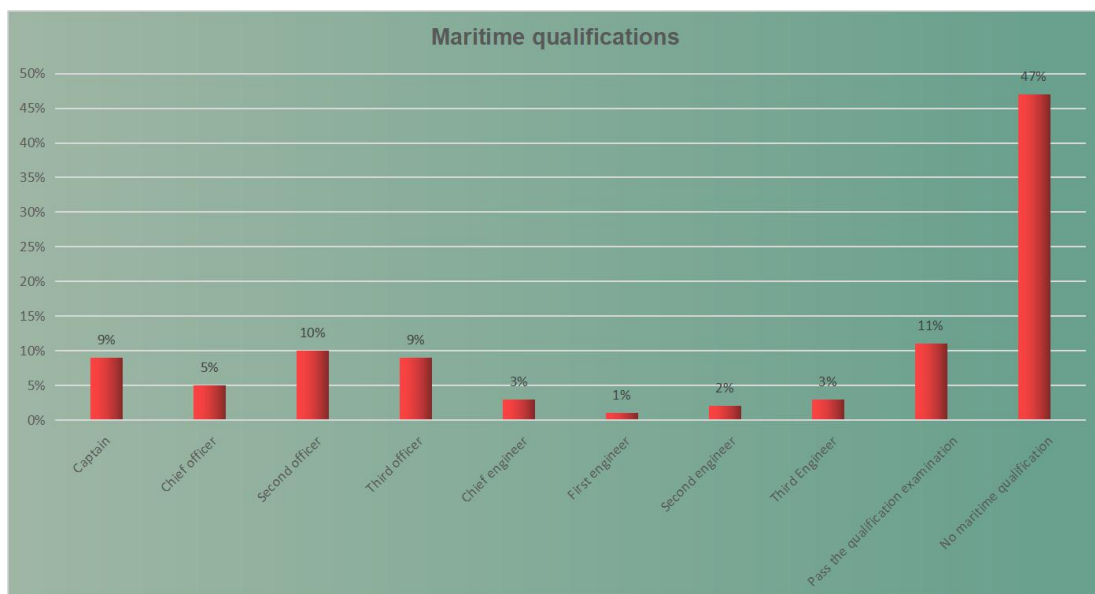


Figure.2.5 Maritime qualifications

According to the statistical data of the questionnaire, the distribution law of maritime qualification of China's maritime investigators is shown in figure 2.5. It can be seen from the figure that nearly 60% of the China's maritime investigators have no maritime qualification or hold the qualification certificates of third officer and third engineer; Less than 20% of the maritime investigators with management level (captain, chief engineer, chief officer and chief engineer) are qualified at sea.

2.1.2 Measures taken by China in recent years

As early as 1952, the MOT drafted and promulgated the "Interim Regulations of the maritime handling committee" for the investigation of maritime accidents in China. In May of the same year, it also issued the "Interim Measures for maritime handling". According to these two regulations, maritime handling committees have been set up all over the country, and investigation teams with practical experience and rich theoretical knowledge have been set up.

With the continuous promotion of maritime investigation, China's maritime handling laws and regulations are constantly improved, and various maritime administration and supervision systems are improved. China's first maritime safety administration law, "the maritime safety law of the people's Republic of China", was passed and promulgated in 1983 and came into force on January 1, 1984. It plays an important guiding role in China's maritime laws and regulations, is the basic basis for maritime administrative agencies to deal with maritime accidents according to law, and is also the criterion to mediate and restrict all kinds of maritime traffic behaviors and their mutual relations. In 1986, the State Council promulgated the "Regulations of the people's Republic of China on the administration of inland river traffic safety", which aims to reduce water traffic accidents, ensure the safety of people's lives and property,

maintain social stability and harmony, maintain healthy and stable economic development, and provide guarantee for China's inland river traffic safety.

With the continuous reform and reorganization of China's maritime administration and the emergence of new water transport situation, China's water traffic safety laws and regulations have been constantly updated and amended, and some new laws and regulations have been issued to replace or supplement those old laws and regulations. For example, on June 28, 2002, the State Council issued the new "Regulations of the people's Republic of China on the administration of inland river traffic safety" and implemented it on August 1 of the same year. At the same time, it announced the abolition of the regulations of 1986. The implementation of the regulations provided a more detailed process for accident investigation.

In order to comply with the development of the times and fulfill the duties of international conventions, China has implemented the system of maritime investigator since July 1, 2006. In order to strengthen the construction of maritime investigation team, reasonably deploy maritime investigators, optimize management, make full use of human resources, and further improve the professional level of maritime investigators, the MOT promulgated the "Regulations on the management of investigators of MSA" on December 29, 2008, and announced that it will come into force on January 1, 2009. The regulation clearly proposes to strengthen the team construction of maritime investigators and improve the business level of maritime investigation; The maritime administration of the MOT is the competent unit. At the same time, it has organized the compilation and publication of "Series of maritime investigators", a total of three volumes, and formulated the training program for maritime investigators, which has played an important role in the training of maritime investigators in China.

"Regulations on the administration of investigators of China Maritime Administration" divides maritime investigators into three levels: assistant level,

intermediate level and senior level, and each level is divided into foreign-related and non foreign-related. Meanwhile, it also stipulates the system of qualification, training, examination and certification, and management of maritime investigators. The specific promotion process is shown in the figure.2.6.

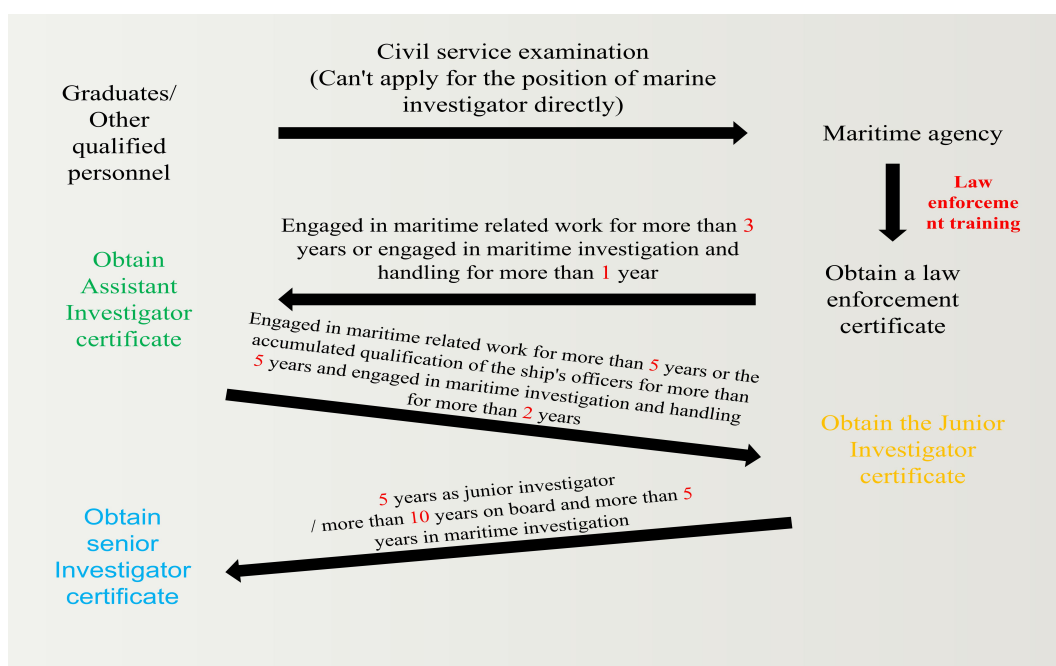


Figure.2.6 Promotion process of maritime investigators in China

2.1.3 Achievements

After the full implementation of the system of maritime investigators, the qualification of maritime investigators also started immediately. According to the regulations, maritime investigators without certificates are not allowed to preside over the work of maritime investigation. Therefore, all maritime agencies require that public officers engaged in maritime investigation must receive professional training and pass the examination before they can take up their posts. This is conducive to optimize the knowledge structure of the existing maritime law enforcement personnel, improve their technical level, and then enhance the overall quality of the

entire maritime investigation team.

There are many holders of certificates, that is to say, there are many maritime investigators, but there are not many people who really participate in the investigation. This is because China's maritime investigators are not full-time engaged in maritime investigation.

In response to the implementation of the international maritime investigation rules, meet the needs of foreign-related maritime investigation, and improve the ability of China's maritime investigators in foreign-related maritime investigation, MSA decided to establish a foreign-related maritime investigation mobile team on January 19, 2009. This move has laid a solid foundation for further enhancing the international image of China Maritime.

2.2 Problems in the construction of China's maritime investigation team in China

At present, China's maritime investigation team construction has achieved remarkable results, but there are still many problems, which restrict the healthy and stable development of the maritime investigation team. In order to fully understand the construction of China's maritime investigation team, by consulting relevant information, visiting and mastering the relevant situation of relevant authorities, combined with the questionnaire survey data, this part summarizes the problems in the process of maritime investigation team construction.

2.2.1 The personnel structure of maritime investigation team is not reasonable

Only reasonable maritime investigation team structure can give full play to the overall effect, and the advantages of human resources will be more prominent. It can be seen from the survey that, compared with the previous situation of maritime investigators, on the one hand, the comprehensive quality of China's maritime investigators has been greatly improved, mainly reflected in the significant improvement of the academic level of the investigators; The relationship between major and maritime is closer. However, on the other hand, there are still some shortcomings, such as the low proportion of full-time investigators; The number of high-level postgraduates in the survey is very small; There is still a lot of room for investigators to improve their English level; There are less qualified personnel of captain and chief engineer, especially those of senior captain and chief engineer.

Maritime investigation is different from other daily supervision or routine work of the maritime system. Only when there is an accident can there be an investigation. If there is no accident, there will be no investigation. Different accidents have different personnel participating in the investigation, and there are no fixed working hours and working objects; If there are few accidents in the jurisdiction, the maritime department may not conduct several maritime investigations all the year round; However, the maritime agencies with frequent accidents in their jurisdiction are busy with maritime investigation and often need to work overtime. Therefore, the post setting of maritime investigation in China should consider the law of accidents in the jurisdiction, and the existing post setting is imperfect.

2.2.2 The training effect of maritime investigation team is not good

From the training effect of maritime investigators, the result is not very ideal. First of all, the importance of training is not fully understood. Some people think that training is just repeating what they know, which is boring and a waste of time; Others see training as a routine meeting, long and boring. No one is willing to participate actively, and many branch maritime administration are forced to take the way of mandatory apportionment or taking turns. Secondly, further strengthen the systematic and targeted training. China's maritime investigation started late, and the training is only about some common sense maritime knowledge. Therefore, there will be problems in the training that are not comprehensive and systematic enough. As far as the training materials are concerned, the current training materials for China's maritime investigation team can not fully meet the needs of the new situation. In terms of training time, content and teachers, compared with some advanced countries, China's maritime investigation team has a certain gap. Most of the foreign training teachers are experienced in actual combat, most of them are senior captains and chief investigators; However, in China, they rely more on the teachers of maritime colleges and universities. What these teachers know about maritime investigation is only the content of materials, they often rely on the outline to impart knowledge. Therefore, most of the classes rely on the teachers to teach according to the past experience, and lack the analysis and discussion of new accident cases. The training is not innovative and of little practical significance, especially for middle and senior investigators. For example, many investigators do not know how to write a maritime investigation report that meets IMO requirements. Then there is the shortage of training funds, which leads to the discontinuity of training work. In this case, it is difficult to cultivate more high-quality maritime investigation personnel.

2.2.3 Talent instability of maritime investigation team

Maritime administration system has been attracting a large number of talents because of its importance and special status, but in contrast, the loss of grass-roots maritime investigators is becoming more and more prominent, showing the following characteristics: the loss of young maritime investigators accounts for a large proportion, especially the loss of highly educated and professional talents. There are many people who hold the certificate of maritime investigators, but not many people are really engaged in maritime investigation; The frequent rotation of maritime investigation personnel and the unstable team are not conducive to the accumulation of maritime investigation experience. For example, in Chongqing local maritime bureau, there is a serious shortage of maritime administration personnel. There are only 400 personnel specialized in maritime administration in the whole system, all of whom hold several posts. The district and county maritime departments usually have 1-2 personnel in charge of all the work of maritime administration. According to the statistics(See figure.2.7), the instability of the maritime investigation team is an important factor affecting the improvement of the level of maritime investigation, accounting for the largest proportion of all factors.

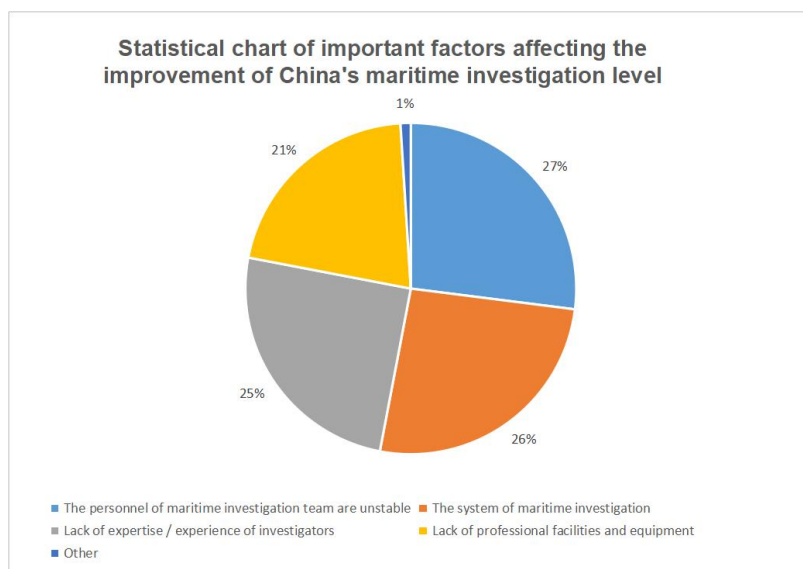


Figure.2.7 Statistical chart of important factors affecting the improvement of China's maritime investigation level

The training of maritime investigators needs a long time, during which huge human, financial and material resources need to be invested. The talents of maritime investigation team bring high replacement cost to the department, and the loss of the key personnel also disturbs the normal investigation work, resulting in the interruption of the investigation work, which will undoubtedly reduce the efficiency of the work. The talents of maritime investigation team will bring many unstable factors, and also damage the reputation of maritime system. The loss of some maritime investigators will have a great impact on the psychology of other maritime investigators, resulting in the panic of the team and seriously affecting the cohesion of the team. Some of the lost maritime investigators may make some adverse remarks to their maritime system, and then damage the reputation and image of the maritime system.

2.2.4 The maritime investigation team lacks enthusiasm

The current assessment content of Chinese government civil servants is also used in the construction of maritime investigation team, but this assessment method itself does not clearly define the level of assessment, so it is not easy to operate. The nature of maritime investigation is more professional and technical, and the assessment method of civil servants is obviously not suitable for maritime investigators. What's more serious is that engaging in maritime investigation has not been included in the assessment criteria. To put it simply, it's the same whether to do it or not, and it's the same whether to do more or less. Therefore, everyone evades the maritime investigation.

The task of maritime investigation is heavy and pressure is great. At present, there are no clear provisions on the selection, training, promotion, management, welfare and other aspects of the maritime investigators in the direct maritime agencies and local maritime agencies(See figure.2.8). The lack of attraction of maritime investigation posts leads to the lack of motivation for the maritime investigation team to study hard. For maritime investigators, whether they have participated in maritime investigation or not does not affect their salary increase or promotion. This also makes the professional certificate of maritime investigators become an embarrassing existence, the investigation work becomes compulsory apportionment, and no one is willing to work actively. This leads to the lack of discrimination of assessment results.

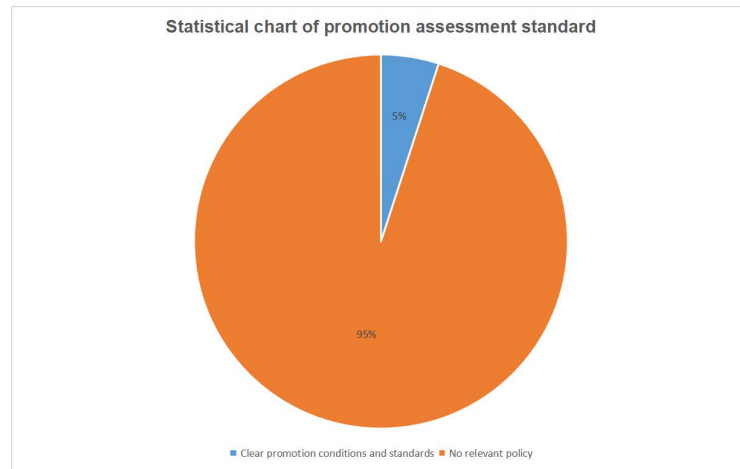


Figure.2.8 Statistical chart of promotion assessment standard

More maritime investigators hope that the number of times they participate in and preside over the accident investigation, the number of times they submit the investigation report, and the level of the accident investigation will be included in the assessment index(See figure.2.9).

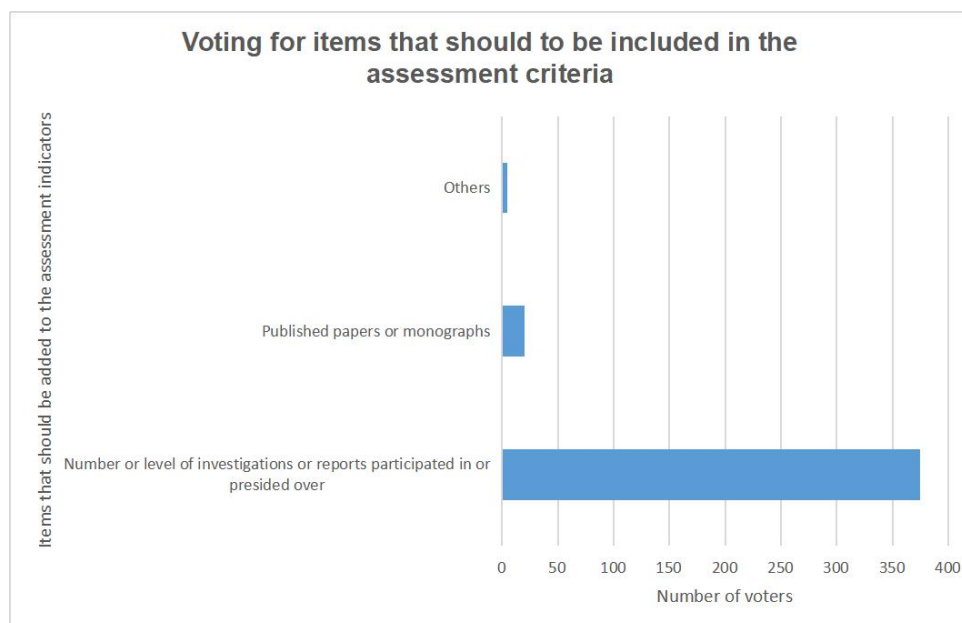


Figure.2.9 Voting for items that should be included in the assessment criteria

2.2.5 Poor external guarantee of maritime investigation team

First, the level of salary and welfare security is not high. From the current situation, the personnel system only lists maritime investigators as general civil servants, and does not treat them as superior, and there is no welfare treatment for maritime investigators or rewards for engaging in maritime investigation. The current personnel management system of the unit is unreasonable for them, "only responsibility, no attraction", "and "the maritime investigation work is not recognized, there is no incentive to do the job well. ". Therefore, there are great worries about the maritime investigation team. The salary, benefits and allowances of the current maritime investigators vary greatly due to the differences between the units and regions. Some areas are economically developed, and the types of benefits and allowances are various, while some areas are difficult to pay salary. Generally, the situation of direct subordinate institutions is better than local institutions, coastal areas are better than inland rivers, and developed areas are better than those in underdeveloped areas. This situation makes the construction of the team difficult, and the team members are more willing to stay in comfortable environment, not to go to underdeveloped areas.

Second, the guarantee of working conditions. Affected by the regional economy, the working conditions enjoyed by maritime investigators are also very different. Maritime investigators in economically developed areas can enjoy all kinds of conveniences, such as complete hardware facilities, more opportunities for training, exchange and study abroad. However, some maritime investigators in economically backward areas have to face the problem that some of the most basic investigation tools and equipment are not complete. For example, due to the limited sources of funds, the Chongqing local maritime bureau has to pay more attention to the

problems, the maritime investigators are not equipped with professional accident investigation equipment. The equipment of grass-roots maritime organizations is backward, which can not meet the requirements of the MOT on maritime investigation equipment. In addition, some local maritime areas are not highly informationized, VTS system is not established, AIS and other equipment are not installed on ships, and the monitoring equipment is not covered by the jurisdiction, which affects the acquisition of relevant evidence and leads to uneven quality of case investigation and handling, it affects the credibility and authority of MSA. Under the new situation, maritime investigation work is difficult, heavy task and heavy responsibility, but there is no insurance system matching with its work.

At present, only 2% of the organizations will give welfare to maritime investigators, while other organizations do not(See figure.2.10).

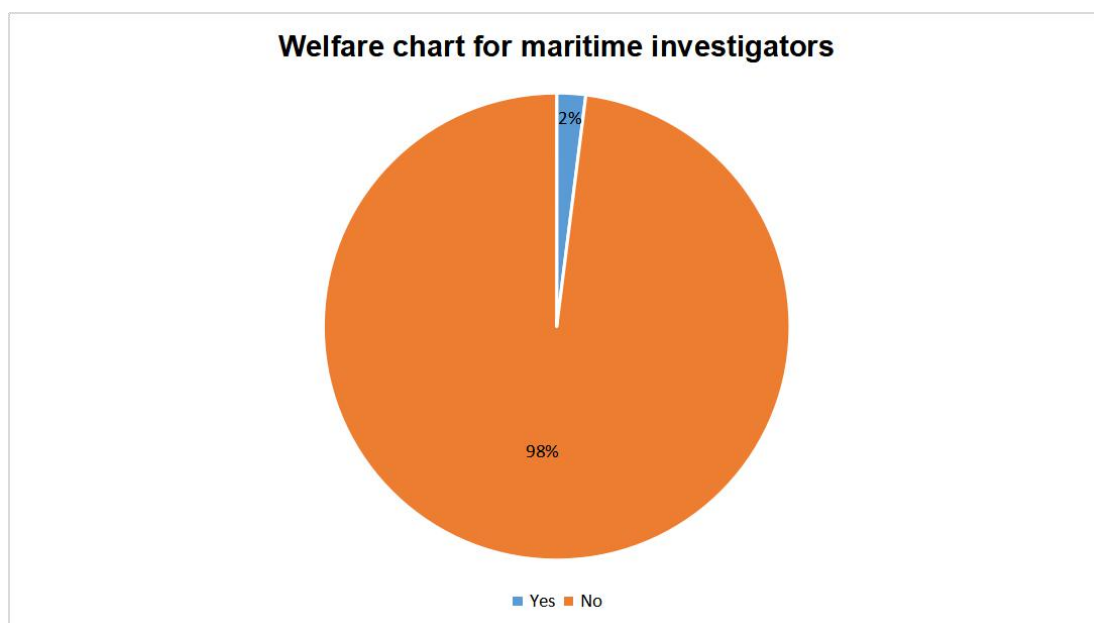


Figure.2.10 Welfare chart for maritime investigators

More maritime investigators expect to have such welfare as advanced selection, promotion, bonus, overtime pay, meal allowance, etc(See.2.11).

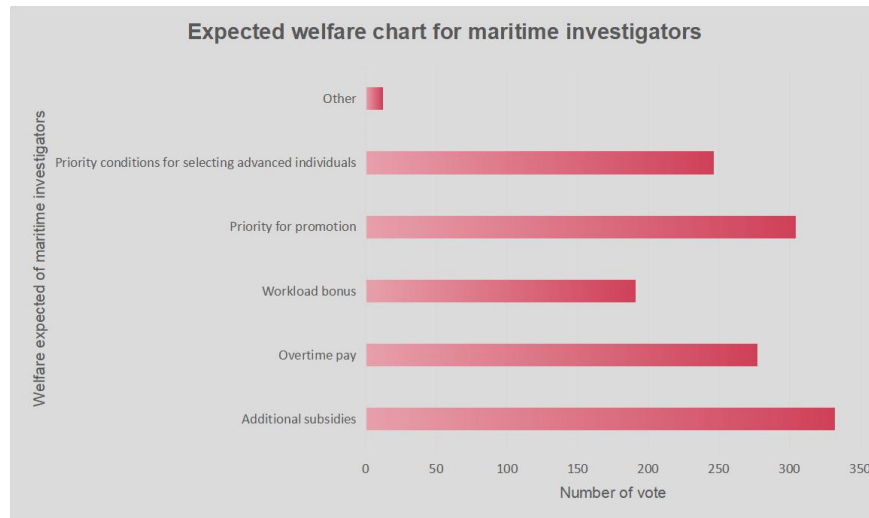


Figure.2.11 Expected welfare chart for maritime investigators

2.3 Analysis on the causes of problems in the construction of maritime investigation team

There are some common problems in the construction of China's maritime investigation team. Although there are some unique internal characteristics, most of the problems are rooted in the whole management. These factors can be divided into the following aspects.

2.3.1 Lack of human resource planning for maritime investigation team

Human resource planning is the long-term design of the organization's future strategy and the further improvement and thinking of the basic problems. It is an organization's action plan, which can be regarded as an implementation strategy, and the planning in the construction of maritime investigation team is often more lacking

and lagging behind. This has also led to the imbalance of the personnel structure of China's maritime investigation team.

(1) Lack of awareness of human resource planning

For a long time, China's relevant laws stipulate that maritime investigation is to "find out the cause and determine the responsibility", which emphasizes the common practice of investigating the accident responsibility and the current maritime investigation system. As a result, China's accident investigation often stays at the superficial cause, and there is still a big gap between China and developed countries in the deeper understanding and excavation of the accident cause. Once it was generally believed that accident investigation could be done by anyone without the accumulation of technology and experience. Over the years, the investigation level in China has been stagnant. Few people with certain experience in accident investigation have been engaged in accident investigation for more than 15 years(See figure.2.12). The personnel with qualification certificate are not full-time, and most of the investigators are part-time.

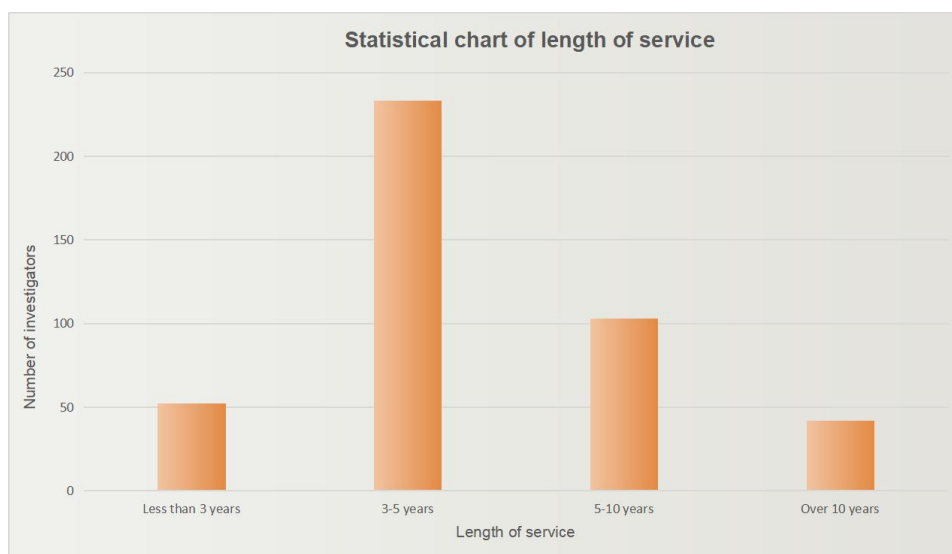


Figure.2.12 Statistical chart of length of service

(2) The scope of personnel selection is limited

At present, China's current "Regulations on the administration of maritime investigators" for the certification of maritime investigators, the prerequisite is to meet the qualification of national civil servants. This provision makes the selection of maritime investigators have resource problems. The scope of selection is too limited, making some talent resources wasted. The working environment of maritime investigation is relatively complex, the conditions are relatively difficult, and the pressure is great. It can be said that it is necessary to be on call, and it is also a job that does not appeal to the superior leaders. Most of the national civil servants who enter the maritime system are not willing to join the investigation team. All these are the reasons for the unbalanced structure of the maritime investigation team.

2.3.2 The training system of maritime investigation team is not perfect

With the development of the "Regulations on the administration of maritime investigators", the management of the maritime investigation team tends to be standardized. Therefore, it is necessary to carry out comprehensive training on the knowledge and skills of maritime investigators. At present, China's maritime investigation team training faces three major problems: there is no unified teaching material; There are no regular teachers; There is no systematic curriculum system.

In 2006, the MOT issued the "Outline of training and examination for maritime investigators" (hereinafter referred to as the Outline) which is compatible with the "Provisions on the administration of maritime investigators" (Trial). The purpose of the "Outline" is to select training materials and develop training courses for maritime investigators to obtain the post, promotion and knowledge updating of maritime investigators. Through more systematic and practical training and teaching, the trainees can be familiar with and master the maritime laws and regulations,

navigation technology, investigation technology, maritime traffic engineering and foreign languages related to accident investigation, so as to improve the basic quality and professional ability of the investigators of maritime traffic accidents, in order to connect with international maritime investigation as soon as possible(Xiao Yishan, 2015, p. 44-46). The "Outline" has made general provisions on the specific content and class hours of the training for all levels of maritime investigators, but it is not a detailed and systematic training content.

The human resource planning of relevant departments does not take into account the common development of the organization and its members, and has not carried out the investigation and analysis of personnel training needs. At the same time, the investigators also ignore the training. According to the survey data, more than half of the maritime investigators think that the current training is of little significance for them, and the training can not bring them actual skills improvement(See.2.13).

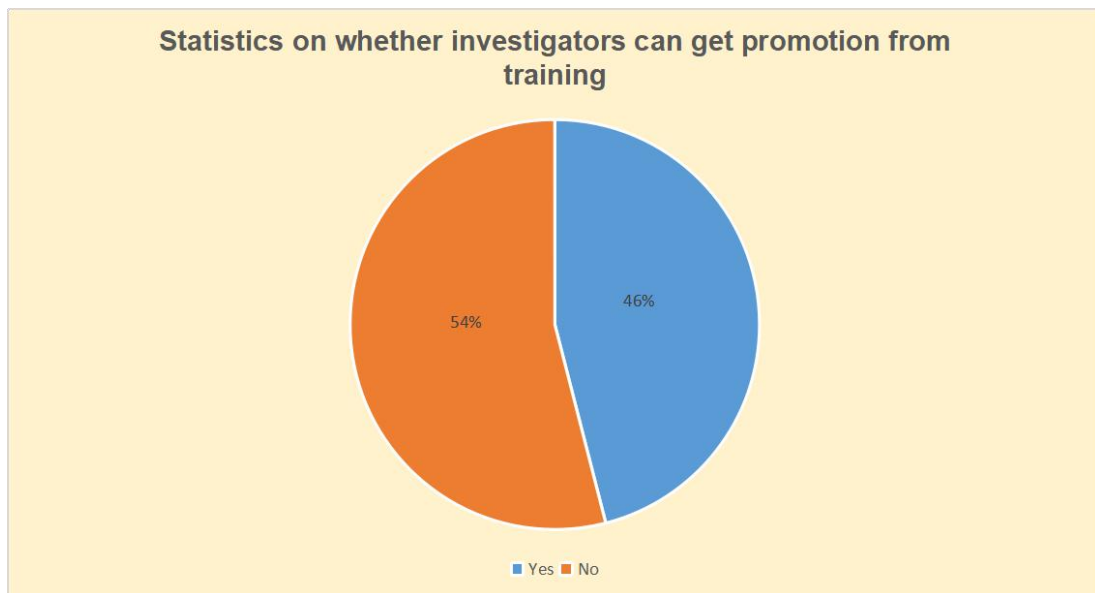


Figure.2.13 Statistics on whether investigators can get promotion from training

More than half of them hope to get effective guidance and help in the professional

skills of investigation. They prefer to master the skills of how to communicate with the parties, how to collect useful evidence materials on the spot, and how to use some equipment to simply detect relevant evidence materials, it's not just limited to paper analysis, empty talk about some theoretical knowledge, but know little about how to apply it. They also want to improve their English level through training, enhance their ability, and participate more in international maritime investigation affairs(See figure.2.14).

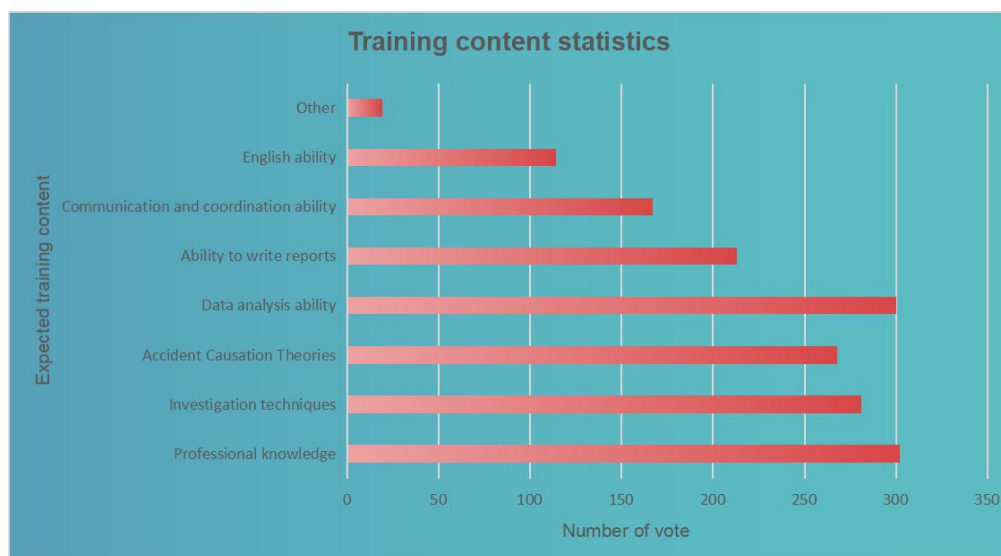


Figure.2.14 Chart of training content statistics

2.3.3 The management of maritime investigation team lags behind

Idea is the forerunner of action. The lag of system is a hindrance in the construction of maritime investigation team. The quality of the system directly leads to the huge difference of the results. A good system will bring everyone's talents into full play. On the contrary, it will hinder development.

(1) The access conditions are too broad

The corresponding competency standards of the maritime investigation team are only

a general description. For example, Article 6 of Chapter II of "Regulations on the administration of maritime investigators" on the qualifications of assistant maritime investigators: (1) holding maritime administrative law enforcement certificate; (2) having college education or above in maritime related majors; (3) having participated in maritime work for more than 3 years, engaged in the investigation and handling of maritime accidents for more than one year (4) qualified by the assistant maritime investigator training (5) valid by annual assessment and registration. Such restrictions are too broad, and there is no detailed competency standards. At the same time, it will increase the operational space when selecting talents, which is not conducive to the cultivation of talents.

From the content of the "Regulations on the administration of maritime investigators", there are no clear provisions on whether and how to flow the maritime investigators. In fact, the power of the flow of maritime investigators is in the hands of the leaders, resulting in the phenomenon of the flow of maritime investigators due to relationship and person, which makes the promotion of maritime investigators more difficult.

(2) Team management is not standardized

The flow of maritime investigators presents a state of lack of competition and low efficiency. At present, there are few maritime investigators who go to the grass-roots level for temporary training. A large number of experienced and capable talents are dedicated to the grassroots, but they can not be promoted all the time because of the poor promotion channels, which also reduces the attraction of grass-roots to talents.

Moreover, although China's maritime investigators are relatively adequate in terms of human resources, but the professional and technical requirements of maritime investigation are high, and the grass-roots units have not set up a full-time maritime investigation department, and there is no relevant post design. The personnel rotation system of maritime agencies affects the stability of the maritime investigation team.

What is more noteworthy is that it is very common for maritime investigators to engage in too much extra work, even full-time maritime investigators are no exception.

There are few growth channels for maritime investigators. The promotion from assistant maritime investigator to intermediate maritime investigator and finally to senior maritime investigator is only a matter of time, not much attraction for them. In terms of professional standards, the professional qualification certification system of maritime investigators needs to be further strengthened.

2.3.4 The constraint assessment system of maritime investigation team is incomplete

Lack of perfect and reasonable assessment mechanism is the main factor affecting the growth of maritime investigators. There is no perfect and reasonable assessment mechanism, which makes the enthusiasm of the team is not high. The assessment of maritime investigators is carried out in accordance with the assessment standards of China's civil servants. The assessment adopts qualitative methods, which are relatively simple, inflexible, and lack of rigor and scientificity, makes the investigators very reluctant to investigate. For example, in maritime investigation, maritime investigators often involved in maritime liability determination, punished the maritime responsible party, and coordinated the compensation affairs between the injured party and the responsible party. However, due to various factors, the conclusion will be uncertain. They should be responsible for their own investigation report, but the investigation work is not included in the performance appraisal, which will seriously affect the enthusiasm of investigators. In addition, there is no specific evaluation index system for the job characteristics of maritime investigators, which

leads to the subjective and random evaluation.

2.3.5 The incentive system of maritime investigation team is not perfect yet

The lack of incentive mechanism fundamentally limits the enthusiasm of talents, making some maritime investigators lack of upward motivation, content with the status quo and doing nothing. The safeguard mechanism involved in many aspects of the life and work of maritime investigators is not perfect, which can not solve the worries of the team.

At present, maritime investigators are still civil servants. However, the salary offered by the current civil servant salary system is not high, and their welfare level is also low, but the work intensity is very high, and the level of treatment and their contribution and value can not be equally reflected, which leads to many people are not willing to join the maritime investigators. With the implementation of medical insurance and housing reform, the social security system for maritime investigators has been gradually established, but the social security mechanism and content are still not perfect. At the same time, China does not have a complete set of rules to regulate the social security behavior of maritime investigators. These reasons lead to the loss of some talents.

At present, maritime investigators "only responsibility, no attraction", "maritime investigation work is not recognized, there is no motivation to do the work well", so that the training of investigators can only rely on compulsory apportionment. According to the survey data, more maritime investigators are looking forward to joining the series of professional and technical personnel. Because maritime investigators mainly investigate, collect evidence, analyze reasons, write reports, etc., the nature of their work focuses on technology rather than administrative

management or public affairs management, and their work is similar to that of public security (criminal investigation and technical investigation) personnel, it is obviously unreasonable for maritime investigators to be included in the civil service series. Maritime investigators also expect to enjoy the benefits they deserve, and include the investigation work in the article of evaluation of excellence and advancement; give appropriate overtime pay, meal allowance, etc.

Chapter III. Experience of maritime investigation team construction in some countries

Some developed countries have already established their own maritime investigators management system. And in general, the management of its maritime investigators has fully absorbed the nutrition of modern human resource management, including promotion and assessment, professional management, vocational training management and other aspects, which are worthy of learning from China's maritime investigation team.

3.1 In addition to China, some countries have taken measures of construction of maritime investigation teams

The maritime investigation team construction of developed countries started early and has reached a mature stage, especially the British and American maritime investigation team setting mode, which has a far-reaching impact on other countries. British maritime management can be traced back to the coast guard patrol in 1698, while the United States Coast Guard is the originator of coast guard in the world. Later, Japan, South Korea, Australia, Canada and other countries were influenced by the British and American maritime administration. However, each country has different ways in the formation of maritime investigation team and personnel training. In view of this, this chapter hopes to provide some guidance for the construction of China's maritime investigation team by analyzing the situation of the four

representative countries, namely the Japan, South Korea, United States and Britain.

3.1.1 Japan: Japan Transport Safety Board

Japan's maritime investigation management system adopts a single administration mode. In 2008, Japan Transport Safety Board (JTSB) was formally established.

(1) Basic functions of JTSB

JTSB is committed to prevent accidents, reduce the damage caused by accidents, improve public safety awareness and improve traffic safety; Do a good job of accident investigation, thoroughly find out the cause of the accident, through the release of safety information, urge the implementation of necessary policies and measures, so as to ensure the safety of public life and property.

(2) Composition of JTSB personnel

The organizational structure of the transport safety committee of Japan is as follows: there is a chairman, seven full-time members, five part-time members, a director of affairs, and a ship accident investigator(See figure.3.1).

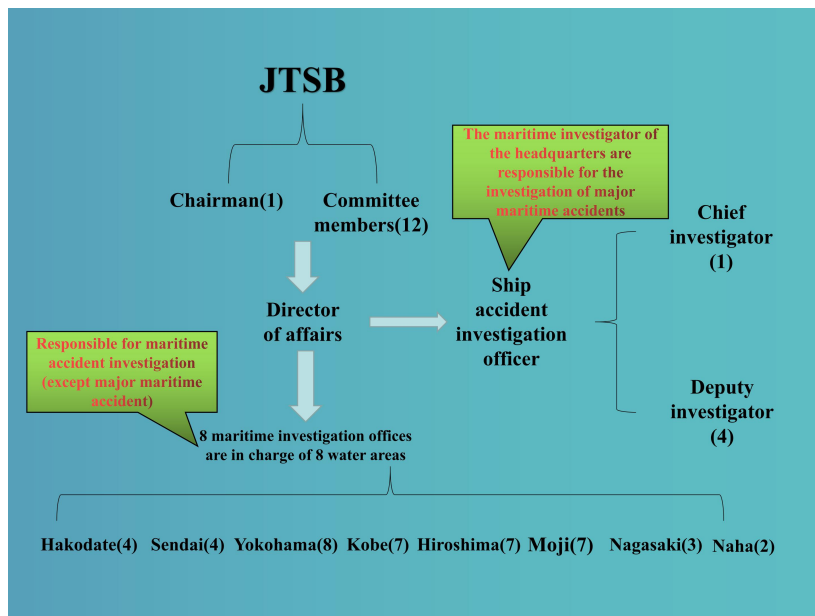


Figure.3.1 Composition of JTSB personnel

(3) Characteristics of JTSB investigation team construction

First, the management system should be standardized. The quality of JTSB's managers is very high, most of them are PhD graduates or professional school principals. As for the selection and appointment of each management personnel, Japan's "Transportation Committee establishment law" has clear and detailed provisions. For example, the chairman and members should be appointed by the minister of land, infrastructure, transportation and tourism from among the personnel who are determined to be able to make scientific and fair judgments with the consent of the two houses of congress.

Second, service socialization and specialization. Japan's transport safety committee has always insisted on transparent and open disclosure of factual information, insisted on providing the best service and the most professional investigation. Therefore, JTSB will publish the most detailed maritime investigation statistical report on its website every year.

3.1.2 South Korea: Korean Maritime Safety Tribunal

Since 1963, Korean Maritime Safety Tribunal(KMST) has been committed to ensuring maritime safety. According to the "Marine accident investigation and court law", by investigating all types of maritime accidents and determining their circumstances and causes, Korean maritime safety court is a subsidiary body of the ministry of ocean and fisheries. KMST adopts the system of administrative court to handle cases. Like criminal and civil court procedures, KMST operates independently.

(1) Basic responsibilities of KMST

The main task of KMST is to determine the cause of the accident, and then judge the

suitability and correctness of the behavior of the crew and related personnel found guilty of negligence, and put forward reasonable suggestions. In addition, on the basis of learning from the maritime accidents that have occurred, the court shall notify the departments that have similar dangers and should correct or improve them, so as to prevent the occurrence of similar accidents(Kong Jia, Fu Yunhui, Liu Chuang & Zhang Wugang, 2017). The whole process of court investigation and responsibility determination are carried out in the form of quasi judicature, but it does not have judicial jurisdiction.

The investigation of the maritime police department belongs to judicial investigation, which mainly investigates whether the accident is suspected of committing a crime and makes disposal according to its corresponding laws, but its investigation does not hinder the maritime investigation carried out by KMST.

(2) Composition of KMST personnel

The organizational structure of KMST is divided into two parts, one is the central maritime court, the other is the regional maritime court. They all have two branches, one in charge of investigation and the other in charge of trial. The basic personnel structure is shown in the figure.3.2. and figure.3.3.

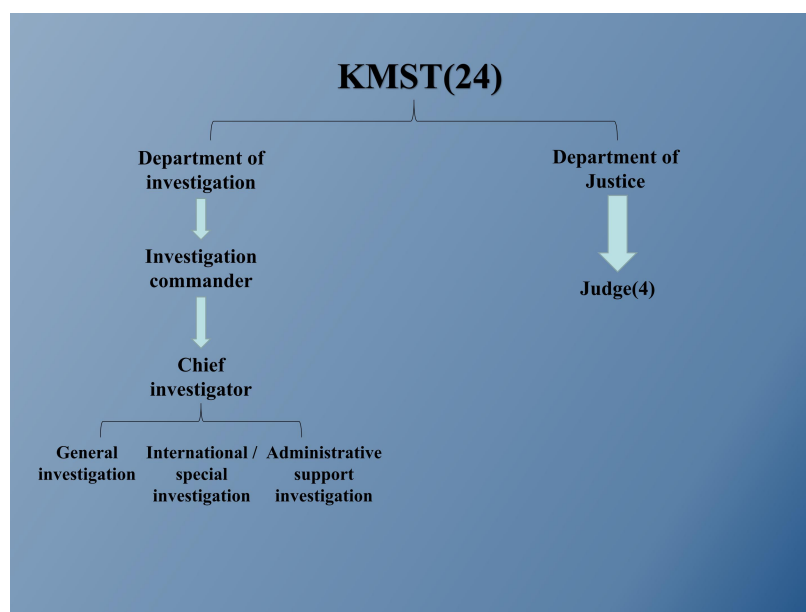


Figure.3.2 Personnel composition in central KMST

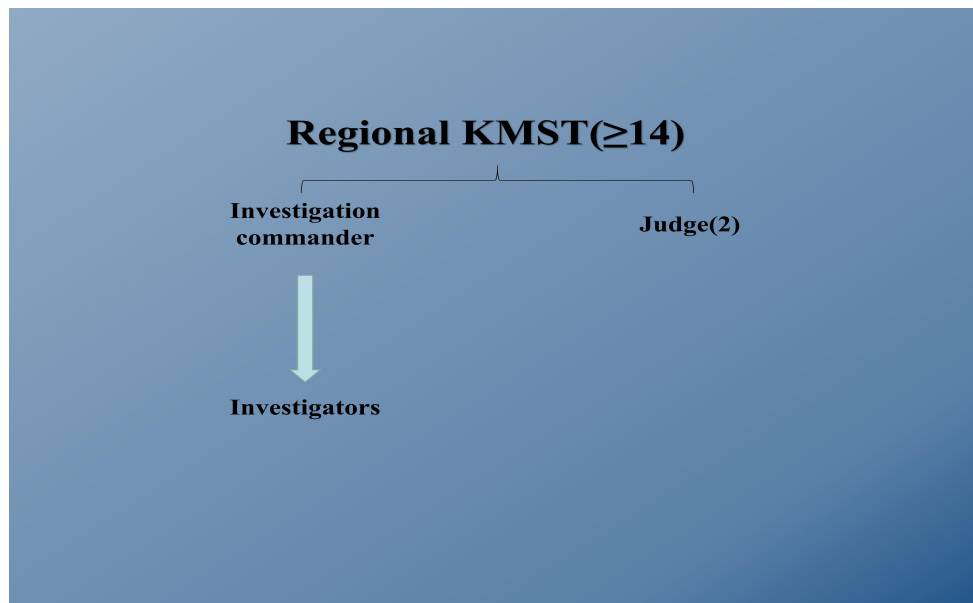


Figure.3.3 Personnel composition in regional KMST

The requirements for KMST investigators and judges are quite high. The basic requirements for being qualified as an investigating officer or judge are at least three years of sailing experience and master's or chief engineer's certificate; Or with senior certificate of chief mate or chief engineer, and at least three years of relevant working experience.

Senior investigators, judges, investigators, assistant investigators and assistant judges are not only professional qualifications in Korea, but also the embodiment of the administrative level of government officials. The power and treatment enjoyed by maritime investigators of different levels vary greatly.

It is not necessary for maritime investigators to hold special certificate of investigator, but they set up the post conditions for investigators and judges, and generally need to have certain maritime qualification; Assistant investigators are generally selected from ship safety inspectors.

(3) KMST personnel training

Every year, the president of the central academy formulates training and education plans and organizes their implementation. Training is divided into basic knowledge training and advanced knowledge training. The personnel who are new to the court must take part in the basic knowledge training, and the rest must take part in the advanced knowledge training every year. At the same time, investigators will be sent abroad for training.

(4) Characteristics of KMST team construction

First, the trend of professionalization and specialization is obvious. The selection of investigators in South Korea is not limited to the certificate, they pay more attention to the ability, which makes the selection more expensive. Most of the investigators in South Korea are full-time staff. They are only engaged in the work related to the accident investigation and will not take part-time administrative work. KMST requires the investigators to have navigation qualification, and the professional restrictions on the investigators are more strict.

Second, form a professional team and attach importance to communication. In order to deal with major maritime accidents, South Korea has established a special investigation team. This team has one investigation director from the central government, three investigators, two from the central government and one from the local government. They cooperate with each other and complete the task together. In addition, South Korea has also continuously strengthened exchanges and learning with the international community, striving to improve its own level of investigation.

3.1.3 The United States of America: National Transportation Safety Board

The National Transportation Safety Board (NTSB) and the United States Coast Guard (USCG) have constructed a dual track of U.S. maritime investigation. The

former is responsible for investigating all maritime matters, while the latter is responsible for the "major maritime matters" in all maritime matters. They conduct independent investigations and independently write investigation reports, safety improvement suggestions are given.

(1) NTSB and USCG basic functions

Since its establishment in 1967, NTSB, as the highest transportation safety supervision organization in the United States, has been committed to accident investigation and on call all the time. Its basic responsibilities include conducting independent accident investigation to identify possible causes, identify safety issues, improve traffic safety, advocate safety improvement, develop safety research, focus on broader safety issues and subject areas, so as to better perform the task, and publish all the latest investigation information on its website.

USCG has a history of 200 years since its establishment. It has always been committed to maintaining the homeland security of the United States. It is responsible for the security of coastal waters and navigation channels, the search and rescue of ships in distress, and the protection of environmental security. It is an integrated maritime law enforcement agency of the United States. Its responsibilities include jurisdiction over all accident investigations and investigation of the causes of accidents; Investigate the implementation of current laws, regulations and standards, and transfer illegal acts to judicial trial or impose administrative penalties. The commander in chief of USCG will not be directly involved in the investigation, but will send his subordinate maritime investigation division to manage it.

(2) Personnel composition of NTSB and USCG

The NTSB has five security commissioners, each nominated by the president and confirmed by the Senate for a five-year term. One is appointed by the president as the chairman and the other four vice chairmen for a term of two years. The presidency needs to be confirmed separately by the Senate. If there is no designated

chairman, the vice chairman shall act as his or her deputy.

NTSB's maritime investigators are selected and appointed by the transportation safety committee according to the needs of maritime investigation post setting and the comprehensive factors such as the investigator's major, work experience, especially the time, ability, work performance and social influence of accident investigation. Once they are appointed as accident investigators, they belong to the national staff. These accident investigators have no compulsory training requirements and standards, and there are no assessment indicators. Whether they can remain competent depends on the specific work situation. However, they are all authoritative persons and experts in the major and discipline involved in the accident investigation.

USCG's accident investigators are relatively fixed, and most of these personnel are transferred between the federal transportation safety commission and the coast guard, because the work of these two departments is similar, and they are directly under the federal government, and their wages and benefits are in accordance with the national standards.

Both NTSB and USCG have a professional and experienced maritime investigation team, including personnel with rich background in various fields. For example, some of them are entrepreneurs, some are engineers, and so on. They have different backgrounds, and have received formal training. They can directly participate in the accident investigation.

(3) Personnel training of NTSB and USCG

NTSB's maritime accident investigators are basically graduates from professional colleges, and most of them have maritime experience. Most of them have served as captain or chief engineer on board. However, before engaging in maritime investigation, they should have two years of working experience and three months of special training.

USCG's maritime investigators must undergo professional training. The coast guard is responsible for selecting training programs, arranging training courses and determining training time. The coast guard is generally responsible for the training, but there are also cases in which maritime colleges or training institutions are entrusted to carry out the training according to the relevant courses. Maritime investigators should first go through three months of training before they are engaged in accident investigation. After the training, they should have a two-year internship. After the internship, the expert committee will evaluate them according to the internship results and work performance. They can only engage in accident investigation after they pass the evaluation.

(4) Characteristics of NTSB and USCG team construction

First, select and employ professionals. The U.S. maritime investigation department has clear regulations on the entry threshold of investigators, and there are certain standards and procedures for their promotion. Usually, the maritime investigators have to go through three months of special training, or they are required to graduate from a professional college and have work experience; USCG investigators are divided into three levels, namely junior, intermediate and senior investigators. Generally, they start from junior investigators and are promoted according to their professional performance after a certain number of years.

Second, systematic training. The training content of USCG personnel covers many aspects, such as laws and regulations related to maritime investigation, international conventions, system documents and statutory documents related to ships; Human factors investigation; Technical requirements, use methods, maintenance and inspection of ship structure, mechanical equipment and anti pollution equipment; Technical standards and operation methods of fire and life-saving equipment, various emergency procedures and fire and life-saving drill requirements; How to use all kinds of navigation aids and recording equipment and how to obtain information;

Investigation skills and techniques, etc. They have a complete scientific curriculum, professional teachers and textbooks, which make their training more systematic and professional. In order to protect the safety of life and property at sea and protect the marine environment, maritime investigation is developing in the direction of informatization, specialization and higher technology.

Third, the department is highly independent. NTSB and USCG are independent of each other and do not interfere with each other, which makes the maritime investigation a challenging work with high technical content, great difficulty and wide influence, highly recognized by the society, and makes its investigation conclusions more authoritative, which is conducive to promoting the modification and improvement of maritime management rules, avoiding or reducing the occurrence of maritime traffic accidents, and is valued by all sectors of the society.

3.1.4 Britain: Marine Accident Investigation Branch

Britain's maritime investigation also belongs to the typical single system management. Although Maritime and Coastguard Agency(MCA) and Marine Accident Investigation Branch(MAIB) are responsible for maritime accident investigation in the UK, the former is an administrative agency, accident investigation is only a part of its law enforcement work, and its nature is law enforcement investigation, while the latter is the agency specialized in handling maritime accidents, they carry out independent accident investigations.

(1) Basic functions of MAIB

Since its establishment in 1989, MAIB has been an independent professional organization for marine accident investigation in the UK. MAIB is responsible for promoting maritime safety by identifying the causes and circumstances of maritime accidents and cooperating with other parties to reduce the possibility of recurrence of

such accidents in the future. The only purpose of its accident investigation is for future safety. It does not investigate the responsibility, does not determine the compensation responsibility, and does not enforce the law or prosecute.

(2) Personnel composition of MAIB

The whole MAIB has four experienced teams of accident investigators, a total of 35 people. The investigators are divided into chief investigator and assistant investigator. Each team has a chief investigator and three investigators from the disciplines of navigation, engineering, shipbuilding or fisheries. An administrative team provides support to investigators, as well as dealing with finance, contracts, data analysis and publications. Those who are engaged in MAIB survey are senior personnel of navigation, marine engineering or shipbuilding, generally with different experience and expertise. Generally, the following requirements are required: a university degree; Have maritime qualification, know enough ship knowledge; And to receive formal training. The specific organization structure is shown in the figure.3.4.

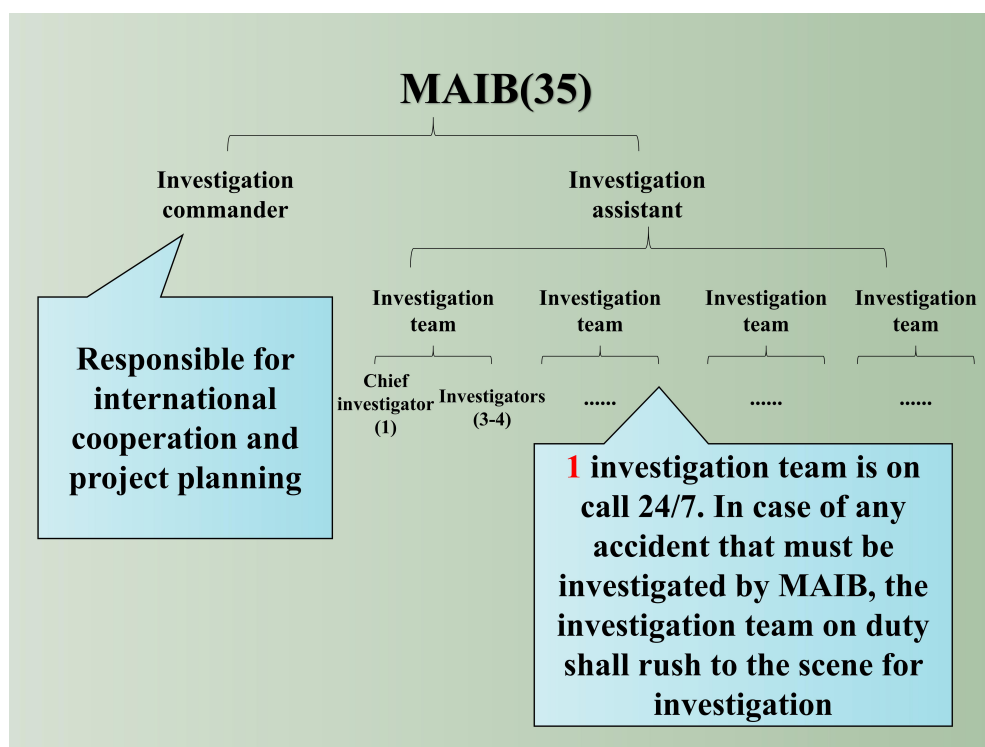


Figure.3.4 Personnel composition in MAIB

(3) Personnel training of MAIB

In the UK, it takes at least two years of pre service training to become a full-time maritime investigator. In addition, MAIB will conduct internal training for maritime investigators every year, mainly on professional knowledge related to accident investigation, such as the use of various navigation instruments, maritime laws and regulations, ship handling and collision avoidance, etc. The British maritime investigation bureau has made great efforts in training. There are detailed training plans for personnel training from the basic level to the top level. The specific training is shown in the table.3.1.

Table.3.1 Personnel training of MAIB

| | Phase | | Training content | |
|--|---|----------------|---|---|
| Pre job training (at least 2 years) | Phase 1 | Basic training | Learning investigation procedures | |
| | | | Make accident report | |
| | | | Physical test and inspection | |
| | | | Collect and analyze evidence, etc | |
| | Phase 2 | Skill training | Interview techniques | After training, entered the investigation team for internship |
| | | | Psychoanalysis | |
| | | | Risk analysis, etc | |
| Phase 3 | Overseas training | | | |
| Internal training | Hold all kinds of professional knowledge training for accident investigation every year | | Arrange for the knowledge needed in the actual work | |

In addition, MAIB will train its investigators with the help of some schools and social forces. Cranfield University, for example, is a well-known graduate education institution focusing on academic research. Founded in 1946, formerly known as Royal aviation base, the school is a world leader in logistics and aviation, with its own airport and aircraft, mainly used for teaching and research. The main funding of the school comes from the relevant corporate sponsorship, and a small part comes from the British government. In recent years, the school has set up short-term training courses, among which the short-term training of accident investigation is very famous. With 35 years of training experience, the school has trained a large number of accident investigators from different countries in the world. The following is the basic training course schedule (part) for accident investigators of Cranfield University in January 2013. It can be seen from the table.3.2 that the basic training courses for accident investigators in Cranfield University are very systematic and scientific.

Table.3.2 Training schedule in CRANFIELD (part)

| Date | Time / Course | Time / Course | Time / Course | Time / Course | Time / Course | Time / Course |
|--------------------|--|-------------------------------------|---|--|--|--|
| Monday (14/01) | 0900~1000 Course introduction | 1015~1115 Course introduction | 1130~1215 Introduction to accident investigation | 1215~1230 Introduction of H &S Laboratory | 1330~1430 Roles and responsibilities of accident investigators | 1445~1700 Roles and responsibilities of accident investigators |
| | | | | | | |
| Tuesday (15/01) | 0845~1130 Potential hazards at accident site | | 1130~1230 Risk management in the early | | 1330~1430 Collection of evidence | 1445~1700 Collection of evidence |
| | | | | | | |

| | | stage of accident | | | | |
|----------------------|---|---|---|--------------------------------------|---|--|
| Wednesday (16/01) | 0900~1130 | The plotting of the wreckage | 1130~1230 | 1330~1430 | 1445~1545 | 1600~1700 |
| | Management rules | | Initial assessment of maritime accidents | Underwater field investigation | Photo technology of investigators | |
| Thursday (17/01) | 0900~1230 | 1330~1600 | | | | 1600~1700 |
| | Special lecture on accident scene disposal | Special lecture on accident scene disposal | | | | Photogrammetry |
| Friday (18/01) | 0900~1115 | 1130~1230 | 1330~1430 | | | 1445~1630 |
| | Discrimination between crime scene and accident scene | Identification of accident victims | Accident pathology | | | Preliminary analysis of the accident |

(4) Characteristics of British Maritime Investigation Team Construction

First, reasonable institutional setup. MAIB, with its independent organization and professional personnel, ensures the effective development of maritime investigation to the greatest extent. Although the number of personnel is reduced, those who are engaged in MAIB survey are senior personnel of navigation, marine engineering or shipbuilding, generally with different experience and expertise. In order to effectively utilize the limited resources and improve the work efficiency, we should adopt the working mode of division of labor investigation and collective discussion.

Second, strict job requirements and standardized training procedures. Pre job training, get job qualification; Regular training after work. At the same time, with the help of society to serve themselves, improve the training effect. Various training methods

enable maritime investigators to improve their abilities through various channels.

3.2 Reference and Enlightenment

The experience of the above countries in the construction of maritime investigation team can produce the following enlightenment for the construction of China's maritime investigation team. These measures are conducive to the further development and promotion of China's maritime investigation team.

3.2.1 To coordinate the professional construction of maritime investigation team

Full time maritime investigators refer to those who are specialized in maritime investigation. They are not engaged in several duties, but only engaged in maritime investigation. Although there are also full-time investigators in China's maritime investigation team, they are not full-time in the real sense. Unlike the investigators from Japan, South Korea and other countries, they only do investigation, regardless of other administrative work. Training full-time maritime investigators is conducive to improving the efficiency and quality of maritime investigation; It is also conducive to the accumulation and inheritance of investigation experience. Maritime investigation is highly professional, practical and experiential. It needs a stable professional team who has been engaged in maritime investigation for a long time. The post of maritime investigation should be treated differently from other posts, and the personnel engaged in maritime investigation should not change frequently.

3.2.2 Do a good job in the professional training of maritime investigation team

Britain, the United States and other countries attach great importance to the training of maritime investigators. Strict pre job training and perfect continuing education training system make maritime investigators have rich knowledge and skills reserve. The corresponding training carried out by maritime investigation training institutions in developed countries has strong pertinence and purpose, and also has the conditions to carry out specific practical training, such as accident scene simulation training and laboratory practical operation. "Simulated accident investigation" not only makes the trainees feel personally, but also makes them realize the on-site evidence collection procedures, inspection steps and summary report after the actual investigation. But this kind of simulated scene accident investigation also needs a lot of training funds support, and also needs to do a good job in all aspects of personnel deployment and cooperation. This kind of teaching method is suitable for small-scale training. If there are many trainees, the training effect may not be obvious. The relevant training in developed countries focuses on professional technology, and the teaching content focuses on the improvement of maritime investigation professional technology; The training of China's maritime investigation needs to start from the basic knowledge, the teaching content focuses on theoretical knowledge, and then gradually through the actual case study, field observation, to improve the professional level of maritime investigators. In addition, most countries also call on non-governmental organizations to participate and contribute to the training of maritime investigators.

3.2.3 Establishing a reasonable management system of maritime investigation team

Most countries with mature systems have an independent department in charge of accident investigation, and maritime accident investigation is only a small branch. For example, NTSB has about 400 employees, of which 25% are engaged in administrative work, and the remaining 75% are accident investigators. Half of the 75% accident investigators are full-time aviation accident investigators. Of all the accident investigators, 19 are engaged in the investigation of maritime accidents. Among the 19 people, one is a full-time administrative assistant and three are full-time managers. The remaining 15 are maritime accident investigators, including 2 full-time investigators of maritime accident investigation report, 2 experts related to human factors, 2 retired captains, 2 serving captains and 3 investigators with senior officer qualification background. For example, the main maritime accident investigators of MAIB are no more than a dozen. However, China's maritime accident investigators are basically attached to the navigation department or safety department of each maritime branch, and most of them have the attribute of "concurrent post". They are not independent and only responsible for the investigation. There are few full-time maritime investigators.

In addition, many countries have established scientific management system of maritime investigators. There are specific requirements and standards in terms of the qualifications of maritime investigators, the corresponding skills of investigators at different levels, the classification and promotion system, etc. The professional knowledge and skills that different levels of maritime investigators should master are also different. MAIB divided the investigator into the survey chief and assistant survey. The chief investigator was responsible for international cooperation and

project planning, and the assistant investigation was divided into four survey teams, each consisting of a chief investigator and 3 to 4 investigators. Britain has strict regulations on the qualifications, knowledge and training of investigators. Generally, it takes two years and three stages of training to become a maritime investigator. From the perspective of the composition system of investigation institutions in various countries, the classification system of maritime investigators in developed countries is relatively simple, and the personnel is relatively simple. In practice, the maritime accident investigation in most developed countries is carried out by special completely independent or relatively independent investigation and analysis institutions according to the principle of separation of rights and responsibilities. For example, NTSB is a completely independent institution, MAIB and MAIA are relatively independent institutions, which is conducive to ensuring the fairness and comprehensiveness of maritime investigation to the greatest extent and restoring the true features of the accident, find out the deep reasons.

Compared with the mature maritime investigation teams in developed countries, there is a big gap in the system of China's maritime investigation team. There is almost no difference between China's maritime investigation team and other maritime administrative law enforcement teams, such as rescue team, which can not reflect the independence of the maritime investigation team, and the management of maritime investigators is very general, without detailed and specific chapters.

According to the above analysis, we can learn from the relatively simple experience of British Maritime investigators' classification, and learn from the experience of the United States' classification investigation according to the accident level, so as to classify China's maritime investigators, and formulate the selection conditions, access qualifications, appointment standards and promotion system of maritime investigators.

Chapter IV. Countermeasures for further strengthening the construction of China's maritime investigation team

Strengthening the construction of maritime investigation team is an important measure to deal with the current world maritime situation. To build a high-quality and high-level maritime investigation team requires not only scientific guidelines, but also various good management mechanisms. However, under China's current maritime management system, that is, MOT has no authority to set up institutions and posts independently, so the construction of maritime investigation team needs to be carried out from top to bottom.

4.1 Expand the introduction channels and optimize the team structure

For the maritime investigation team, one of the important ways to change its unreasonable structure is to select the personnel suitable for the development of the maritime investigation team. We can start from the following aspects.

4.1.1 Making scientific and reasonable employment plan

The maritime investigation team should consider the age, number, profession and other related factors, make scientific planning, adhere to the requirements of team echelon construction, and formulate a detailed employment plan in combination with the development strategic objectives of China's maritime industry, so as to formulate a practical long-term plan for the development of maritime investigation team and an

annual recruitment plan. Each branch bureau should reasonably determine the number of investigators according to the number of accidents each year, so as to avoid the phenomenon of "nothing to do" and "no one to do". At present, it is difficult to change the organizational structure of the MSA and increase its staffing. It is a convenient and easy way to set up a maritime investigation center as an internal organization in the MSA directly under the MSA without increasing the establishment, and implement the management mode of "one organization, two departments" with the safety department. This can not only ensure the relative stability of the team of maritime investigators, but also mobilize everyone's enthusiasm through the post setting(See table.4.1).

Table.4.1 Personnel planning table

| | Position | Number | Job Requirements | Benefits | Remarks |
|--------------------|----------------------------------|--------|---|--------------------------------------|--------------------------------------|
| All provincial MSA | Chief maritime investigator | 1 | With senior maritime investigator certificate and rich experience in accident investigation | Department level or deputy treatment | |
| | Director of marine investigation | 1 | Hold at least intermediate maritime investigator certificate | Section level treatment | Assist the chief investigator's work |
| Branches | Director of | 1 | Hold at least | Section or sub | |

| | | | |
|---------------|---|-----------------|-------------------|
| marine | | intermediate | section |
| investigation | | maritime | treatment |
| | | investigator | |
| | | certificate | |
| Maritime | | Hold at least | Assist the |
| investigation | 1 | junior maritime | director to carry |
| assistant | | investigator | out work |
| | | certificate | |

4.1.2 Adhere to the admittance mechanism of maritime investigation team

As for the selection and employment of the maritime investigation team, it is necessary to strictly control the entrance. First of all, the candidates must have the desire to engage in the work, also need to have a higher political and ideological quality, and should have good professional quality and ability. The vitality of the maritime investigation team comes from every member of the team. Therefore, adhering to the access mechanism of maritime investigators can enable those who are really capable and love the work of maritime investigation to enter the maritime investigation team, so as to prevent those who do not love the work of investigation and regard the work of investigation as a shortcut for rapid promotion from entering the team, which is conducive to maintaining the stability and reliability of the maritime investigation team.

In the process of selecting maritime investigators, competent authorities should strictly abide by the principles and standards of selection. In the process of formulating principles and standards, the unified standards should be formed on the premise of paying attention to systematicness, operability and scientificity. In order

to have a more comprehensive understanding of the qualities of candidates, we can assess them in the following methods.

(1) Written form

Through the written examination, competent authorities will examine whether the candidate has the most basic knowledge, such as political ideology and morality, navigation knowledge, ship handling, marine engineering, legal knowledge, evidentiary knowledge, linguistic knowledge and other relevant knowledge, and whether they can use these knowledge to solve problems.

(2) Psychological test

Through the test, competent authorities can detect whether the candidate is mentally healthy, and make a comprehensive judgment on the candidate's personality, emotional stability, preference, interpersonal skills, etc.

(3) Situational interview

Situational interview method can test candidates' professional quality, organizational ability, problem-solving ability and communication ability. Design some maritime investigation activities or tasks in the situation, such as looking for evidence, inspecting ships and equipment, filling in investigation records, investigating and inquiring, etc., and give assessment, so as to further understand the ability of candidates.

Competent authorities can also follow the way of recruitment of civil servant in the technical category, first having the law enforcement certificate, and then conducting the recruitment examination. This can expand the scope of talent selection, attract talents from the society, make full use of resources, and provide reserve talents for the long-term development of the maritime team. This is because the structure of the maritime investigation team needs multiple components. On the one hand, personnel with different backgrounds, qualities and abilities can be integrated in proportion to form a team, which can improve work efficiency; On the other hand, it can make the

team more energetic.

4.2 Improve the training system of maritime investigation team

The training of maritime investigators should be planned and continuous, adhere to the method of combining theory with practice, pay attention to the flexible use of theory, highlight the actual effect, and take the actual cases as the guide to learn and deal with problems.

4.2.1 Improve the training system of maritime investigation team

Another important part of the entrance is to establish a system of on-the-job training, that is, to work with a certificate. The requirements for the post training of China's maritime investigators are clearly stipulated in "Regulations on the administration of maritime investigators" and "Maritime administrative law enforcement certificate of China". Good quality and good work habits are never born, they need to be formed through a systematic training.

Fairness, objectivity, timeliness and comprehensiveness are the most basic requirements for every member of the maritime investigation team. The purpose of the training is to make each member clear about their responsibilities, form good habits, adapt to their roles as soon as possible, and put into work. At the same time, it is also necessary to strengthen the information training on how to obtain the support of experts, so that students can learn to deal with accidents more quickly and scientifically with the help of foreign aid, such as CCS experts.

Adhere to the maritime investigation team knowledge and skills update training. First of all, competent authorities should strengthen the professional ethics training of

maritime investigators. Through some special lectures and discussions, competent authorities could improve the political quality and theoretical cultivation of the maritime investigation team, make them love their work wholeheartedly and enhance their sense of responsibility. Secondly, it is necessary to strengthen the professional quality and ability training of maritime investigation team, and guarantee it in terms of funds and time. Due to the unique nature of maritime investigation, competent authorities must constantly update our knowledge and skills, so as to make the maritime investigation team develop continuously. In addition, the training content must combine study with work, so as to increase knowledge and improve work level. At the same time, to strengthen the training and construction of the maritime investigation team, it is necessary to make each member clear about their own interests and goals, which is conducive to the construction of a diversified career model for maritime investigators, and is an important means for the team to retain talents.

Reform the training mode and try to implement the personalized training. This dissertation attempts to implement personalized customized training for different levels and even individuals, so as to design the training contents and methods for the purpose of improving the practical operation ability, continuously improve the business level of China's maritime investigation team. The way of training can be the same as classroom network training, the establishment of maritime investigators specialized network training platform. Maritime investigators have their own account and password, log in by themselves, and make up for their shortcomings according to their own actual situation. It is more suitable for the current situation of China's maritime investigation system and the team of investigators to adopt modular course training for the training of maritime investigators. According to the current situation in China and the discussion of relevant experts, the training program is as follows:

Table.4.2 Training framework for assistant maritime investigators

| NO. | Module | Course | Reference hours |
|-----|--|---|--------------------|
| 1 | Maritime regulations(20 class hours) | Basis of maritime convention | 3 |
| | | International convention on maritime investigation | 1 |
| | | Basis of China's maritime laws and regulations | 8 |
| | | China's maritime investigation laws and regulations | 8 |
| 2 | Professional knowledge(12 class hours (Optional according to different professional background) | Navigation | 12 |
| | | Marine engineering | 12 |
| | | Shipbuilding | 12 |
| 3 | Investigation knowledge and skills(10 class hours) | Basic knowledge of maritime investigation | 5 |
| | | Maritime investigation technology | 5 |
| 4 | Evidence science and evidence collection(10 class hours) | Evidence science | 5 |
| | | Evidence collection technology | 5 |
| 5 | Accident analysis(10 class hours) | Psychological basis | 5 |
| | | Accident analysis method | 5 |

| | | | |
|---|---|---|----|
| 6 | Investigation of human factors / fatigue factors(10 class hours) | Human factors investigation | 10 |
| 7 | Investigation equipment and use (practical operation)(4 class hours) | Personal protective equipment wearing practice of maritime investigators | 1 |
| | | Practical operation of detection equipment | 1 |
| | | Marine instrument data extraction | 1 |
| | | Practical operation of evidence collection and preservation equipment | 1 |
| 8 | Investigation report writing(4 class hours) | Analysis of investigation report | 2 |
| | | Investigation report writing | 2 |
| 9 | Common English for maritime investigation(4 class hours) | IMO standard maritime English | 2 |
| | | Common English for maritime investigation | 2 |

Table.4.3 Training framework for intermediate maritime investigator

| NO. | Module | Course | Reference hours |
|-----|--------------------------------------|---|--------------------|
| 1 | Maritime regulations(12 class hours) | International convention on maritime investigation | 6 |
| | | China's maritime investigation laws and | 6 |

| | | | |
|---|---|---|-----|
| | | regulations | |
| 2 | Professional knowledge(4 class hours) | Navigation | 4 |
| 3 | Investigation knowledge and skills(18 class hours) | Maritime investigation technology | 18 |
| 4 | Evidence science and evidence collection(10 class hours) | Evidence science | 5 |
| | | Evidence collection technology | 5 |
| 5 | Accident analysis(10 class hours) | Maritime statistical analysis | 2.5 |
| | | Accident analysis theory | 2.5 |
| | | Accident analysis method | 5 |
| 6 | Investigation of human factors / fatigue factors(8 class hours) | Human factors investigation | 4 |
| | | Fatigue factors investigation | 4 |
| 8 | Investigation report writing(8 class hours) | Analysis of investigation report | 4 |
| | | Investigation report writing | 4 |
| 9 | English for maritime investigation(14 class hours) | Common English for maritime investigation | 6 |

| | | |
|--|--|---|
| | Investigation report writing in English | 8 |
|--|--|---|

Table.4.4 Training framework for senior maritime investigator

| NO. | Module | Course | Reference hours |
|-----|---|--|--------------------|
| 1 | Maritime regulations(10 class hours) | Maritime regulations | 10 |
| 2 | Professional knowledge(10 class hours) | Marine traffic engineering | 10 |
| 3 | Investigation knowledge and skills(10 class hours) | Maritime investigation technology | 10 |
| 5 | Accident analysis(10 class hours) | Psychological basis | 10 |
| 8 | Investigation report writing(10 class hours) | Analysis of investigation report | 5 |
| | | Investigation report writing | 5 |
| 9 | English for maritime investigation(18 class hours) | Maritime English | 4 |
| | | Common English for maritime investigation | 8 |
| | | Investigation report writing in English | 6 |

In addition, the contents of knowledge updating training and special training should be determined according to the specific situation. The training program should be

made according to the updated content; Special training should be based on specific training programs to develop training programs.

At the same time, competent authorities should learn from the practices of developed countries, introduce social forces and join in the training of maritime investigators. And train a group of part-time maritime investigators to supplement the full-time maritime investigation team. When the accident occurs, in order to select investigators with different backgrounds and quickly set up an investigation team.

4.2.2 Formulate the training and development plan of maritime investigation team

It is also the key to build an excellent maritime investigation team to help maritime investigators make career plans, train full-time maritime investigators and expand the career development space of maritime investigation team. Career planning is actually a kind of care, support and help for investigators, and also a concrete embodiment of encouraging investigators to realize their own value. Career planning can make investigators willing to work hard to achieve their development goals. Maritime investigators may formulate a career planning form according to their own specific conditions. At the same time, all maritime administrations should also make plans for the maritime investigation team to let the maritime investigators know that this job is very promising.

First of all, it is necessary to establish a perfect personal career development planning system to build a platform suitable for personal development and exhibition for maritime investigators. Secondly, through their career promotion channels, the maritime investigators' individual efforts and dedication should be combined with their long-term economic interests to affirm their work achievements, enhance their sense of achievement and belonging, and improve their work enthusiasm. This can

provide all kinds of resources and conditions for the maritime investigation team to achieve the goal, which is conducive to the growth of the team.

In addition, in order to improve the overall knowledge level of the maritime investigation team and make the maritime investigation team professional, the maritime system can recommend excellent investigators to go out to study, encourage and support them to obtain a higher level of education, optimize the overall structure of the team and promote the healthy development of the maritime investigation team.

4.3 Improve the management system of maritime investigation team

The training of full-time maritime investigators needs a supporting management system. System is the plan to guide action. To clarify the level and treatment of full-time maritime investigation position in the system can make the investigators study maritime investigation business and improve their maritime investigation skills with ease and concentration. Only with salary can there be competition, and only with competition can the vitality of the team be maintained.

4.3.1 Improve the team management mechanism

At present, the full-time maritime investigators are still government officials. This is obviously out of date for the technical maritime investigation post. The government had better classify the post of maritime investigation as a series of professional and technical posts. At present, the personnel management system of China's institutions, especially the title management system, is generally divided into primary, intermediate and senior titles. The three-level investigator system can be directly

connected with the title management system, and refer to the relevant personnel management policies to manage the maritime investigators.

In the construction of maritime investigation team, it is necessary to clarify the post and responsibility. According to the actual function of the post and the actual performance of the personnel, the post of the whole maritime investigation team is divided into several levels, and the conditions and responsibilities of the posts at all levels should be clear, and the assessment standards and salary system should be established and improved. For example, a maritime bureau has a full-time post of maritime investigators, which is set up in the safety management department. At the same time, there is a matching system of treatment and welfare. In this way, competent authorities can not only clarify the post responsibilities of the maritime investigators, but also ensure their treatment, which is conducive to the construction of a reasonable career promotion channel, but also conducive to the stability of the team, so that the full-time maritime investigators can smoothly study the investigation business, improve their investigation skills, and lay a foundation for the sustainable development of the maritime investigation team.

MSA is responsible for both maritime investigation and responsibility identification, administrative penalty and administrative mediation, which also leads to many problems, and is one of the main reasons to limit the improvement of China's maritime investigation level. Under the condition that this system can not be changed in a short period of time, competent authorities should set up a maritime investigation technical organization directly led by the MSA and stipulate that its duty is to find out the cause, that is, it can make this organization get rid of the shackles of responsibility determination and maritime mediation and devote itself to the accident investigation. After the investigation of the cause of the accident is clear, the responsibility of determining the responsibility of the accident and maritime mediation is transferred to other maritime administrative departments or maritime

courts for further treatment according to the accident investigation report, thus realizing the separation of accident investigation and responsibility determination to a certain extent. The personnel of an independent technical institution for maritime investigation shall be full-time maritime investigators and may be managed in accordance with the establishment of professional and technical personnel of China's institutions; Or introduce talents to the society and let them flow freely according to the market rules, so as to break the institutional barriers of talent flow. Maritime investigation team can achieve talent introduction, which is bound to improve the level of maritime investigation. At the same time, the establishment of independent maritime investigation technical institutions can also share the limited resources of maritime investigation experts in China, so as to solve the problem of maritime investigation talent shortage to a certain extent.

In addition, democratic management should be advocated, so that everyone in the team has the right to speak, and talents can participate in the management to varying degrees, so as to achieve the purpose of retaining people's hearts. Adhere to people-oriented, build team culture, establish the spiritual pillar of the maritime investigation team, and then enhance the unity of the team.

4.3.2 Improve the flow mechanism of talents

By studying the construction of maritime investigation teams in developed countries, it is not difficult to find that the high-level maritime investigation team must have a reasonable talent flow mechanism. Scientific and reasonable talent flow mechanism provides talent support for team development, which has important practical significance for improving the core competitiveness of the team. To vigorously promote the construction of the flow mechanism of maritime investigation team, competent authorities should first do a good job in the scientific management of

talents, promote, select and export excellent talents to important posts, and pay attention to the training and use of reserve personnel; At the same time, competent authorities should carry out competition and job rotation, and establish a normal job exchange system. Reasonable talent flow mechanism can keep the maritime investigation team energetic, open up the career development channels of maritime investigators, and maintain the enthusiasm of them. In addition, competent authorities should also improve the mechanism of maritime investigators' selection and transfer, so as to select and transfer appropriate personnel to form an investigation team according to the nature of the accident.

4.3.3 Establish the exit mechanism of team members

Strengthen the dynamic management of the maritime investigation team, so as to achieve the continuous updating of talents. The exit mechanism can make the talents flow reasonably and make the human resources reach the optimal allocation. But the exit mechanism must be supported by law. The maritime investigation team should establish and improve the exit mechanism according to law to allow the resignation of the personnel whose goal is not in the maritime investigation; At the same time, those who neglect their duties and violate the law and discipline will be dismissed; Allow persons who are incapacitated or who have reached the legal age and length of service to retire; In this way, it can not only make room for other capable and willing talents, but also help the maritime investigation team to maintain a reasonable age structure, which is of great significance to the development of outstanding young talents.

4.4 Improving the restraint and assessment mechanism of China's maritime investigation team

Competent authorities should further improve the restraint and assessment mechanism for the maritime investigation team, and earnestly strengthen the assessment of the maritime investigation team, so as to achieve a clear distinction between rewards and punishments and reward for meritorious deeds. This is also an effective measure to further strengthen the construction, management and use of the maritime investigation team.

4.4.1 Establish multiple levels of assessment standards

The assessment contents, standards and methods of maritime investigators can be determined according to their duties and obligations. Competent authorities should adhere to the principle of objectivity and impartiality when formulating the assessment standards; Competent authorities should adhere to the principles of democracy and operability in the assessment methods and procedures. The assessment of administrative personnel in developed countries is divided into 5-7 grades, and each level adopts different feedback methods, which can effectively improve the staff working level and prevent the investigators from slack working status.

Professional technology series management system has relatively perfect access, assessment, promotion, reward, exit criteria and clear level and treatment. When the full-time maritime investigators are included in the professional technology series and there is no restriction on the identity of government officials, it can attract more social talents to join the team of maritime investigators, and maintain the competition and vitality of the team. At the same time, it is also convenient to assess the workload

of maritime investigation, so that full-time maritime investigators can study more professional topics and participate in relevant academic activities, so as to improve the overall level of maritime investigation. Referring to the assessment methods for professional and technical civil servants, the assessment contents of maritime investigators should include: basic information, ideological and political quality, attendance, training and further study, main work contents, papers, reports, academic conditions, etc. Through scientific, systematic and standardized evaluation, the strict requirements and management of the maritime investigation team should be implemented, so as to play a role in forming the vitality of the maritime investigation team.

4.4.2 Establishing the system of assessment, supervision and accountability

Reasonable assessment mechanism is also an effective supervision and restriction mechanism, which can improve the comprehensive quality of maritime investigation team. The establishment of a scientific assessment scheme combined with the actual situation of the world's maritime industry can provide excellent maritime investigators with career promotion, knowledge and skills training and other growth opportunities, stimulate the work motivation of the team, reduce the bad performance of the team, and promote the improvement of relevant personnel.

In order to reduce the shortcomings and errors in the assessment, the examinees should accept the assessment of their colleagues and subordinates in addition to the assessment of their superiors and supervisors, so as to get more comprehensive assessment results. Colleagues work together, they usually spend more time with each other than with their superiors. They are more aware of each other's advantages and disadvantages. Their mutual assessment can give more objective and accurate evaluation on the performance of the staff being assessed. Self assessment is put

forward by enterprises based on the concept of "people-oriented". It can also be adopted in the maritime investigation team, which is more flexible than the unilateral assessment of the superior to the subordinate. It can not only make the investigators understand their own shortcomings, but also better accept their own opinions and criticisms. The lower level assessment pays more attention to the evaluation of the superior's ability, and the lower level is more clear about what kind of superior leaders they need, so that the assessment results are closer to the actual work situation.

The establishment of assessment and supervision mechanism can ensure the authenticity, fairness and accuracy of the assessment results, maintain the enthusiasm of investigators, and then mobilize their enthusiasm. For the problems existing in the performance appraisal, competent authorities should implement the responsibility system, give full play to the accountability mechanism of maritime investigators' performance appraisal, combine with the existing supervision methods, and increase the strength of appraisal and supervision.

4.4.3 Establish the feedback system of assessment

The purpose of the assessment is to make an objective and effective scientific evaluation on the work of the maritime investigators, improve the ability of the investigators, so as to ensure the effectiveness of the maritime work. On the one hand, it can supervise the examiners and make them take the assessment more seriously. On the other hand, it can also give the examinees a chance to reflect on themselves and make representations, so as to achieve the purpose of motivating maritime investigators.

Some leaders at higher levels often do not talk about the results of the assessment, thinking that the assessment is confidential. In fact, this is a wrong idea. The purpose

of assessment is to help individuals and organizations realize their own shortcomings. Feedback the assessment results to the organization members can point out the direction of improvement and efforts for them. The feedback system of performance appraisal is very important. In China's civil service system, there are clear regulations on the appeal process. For the assessment feedback appeal of the maritime investigation team, the appeal application should be submitted first to clarify the controversial content and reasons. Then, after the authenticity is confirmed by the relevant departments, a review group is set up to make a decision. The assessment results play an important role in the promotion, reward and punishment of maritime investigators. Therefore, the assessment results should be fully open. The assessment results are not only related to the interests of the examinees themselves, but also related to the interests of other personnel. Full disclosure can prevent black box operation.

4.5 Implement incentive and guarantee mechanism of maritime investigation team

Incentive theory emphasizes to meet the material and spiritual needs of employees, to promote employees to work actively, otherwise it will lead to resistance, work not seriously, affect the overall stability of the team. Therefore, in the process of maritime investigation team construction, how to take effective measures to mobilize the enthusiasm of investigators is particularly important. In the framework of China's existing system, the incentive mechanism for maritime investigation should be established by means of material reward or job promotion. For example, in addition to full-time maritime investigators, other personnel participating in maritime investigation belong to overtime behavior and should be compensated for overtime. In the promotion, the frequency and quality of participating in maritime investigation

work should be taken as an important reference standard, or as a reference condition for evaluating advanced and various honorary titles, so as to arouse the enthusiasm of maritime investigators.

4.5.1 Improve the salary and welfare level of the maritime investigation team

Salary and benefits are not only the guarantee means but also the incentive means for the construction of maritime investigation team. Salary is the most basic incentive means. Improving the salary level can effectively mobilize the enthusiasm of the maritime investigation team and improve the work efficiency. At the same time, salary is also a means to attract talents. Improving the salary level can attract excellent talents to the team. In addition, the salary is also the basic living needs of the maritime investigators themselves and their supporting families. Raising the salary level can protect their economic status in the society and give them more dignity.

As a supplementary form of salary, attractive benefits often have a competitive advantage in recruitment. The establishment of a flexible and attractive welfare mechanism to properly supplement the basic living needs of the maritime investigation team members in special circumstances is conducive to stabilizing the maritime investigation team and enhancing the sense of belonging of the team members.

Competent authorities should improve the reward mechanism for maritime investigation teams, and give recognition and rewards to those who have made outstanding achievements in maritime investigation according to the principles of fairness, appropriateness, timeliness and effectiveness, and combination of rewards and punishments. Those who are not serious, irresponsible and violate the law and discipline should be severely punished. The construction of incentive mechanism for

maritime investigation team can make the whole team full of energy.

4.5.2 Establish a scientific and transparent promotion channel

In the maritime investigation team, there are different work demands for people of different ages. For the inexperienced young members, more attention should be paid to the improvement of skills. For some experienced personnel, they pay more attention to the sense of achievement and personal future. Therefore, competent authorities need to build a channel, for different personnel, to meet their different needs, so that the whole team can continue to develop and progress. The open and transparent promotion channel can make the members of the maritime investigation team have a clear goal, more at ease with their own work, and can also maintain the stability of the team. For example, Guangdong maritime administration of China has established a promotion channel for maritime investigators and a management method for high-end talent pool, with a total of 13 modules. The second module is the high-end talent pool for accident investigation, which provides strong support for the development of the team. Set up a full-time maritime investigation position in the maritime department to be responsible for accident investigation and safety situation research within the jurisdiction, form a bottom-up promotion mechanism, and ensure the relative stability of the maritime investigation team.

4.5.3 Establishing the power guarantee mechanism of maritime investigation team

The power protection mechanism of maritime investigators should implement the principles of equality, hierarchy and consistency of rights and obligations. The principle of equality is to enjoy the legal rights equally and should not be affected by the position, qualifications, family birth and so on. The principle of hierarchy is

related to maritime investigators, who have the basic rights of being Chinese citizens and enjoy the functions and powers prescribed by Chinese laws. The rights and obligations of the maritime investigation team are an inseparable unity. The rights of maritime investigators are not only the guarantee of their status, but also the guarantee of performing their duties according to law. Only in this way can the democratic and legal management of the maritime investigation team be facilitated. Establish and improve all aspects of the maritime investigation team insurance guarantee mechanism, such as work-related injury insurance, endowment insurance, medical insurance, unemployment insurance, etc., all aspects of the rights guarantee mechanism can guarantee the emotional stability of the maritime investigators, so as to ensure the effectiveness of their work, but also reduce the burden of the family, solve the worries of the maritime investigators. Competent authorities should also support the local maritime information construction, strengthen the construction of maritime investigation equipment and information infrastructure.

The purpose of establishing the incentive guarantee system of maritime investigation team is to build a platform for the development of maritime investigators, so that more talents can make a difference, so as to truly retain talents.

Chapter V. Summary and conclusion

Maritime investigation is an important basis to improve the modernization level of maritime safety administration system and governance capacity, an effective way to promote maritime transformation and upgrading and improve management level, an important means to accelerate the construction of essential safety of maritime, and plays an irreplaceable role in promoting social stability. It is the most important task for China to strengthen the construction of maritime investigation team in the future.

Over the past decade, from the formal establishment of the system of maritime investigators to the formal implementation of the "Regulations on the administration of maritime investigators", China's maritime investigation has developed rapidly. Similarly, there are many problems in the process of building a maritime investigation team. At present, the current business and technical level of China's maritime investigators need to be strengthened. Based on the theory of human resource management and extensive investigation of China's maritime investigation team, this dissertation points out the main problems of China's maritime investigation team and analyzes the reasons. Based on the construction of accident investigation team in other similar industries in China, this dissertation puts forward some suggestions on the construction mechanism of maritime investigation team, which has a certain reference effect on strengthening the ability of China's maritime investigation team and improving the investigation level.

The construction of maritime investigation team is a long-term and complex project. Next, under China's existing system, I hope to be led by the MSA and coordinated by local bureaus according to local conditions to create a professional, independent and international maritime investigation team.

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APPENDIX A

Questionnaire A Personal questionnaire of maritime investigators

This questionnaire aims to provide practical basis for the construction of China's maritime investigation team. The method is anonymous. Please feel free to answer.

I Basic information

Q1:Age:

☐Under 25 ☐25-35 ☐35-45 ☐45-60

Q2:educational background:

☐Junior collage ☐Undergraduate ☐Postgraduate(M.D./Doc.)

Q3:Major:

☐Navigation technology ☐Marine Engineering ☐Maritime administration
☐Other

Q4:Unit / Department / Administrative level:

☐Section and below ☐Section chief ☐Bureau

Q5:Your administrative level:

☐Clerk ☐Section ☐Section chief ☐Bureau

Q6:Your level of investigator certificate:

☐Assistant ☐Intermediate ☐Senior

Q7:How long have you obtained the certificate of investigator(Years):

☐1-3 ☐3-5 ☐5-10 ☐Over 10

Q8:How many times did you participate in the maritime investigation of a particularly serious accident:

☐0 ☐1-5 ☐5-10 ☐Over 10

Q9:How many times did you participate in the maritime investigation of major accidents:

☐0 ☐1-5 ☐5-10 ☐Over 10

Q10:How many times did you participate in the maritime investigation of serious accidents:

☐0 ☐1-5 ☐5-10 ☐Over 10

Q11:How many times did you participate in the general accident maritime investigation:

☐0 ☐1-5 ☐5-10 ☐10-20 ☐Over 20

Q12:How many times did you participate in the minor accident maritime investigation:

☐1-5 ☐5-10 ☐10-20 ☐Over 20

Q13:How many times did you preside over the maritime investigation of particularly serious accidents:

☐0 ☐1-5 ☐5-10 ☐Over 10

Q14:How many times did you preside over the maritime investigation of major accidents:

☐0 ☐1-5 ☐5-10 ☐Over 10

Q15:How many times did you preside over the maritime investigation of serious accidents:

☐0 ☐1-5 ☐5-10 ☐Over 10

Q16:How many times do you preside over the maritime investigation of general accidents:

☐0 ☐1-5 ☐5-10 ☐10-20 ☐Over 20

Q17:How many times did you preside over the maritime investigation of minor accidents:

☐0 ☐1-5 ☐5-10 ☐10-20 ☐Over 20

Q18:What is your latest training level for maritime investigator:

- ☐Assistant ☐Intermediate ☐Senior

Q19:What kind of training did you attend last time:

- ☐Updating knowledge ☐Certification ☐Other

II Occupational status

Q20:What do you think is the educational standard for a maritime investigator?

- ☐Junior collage ☐Undergraduate ☐Postgraduate(M.D./Doc.)

Q21:What do you think the professional background of the maritime investigator should be?

- ☐Navigation technology ☐Marine Engineering ☐Maritime administration
☐Other

Q22:What do you think is the working experience of a maritime investigator?

- ☐No maritime related work experience is required
☐Less than 3 years maritime related working experience
☐3-5 years maritime related working experience
☐5-10 years maritime related working experience
☐More than 10 years working experience in maritime related

Q23:What do you think is the qualification of a maritime investigator?

- ☐No marine qualification required
☐Less than 3 years marine qualification
☐3-5 years marine qualification
☐5-10 years marine experience
☐More than 10 years of marine experience

Q24:What do you think the character of the maritime investigator should be?

- ☐Extroversion ☐Introvert

Q25:Which of the following options do you think is more suitable to be a maritime investigator(Multiple choice)

- ☐Easygoing ☐Good at cooperation ☐Stubborn ☐Paranoia
☐Careful

Q26:Which of the following abilities do you think is more important for a maritime investigator

- ☐Pressure resistance ☐Adaptability

Q27:What professional skills do you think maritime investigators need(Multiple choice)

- ☐Professional knowledge ☐Report writing ability ☐Communication and coordination ability
☐Evidence / Data analysis capability ☐Maritime investigation (Inquiry) skills
☐Accident cause theory ☐English ☐Other

Q28:What abilities and qualities do you think an excellent maritime investigator must possess?

Q29:In your opinion, the main reasons that affect the improvement of the level of maritime investigation in China are as follows: (Multiple choices)

- ☐On the system of maritime investigation
☐Serious turnover of marine investigators
☐Lack of expertise / experience of investigators
☐Lack of professional facilities and equipment
☐Other

Q30:Which maritime investigation professional skills do you think need to be further improved(Multiple choice)

- ☐Professional knowledge ☐Report writing ability ☐Communication and coordination ability
☐Evidence / Data analysis capability ☐Maritime investigation (Inquiry) skills
☐Accident cause theory ☐English ☐Other

Q31:Does your department have an evaluation mechanism for maritime investigation, such as the evaluation of a maritime investigation after it is completed?

☐Yes ☐No

Q32:Does your department have a performance appraisal system for marine investigators?

☐Yes ☐No

Q33:Does your department have a maritime investigator training system?

☐Yes ☐No

Q34:Do you think the current training system can improve skills in essence?

☐Yes ☐No

Q35:What kind of training would you like to receive? (Multiple choice)

☐Professional knowledge ☐Report writing ability ☐Communication and coordination ability

☐Evidence / Data analysis capability ☐Maritime investigation (Inquiry) skills

☐Accident cause theory ☐English ☐Other

Q36:Does your department have a promotion system for maritime investigators?

☐Yes ☐No

Q37:What do you think should be examined in the promotion of maritime investigator? (Multiple choice)

☐Participate in / preside over the investigation; Number / level of reports submitted

☐Published papers / monographs

☐Other

Q38:Does your department have any benefits for maritime investigators? Or reward for engaging in maritime investigation?

☐Yes ☐No

Q39:What benefits do you think maritime investigators should enjoy? (Multiple choice)

- ☐Additional subsidies
- ☐Overtime pay
- ☐Workload bonus
- ☐As a priority for promotion
- ☐Priority conditions for selecting advanced talents
- ☐Other

Q40:As you know, has any unit conducted a special project research on the official surface of maritime investigation?

- ☐Yes ☐No

APPENDIX B

Investigation of different levels of MSA

1. General situation, number and rank of maritime investigators.
2. Accident level that can be investigated
3. The post setting, corresponding level and post rotation of maritime investigator.
4. The authority of maritime investigators in accident investigation (The relationship between accident investigation level and maritime investigator level).
5. How many investigators are there in the investigation team
6. Relevant documents of the current construction mechanism planning of maritime investigators (maritime talents).
7. The training mechanism of maritime investigators and related systems.
8. Documents related to the current work evaluation mechanism for maritime investigators.
9. The current system of the treatment mechanism for maritime investigators / maritime talents.
10. The current maritime investigator / maritime personnel position / technical level promotion mechanism related system.