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An analysis of the salvage market in China

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AN ANALYSIS OF THE SALVAGE MARKET IN CHINA

By

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China

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DECLARATION

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

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

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ABSTRACT

Title of Dissertation: **An Analysis of the Salvage Market in China**
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For a country like China with considerable dependence on the shipping industry, an efficient and effective salvage industry is of great importance. This dissertation, an analysis of the salvage market in China, aims at helping salvage companies to better equip and mobilize their salvage forces and thus improve their effectiveness.

The salient features of salvage and the development of the Chinese salvage industry are examined in order to set up a basis for further analysis.

The number of maritime accidents has decreased by nearly half from 2003 to 2008, and many other indicators also show an improved maritime safety situation in China. However, there remain several negative elements influencing the maritime safety, which indicates that salvage companies should maintain their salvage capability and also attempt to enhance their capability to deal with accidents of larger vessels and hazardous cargos.

An analysis of the various market segmentations, including the regional differences, the types of accident and the types of ship, is carried out. In 2008, 37% of the maritime accidents occurred in Changjiang Delta, 57% of the accidents were caused by collision or contact and 86% of the accidents were related to cargo ships, the focus of the salvage forces today and in near future should be adjusted according to the discrepancies in different regions, types of accident and ship types.

KEYWORDS: Salvage market, Accident, Maritime safety, China

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LIST OF ABBREVIATIONS

CMB	China Meteorological Bureau
CMRCC	China Maritime Rescue Coordination Center
CRS	China Rescue and Salvage
DWT	Dead Weight Tonnage
GSD	General Staff Department
IMO	International Maritime Organization
ISM	International Maritime Organization
ISU	International Salvage Union
ITS	International Tug & Salvage
LNG	Liquefied Natural Gas
LOF	Lloyds' Standard Form of Salvage Agreement
LPG	Liquefied Petroleum Gas
MOA	Ministry of Agriculture
MOC	Former Ministry of Transportation of China
MOH	Ministry of Health
MPS	Ministry of Public Security
MRSC	Maritime Rescue Sub-Centers
MSA	Maritime Safety Administration of China
PAP	People's Armed Police Force
RCC	Rescue Coordination Center
RMB	Renminbi, (name of Chinese currency)
SAR	Search and Rescue
SAWS	State Administration of Work Safety
SCOPIC	Special Compensation P& I Clause

SOA	State Oceanic Administration
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
TEU	Twentyfoot Equivalent Unit
U.S.A	United States of America
VIMSAS	Voluntary IMO Member State Audit Scheme

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Salvage, as a commercial business, which was deemed to be beneficial to the common interest of owners of the salved property, can be traced back to as early as Roman times. Since then, on the basis of the ancient concept, the doctrine of salvage has developed over the last few centuries. The latest and most authoritative definition is made by IMO (1989) in the International Convention on Salvage 1989, according to which, salvage refers to “any act or activity undertaken to assists a vessel or any other property in danger in navigable waters or in any other waters what so ever”.

Salvors are often considered to be “beachcombers and vultures”, because their business becomes possible only when misfortunes occur to others. Nevertheless, quite the contrary, since they are engaged in so dangerous a service of assisting others at extreme risk, many argue that salvors always present the spirit of chivalry. Anyway, as long as there is a maritime casualty, the salvage service is virtually indispensable to the shipping world (Mukherjee, 2006, P273). When mentioning the importance of salvage, Thapar (1996, P5) indicates that “if ships keep the cargo

moving, in some ways, salvors keeps the ships moving". Nowadays, when the concept of "cleaner oceans" is taken into account, the salvage industry benefits not only commerce but also public concerns. Without a strong salvage presence, the interests of navigation and even the marine environment will be at risk.

For salvage companies, the primary goal is unquestionably to maintain profitable returns on investments. In the early stage during the development of the industry, a few lucky salvors, who "have been in the right place at the right time" (Baptist, 1979, P1), might have made gains beyond normal expectation with little risk and effort. However, with the industry becoming mature, salvage has gradually turned to become a highly competitive business. The necessities for the salvage operator, such as impressive and diverse range of expertise and skills, various capital intensive equipment as well as qualified, experienced personnel, usually require sound financial support. Meanwhile, casualties that need salvage assistance are not predictable, and owing to the efforts of various attempts by the shipping world to improve maritime safety, the number of maritime casualties is today presenting a declining trending. As such, reasonable judgement of the market and further, careful arrangement of the salvage resources which the company holds, are becoming extraordinarily important for the survival and prosperity of the salvage companies over the long term.

1.2 PROBLEM STATEMENT AND OBJECTIVES

As is known to all, the economy and thus trade of China has been expanding dramatically during the last few years, in the development of which water transportation plays a critical role. At the same time, to keep the improvement of national economy stable, the vitality of the nation's waterways and continuous,

uninterrupted shipping support are accordingly expected. Salvage, an industry providing emergency response in perilous maritime situations, has never been ignored as to its importance. Salvage companies used to be owned only by the government in China, but with the adjustment of the country's policies, private investments have been allowed. Now, both the state-owned salvage companies and private forces exist to compete in the market. Since China is in the process of fast development, significant changes are the result, not only in maritime traffic and shipping but also in the safety situation. For salvage companies, to make the right decisions in commercial operations and investments, it is necessary to better understand the movement and trend of the maritime safety situation, in other words, that of the salvage needs, which is also the original incentive of this dissertation.

To achieve such goals, the general features of salvage as a commercial activity and the main concerns of salvors in the business will be examined. Further, on the basis of an analysis of current maritime casualty situations in China, the dissertation hopes to discover the development of the salvage market in recent years and assess its future trend. Moreover, several segmentations in the salvage market will be analyzed, aiming at elaborating the concrete factors influencing the salvage operation and the returns.

1.3 METHODOLOGY

Data used as the footstone of analysis in this dissertation is mainly from public statistics in authorities and their websites. Some unpublished figures from authorities are also quoted for the sake of understanding.

Empirical opinion largely contributes to the qualitative analysis of this dissertation.

Literature reviews of substantive relevant books, journals and articles are included. Communications with experts in the salvage industry are conducted, through which the professional opinions they express are involved in this dissertation. Further, several years' working experience of the author is also included in the writing of this dissertation.

1.4 LIMITATIONS OF THE STUDY

It will be more rational if the data used for analyzing the maritime safety situation includes all the accidents occurring in Chinese territorial waters, no matter what the flag or functions of the vessel are. Actually the statistics that the author has collected only reflect an approximation. However, this does not affect the reliability of the research in general terms.

Since there are various standards for salvage market segmentation, it is not possible to include all of them, thus only those critical ones are selected.

1.5 DISSERTATION PLAN

After the introduction, the salient features of salvage from the salvage companies' point of view are presented in chapter 2, as well as the historical and current posture of Chinese salvage forces.

Chapter 3 discusses the general situation of maritime safety in recent years, the reasons for its movements and its predictable trends, and further, that of the salvage market.

Chapter 4 considers several sub-divisions of the salvage market that will make sense to the salvors, including the regional differences, the types of accident and the types of ship.

Finally, the conclusions based on the research in the former chapters are given in Chapter 5.

CHAPTER 2

SALIENT FEATURES OF THE SALVAGE BUSINESS AND DEVELOPMENT OF THE SALVAGE INDUSTRY IN CHINA

2.1 INTRODUCTORY REMARKS

Salvage is unique although it is a small sector in comparison with other industries in the shipping world. To know the business before going into it is always helpful for success, similarly, it is meaningful to start this dissertation with a discussion of the salient features of salvage, especially from the perspective of the salvage companies. Further more, since the topic concerns the salvage market in China, a brief review of the development of the Chinese salvage industry will also be included here.

2.2 SALIENT FEATURES OF THE SALVAGE BUSINESS

The peculiarities of salvage lie in its professionalism as well as many other aspects. It is unpredictable to know before accidents occur whether and what salvage services will be required. However, when casualties occur and sufferers call for help, the assistance becomes first-aid. The job is of high risk because what the salvors have to

fight with are often the most dangerous circumstances. Therefore，the resulting rewards must provide sufficient incentives for the service to continue. Actually, the salvors' commercial welfare is mainly ruled by an ancient equality principle, whereas the rules have evolved considerably to date. More details about these features of salvage will be explained separately in the following sections.

2.2.1 Professionalism

The expanded functions of salvage in modern times include (National Academy of Science, 2003, P19):

- Emergency towing of a stricken vessel
- Ability to patch and refloat a sunken vessel
- Ability to right and refloat a capsized vessel
- Internal transfer operations to mitigate stress in the vessel's hull and to enhance seaworthiness
- Lightering of liquid cargo and offloading of other hazardous cargoes
- Dredging to free a grounded vessel or open an impeded waterway
- Heavy lift capability
- Firefighting, and
- Deep water search and recovery.

As a result, specialized equipment, professional staff as well as advanced technology are supposed to be embraced in a successful salvage company. The equipment served

in salvage operations involves an extensive array of specialized vessels, such as tugs, salvage vessels, dredgers and so on, which are falling outside the usual commercial usage of transportation. A wide variety of particular facilities like firefighting, oil-recovery and pontoons is necessary in diversified specific cases. The persons on board have to be able to manoeuvre the equipment skillfully, without exception, in rough weather. The knowledge that they hold, should therefore, be sound and often above the level that the average crew has in commercial ships. Diving is one of the professional techniques applied in salvage. Before being qualified to conduct underwater surveys, cutting, welding and several other underwater operations, divers are normally trained over an extensive period. Moreover, with the increasing size of ships, the salvage operations available are becoming increasingly more complicated, requiring a stronger capability to respond and more advanced technology.

2.2.2 Unpredictability

The business of salvage is unpredictable by its very nature in respect that the persons dealing with the salvage business make their living out of disasters and accidents. Nobody knows when and where accidents will occur, and as a result, nobody knows when and where the salvage business will be needed. Indeed, it is not always possible to locate the required equipment in all geographical areas. To ensure a rapid and effective response, salvors usually concentrate on the regions with busy vessel traffic and frequent accidents. In addition, in the seasons when typhoons, floods or other bad weather strike the navigational lanes, salvors naturally pay more attention and dispatch their salvage forces to the regions in such seasons.

Salvage is not everyday work. During free days, it is, therefore, important that salvage companies explore and develop other related jobs to keep the valuable

additional use of equipment; for instance, harbor towage, ocean towage and offshore services are normal businesses that the salvage companies deal with out of salvage. The world famous, Dutch salvage specialist, SMIT, classifies its core activities into salvage, terminals and harbor towage and transport and heavy lift (ITS, 2002, p9). According to the study of Committee for Marine Salvage Response Capability in the U.S.A., the proportion of salvage in the overall business of the company is around 10 to 25 percent (National Academy of Science, 2003, P12).

2.2.3 First aid

Salvage is a first-aid business. To deal with uncertainty rapidly, salvors are 24-hour and 7-day ready. Not only high quality professionalism, but also the time to mobilize the suitable equipment and the personnel plays a significant role as well; prompt emergency response is always helpful and meaningful. The absence of salvage forces when accidents do occur, or the delayed departure of salvage vessels will somewhat affect the result of a salvage operation, and can even make the difference between success and failure.

Before the commencement of salvage operations, the agreement of salvors and the salved parties used to take time and in certain instances results in the loss of the best opportunity to succeed. To avoid senseless commercial haggling, and accelerate the salvor’s response, pre-formed contracts prevail worldwide in the salvage industry, today where Lloyds’ Standard Form of Salvage Agreement (LOF) is one of the leading models.

2.2.4 High risk

The private sacrifices of salvors are understandable since they work in such difficult working circumstances and sometimes at great personal risk. Besides the skillful knowledge and confidence to solve problems under rough conditions, courage and dedication are always necessary to keep the miracle high and to engage in such dangerous occupation. Nevertheless, after the perfect completion of a tough salvage operation, not only are the commercial returns good but also the mental rewards are beneficial for the salvors' heroic endeavors.

2.2.5 Special rules for rewards

There are several standard rules regarding salvage. The first one was signed at Brussels in 1910, which came to be known as the 1910 Salvage Convention. The famous golden rule of "No Cure- No Pay" was legalized in this Convention. The other one is the paramount rule prevalent until now, namely, the International Convention on Salvage, 1989. The conventions apply to all different types of salvage agreements and operations, except for the free will of the parties involved.

The standard forms of salvage contracts mostly utilized include Lloyd's Form, Japanese Form, Turkish Form and Hamburg Form. The agreement might alternatively stipulate the remuneration on the basis of daily rate or lump sum systems as well. According to the survey of the International Salvage Union (ISU, 2009), around 20% of the reported salvage services applied LOF in 2008, which remains the most widely used standard salvage form.

No matter whether in the conventions or the contracts, the traditional principle referring to the awards which is the salvors primary concern, tends to relate to the values saved. As per the statistics published by the Salvage Arbitration Branch (2009), under LOF the percentage of salvage awards to salved values have varied between 4.8% and 18.8% in the past nineteen years. The specific figures of each year from 1990 to 2008 are illustrated in Figure 2.1 below.

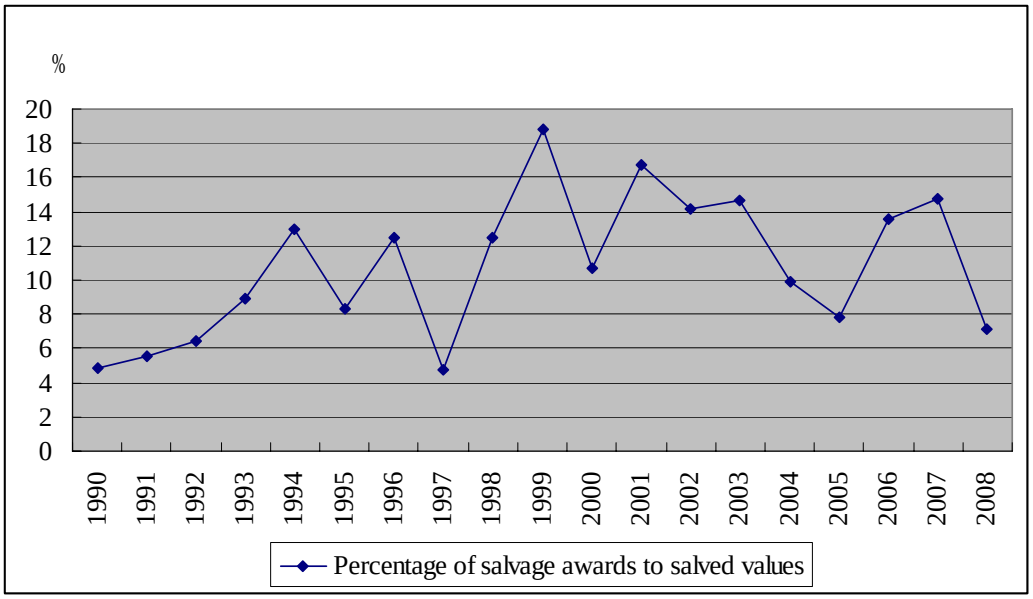

Figure 2.1 Percentage of salvage awards to salved values under LOF from 1990 to 2008

Source: Complied by the Author from LOF statistics of Salvage Arbitration Branch (2009).

In the light of the changing circumstances of the industry, the rules stipulating rewards have been modified several times. The development involves the birth of several critical concepts, such as “Safety Net”, “Special Compensation” and “Special Compensation P&I Clause (SCOPIC)”. The emergences of these rules relied mainly on the increasing number of accidents with a threat to the environment and public

concern regarding environmental protection. In contrary to the “No Cure, No Pay” principle, generally under the above mentioned rules, salvors are entitled to chances of gaining compensations instead of being empty-handed when environmental assistance has been rendered, even if the salvage operation finally fails. For sure, each rule of the “Safety Net”, “Special Compensation” and SCOPIC, has its own conditions and scope of application; the specific stipulation and differences among them being found from the two salvage conventions and various versions of LOF, which will not be elaborated here. Nevertheless, one point worth remembering is, for the salvage company, the selection and application of rules on salvage rewards will subsequently influence its commercial interests. The familiarity of contractual terms and their implied rewarding principles is, therefore, of great importance for businessmen in the industry.

To sum up, salvage is a special industry requiring professionalism, abilities to deal with uncertainties and also promptly respond to emergencies. In spite of their proficient skill and knowledge, the salvors are always appreciated for their bravery and dedication. Furthermore, the rules regarding awards should be taken into account for maintaining a profitable business as well.

2.3 DEVELOPMENT OF THE SALVAGE INDUSTRY IN CHINA

The history of salvage can be dated to as early as 830 years ago, when the first salvage institution was set up in Zhenjiang Xijin Ferry, which aimed to help save lives and vessels passing through the river (Gao, 2006, P25).

After the People’s Republic of China came to existence, in order to clear the sunken vessels and wrecks left behind after the war, and to furbish the navigation freeways, a

specialized salvage agency was operated by the state from 1951 in Shanghai, namely, the China People Salvage Company. The company was the embryo of the nowadays China Rescue and Salvage (CRS), bearing the responsibility of marine rescue and salvage of lives, property and environment in Chinese territorial waters. The company was renamed Shanghai Rescue and Salvage Bureau in 1956, under the administration of the Ministry of Communications of China (MOC). In 1974, Guangzhou Rescue and Salvage Bureau and Yantai Rescue and Salvage Bureau were founded; 11 rescue and salvage stations along the coastlines having been built by then. The headquarters of the three Rescue and Salvage Bureau, Chinese Rescue and Salvage Bureau, was set up in 1978, and located in Beijing under the direct supervision of the MOC. Since then, the basic framework of the whole Rescue and Salvage system has been constructed (Zhu, 2001, P11-14).

As the sole national professional rescue and salvage organization in China, the CRS undertakes the missions including saving lives at sea, the salvaging of vessels and property in distress, eliminating oil spillage at sea and other emergency responses to maritime accidents happening in Chinese waters. China ratified the International Convention on Salvage 1989 in 1993. CRS, on behalf of the Chinese government, implements the obligation of international conventions and bilateral shipping agreements. It is a member of the International Salvage Union, International Maritime Rescue Federation and many other relevant international specialized organizations.

To better streamline and rationalize the system, CRS conducted a reformation in 2003. The three branches were divided into six, namely, the Beihai Rescue Bureau, Donghai Rescue Bureau, Nanhai Rescue Bureau, Yantai Salvage Bureau, Shanghai Salvage Bureau and Guangzhou Salvage Bureau. From the names, we can see the

primary changes; the functions of rescue being separated from those of salvage. The rescue bureaus are in charge of life-saving and other emergency responses to marine casualties on behalf of public welfare; the expenditures of maintaining the rescue forces being paid by the government. The salvage bureaus are in charge of property-saving, oil recovery and other salvage activities. Though they also present the government and are supported by the government, the operation of them mostly depends on the commercial returns. The reform was proved to be meaningful and the development of CRS is successful. The three rescue bureaus in addition to the 21 rescue stations and 4 rescue plane teams present specialized forces and play an increasingly important role in maintaining the maritime safety. The salvage bureaus are the leading service providers in China for commercial salvage and related activities.

Due to the high risk and professional requirement of the industry, for a long period CRS was the sole salvage force in China. Until the end of the 1980s, private investments started entering the salvage field. With the prosperity of Chinese shipping, the salvage industry has also experienced an expansion then. After decades' developments, several excellent private salvage companies have emerged. Now the situation in China is both the state-owned and private companies compete for the salvage business.

2.4 CONCLUDING REMARKS

Salvage is a special industry embracing several particular features. Not only the state-owned companies but also private providers compete in the salvage market today. However, dramatic changes have occurred in shipping of China along with the maritime safety situation. As a result, these changes have affected the salvage market,

which will undoubtedly affect the strategies of the salvage companies. What is the current situation of maritime safety in China and how has the salvage market developed? The next chapter will consider these questions.

CHAPTER 3

ANALYSIS OF THE GENERAL SALVAGE MARKET IN CHINA

3.1 INTRODUCTORY REMARKS

Salvage is casualty related, whose existence depends on dealing with accidents and rendering assistance to ships and seafarers in severe distress. The assisting service given, including a wide variety of operations, such as refloating a stranded vessel, towing the vessel to a safe place, removing sunken wrecks, cleaning up oil spillage etc., is determined by the feature of the casualty and the damage inflicted. Though not every accident necessitates salvage, for instance, when the salved value is evaluated to be even lower than the cost of salvage and the sunken wrecks being not obstacle of navigation, the salvage will not be conducted then, the proportion of the salvage jobs is deemed to be dependent upon the movement of accidents (Drewry Shipping Consultants, 1992, p7-35).Owing to such very nature, discussion of the salvage market in China should start with an analysis of the recent safety situation in waterways under Chinese jurisdiction, after which the probability of serious casualties involving salvage assistance will be discussed.

Besides the traditional types of operations relating to ships and properties on board, other operations have been undertaken by salvage companies recently, for example,

the location and recovery of parts of a crashed aircraft from under the water, and the excavation and recovery of ancient ships (Baptist, 1979, p4). The exploration of historical treasures from the seabed has now become a hot topic in China, especially after the successful salvage of an 800-year old ship “Nanhai No.1” in December 2007. However, these will not be considered in the discussion of this dissertation due to the length limit as well as the research scope.

3.2 DATA SELECTION AND DESCRIPTION

Shipping has always been potentially hazardous and dangerous, and a considerable number of accidents happen in the sector from time to time. As a result vessels, cargos and even lives are unfortunately lost, which accordingly leads to other property and economic losses. To assess the safety management level of its fleet, MOC, as the main authority in charge of national maritime traffic, takes four indicators into account and publicizes the statistics each year: the number of accidents, lives lost, ships lost and direct economic loss. Since the data is collected on the basis of the Statistical Rule of Marine Accidents, the latest version of which was published in 2002, the changes of Rule 2002 from the former one makes the comparison between data before and after 2002 meaningless. To identify the new situation, only data after 2002 is selected here.

Regarding the selected four indicators, more explanations are necessary:

(1) the accidents counted refer to those in which the vessels involved are with Chinese flags (excluding Hong Kong and Macao flags) and for merchant transportation purposes; those agricultural, fishing, entertainment and military vessels are not included. Therefore, it should be noted that the four indicators do

not completely reflect all the accidents in Chinese territorial waters but can only be seen as an approximation;

(2) the accidents counted consist of those happening in Chinese coastal areas, inland navigable water areas, as well as those out of China but with vessels involved with Chinese flags;

(3) the accidents counted consist of those caused by collision, stranding, grounding, fire / explosion and all the others resulting in casualties and direct economic loss;

(4) each of the accidents resulting in the collision of two or more vessels is counted as one item;

(5) the ships lost counted refer to those sunk, total loss or constructive total loss;

(6) the lives lost are numbers of death and abscondence counted within seven days after the accident happened;

(7) the direct economic loss is counted in terms of direct loss caused by accidents to ships and other properties, including cargo loss, cost of ship repair, investigation, pollution cleaning, salvage etc.(The Statistical Rule of Marine Accidents of China, (2002)).

3.3 DEVELOPMENT OF SAFETY SITUATION

The four indicators selected to analyze the development of the safety situation from 2003 to 2008 are illustrated in Table 3.1 as follows:

Table 3.1 Development of four indicators concerning the safety situation in Chinese waters from 2003 to 2008

Year	Accidents		Lives lost		Ships lost		Direct economic loss	
	No.	Annual growth	No.	Annual growth	No.	Annual growth	RMB (10,000)	Annual growth
2003	634.0	-	498	-	343	-	38009.0	-
2004	562.0	-11.4%	489	-1.8%	330	-3.8%	36891.8	-2.9%
2005	532.0	-5.3%	479	-2.0%	306	-7.3%	49500.0	34.2%
2006	440.0	-17.3%	376	-21.5%	250	-18.3%	44303.9	-10.5%
2007	420.0	-4.5%	372	-1.1%	248	-0.8%	40197.6	-9.3%
2008	342.0	-18.6%	351	-5.6%	213	-14.1%	51890.3	29.1%

Source: Annual Industry Development Bulletin (from 2003 to 2008), MOC, Beijing.

From the data above we can see that the first three indicators have all decreased in the past several years though the speed of decrease changes from year to year. The fourth indicator, direct economic loss, fluctuates during this period. The developing trend roughly indicates the safer traffic situation of Chinese waterways albeit not quite stable.

In addition, the four indicators above are absolute numbers, but as we know, the national fleet size is not stable each year, so in spite of absolute changes, many institutes consider the relative information as well to assess the marine casualty situation. For instance, IMO (2008, p13) in its report "*International Shipping and World Trade Facts and Figures* "use "ratio of vessels lost", which is the ration of lost vessels in the world fleet. According to this report, the ratio of vessels lost in 1990 is at 2.4 per thousand vessels, but had declined to 1.9 by 2000. Here a simple calculation is made to obtain the relative figures for the Chinese fleet by applying the data in the above Table 3.1 and the following Table 3.2.

Table 3.2 Development of Chinese fleet size by number from 2003 to 2008 (1,000)

Year	2003	2004	2005	2006	2007	2008
Number	204	211	207.3	194.4	191.8	184.2

Source: Annual Industry Development Bulletin (from 2003 to 2008), MOC, Beijing.

The formulas used for calculations are as follows: Ratio of accidents per year = Annual number of accidents / Annual number of ships * 1000 ‰, Ratio of lives lost per year = Annual number of lives lost / Annual number of ships * 1000 ‰, Ratio of ships lost per year = Annual number of ships lost / Annual number of ships * 1000 ‰, Ratio of direct economy loss per year = Annual amount of direct economy loss / Annual number of ships * 1000 ‰. The results are shown in Figure 3.1, Figure 3.2, Figure 3.3 and Figure 3.4.

From Figure 3.1, we can see that the ratio of accidents in the Chinese fleet in 2003 was 3.1 in a thousand; the figure falls year by year, until 2008 when it arrives at less than 2.

The curve in Figure 3.2 illustrates that the stream of average lives lost each year per thousand ships declining as well from 2003 to 2008; the number being around 2.5 in 2003, falling below 2 since 2006, and remaining around 1.9 for the next three years.

It is notable from Figure 3.3 that despite a tiny rise from 2006 to 2007, the ratio of ships lost per year per thousand ships in the Chinese fleet is turning downwards, from close to 1.7 in 2003 to a little bit lower than 1.2 in 2008.

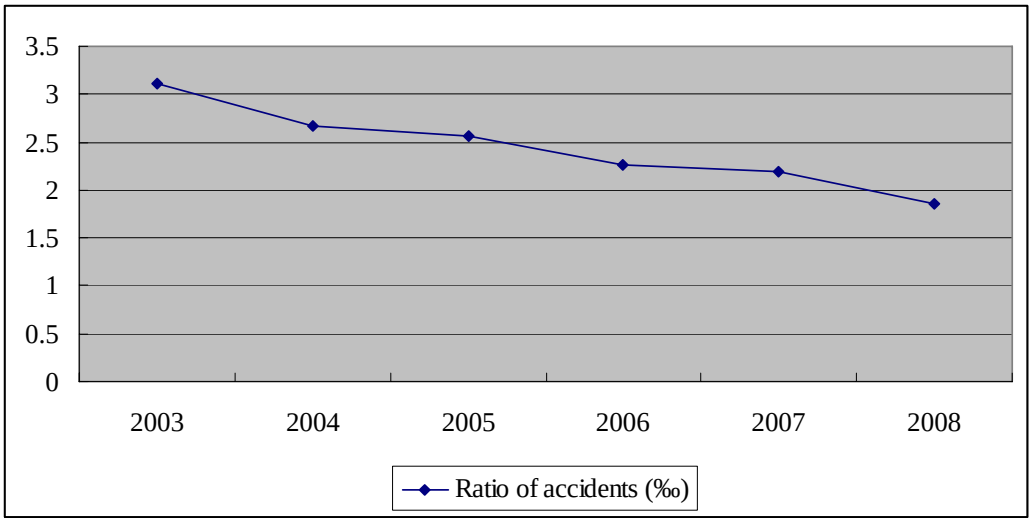

Figure 3.1 Ratio of accidents to ship numbers in Chinese fleet from 2003 to 2008

Source: Complied by the Author from Annual Industry Development Bulletin of MOC (2003 to 2008).

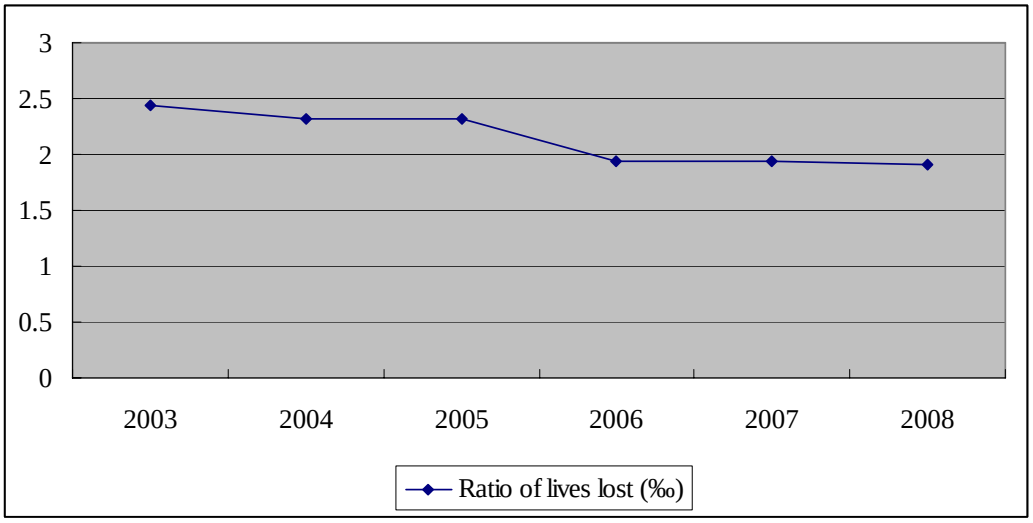

Figure 3.2 Ratio of lives lost to ship numbers in Chinese fleet from 2003 to 2008

Source: Complied by the Author from Annual Industry Development Bulletin of MOC (2003 to 2008).

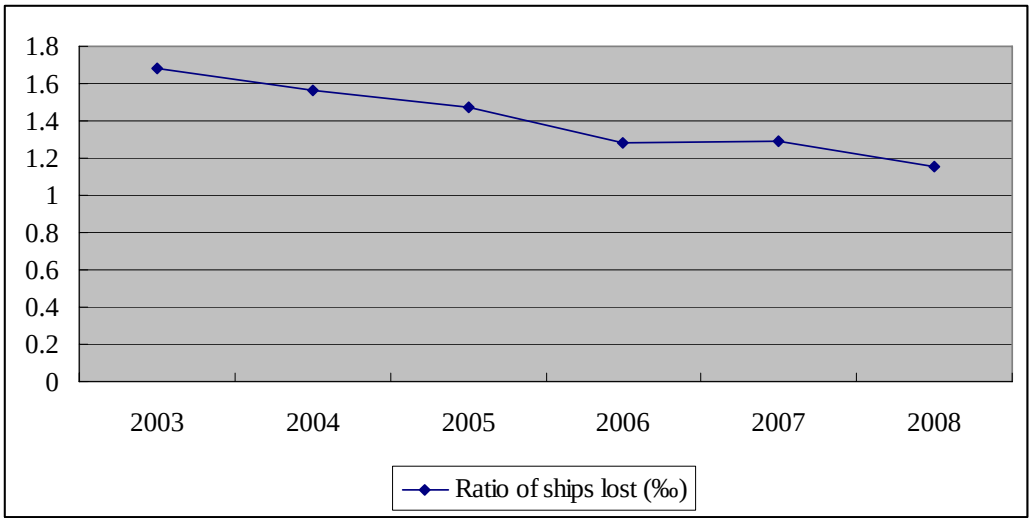

Figure 3.3 Ratio of ships lost to ship numbers in Chinese fleet from 2003 to 2008

Source: Complied by the Author from Annual Industry Development Bulletin of MOC (2003 to 2008).

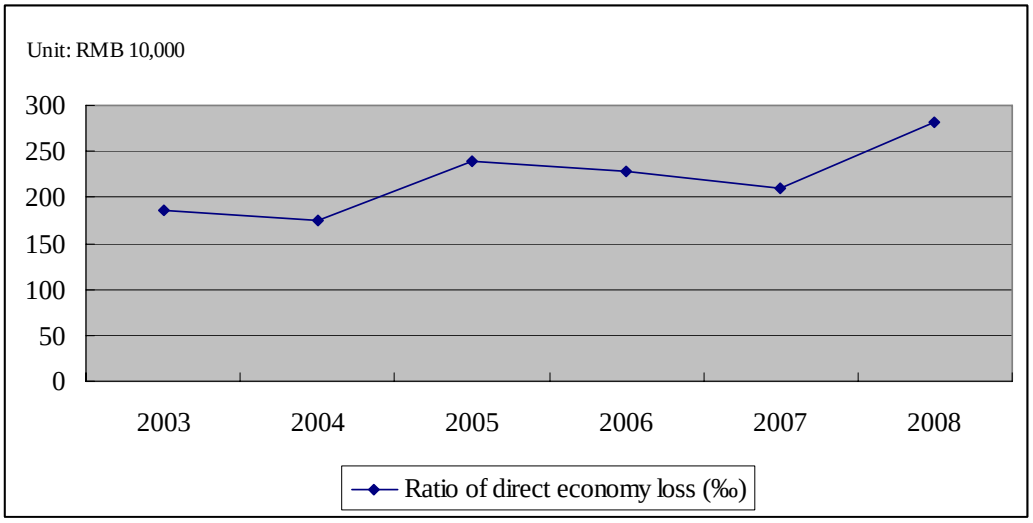

Figure 3.4 Ratio of direct economic loss to ship numbers in Chinese fleet from 2003 to 2008

Source: Complied by the Author from Annual Industry Development Bulletin of MOC (2003 to 2008).

Figure 3.4 illuminates a wavy advance in the amount of direct economic loss caused by casualties in a thousand ships each year; the loss being less than RMB 2,000,000 respectively in 2003 and 2004, climbing to RMB 2,000,000 in the following years, and even over RMB 2,500,000 in 2008.

From the aforementioned analysis, we can conclude that both the absolute and comparative statistics of the first three indictors are alike in tracing the declining track though the extent of reduction is different, while the direct economic loss, no matter whether absolute or comparative, is volatile year by year. However, the overall safety record has shown the indubitable improving direction of the Chinese maritime safety situation during the past six years.

Nowadays China is prevalently known as the powerhouse of global economic growth. If we take the recent prosperity of the Chinese economy into account, especially the steady upward climb of shipping transportation (Table 3.3), the positive development of the maritime safety situation becomes more impressive.

Table 3.3 Development of Chinese domestic and international shipping transportation from 2003 to 2008 (in million of tons)

Year	2003	2004	2005	2006	2007	2008
Cargoes transported	1580	1870	2196	2487	2812	2945

Source: Annual Industry Development Bulletin (from 2003 to 2008), MOC, Beijing.

What are the reasons for such a positive development of the safety situation; what is the divinable future trend and its implications for the salvage market? The next step

is to discuss these questions.

3.4 ANALYSIS OF REASONS FOR THE DEVELOPMENT OF A SAFETY SITUATION

"Accidents are the consequences of highly complex coincidences (Wagenaar, & Groeneweo, 1987, P 587)." Various kinds of measures might be taken to prevent the occurrence of marine accidents by diversified forces, where IMO is the leading organization among which to promote safety and security and prevent pollution from ships worldwide by regulating the maritime industry, through the application of advanced technologies and facilities, implementation of regulations, improvement of the management both on board ship and on shore etc. (IMO, 2008, P6, 14). As a member state of IMO, China also contributes to and benefits from such global safety initiatives.

The idea to list all the interrelated reasons for the development of safety situation in China is far beyond the ambition of this dissertation, so more practically it attempts to find some factors from the perspective of governmental efforts, because the guidance and influence of the government in every walk of life is decisive at the present stage of Chinese high-speed developments.

Like the backbone, shipping is foremost in supporting the state's economic development. To ensure stable and sustainable growth, the safety of shipping should not be overlooked. Grounded on such explicit realization, the Chinese government has made considerable efforts to improve the national maritime safety situation.

3.4.1 Formulation of macro- development programming

During the past few years a series of shipping infrastructure construction programmes have been formulated by the MOC and ratified by the State Council successively. These include the National Seaport Distribution Programming, National Inland Water-route and Port Distribution Programming, State Waterway Traffic Safety Supervision and Rescue System Distribution Programming, Changjiang Delta Zhujiang Delta and Bohai Gulf Area Seaport Construction Programming, Changjiang Delta Area Modernization Road and Waterway Traffic Programming, the “Eleventh Five-year Period” Changjiang Golden Waterway Construction Blue Print (Li, 2007). These macro-development programmes help to clarify the goals, feasibilities and emergent degrees of each project, ensure investing with pertinence, and sequentially from the golden rule’s point of view, guarantee the overall shipping environment to be stable and safe.

3.4.2 Augmentation for infrastructure investment

From 1996 to 2000, which is the Chinese Ninth Five-year Plan period, 41.6 billion Chinese Yuan has been invested in seaport infrastructure, 23.1 billion in inland waterways and 6.5 billion in supporting systems (MOC, 2001b). The capital launched in the social traffic system during the Tenth Five-year Plan period from 2001 to 2005 is 2.17 times of that in the Ninth one, 52% higher than the total sum since the People’s Republic of China was founded in 1959 (MOC, 2006c). Even more is planned to be spent from 2006 to 2010, during the Eleventh Five-year Plan period as pronounced by Mr Li Shenglin, the Minister of the MOC (Li, 2007).

Plentiful high-quality ports and berths have been built; the number of berths with a volume of cargo handling more than 10,000 tones being 1416 in 2008, 75% higher than in 2001; abundant water-ways meliorated, the quantity of wider and deeper waterways rose fast, for instance, compared to 2001 there were more than 1543-kilometre class three water-ways in 2008 throughout the country, standardized to be 3.2-metres wide and 4.5-metres deep; more than 2000 Aids to Navigation newly constructed, traffic satellites and other modern communications methods prevailed, advanced vessels and airplanes employed by the Maritime Safety Administration (MSA) and Search and Rescue (SAR)(MOC, 2008; MOC, 2001a).

The effects of such huge investments and constructions are gradually contributing to the improvement of the safety situation: the navigational conditions are optimized, the traffic congestion phenomena in busy waterways and ports revived visibly, and the level of marine supervision and rescue enhanced promptly.

3.4.3 Improvement of fleet structure

Before shifting its attention to the human element of daily operation and ship management, IMO used to put its first concern on the development of technical standards in ship design and construction (Liu, 2001, P81); the Chinese government also tried a lot to improve ship safety which is the object of shipping itself. Besides the reinforcement of safety in ship inspection and ship building, the official targets are mainly to adjust fleet structure, standardize ship types and heighten shipping market entrance requirements.

From the economy of scale point of view, renewing the fleet with bigger volumes and more power is a fashionable trend in the global shipping world presently, which

is also the principle for the Chinese government to adjust the national fleet. Together with Table 3.2, the following Figure 3.5 demonstrates the recent development of the country's fleet structure.

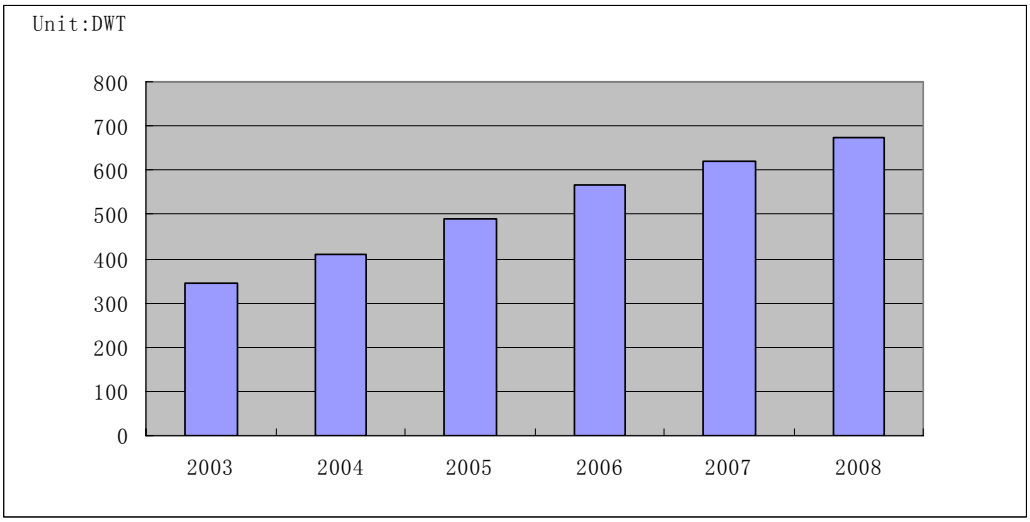

Figure 3.5 Development of average ship size in China from 2003 to 2008

Source: Annual Industry Development Bulletin (from 2003 to 2008), MOC, Beijing.

The total number of maritime transportation ships in 2008 was around 20,000 less than that of 2003 as shown in Table 3.2, but the net dead weight tones of each ship in Figure 3.5 almost doubled, growing from 345.7 tones in 2003 to 674.14 tones in 2008. The aim of forming a bigger and more powerful fleet has been realized bit by bit.

The standardization of ship types is the other measure being taken. The evolvement of bulk carriers, tankers and container ships are encouraged, the construction of LNG, chemical cargo, Ro-Ro and other specialized types of ships are promoted, and the research and development of standard, modern ships is underway (Li, 2007).

Concerning the age of the ships, the government enhances the market entrance requirements step by step and depending on the practical situation, lots of old and low-quality ships are compelled for scrap (Li, 2007).

3.4.4 Improvement of national administration system regarding maritime safety

There are three related aspects: the melioration of the SAR system, the accomplishment of the MSA reformation, and the completion of the CRS reformation. The reformation of the CRS has been discussed in Chapter 2, so more attention will be paid to the SAR and MSA here.

On December 7, 2005, the First National SAR Ministerial Meeting, attended by representatives from 15 ministries or military members, was held. This meeting is scheduled to be held annually for the purpose of better cooperation and communication among those who can contribute to the SAR service in various ways (Wang, 2006, P23-24). Since then, the Inter-Ministry Coordination Meeting Mechanism has been established, which indicates the further improvement of the Chinese SAR system; various resources are coordinated to strengthen the national SAR force. The China Maritime Rescue Co-ordination Center (CMRCC) is the daily working group of this mechanism, and the MSA patrol vessel force and maritime professional rescue force are the two main executive parts. Under CMRCC, there are 12 provincial Maritime Rescue Sub- Centers (MRSC) and 75 local MRSCs along coastline, Changjiang River, including three Rescue Co-ordination Centers (RCC) separately located in Hong Kong, Macao and Taiwan (Zhang, 2008, P25). The melioration of the SAR system appears to guarantee the improvement of Chinese maritime safety.

The present structure of the SAR system in China is shown in Figure 3.6.

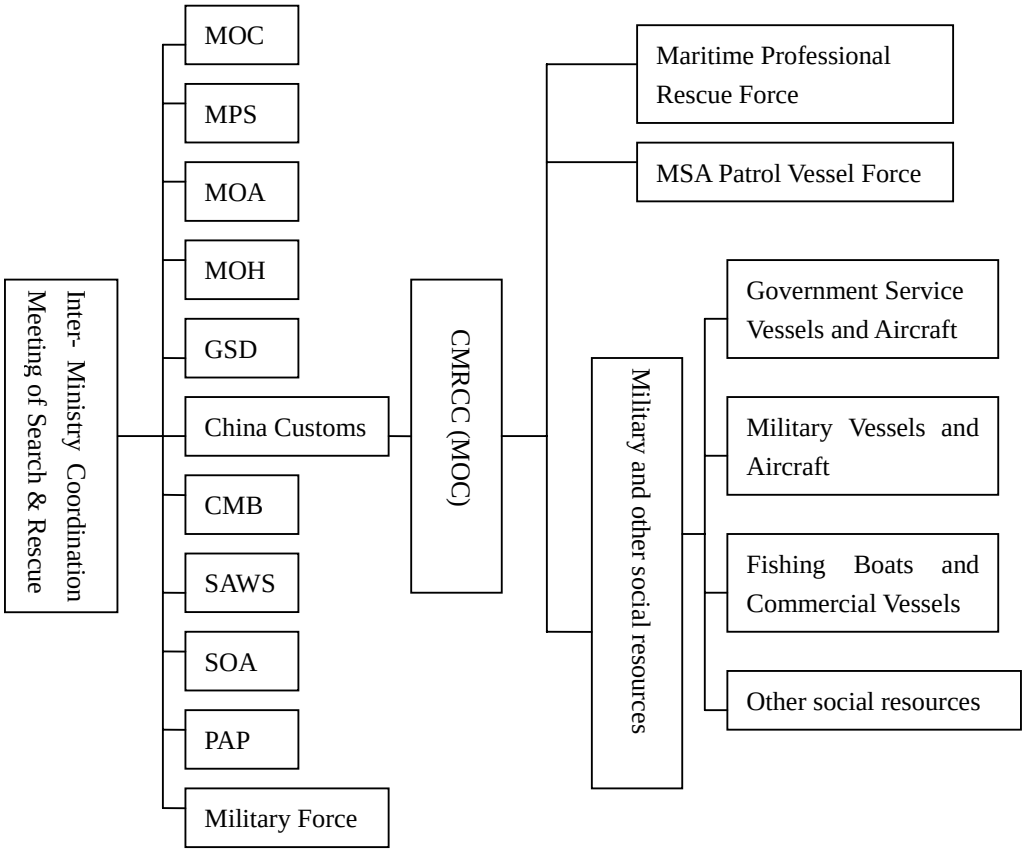

Figure 3.6 Organizational structure of SAR system in China

Source: China Maritime Rescue Coordination Center (CMRCC), 2006, Beijing

The location of CMRCC, MRSCs and RCCs is illustrated in Figure 3.7 as follows.

Figure 3.7 Locations of CMRCC, MRCs and RCCs

Since the Jiangxi Province Municipality turned over the responsibility of maritime safety administration on the main stem and ports along the Changjiang River to the MOC on June 10, 2005, seven years after its inauguration in 1998, the national reform of MSA has been fully and successfully completed (MOC, 2006b). This reform reintegrated the whole state resources of maritime administration, and unified the functional elements, which guarantee the control and supervision of maritime safety more effectively and valuably from the institutional level. Despite the positive impact of numerous investments on updating facilities and technologies as mentioned in section 3.4.2, many active measures have been taken to fulfill its functions as well：carrying out the activities of collision and oil spillage prevention, punishing the breach of discipline more severely, establishing certain procedures regarding maritime safety, and focusing on the supervision of passenger ships and

dangerous cargo ships, which are deemed to be highly risky(Wang & Wang & Li, 2007, P6-9; Wang, 2008, P4-7). As the maritime law-enforcement body, implementing the existing regulations seriously actually works in practice to prohibit the potential risk of incidents and ensure maritime safety.

3.4.5 Reinforced maritime education and training

Human error is well known as the main cause of marine accidents, therefore to maintain safe and efficient ship operations, a good quality of education and training for seamen greatly contributes. During the past few years, many changes have been undergone in raising the quality of crew members onboard Chinese flag ships: more new practical training methods, simulators and information technologies have been applied in the teaching field, more training agencies have been established and financially supported in the middle and western part of China to train the local inhabitants and help them gain certification as seafarers (Wang & Wang & Li, 2007, P6-9). Concerning the shortage of seafarers, particular the high qualified officers, two International Maritime Safety Administration Forums were held separately in 2006 and 2008 in Shen zhen, China(Wang & Wang & Li, 2007, P6-9； Wang, 2009, P7-9). Many precious suggestions and recommendations have been proposed by the experts and other attendants from home and abroad. The whole competency of Chinese seafarers has been improving.

3.4.6 Strengthened legal systems

The framework of the legal system is forming gradually; Port Law, International Shipping Statute, Inland Water Traffic Safety Supervision Statute, Seafarers Institute as well as Old Transportation Ships Supervision Regulation have been instituted,

Sea-route Law, Amendment of Maritime Traffic Safety Law, Shipping Transportation Supervision Statute, Ocean Environment Pollution Prevention Statute and so on have been sent to the State Department for approval (Li, 2007).

China has ratified several international maritime conventions, such as the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), International Safety Management Code (ISM). The performance of these conventions in the country avails greatly to the improved safety situation. For example, the ISM Code was ratified on July 01, 1998 by China; after several years' nationalization, the National Safety Management Code of People's Republic of China was issued in 2003, which was implemented in stages. Until 2008, 1118 shipping companies have launched the Code, the criterion of daily management largely meliorates ship safety, the accident rate of each ship falling from 0.1163 in 2003 to 0.0468 in 2007(Lv, 2009). Recently, China has applied to IMO for the Voluntary IMO Member State Audit Scheme (VIMSAS), which is expected to improve the safety management of ships.

As reported in the International Shipping and World Trade Facts and Figures by IMO (2008), the safety level of a vessel can be influenced by many variables and it is therefore not easy to measure. The above sections list several of the main actions that the Chinese Government has taken in the past few years aiming to improve the safety situation and that have really worked as evident in the practical proof. On the basis of this analysis, further discussion on the casualty related salvage market is desirable.

3.5 ANALYSIS OF THE MAIN FACTORS AFFECTING THE SALVAGE MARKET

The size of the salvage market is considered to be dependent on the “size of world trading fleet, age, nature of ship casualties, size of pollution threats” (Drewery Shipping Consultants, 1992, P34-35). Actually the influential ingredients can be classified into a triumvirate: the probability of potential accidents, the severe degree of each accident and the pollution involvement. The explanation of the first is unnecessary thanks to common rationale. Regarding the severe degree of each accident, the reason is because based on the famous “No Cure, No pay” theory, where the amount of the salvage award will be assessed according to “the risk, time taken, equipment used and expense incurred as well as the value of the vessel and cargo salvaged ”(Baptist, 1979, P2）. In other words, the extent of damage to ship and cargo, coupled with the degree to which salvor is successful, are of great importance. The growing concern of environmental pollution is also reflected in the salvage market, not only because more and more salvage cases involve pollution but also pollution prevention efforts lead to the likely exception of “No Cure, No pay”, and enable the salvors to at least recover the out of pocket expenses (Xu, 2000, P58).

More details of each of these three factors are discussed below.

3.5.1 Probability of accidents

Though the whole maritime safety state is getting better, “as long as there is a marine industry there can be casualties (“Insights”, 2008) ”, “weather, mechanical failures and human error will still result in vessel casualties (‘The future’, 2007)”. In China

more variables exist nowadays with the dramatic economic and social upward situation, thus potential casualties will still probably happen from time to time.

Firstly, from a national strategy perspective, shipping is of great importance for the movement of the whole country's economy; the advantages of larger volumes, cheaper prices, less energy consumption and pollution making it hard to replace with other means of transportation. Therefore, the sustainable speedy expansion of the shipping industry is an inevitable stream, and even deemed as a crucial measure of building resources – a saving, environmentally friendly society. Rapid growth and the burgeon of shipping, both international and national, will place increased pressure on the country's marine traffic systems and maritime safety situation.

Secondly, in spite of the remarkable achievements in shipping during recent years, many hardware and software conditions are far from perfect in China, conflicts from all walks of life remain prominent: some main coastal ports can not fulfill the requirements of bigger ships' entrance, several old port areas are located in the city centers which prohibit their possibility of adapting to the outspreading trend, the navigational status of inland waterways are not optimistic, the effective linkage between coastal and inland transportation is not formed yet, the informationization level is anyway low compared to practical needs, etc. These complex issues might be intensified while meeting fortuitous coincidences, and consequently cause unexpected severe accidents.

Thirdly, since the number of accidents has dropped to a relatively low level, further reduction is harder and will cost even more. From Table 3.1, the first three indicators decline year by year, however, the annual decrease is wavy; take the number of accidents as an example, the decreasing rate of each year from 2004 to 2008 is

respectively 11.4%, 5.3%, 17.3%, 4.5%, 18.6%，which indicates the restricted extent of the downtrend. In the future, numerous efforts are sure to be made in maintaining maritime safety, but to be realistic, achieving distinct results will not be so easy.

Fourthly, one of the main factors causing accidents is the catastrophic weather conditions, accompanied by global warming, with yearly imminent typhoons, the natural weather becomes choppy and changing; even though the weather forecasting method is improving, unexpected cases happen now and then. Particularly, when the accidents are lessening, the influence of natural facet is playing a more significant role, but it is still currently hard to control by human beings.

Fifthly, there are many other variables. For example, the risk of global economic recession is one. The shipping slump tends to result in owners cutting costs and in turn often leads to an increase in casualties and breakdowns (Lloyd's list, 2009), with a flurry of demand for salvage services often following.

According to the research of Li (2007, P35-40), unlike the highly developed countries such as the USA, China is experiencing a special state of dramatic transformation. In addition to the unique discipline of marine accidents, which determine that the uncertainties will remain in the near future, the probability of marine accidents will not necessarily fall and a few unpredictable elements might lead to a fluctuation of potential casualties.

3.5.2 Severity degree of each accident

The fashion of building large-scale ships brings lots of changes to salvage as well. Salvage operations are becoming increasingly more difficult and expensive to mount,

because the growing size and sophistication of vessels in distress requires more costly and larger salvage craft to rescue them (Gaskell, 1991). On the other hand, the technical challenges have become more daunting with larger, more sophisticated ships and cargoes requiring new salvage strategies (Lloyd's list, 2009).

As discussed in section 3.4.3, the whole Chinese fleet is expanding in size, and the real cases illuminate the climbing trend of bigger ship size calling for salvage assistance. For the purpose of better understanding, some cases are listed below.

On August 23, 2004, the 50,000 tones bulk carrier "Peng Yang" grounded in the Mawang waterway in HongKong, with around 50,000 tones coal and more than 100 tones bunker oil loaded onboard. The sum of all the floating crane barge's capacity in China is not enough to provide the outside force to salvage such a vessel. Finally the vessel's inner buoyancy was applied for the successful salvage, which was the first time in China such technology had been utilised. The whole process of salvage exceeded forty days and resulted in an economic loss of nearly 31 million RMB (Guangzhou Salvage Bureau, 2005, P280-283).

On March 8, 2007, "Fairway", the largest dredger worldwide, collided with the container ship "MSC JOANNA" while operating in the main sea-route of Tianjin Port. Because of the complex conditions of the sunken ship, several tugs and salvage facilities from different salvage companies were mobilized for the salvage operation, which was completed in forty days (Man,& Hu, & Cong, 2007, P31-36).

On December 20 of 2007, "Zhongchang 118" loaded with 40,000 iron ore onboard sank after a collision in the Wusong water area, which is a busy waterway on the Changjiang River. The sunken ship badly disturbed local navigation. Both traditional

and advanced techniques were used to successfully raise the vessel which was the largest salvage operation in the Changjiang Mouth; the operation took the salvors twenty-eight days (Fan, & Xu, & Zhang, & Tong, 2008, P132-134).

More and more the all-time largest scale, latest technology, most facilities and personnel employed appear in salvage operations today. For the sake of business confidentiality, more detailed data cannot be published here, but from Table 3.1 we can at least get some hint. Though the number of accidents fell consistently from 2003 to 2008, the direct economic loss during this period fluctuated instead of decreasing; in addition to the influence of inflation, vessels involved in accidents being bigger and more valuable might be the reason. For salvage companies, the number of salvage operations each year might be volatile but the workload is not necessarily reduced at the same time, because a large, difficult salvage will often involve much more time, property and personnel than a small one.

3.5.3 Pollution involvement

With the growing concern of the public and politicians regarding environmental protection, the concept of “zero tolerance” is being firmly insisted upon. In the light of the close connection of salvage with marine pollution control, the extent of pollution involved in each accident asking for salvage services might not only attract the salvors’ attention but also lead to an increase in official intervention and even of bureaucratic control (Drewry Shipping Consultants, 1992, p4), with the aim of protecting local industries, fisheries, and the maintenance of the ecology of the area (IMO, 1997, P2).

China is the second largest oil consumer country in the world. The enormous

amounts of oil thus imported rely on ships, where more than 400 different types of tankers sail along the Chinese coasts everyday on average (“MSA claims”, 2007). In spite of the tankers, the increasing size of other cargo ships also brings a larger amount of bunker oil onboard, which sometimes is even more than the oil carried by a small tanker. Such elements keep a high pressure on Chinese shipping in oil pollution prevention, even though lots of efforts have been made, such as joining the international conventions for pollution prevention, establishing a coordination mechanism with other countries, investing in the construction of infrastructure facilities and so on (Kang, 2008, P1). Until 2008, over 3000 oil spillage accidents have been reported during the previous 25 years, among which the number of severe accidents with over 50 tons of oil spillage is 69; the total amount of oil spilt is 37,000 tons (Takunpao, 2009).

From the salvage’s perspective, the spill clean-up is not very cost effective. According to the ISU report (2006), much less than 10% of oil spilt is usually recovered, the more ideal way being to keep the oil in the ship. Salvage is recommended as the primary means of defending marine pollution by ISU, and also the Environmental Award to complement the traditional system of Salvage Awards for the recovery of property for the prevention or minimizing of the pollution risk. In Chinese salvage practice, the first issue of dealing with a property salvage is to ensure the safety of bunker or cargo oil inside, and only when the spillage is indeed occurring, are facilities and measures taken to clean up the pollutants.

3.6 CONCLUDING REMARKS

In this chapter, the data of four indicators that are used to assess the marine traffic safety situation, based on the analysis of their development, and the reasons behind

such changes, have been reviewed and discussed. Further more, the trend of the casualty-related salvage market has been generated. Due to the special stage of today's China, more uncertainties will still exist in the future, and maritime accidents are not necessarily decreasing. In the meantime, accompanied by the growing size of the shipping fleet, the salvaged ships and cargoes tend to be more valuable and accordingly the workload of salvage is increasing. Marine pollution is another element or probably more crucial one in the future for salvors, thus much more attention should be paid to pollution prevention by them; the results will undoubtedly determine the revenue of each salvage operation.

So far the general situation of the salvage market has been discussed. Furthermore, the market in different regions has its own characteristics, the types of ship or accidents will influence the methods and techniques taken by the salvors as well. By diversified criteria, the salvage market can be divided into several small segments. The study concerning these segment markets is conducted in the following chapter.

CHAPTER 4

ANALYSIS OF THE SALVAGE MARKET SEGMENTATION IN CHINA

4.1 INTRODUCTORY REMARKS

To better understand and plan the market, the whole market is usually divided into several smaller segments which have common characteristics. In salvage, the regional differences, the type of accidents, and the type of ships are the criteria used for market segmentation. In this chapter, on the basis of unpublished data that the author has collected from the China MSA, elaboration of the market segmentation by region, nature of accident and ship types is carried out.

4.2 SALVAGE MARKET SEGMENTATION BY REGION

China is a country with rich resources of water transport. It not only has an over 18,000 km mainland coastline, but also several ideal inland navigational waterways. In the light of MOC statistics (2008), the number of ports of various sizes all over the country, had reached 413 by 2008. Due to the discrepancy of natural geography, navigational conditions, regional economic situations and so on, the development of

water transport in each region remains imbalanced, where maritime safety situations differ as well. For salvors, the main traffic lanes, the busy shipping lines, especially those with high-risk vessels, or in summary, the water areas where casualties occur frequently are inevitably their main concerns. The salvage companies usually equip their facilities and personnel in these areas to ensure a quick response whenever an accident happens. The quicker they are, the more chance they have for success.

Figure 4.1 Distribution of Chinese coastal seaports by regions

Source: MOC (2006d), Beijing.

In the National Seaport Distribution Programming (MOC, 2006d), the whole country's coastal seaports are divided into five regional clusters on the basis of geographical location, features of local economy development, and rationality of main cargo for transportation. These five clusters are Round Bohai Gulf Area, Changjiang Delta, Southeast Coastal Area, Zhujiang Delta and Southwest Coastal Area, the location distribution of which is illustrated in the Figure 4.1 above. Such regional division is reasonable even in the salvage market, because the adjacent waters in each region share similar natural conditions, navigational conditions, and traffic conditions, which will finally affect the probability of accidents and further the difficulty of salvage operations. Explicitly said, these conditions include wind, wave, vision distance, setting of sea-route, landform, aids to navigation, anchorage, degree of traffic density, varieties of ship type. Thus, discussion about the regional segment market will be hereinafter founded on these regional divisions.

Figure 4.2 below shows salvage operations in the main coastal areas in 2008, from which we can see that over seventy percent of the whole market was focused on the Changjiang Delta and Bohai Gulf Area during this year. The Southeast Coastal Area shared fifteen percent of the market, the Zhujiang Delta twelve percent, and the South-west Coastal Area only one percent. The figure might not be the same in every year. However, through Figure 4.2 at least a rough picture of regional distribution for the salvage market is seen. The salient features of each region are analyzed in the following paragraphs.

The Changjiang Delta covers the districts of Shanghai City, Jiangsu province and Zhejiang province, which have the foremost advantages in geography. It is located in the middle of the country's coastline, and has a huge inland navigational net.

Abundant eximious ports, such as Shanghai, Ningbo, Nanjing, Zhangjiagang, Nantong, Zhenjiang, Jiangyin and Taichang, are located within this area. Besides its exclusive geographical superiority, the Changjiang Delta is also the most developed region in China, with enormous energy sources, raw materials and foreign trade cargo spreading out from here. In Shanghai there are more than 200 shipping lines to America, Europe, Australia, Africa, Northeast Asia and Southeast Asia (Wei, 2007, P20). With the prosperity of shipping, not only has the number of ships soared but also the species of ships multiplied, traffic ships, fishing ships, engineering operation ships and passenger ships often sailing on the sea at the same time. In Zhoushan, the main stem of the harbor area intersects the sea routes of passenger ships or fishing ships, which makes shipping much more complicated. Regarding weather conditions, both tropical storms and cold waves hit the area from time to time, resulting in the frequent sinking of vessels during such extreme weather.

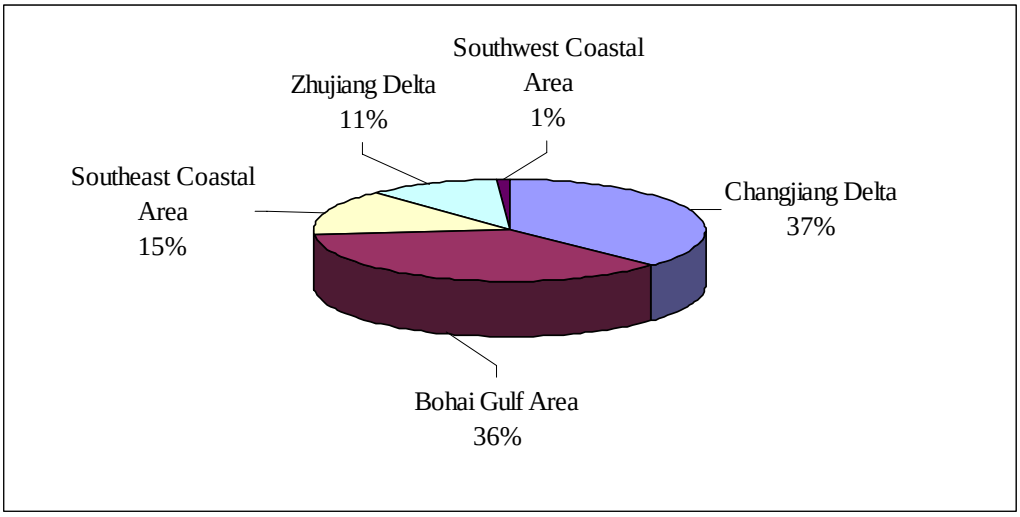

Figure 4.2 Salvage operations in the main coastal regions of China in 2008

Source: Complied by the Author from unpublished statistics of MSA (2008a).

The Bohai Gulf Area refers to water areas in Tianjin city, Hebei province and Liaoning province. It is a constituent of the forming Northeast Asia Economy Circle. The fast developing local economy guarantees ample consistent cargo sources, which include iron ore, steel, crude oil, grain and vehicles. The area possesses more than 60 ports, among which there are several with a volume of cargo handled over 100 million tons, like Dalian, Qingdao, Tianjin, Qinhuangdao (Wei, 2007, P17). In spite of busy cargo transportation, plenty of passenger ships cross the area throughout the year. Taking the passenger shipping line from Dalian to Yantai as an example, there are 26 passenger Ro-Ro ships running (Shi, 2008, P1-2). The Bohai Gulf Area is famous for its unpredictable weather conditions as well. In the winter half year from October to the next April, strong cold waves accompanied by temperate cyclones sometimes lead to the sudden increase of air pressure and extreme hard winds, which ships hardly prepare for in advance. The unique density of maritime traffic, complex constituent of ships and the changeable weather conditions are the chief reasons for this to be considered as one of the most risky shipping areas in China.

The Southeast Coastal Area mainly consists of the water area in the Fujian province, where the ports located include Xiamen, Fuzhou, Quanzhou and Zhangzhou. With the further communication and improvement of regional trade between mainland China and Taiwan, the importance of this area as the window of mainland China to Taiwan is gradually emerging. Other than containers, many other types of cargo like crude oil, iron core and coal are transported, largely through the Taiwan Strait. Seasonal typhoons in the area are an enormous threat to ships navigating to and from Taiwan.

The Zhujiang Delta is one of the most developed regions in China. It is located to the east of the Pacific Ocean, and at the point of intersection of two international

shipping lines: Far East- Europe and Far East – America. Energy sources, raw materials and foreign trade cargo from Guangdong province, Middle China and Southwest China are mostly transported through the waterways here. As the strategic passage from north China to the south, the Zhujiang Delta is of special importance. The leading ports in this region include Guangzhou, Shenzhen, Shantou and Zhuhai. Guangzhou is the primary arrival port of energy sources like coal, and iron core, providing the necessary materials for daily production and life in the Zhujiang Delta. Shenzhen is one of the four international deep-water ports in China, and the biggest container port in South China. Because of its special geographical position, the Zhujiang Delta is easily hit by Pacific Ocean and South China Ocean typhoons. For instance, Shantou, situated at the mouth of the wind, regularly suffers from strong waves during the typhoon season. Further, the typhoons in the South China Ocean are generated rapidly, change suddenly, are very hard to forecast and present great danger. Shantou is the primary risk region for shipping in the Zhujiang Delta. Two other dominating regions with most accidents are the Zhujiang Mouth and the Qiongzhou Strait (Tang, 2003, P4). At the mouth of the Zhujiang River, many different types of ships, like high-speed passenger ships, yachts and commercial ships, pass through at the same time. Collisions, fire explosions and several other casualties occur from time to time in this water. The Qiongzhou Strait is notable for its high density of passenger ships, ferries and fishing ships. In particular, passenger Ro-Ro ships have become the main subject of supervision by the MSA. Also the foggy season is a problem for safe shipping in the Qiongzhou Strait. There are 35 days with fog on average every year and these foggy days are often the midseason for shipping (Huang, 2008, P236).

The South-west Coastal Area is a region with fewer marine accidents. The main ports are Zhanjiang, Fangcheng and Qinzhou. The South-west Coastal Area is less

developed compared to the other four regions. The size of ports is relatively smaller as well. However, with the implementation of the Westen exploration policy, the water transport in this region will become more and more crucial in future. Thereinto, Zhanjiang is the port with the shortest voyage to Southeast Asia, Africa and Europe, where the biggest crude oil wharf with a volume of 300.000 tons on shore in China and the sole iron ore wharf with a volume of 200,000 tons on shore in South China have been built (Wei, 2007, P23).

The coastal area, as the window of China to the world, has been explored thoroughly in the past few years. The shipping industry is prospering and playing an extraordinary vital role in social and economic development. Accordingly, its importance for the salvage market has been dominating for a long period, not only because of the mature shipping industry along its coastline, but also the terrible weather conditions and the bigger size of ships. Compared to the coastal area, the inland waterways are usually hard to be thought highly of. However, in the light of the country's macro- development programming, the inland area is the emphasis of future investment and exploration. In the National Inland Water-route and Port Distribution Programming (MOC, 2007b), the key inland waterways are described as Changjiang, Zhujiang, Jinghang Channel, Huai River, Heilongjiang and Songliao water system, the location of which is shown in Figure 4.3 below. Until now, Changjiang and Zhujiang are the two busiest shipping areas in China, more details about which will be discussed in the following paragraphs.

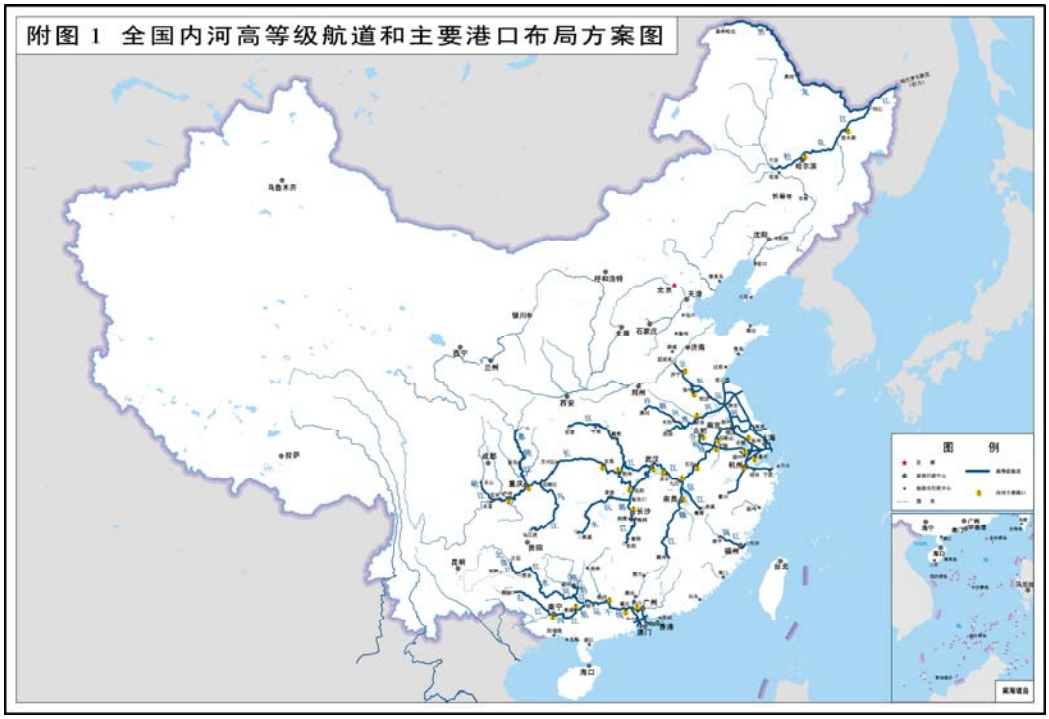

Figure 4.3 Location of Chinese inland high-level navigational routes and main ports

Source: MOC (2007), Beijing.

Changjiang is the biggest river in China, namely the Chinese Mississippi or Rhine River because of its busy water transport and critical importance for the local economy and trade. It lies in the middle of the country, from the west, middle, to the east and is the main artery of China. Provinces and cities along the river boast various industrial specialities, such as steel, petrol, vehicles, power plants and agriculture production. Vessels from 10,000 ton tankers, 1,000 ton cargo vessels to small fishing ships with a capacity of less than a hundred tons sail in the river to satisfy different transportation needs. The shipping routes are multiple as well, from sea to river, from river to sea, through the main stem, from branch to main stem etc. All these compositive elements make shipping in it at stake, since especially in the

upper and down stream of the river many accidents occur each year. From the end of December to the following March, the water level of Changjiang becomes lower, navigation routes tend to be narrow and shallow, and under such situations the ships easily to go aground. Furthermore, the alternation from winter to spring occurs during this period, the heavy wind and fog often making safe shipping harder. From June to September, the flood season comes, the water level usually rises and the current runs rapidly, operational performance becoming changeable and difficult to control, with the risk that ships may capsize or even sink. Over 130 salvage operations from 2005 to 2008 in Changjiang have been reported (MSA, 2008b).

The Zhujiang River is the third largest river in China. Because of its fast developing economy and sufficient cargo sources, the role of water transportation can not be replaced. In 2008, 7.24 million TEU containers are transported through it, accounting for over fifty percent of the inland container shipment in China (Chen & Li, 2009).

In company with the development of inland water transport in the future, more ships will be operated and further, there will be a standardization of the fleet. The average DWT of each ship will be over 400 tons (Li, 2007) according to the national programming. Therefore, the traffic might grow to be busier, the ships becoming bigger and the structure of the fleet more diversified, all of which will influence shipping safety. The inland waterways will gradually become a more important market for salvors.

In conclusion, the coastal areas are dominating markets that salvors should focus on. Thereinto, the Changjiang Delta, as the busiest traffic region, ranks as number one. The Bohai Round Gulf Area and Zhujiang Delta are also regions where accidents frequently occur. The Southeast Coastal Area, because of its special geography, tends

to be more and more important for the economic communication of the China mainland to Taiwan, and the seasonal typhoon makes shipping in this area dangerous sometimes. The Southwest Coastal area is less developed in comparison with the other regions, but its location is of great importance and it holds enormous potential for further improvement which can not be underestimated. Meanwhile, with more investment in the inland water areas of the whole country, the development will soon become evident and the markets in these areas will definitely grow.

4.3 SALVAGE MARKET SEGMENTATION BY NATURE OF ACCIDENT

Vessels and cargo on board are prone to a wide range of dangers from collision, stranding, fire and explosion to foundering. The methods, equipment and techniques applied in a salvage operation are different for each accident, the input of which will absolutely affect the returns which salvors mostly take into account. In accordance with the Manual On Oil Pollution, Section three, Salvage (IMO, 1997, P 17-35), the salvage methods include lightering, air lift, tidal lift and heaving, towing, refloating or breaking out of stranded vessels and so on; specialized salvage equipment involves salvage vessels, ocean-going salvage tugs, coastal and harbor tugs, diving inspection salvage vessels, coastal and inland waterways salvage vessels, floating cranes and sheer-legs etc. and the salvage techniques comprise damage inspection, divers, fire prevention, fire- fighting, pumping systems and so forth.

In 2008, in the light of the statistics shown below in Figure 4.4, 57% of accidents happening in Chinese waterways were caused by collision or contact, which usually involves extensive salvage operations; the other top causations of accidents being foundering, 29% , grounding, 4%, and fire or explosion, 3%.

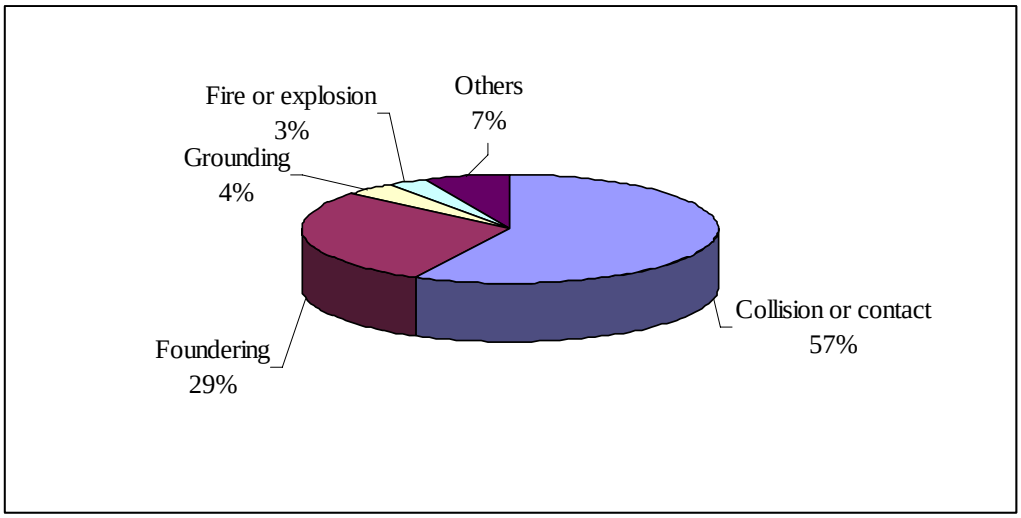

Figure 4.4 Accidents classified by nature in Chinese waterways in 2008.

Source: Complied by the Author from unpublished statistics of MSA (2008c).

Collision or contact is the accident happening most frequently as per the statistics. When two vessels collide and get stuck, they both may be badly damaged. The damage inspection should be taken first to ensure the further safe separation. Damage control, including patches for holes, pumping the waters to reduce the flood, lightering or transferring cargo to other ships for buoyancy reservation etc, is then of enormous importance in the salvage response. At the same time, to retain the fuel in the tanks is of necessity while rendering the damage control services. If oil has spilled out, the oil-recovering system is to be applied as well. After the temporary repair of the damage, the disabled vessels will be beached or towed to a safe place to avoid sinking or further damage.

Foundering ranks number two among the various accident types. The ships suffering from foundering are often small ones operating in inland waters for the transportation of sand or other materials. If the salved value of a sunken ship may not be sufficient

to pay the salvage cost, the ship owner and the underwriter will give up the opportunity of salvage. However, besides the consideration of salved values, if the accident happens in the port or the sunken vessel blocks the navigational route, the salvage of the ship will become compulsory. As such, the critical role of a skillful diving team for underwater survey appears in the beginning of a salvage operation. A detailed report about the underwater circumstances of the vessel is always helpful for salvage efficiency and final success. In particular, the location of tanks and dangerous cargo should be pointed out for safe underwater repairs made by the divers. The equipment and the know-how to lift sunken vessels should be seriously taken into account. The application of pontoons, barges, lifting cranes and other equipment, as well as the technology, depends on the depth of the wrecked vessel. After the vessel is refloated, it will be towed to a dedicated place by salvage tug.

Grounding is a common accident in reality. The assistance to a grounded vessel “could be one of the toughest, trickest, most frustrating, longest and at times, unsuccessful services. At the same time, if successful, it could be the most rewarding work for the salvor ” (Thapar, 1996, P26). The first step is to keep the tanks on board and make sure they are safe, otherwise, pumping out or transferring the fuel oil to a secure container is to be done. The result of damage inspection determines the fate of a grounded vessel. If refloating is possible, after temporary repairs, several methods, such as discharging the cargo, pumping in air under pressure and so forth, may be employed to restore the buoyancy and stability of the vessel depending on the nature of the grounding. Tugs are usually used to help generate the moving force of the vessel off the ground afterwards.

The severity of fire or explosion diversifies from time to time. Nevertheless, “In the event of a fire breaking out, the primary aim should be to contain the fire, prevent it

from spreading, reduce the area and severity of the fire, and ultimately extinguish it ” (IMO, 1997, P 17-35). In spite of the normal fire-fighting techniques, the materials catching fire should not be ignored. To control the fires from oil products, foam is preferred rather than water; further, regarding chemical fires, specialized knowledge and techniques are necessary.

No matter what type of accident it is, whenever oil spillage is concerned, the oil recovery equipment and techniques of preventing pollution should be applied.

The real situation of dealing with an accident is always much more complicated than described above. Numerous facets including the size of the ships, the severity of damage, the features of cargo and the states of engines substantively affect the application of the salvage operation. At the same time, the weather is another definitive factor. When it is calm, the job is somewhat easier; while when meeting rough weather, the time, forces and personnel invested for salvage assistance will be accordingly more.

4.4 SALVAGE MARKET SEGMENTATION BY SHIP TYPES

In the statistics of accidents assorted by ship types in Chinese waterways in 2008, as illustrated in Figure 4.5, ships are classified into five types. Cargo ship indicates all types of ships carrying various cargos from manufactured goods, food stuff to complex machinery, except dangerous cargo. Passenger ship refers to passenger Ro-Ro ship, ferry, high-speed passenger ship and general passenger ship. Ships with dangerous cargo are, namely, oil tankers, LNG, LPG, chemical ships etc. Working ships like harbor operation, engineering, supply and traffic ships are arranged as one category.

According to Figure 4.5, cargo ship ranks number one in the five types of ship involved in accidents, taking up 86% of all. The proportions of the other three main types of ship in all are respectively 5%, 4% and 3%.

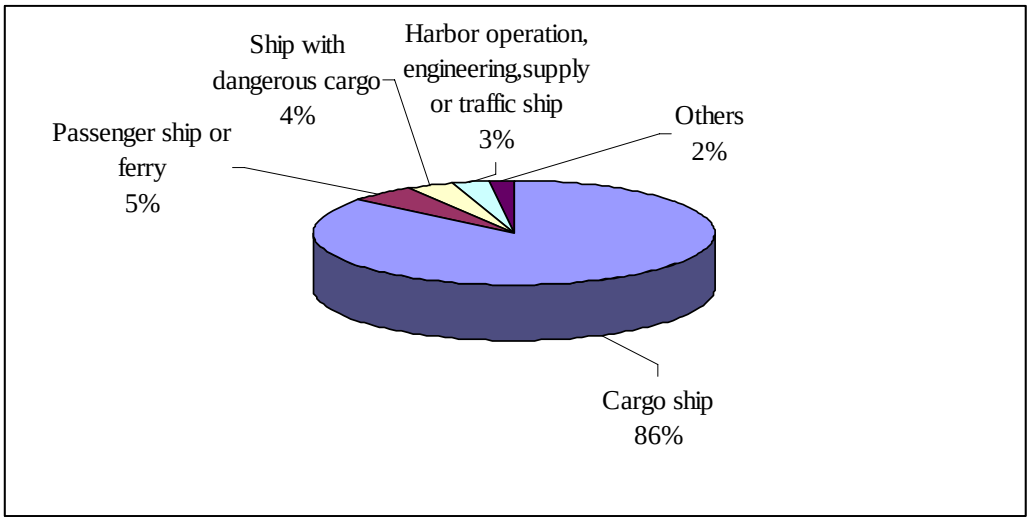

Figure 4.5 Accidents classified by types of ship in Chinese waterways in 2008.

Source: Complied by the Author from unpublished statistics of MSA (2008d).

From the salvors' point of view, the general ways of assisting a stricken ship are more or less the same as mentioned in the last section, no matter what type of ship it is. However, there are two points worthy of mentioning when the differences of salvage for different types of ship are concerned. Firstly, the ship with dangerous cargo requires more attention on tackling the specialized, hazardous cargo safely to prevent or minimize the probable threat of pollution. Secondly, the probability of severe accidents occurring to different types of ship varies. For salvors, the severer accident means more risk, tougher work and also greater returns if the service finally proves to be successful.

Due to increasing public interest in environmental protection, an accident involving an oil tanker or chemical ship will definitely draw much more attention of the authorities and media than a normal cargo ship. Primary pressure comes from the mission of saving the environment. Keeping the oil products and hazardous material on board ship is the first defence of pollution. Otherwise, measures should be taken to control the flow of oil from the ruptured tanks. Escaped oil or other hazardous materials can be a great hazard to the environment, so an immediate and urgent reaction will always help the control of further damage.

The Statistical Rule of Marine Accidents of China (2002) classifies the severity of an accident into five levels in terms of deaths or direct economic loss, the standards of which differ according to a ship's gross tonnage or power of engine. The statistics of severest accident, which are stipulated by the State Council, are not considered here because of their rare occurrence. According to the Statistical Rule mentioned above, for vessels with a gross tonnage over 3000 tons or engine power over 3000 KW, the second severest accidents refer to those involving over 3 persons' deaths or direct economic loss above 5,000,000 RMB; for vessels with a gross tonnage between 500 and 3000 tons or engine power between 1500 KW and 3000 KW, the second severest accidents refer to those involving over 3 persons' deaths or direct economic loss above 3,000,000 RMB; for vessels with a gross tonnage below 500 tons or engine power below 1500 KW, the second severest accidents refer to those involving over three3 persons' deaths or direct economic loss above 500,000 RMB. To clarify the differences of probability of a severe accident occurring to various types of ship, the ratio of the second severest accident to the total accident of each type of ship in 2008 has been calculated in the light of the MSA statistics, the specific figure of which is illustrated in Figure 4.6 below.

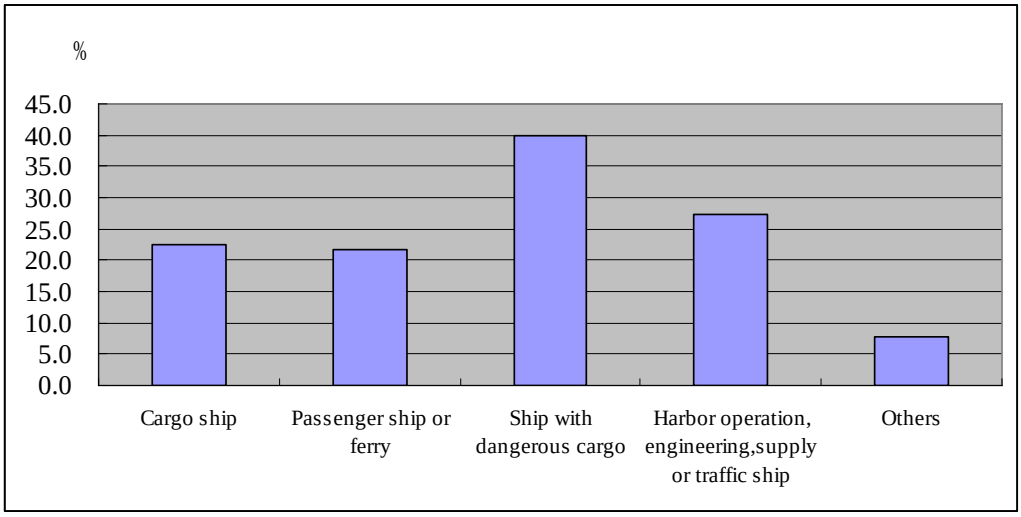

Figure 4.6 Ratio of severe accident to total accident of each type of ship in Chinese waterways in 2008.

Source: Complied by the Author from unpublished statistics of MSA (2008e).

From Figure 4.6, it is noted that the ratio of severe accidents occurring to ship with dangerous cargo is around 40%, ranking number one, following which is that of a working ship, over 25%. The ratio relating to the cargo ship is similar to that of a passenger ship or ferry, both a bit over 20%. Such order is understandable. Once the ship with dangerous cargo meets problems, it is easier for it to result in a grave disaster and increase the workload for the salvors. The working ship, including harbor operation, engineering and supply or traffic ship, is designed for specialized purposes, thus it is often equipped with comparatively high-value facilities. Further, an accident involving a working ship influences not only the vessel itself but also leads to the economic loss of on-shore facilities or other equipment. Therefore, an accident relating to working ship is more often severe. When a passenger ship or ferry is concerned, the passenger Ro-Ro ship should to be mentioned in particular,

since it embraces the advantage of a Ro-Ro ship and passenger ship; the passenger Ro-Ro ship being very successful in business. Nevertheless, also owing to the shipping of passengers, cars and other cargo, a casualty involving a passenger Ro-Ro ship often results in the loss of both lives and property, which can be a really huge disaster. The catastrophe of the “Dashun” on November 24, 1999, is a typical lesson, when 282 persons died and the direct economic loss amounted to over 90,000,000 RMB (Yang, 2007, P1).

The former discussion demonstrates that accidents are mostly related to cargo ships. The number of accidents occurring to ships with dangerous cargo is much smaller, but the risk of environmental pollution should not be underestimated. The working ship and passenger Ro-Ro ship also require greater attention since their severity potential is much greater

4.5 CONCLUDING REMARKS

In this chapter, several criteria have been chosen to analyze the market divisions: region, nature of accident and types of ship. The coastal areas maintain the dominating markets for salvage while the inland markets are predicted to be increasing in the future. The methods, equipment and techniques invested in salvage operations vary in dealing with different types of accident. Collision is the most frequent accident in 2008 according to the statistics, following by foundering, grounding and fire or explosion. Regarding ship types, cargo ships occupy the key market of salvage, however, accidents from ships with dangerous cargo and some other ships should not be underestimated, not only for the reason of environmental protection but also the severity of the accident.

CHAPTER 5

CONCLUSIONS

Salvage, a specialized industry with quite a long history, is considered to be not only beneficial for commerce but also indispensable to the shipping world and public concern. Nevertheless, salvage is not an easy job for those who are really engaged in it because it is an unpredictable business requiring emergency response and substantial courage to conquer the risks. Furthermore, in spite of excellent professionalism, including equipment, technology and personnel to support a healthy and continuous business, a reasonable judgement of the market to help choose the right arrangement of the salvage resources is of enormous importance. In China nowadays, there are both state-owned and private salvage forces existing to render their services. The present and future maritime safety situation, the general salvage market as well as the focus of salvage market segmentations are their main concerns.

The key part of this dissertation has discussed the development of the Chinese maritime safety situation. According to the statistics, three main indicators concerning maritime safety in China have all shown a trend of decreasing in the past five years: the number of accidents in 2008 was 342, which had dropped by around 50% from 634 in 2003; the lives lost in maritime accidents decreased from 498 in 2003 to 351 in 2008; the ships lost fell to 213 in 2008, from 343 in 2003. The general maritime safety situation has been proved to be getting better through the efforts

made by various facets, especially the government. For instance, continuous huge investments in infrastructure constructions have been made to improve navigational routes, release the traffic congestion in busy waterways and enhance the level of maritime supervision and rescue. Measures have also been taken to adjust fleet structure, standardize ship types and heighten shipping market entrance requirements. The average size of ship in China has almost doubled, increasing to 674.14 DWT in 2008 from 345.7 DWT in 2003. At the same time, the melioration of the administration system relating to maritime safety, the maritime training and education as well as the legal systems have also contributed to improving the maritime safety situation in China.

However, these remarkable achievements can not definitely make the future trend over optimistic: increasing pressure on the country's marine traffic systems and safety situation will continue due to the expected rapid growth of shipping; many existing conflicts in the developments of shipping and ports might be intensified and accordingly cause severe accidents; maintenance of the safety situation is not easy, further reduction of the accidents will be harder and cost even more; the weather conditions, which remain a leading facet of influencing maritime safety, are still hard to control with present knowledge and technology. Therefore, the probability of maritime accidents will not necessarily fall and the salvage responding forces should not be weakened as a result.

On the other hand, with ships becoming bigger and bigger, the result of a potential casualty might be more severe, thus, it is better to update the salvage equipment and techniques for adaption to the changes of the market requirements. At the same time, the continuous growth of oil consumption and transportation, underlying threats of ocean pollution, in addition to the increasing public concern of environmental

protection, will far more challenge the salvors' emergency response capability for tackling oil pollution. The advanced and efficient oil-recovering system and technology will certainly enhance the salvage company's competiveness and benefit its commercial reputation.

For salvors, the coastal areas with their main traffic lanes and busy shipping lines, especially those areas where casualties frequently occur, are their primary focus. In 2008, 37% of maritime accidents were reported to appear in the Changjiang Delta, 36% in the Bohai Gulf Area, 15% in the Southeast Coastal and 11% in the Zhujiang Delta. The discrepancy in natural conditions, navigational conditions and traffic conditions in each region influences not only the probability of accidents but also the difficulty of salvage operations, which should be taken into account whenever a salvage service is required. Meanwhile, with the further development of inland water areas, more opportunities for the salvage business can be expected, particularly in Changjiang, Zhujiang, Jinghang Channel, Huai River, Heilongjiang and Songliao water system.

The methods, equipment and techniques applying in the salvage operation diversify in dealing with different types of accident. In 2008, 57% of the accidents that vessels suffered in Chinese waterways were collision or contact. The other leading types of accident were foundering, 29%; grounding, 4% and fire or explosion，3%. In spite of the basic concepts of salvage operation in each type of accident, the input of equipment and personnel also depends on the severity of damage, the features of cargo and the temporal weather conditions in each specific accident.

Furthermore, 86% of casualties in Chinese waterways were related to cargo ships in 2008. Nevertheless, accidents concerning ships with dangerous cargo have been

proved to have more chances of being severe, namely, 40% in 2008. Specific attention should also be given to working ships and passenger Ro-Ro ships for the possible serious influences according to the reported figures and practical experiences.

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