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## Marine casualties and the human factor : the focus on issues relating to international crews

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**WORLD MARITIME UNIVERSITY**

Malmö, Sweden

**MARITIME CASUALTIES AND  
THE HUMAN FACTOR**

**-THE FOCUS ON ISSUES RELATING TO  
INTERNATIONAL CREWS**

By

**ZHANG SHIPING**

**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

**GENERAL MARITIME ADMINISTRATION  
AND ENVIRONMENT PROTECTION**

1995

## 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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## ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Dalian Maritime University, the Ministry of Communications of the People's Republic of China for nominating me to study at the World Maritime University and the Sasakawa Peace Foundation of Japan for awarding me the two-year fellowship.

I am grateful to my Professor T. J. Sampson for his instruction and assistance during my study.

I also thank all professors, visiting professors, lecturers and staff members of the university for their help during the two years.

I specially thank my mother for looking after my son, and my wife, Lu Huimin for her help and encouragement during the two years.

## ABSTRACT

Title of Dissertation: Maritime Casualties and the Human Factor -The Focus on  
Issues Relating to International Crews

Degree: MSc

This dissertation is a study of international crews and the major problems they have through analysing the total losses of open registered fleets and major claims covered by two P&I clubs.

A brief look is taken at the historical development and growth of the open registration and the increased demand for international crewing, which have resulted in great changes in international shipping. The most obvious are more nationalities of seafarers involved in international shipping and the changes in seafarers' qualifications.

The dominant factor of marine casualties and accidents is the human error. With more international crews involved in international shipping, the major problems have been exposed, viz, insufficient training resulting in inadequate competence and language difficulty blocking effective communication.

The requirements of the new STCW Convention have been set up and will have a great impact on international crewing, companies and training institutions particularly concerning the qualifications of seafarers.

The concluding chapter further examines the problems affecting the qualifications of international crews and discusses the possible ways to overcome them. A number of recommendations are made concerning the improvement of the competency of international crews.

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## LIST OF ABBREVIATIONS

<b>BIMCO</b>	The Baltic and International Maritime Council
<b>COSCO</b>	China Ocean Shipping Company
<b>DIS</b>	The Danish International Register of Shipping
<b>FOC</b>	Flag of Convenience
<b>GIS</b>	German International Shipping Register
<b>HF</b>	high frequency
<b>ILO</b>	The International Labor Organization
<b>ILU</b>	The Institute of London Underwriters
<b>IMO</b>	The International Maritime Organization
<b>ISF</b>	The International Shipping Federation
<b>ISM Code</b>	The International Safety Management Code
<b>ITF</b>	International Transport Workers' Federation
<b>MASES</b>	China Marine and Seamen Service Corporation
<b>MF</b>	medium frequency
<b>NIS</b>	The Norwegian International Ship Register
<b>OECD</b>	Organization for Economic Cooperation and Development
<b>STCW</b>	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978
<b>UNCTAD</b>	The United Nations Conference on Trade and Development

# CHAPTER ONE

## INTRODUCTION

Even though aircraft transportation has developed very fast and rail and road transportation have been continuously developed, shipping, the traditional means of transportation, is still very important in world-wide trade today. The utilisation of modern technology and the installation of modern navigation equipment have made marine transportation more efficient, but shipping is still a "high risk" industry. Maritime casualties and accidents occur from time-to-time. According to studies and accumulated statistics, human error is one of the most important factors. When we look into the statistics, we find that the accident rate of the vessels manned with multinational crews is much higher than that of vessels manned in the traditional way.

World shipping has changed tremendously during the past twenty years, not only in the application of modern science and technology and the implementation of international conventions and regulations, but also in terms of management and operation. The process of internationalisation of shipping firms has taken place with considerable rapidity. This internationalisation process may be interpreted as a gradual loosening of the traditional interrelationship between a national economy and a shipping company, as well as towards the establishment of a type of shipping company organised on a global basis.

A global shipping operation includes changes in vessels' registration from traditional maritime countries to countries with open registries. Such a global operation implies

the employment of international crews, engaging not only in foreign trade, but also in cross trading, in co-operation with other companies.

The development and growth of open registries in the past twenty years has been very fast. The total percentage of the open registry fleet was 18.1 % of the world fleet at the beginning of the 1970s, 27.3 % at the beginning of the 1980s, and 54 % at the beginning of 1995. This trend seems to be continuous.

The rapid development and growth of the open registries has allowed the number of vessels manned with international crews to increase greatly. This is because of low costs, the manning policy, safety and social standards and other more flexibilities. All this is the result of the over-capacity in the shipping market and the severe competition.

The employment of international crews is one of the major cost-cutting measures to preserve the viability of shipping operations. International crews have become more common also because of the growing unpopularity of seafaring as a profession in many of the traditional maritime countries. The development and growth of the open registries has also resulted in some new problems, such as inadequate training, inadequate manning and language difficulties. The International Maritime Organisation noticed this critical situation, and decided to address the problems by revising the Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW) ahead of schedule, in order to ensure safety at sea and prevent pollution of the marine environment.

This paper analyses the statistics of the world total losses during the period of 1986-1993, as well as the major claims covered by the UK P&I Club and Assuranceforeningen Gard (a Norwegian P&I club) during the period of 1987-1992

and 1987-1990 respectively in order to find the special problems associated with international crews.

The paper also analyses the new STCW Convention and its impacts on international crews, shipping companies and the maritime education and training institutions and suggests some ideas for improving the quality of international crews, as well as the qualifications of Chinese seafarers.

“Maritime Education and Training, Examination and Certification of Seafarers and Manning of Ships are three vital and inseparable links in the ‘quality chain’ ” (Professor P. S. Vanchiswar and G. Zade, 1994). In order to ensure quality, flag states, maritime labour supplying countries, shipowners and manning agencies have the responsibility to ensure that seafarers on board their vessels are well trained and properly certificated, and that their ships are manned according to the international conventions. Since international crews have become an international issue, all the parties who benefit from shipping should be concerned about this issue and cooperate with each other, and contribute in solving the problems that international crews present.

China is a country with a large potential labour force and the Government has decided to provide more qualified maritime labour for the international market. To realise the objective, the others’ experiences and ones own previous experiences should be taken into account. In order to meet the requirements of the international market, the only way is to improve the qualifications of Chinese seafarers.

During two years of study at the World Maritime University and during visits to maritime administrations in various developed countries, I have found an emphasis on the needs for qualified seafarers and managerial personnel as a fundamental part of maritime safety and environment protection programs.

As a member of the staff of Dalian Maritime University in my country, I have the opportunity to be engaged in the training of more and better qualified maritime personnel for both my own country and the international market as part of the international effort to minimise maritime casualties and accidents at sea. This is the reason why this topic was chosen.

The aim of my dissertation is to analyse the major problems that international crews have and find suitable ways to improve the qualifications of the international crews, as well as the qualifications of Chinese seafarers. In order to achieve these objectives, the following procedures will be applied.

Chapter One is the introduction which gives the general situation of world shipping and the involvement of international crews, as well as the purposes of this paper.

In Chapter Two, open registry, its growth and international crews are discussed, in order to give us a better understanding of the development of open registry and the policies of individual maritime labour supplying countries.

The analysis of the total losses of the open registered fleets and the major claims covered by P&I clubs, as well as their causes discussed in Chapter Three, will show that the qualifications of international crews should be further improved.

Chapter Four discusses the special problems with the international crews. Two major problems, which are the major components of the human element, viz, inadequate training and language difficulty, are discussed.

The new STCW Convention will have a great impact on international crews, companies and maritime education and training institutions in various ways. This is further discussed in Chapter Five.

The analysis of the problems affecting the qualifications of international crews and finding possible ways to overcome these problems is discussed in Chapter Six.

The conclusion of the dissertation further summarises that human resources and their quality in the maritime industry which affects safety at sea and environment protection greatly. Quality improvement is a continuous long-term task for the industry.



## CHAPTER TWO

### OPEN REGISTRATION, ITS GROWTH AND INTERNATIONAL CREWS

The development of international crews is a direct result of the growth of the open registration system. Without the existence of open registries, there would be few international crews.

Before the issue of international crews is discussed, however, it is necessary to further understand the difference between traditional closed registration and the open registration. It is then necessary to review the development of the open registration system and become familiar with the present registers with their special features and manning policies.

#### 2.1 The functions of ship's registration

“Registration of a ship is used as evidence of the right to fly the flag of the state as well as the right of ownership and mortgages. Thus the registration of a ship is very important since it accords nationality to the ship and serves as proof of title.”(Professor P.S.Vanchiswar, 1992. p.63). The registration process involves the observance of the requirements and formalities prescribed under the individual national merchant shipping law and makes the ship an extension of national territory while it is in international waters and trades freely with foreign countries.

### **2.1.1 The traditional closed registration**

The traditional closed registration has been practised in most of the maritime countries for a long time. In order to have the exclusive jurisdiction of the flag state over ships on the high seas and to trade freely within the major ports of the world without any difficulty with the port states, the flag state must establish the registry system according to the national laws to make the ship have a nationality, thus identifying it for legal and commercial purposes.

Articles 91 and 94 of the United Nations Convention on the Law of the Sea, 1982 state that:

#### **Article 91**

##### **Nationality of Ships**

(1) Every State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory, and for right to fly its flag. Ships have the nationality of the State whose flag they are entitled to fly. There must exist a genuine link between the State and the ship.

(2) Every State shall issue to ships to which it has granted the right to fly its flag documents to that effect.

## Article 94

### Duties of the Flag State

- (1) Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.
- (2) In particular every State shall:
  - a) maintain a register of ships containing the names and particulars of ships flying its flag, except those which are excluded from generally accepted international regulations on account of their small size; and
  - b) assume jurisdiction under its internal law over each ship flying its flag and its master, officers and crew in respect of administrative, technical and social matters concerning the ship.
- (3) Every State shall take such measures for ships flying its flag as are necessary to ensure safety at sea with regard, inter alia, to
  - a) the construction, equipment and seaworthiness of ships;
  - b) the manning of ships, labour conditions and training of crews, taking into account the applicable international instruments;
  - c) the use of signals, the maintenance of communications and the prevention of collisions.
- (4) Such measures shall include those necessary to ensure:
  - a) that each ship, before registration and thereafter at appropriate intervals, is surveyed by a qualified surveyor of ships, and has on board such charts, nautical publications and navigational equipment and instruments as are appropriate for the safe navigation of the ship;

b) that each ship is in the charge of a master and officers who possess appropriate qualifications, in particular in seamanship, navigation communications and marine engineering, and that the crew is appropriate in qualification and numbers for the type, size, machinery and equipment of the ship;

c) that the master, officers and to the extent appropriate, the crew are fully conversant with and required to observe the applicable international regulations concerning the safety of life at sea, the prevention of collisions, the prevention, and reduction and control of marine pollution, and the maintenance of communications by radio.

(5) In taking the measures called for in paragraphs 3 and 4 each State is required to conform to generally accepted international regulations, procedures and practices and to take any steps which may be necessary to secure their observance.

(6) A State which has clear grounds to believe that proper jurisdiction and control with respect to a ship have not been exercised may report the facts to the flag State. Upon receiving such a report, the flag State shall investigate the master and, if appropriate, take any action necessary to remedy the situation.

(7) Each State shall cause an inquiry to be held by or before a suitably qualified person or persons into every marine casualty or incident of navigation on the high seas involving a ship flying its flag and causing loss of life or serious injury to nationals of another State or serious damage to ships or installations of another State or to the marine environment. The flag State and the other State shall co-operate in the conduct of any inquiry held by that

other State into any such marine casualty or incident of navigation.(The United Nations Convention on the Law of the Sea,1982)

This clearly indicates that the registration of a ship in a state become an obligation under the rules of international law. Since the convention does not define what constitutes a genuine link between state and ships, it has been left to each state to define this link for itself.

The traditionally closed registration states define this link as a strict one, while the open registration states vary; this is discussed in the next section. As regards the qualifications for ownership, most of the maritime countries, that is, the closed registration states, stipulate that their ships must be owned by their respective nationals or companies which are fully owned or partially owned by their nationals. From the economic aspect, the person or a company registering a ship in the state becomes subject to the national law of the State. The national law will determine their liability to pay tax, the type of company and its organisation, auditing of accounts, and employment of staff - all of which will affect the economics of the business. In most of these countries, the crews employed must be their own nationals. Further the safety standards of these countries should meet the minimum mandatory requirements of the international conventions to which they are signatories or higher requirements according to national legislation.

### **2.1.2 Open registration**

Ship registers can be broadly divided into two groups - closed registers, which has already been discussed, and open registers. There are some countries which do not insist on the strict conditions as stated earlier and which grant registration on relatively easy terms. These open registers are available to any shipowner from any country, who wishes to apply for registration and satisfies the necessary conditions.

The United Nations Convention on the Law of the Sea 1982 stipulates that the genuine link between the state and the ship must exist, but leaves each state to define the link for itself. What kind of registration system a country takes is the sovereign right of a country to decide upon as part of the policy of that country to be implemented in the maritime field.

In practice, Martin Stopford(1988) suggests the open registry can be divided into two important groups - national registers and international registers.

National registers are those which treat the shipping companies registered in their countries in the same way as any other businesses in the countries. Certain special incentives or subsidies may be available, but the shipping companies in those countries are subject to the full range of financial, company and employment regulations that apply to all companies.

International registers are those that have been set up with the special aim of offering the shipowners registered in those countries internationally competitive terms as a means of earning revenue for the flag states. The terms and conditions offered by international registers vary considerably, depending upon the policy of the countries concerned. The term, "Open registers" is commonly used to refer to this group - international registers.

The motivational factors causing shipowners to switch their vessels to open registers are the low taxes, or even no taxes in some countries with open registration, the freedom to employ crew from low-labour cost countries, the low safety standards and other flexibilities available to the shipowners.

## **2.2 The history and growth of the open registry**

### **2.2.1 The early period**

Stopford(1988) suggests the history of open registry can be traced back to as early as the 16th century. At that time the English merchants flew the Spanish flag in order to dodge restrictions limiting non-Spanish vessels from West Indies trade. There were also the English fishermen in Newfoundland who used French registry as a means to continue operations after the British registration of fishing boats in the 17th century.

During the Napoleonic Wars of the 19th century, English shipowners changed their registration to fly the Germany flag in order to avoid the French blockade and in the War of 1812, the United States shipowners in Massachusetts changed to Portuguese registry to avoid capture by the British.

### **2.2.2 The movement towards international open registers**

During the 1920s, the United States shipowners found that registration under the Panamanian flag could reduce operating costs because they could employ cheaper shipboard labour and could also avoid the high tax rates in the United States. After the Second World War, the United States Government sold off liberty ships to U.S. owners. This greatly increased the potential for growth of open registration. During this time the U.S. tax lawyers also approached Liberia to set up an even more attractive regime for ship registration in New York. The new registration was more attractive with low registration fees, an absence of Liberian taxes, and an absence of operating and manning restrictions. All this made the registry economically attractive. Later, Panama adapted its law to attract shipowners from anywhere in the world; Thus two of the major international open registers were established.

### **2.2.3 Controversy and growth**

Prior to the Second World War the vast majority of the world's shipping industry was devoted to national fleets, owned, managed, and crewed by nationals of the country whose flag the ship flew. This situation changed drastically after the War, when Panama, Liberia and Honduras set up open registration, by predominately American shipowners, as shipping registers which were willing to accept ships irrespective of their ownership, management and crewing. These soon became known to shipowners as open registers and to seafarers as Flags of Convenience (FOC).

After the Second World War, the reconstruction made the shipping demand grow rapidly, especially the growing needs for crude oil as a source of energy. The two major open registers( Liberia and Panama) fleets increased significantly and the open registry was becoming a major issue for the traditionally established shipping states. The argument was whether a country like Liberia had the right to offer registry to a shipowner who was not a national of Liberia. Greek, American and Canadian shipowners taking advantage of the post-war boom and the availability of cheap tonnage began registering them abroad, so that they could avoid their national taxation legislation, as well as escape the costs associated with the safety and social regulations applicable to their national fleets. The European shipowners argued that for a ship to register in a country there had to be a "genuine link" between registration and ownership, and that in the case of international open registry flags, this link did not exist. The International Transport Workers' Federation (ITF) launched a campaign against Flags of Convenience. Although there were many victories in the fight against FOCs and substandard vessels, the effort to phase out the FOC for good was unsuccessful.



Towards the end of the 1970s, the United Nations Conference on Trade and Development (UNCTAD) began a series of meetings with the intention of drawing up a binding definition of the "genuine link" between shipowners and their flags. In the end, and after a decade of wrangling, the resulting UN Ship Registration Convention 1986, effectively legitimised open registration.

During this period certain a number of shipping companies reaped profits through Flags of Convenience. And many countries competed for ship registrations, recognising the economic benefit to the flag state, but only a few succeeded in attracting significant registration.

#### **2.2.4 The new developments**

Although a number of shipowners changed their ships from OECD countries to the open registers, there are many traditional shipowners from OECD countries who do not wish to flag out and remain in their national registers. Since 1986, the new international registers linked to the national flag have offered an alternative to open registration, while savings can still be made.

These registers, such as Kerguelen Islands Register, Manx Register, the Norwegian International Ship Register and the Danish International Register of Shipping, allow shipowners to fly their national flags while enjoying some of the advantages of open registration. The reasons for these newly developed registers are that the Western European shipping companies are confronted with high labour costs and the shipping industry requires new equity capital(Kappel 1988). There are some significant differences between them and the traditional open registries, and the ITF has not yet added them to its list of registers which it considers to be FOCs. For example, the NIS and DIS aim to be quality registers and are based on Norway's and Denmark's

international obligations respectively, as reflected in the relevant IMO and ILO Conventions.

On January 11, 1995, Lloyd's List reported that Germany's international register was declared legal by the German Constitutional Court, which could allow German shipowners to hire foreign crew at their domestic wage on German-flag vessels. Although the trade unions and the coastal state of Bremen were against the register, they lost their argument that the international register enabled owners to cut corners on pay and social conditions that could lead to safety problems on ships employing inexperienced staff. The court followed the Government's argument that the international register was needed to combat the trend towards Flags of Convenience. The Government's choice had been either to do nothing, which would have fostered flagging out or to keep at least a limited sector under the German flag. The Government of Germany chose the latter. But unfortunately Germany's International Shipping Register has become the second international register of shipping to be declared a Flag of Convenience by the ITF recently.

It is noteworthy that Italy also is ready to start an international register for ships engaged in international service, but is awaiting the approval of the Parliament reported by Lloyd's List 16 December 1994.

Issue 115 of The Sea 1995 reported that Japan is reviewing register plans and is considering setting up an international ship registration system similar to those established in Europe in a bid to maintain a Japanese flagged fleet and a core of Japanese seafarers. The idea was originally rejected four years ago, but appears to have been renewed because the amount of Japanese-owned tonnage under foreign-flags has risen to 80 per cent.

In the past, "The world shipping markets have been partly characterised by interventionism and state subsidises"(Kappel, 1988. P.28). The new development of international registers tends to counteract both tendencies. The further development of the newly developed international registers might stop the tendency of flagging out from traditional maritime countries to Flags of Convenience, but the rapid growth of such international registers linked to the national flag would foster competition between all open registers. Open registration will still be able to prosper and grow to a certain extent, but they will have to revise and upgrade their standards and practices.

### **2.3 The open registers and their manning policies**

In defining a Flag of Convenience, the ITF considers the most important factor to be whether the nationality of the shipowners is the same as the nationality of the flag. In 1974, the ITF defined a FOC as follows "Where beneficial ownership and control of a vessel is found to lie elsewhere than in the country of the flag the vessel is flying, the vessel is considered as sailing under a flag of convenience." The country allows non-residents to own and control vessels; access to and transfer from the registry is easy; taxes on shipping are low or non-existent; the country of registration does not need the shipping tonnage for its own purpose but is keen to earn the tonnage fees; crewing by the non-nationals is freely permitted; and the country lacks the power(or the will) to impose national or international regulations on "its" shipowners.

In past years, a process of internationalisation of shipping firms has taken place with considerable rapidity. This internationalisation process has changed the traditional interrelation between a national economy and a shipping company, and has led to the establishment of shipping companies organised on a global basis. This includes changes of vessel registration, employment of international crews, cross trading, and co-operating with other companies.

Since the Second World War, the open registries have grown very fast. There were 21 open registers, 7 international registers, and 3 ship-by-ship based registers according to the list prepared by ITF, representing more than 50 % of world tonnage at the end of 1994.

**Open Registers:**

**Antigua & Barbuda**

**Bahamas**

**Bermuda**

**Burma**

**Cayman Islands**

**Cook Islands**

**Cyprus**

**Gibraltar**

**Honduras**

**Lebanon**

**Liberia**

**Malta**

**Marshall Islands**

**Mauritius**

**Netherlands Antilles**

**Panama**

**St. Vincent**

**Sri Lanka**

**Tuvalu**

**Vanuatu**

**International Registers:**

**Denmark (DIS)**

**Germany (GIS)**

**Isle of Man (UK)**

**Kerguelen (France)**

**Luxembourg (for Belgian ships only)**

**Madeira (Portugal)**

**Norway (NIS)**

**Ship-by-Ship Basis:**

**Hong Kong**

**Philippines (foreign owned ships bareboat chartered to the Philippines)**

**Singapore (foreign owned ships without approved agreements)**

One of the most important differences between traditional registered ships and the ships flying Flags of Convenience is the labour quality and the manning requirements. In order to reduce the crew costs, the shipowners avoid national manning requirements and employ the cheaper crews as they want. The following is the manning policy of the major open registers:

**Antigua & Barbuda**

There are no nationality requirements for officers and crews serving on Antigua & Barbuda vessels. Certificates of Competency are issued by the Maritime Department against equivalent certificates from approved overseas bodies.

**Bahamas**

No requirements exist concerning the nationality of officers serving on Bahamian ships, but they must hold a Bahamian certificate.

**Bermuda**

The master, chief officer, and chief engineer, must hold British certificates or certificates issued by the Irish Republic and certain Commonwealth administrations. For the ratings there are no nationality or certification requirements.

**Cyprus**

There should be 15 % of the crew of a Cyprus ship that are Cypriots, but in view of the scarcity of Cypriot seamen, this condition is never observed. The crews of Cyprus ships must hold certificates of competency granted by a competent authority of either Cyprus or any of the recognised authorities.

**Honduras**

There are no requirements under Honduras maritime law with regard to minimum manning scales. There is however, a requirement that 90 % of the crew should be Honduran. If there are no Honduran crew available, a waiver is granted. All certificates of competency are issued by the Department of Merchant Marine. Holders of valid certificates of competency issued by foreign nations will be accepted as equivalent.

**Liberia**

There are no nationality requirements for officers and crew. Officers must possess a Liberian licence, which may be issued against a foreign licence recognised as the equivalent by the Liberian authorities.

**Malta**

No restrictions are imposed on the nationality of the master, officers and crew engaged on Maltese ships. The advantage of employing Maltese seamen lies in the progressive reduction of annual charges as more Maltese seamen are employed. The Maltese authorities issue certificates to Maltese citizens on examination for masters and all officers. Foreign certificates are recognised where they have been granted by examination and are considered equal to Maltese certificates.

**Netherlands Antilles**

The master should be of Dutch nationality. If the company cannot appoint a Dutch national the Government may grant permission to a qualified foreign master to serve on board an Antillean vessel. The master and first mate must be able to speak English. No regulations with regard to the nationality of other officers and crew members. Foreign certificates are recognised on the condition that they are equivalent to those issued in the Kingdom of the Netherlands and this applies particularly to those of the master and chief engineer. Certificates issued by certain countries are regarded as equivalent to those issued by the Kingdom of the Netherlands.

**Panama**

There should be 10 % of the crew that are Panamanian, but in practice this is not applied. In the past Panama issued no certificates of its own, but accepted the certificates of other countries. Now Panama has introduced a computerised examination and certification program. A private company receives applications for certificates of competency and conducts examinations in English, Spanish, Chinese, Japanese, Greek and Korean.

**St. Vincent**

There are no nationality requirements for officers and crew serving on St. Vincent vessels. UK certificates and certificates of the other reputable administrations are acceptable.

**Vanuatu**

No nationality requirements exist. Officers that are certificated by their own country, have their certificates accepted on the basis of equivalence.

**Denmark (DIS)**

There are no restrictions on the nationality of the ship's crews except that the master must be a Danish nationality, but a waiver can be given. Others on board holding a non-Danish certificate must hold a certificate issued in a country which has ratified the STCW Convention.

**Hong Kong**

There are no nationality of residence requirements for the crew. The master, chief officer, chief engineer, second engineer and all watchkeeping officers and engineers must hold appropriate certificates of competency issued by the Hong Kong Marine Department, or other maritime administration recognised for the purpose of granting Hong Kong licences.

**Kerguelen Islands**

There should be 35 % of the crew that are French nationals, of which four, including the master, must be officers. There are no nationality requirements for the rest of the crew where appropriate.



### **Norway(NIS)**

There are no restrictions on the nationality of the vessel's crew except that the master must be Norwegian, but a waiver can be given. Persons holding non-Norwegian certificates must apply to the Maritime Directorate for a qualification document. If the country of issue has ratified the STCW Convention this should be achieved without undue difficulty.

### **Singapore**

There are no nationality requirements with regard to the manning of Singapore foreign- going vessels, although there is a financial incentive to employ Singaporean seafarers. The certificates of competence of certain commonwealth countries are recognised.

## **2.4 International crews**

The international crew may also be called multinational crews or multi-cultural crews. They are seafarers from maritime labour supplying countries normally recruited by manning agencies or management companies, working on board foreign ships. Their salaries are relatively low and the working conditions vary greatly.

The international crews have become more common for a number of reasons, such as lower crew costs, less strict manning requirements, reduced safety and social standards and greater flexibility in crewing vessels. Among these reasons, the most important one is probably the lower cost. The manning cost is a large proportion of operational costs. Lloyd's Maritime Asia October 1987 indicated the huge differences that exist in crewing costs annually as flag and crews vary:

UK flag/UK seafarers	\$908,000
Liberian flag/Korean seafarers	\$490,000
Hong Kong flag and seafarers	\$396,000
Open registry flag/Polish seafarers	\$338,000

These great differences have had a tremendous effect on shipping and it is one of the important reasons why open registries have grown in importance. As discussed in the previous section, open registers allow the shipowners, or ship operators, to select crews from any nationality where lower salaries are possible.

International crews have also become more common because of the growing unpopularity of seafaring as a profession in many of the traditional maritime countries. The lack of job opportunities and uncertainty about the long-term career prospects have had an impact in these countries. The advantages of shore jobs, such as high wages, long holidays and more social activities influence the seafarers to eventually change their jobs in these countries.

The major change occurring in the shipping industry is the large scale transfer of ships from the registers of traditional maritime nations to open registers. Beneath the obvious signs of change, reflected in the flag flown at the sterns of so many of the world's merchant ships, is the change of perhaps yet greater significance, concerning the nationality of the seafarers manning those ships, the qualifications they hold and their professional ability. All these are directly related to the safe operation of vessels. The analysis of the shipping casualties and accidents in the following chapter indicates that maritime casualties and accidents have occurred more often on mixed crew vessels.

The shipowners who were required to operate under restrictive legislation and/or union agreements covering the nationality of their crews have been obliged to transfer their ships to the more flexible regimes of the open registers if they were to stay in business. The long period of recession in the shipping industry and the overcapacity of supply have made the competition in the industry even more severe. To avoid running the shipping business at a loss, the shipowners, or operators, have to reduce the costs of manning and management, so they employ more and more seafarers from maritime labour supplying countries on their open registered vessels.

#### **2.4.1 The policies on development of the seafaring industry in various countries**

Since the oil crisis in 1973, the shipping industry has been suffering from a recession. The oil shortage and the resulting sharp rise in oil prices throughout the world affected the industrial countries greatly and in the following years the world economy was confronted with difficulties due to inflation, depression and a worsening international balance of payments. As a result, West European shipping has been reduced significantly in capacity, in number of vessels and in employment.

At the same time, some developing nations have decided to develop their merchant shipping industry. For example, between 1970 and 1985, the combined fleets of Southeast Asian countries(including Brunei Darussalam) increased by 3.7 times in terms of the number of vessels and by 7.2 times in terms of tonnage,(Brooks 1989). The total gross tonnage of the world merchant fleets from the 1970s to the 1980s almost doubled.

#### **The Philippines**

The increases and decreases in seafarers is related to the development of merchant shipping. The Government of the Philippines, for example, adopted the policy of implementing bareboat chartering. This was the overwhelming reason for the

dramatic expansion of the Philippine fleet. The Decree permitted foreign-owned vessels to be registered in the Philippine registry, providing that the vessel was bareboat chartered to a Filipino national or company, i.e. dual registry. In 1975 the Philippine foreign-going merchant fleet consisted of 62 vessels of 870,000 dwt. This had increased to 396 vessels of 11,200,000 dwt by June 1986. This significantly affected the available supply of Filipino seamen for the bareboat chartered ships which were required to have a full Filipino crew. There are more than 100,000 Filipino seafarers employed on foreign-going vessels, both foreign flags and the Philippine flag. The Philippines are seen internationally as a major maritime labour market.

#### **Sri Lanka**

The Government of Sri Lanka, through its Ministry of Trade and Shipping, takes an active role to promote the development of seafarers and offers them to foreign shipowners. The Government introduced a scheme in 1987, by which foreign vessels could be registered under the Sri Lankan flag. The aim of the scheme was not only to raise registration revenue, but also to increase the employment opportunities for Sri Lankan seafarers, since any such vessel was obligated to carry 50 % Sri Lankan crew.

#### **Singapore**

Singapore is located on the Europe-Far East trade route. It is one of the busiest shipping centres in the world. Singapore's policy to open the shipping registry is to create more employment opportunities for Singaporean seafarers. A rebate of half the tonnage tax for the vessels concerned is provided if shipowners employ Singaporean seafarers for over 25 % of the crew.

#### **India**

India today has a well-established maritime tradition. It is comprised of 340 vessels of 1,000 grt and over, totalling 11.3 million dwt as of July 1, 1994 and is ranked 14th in the world. This is due to the Government being responsive to the need to provide

adequate shipping services from the national fleet to provide transport for the food supplies required. The Government of India adopted a policy to maintain the national fleet, the aim being that the entire coastal trade and a significant proportion of India's overseas trade should be carried by an Indian merchant fleet. It recognised that the expansion of the Indian merchant fleet would require an equal increase in the number of trained personnel for manning such ships. India also had a long history of supplying seafarers for foreign shipowners. It has been one of the centres of seafarers' supply. At present, India supplies a large number of seafarers, both officers and ratings for the international market.

### **Indonesia**

The Indonesian Government has identified the shipping sector as one source of employment for the country. Attention has been paid to employment with foreign shipping companies as a means of providing new job opportunities, as well as to earn foreign exchange.

The individual national policy on the development of the seafaring industry has increased the total tonnage of the fleets of the developing countries and overseas employment has raised the demand for seafarers. To meet national needs and the international demand, training has become a critical issue. Thus a large number of maritime training institutions were established during the 1970s and 1980s. Quantity was given a priority rather than quality during this period.

#### **2.4.2 Seafarer's demand and supply**

Shipping remained strong after the Second World War until the recession of the 1970s. At that time, recruiters began hiring increasing numbers of crews from poorer countries for low salaries, leaving many skilled mariners without work. This has meant that many seafarers from several traditional maritime countries have lost their jobs to

the seafarers in the Far East and other lower-cost areas. The demand for international crews has increased continuously over many years. As mentioned in the previous section, it was possible to find seafarers in developing countries, the vast majority from Asia. There are more than 100,000 Filipino, 41,000 Koreans, 20,000 Indians, and 20,000 Burmese and 19,000 Pakistanis employed in international trade. Statistics on Indonesia are hard to find. This vast country with seventeen thousand islands may have as many as 80,000 registered seafarers, (P.K.Chapman, 1992).

Since the end of the 1970s, China has been supplying seafarers to the international maritime labour market. The maritime labour market was affected during the years of 1989 and 1990, when Eastern Europe was being opened up to the West. Russian, Polish, Yugoslavian, and other Eastern European seafarers sought jobs, many for low wages, on international ships. At present, the seafarers from these countries still represent a significant potential source of supply of man power.

When we consider the recruitment of seafarers, the economy of the providing country should be considered. Today the majority of seafarers employed on foreign flag vessels are from the developing countries. The economic situations within these countries are variable. When the domestic economic situation changes, people find better jobs ashore and a supply of seafarer is no longer available. This is particularly true in Asia. During the past 20 years, due to national economic growth, the supply of seafarers in South Korea, Taiwan, Hong Kong and Singapore has been declining.

The number of Korean seafarers has declined significantly as wages have increased ashore. Between 1985 and 1989, the number of Koreans working on international ships dropped from 51,000 to 41,000. Many former seafarers are now attracted to work ashore,(P.K.Chapman, 1992).

In 1968, Singapore started an open registry in order to increase employment opportunities for its unemployed seafarers. However, not long after this, the employment situation improved and there was no more a need to promote the employment of Singaporean seafarers in its open registry fleet. The total number of seafarers declined rapidly from 6802 in 1972 to 2274 in 1984,(P.K.Chapman, 1992).

Hong Kong was one of the major supply sources of seafarers. In the 1960s and 1970s Hong Kong seafarers served on vessels of all flags in all parts of the world. However, since the late 1970s, the number of Hong Kong seafarers has declined, with many leaving the sea for shore employment. Although Hong Kong is still considered as a supply centre, the majority of seafarers recruited are from the mainland of China. The situation in Taiwan has changed tremendously. In the 1970s there were more than 36,000 seafarers employed in open registry vessels. In the 1980s the economic growth at home was very fast, and the number of seafarers was reduced considerably. According to an investigation into the majority of the shipping companies in 1993, the shipping companies lacked both officers and experienced ratings. The total number was 557 officers and 297 ratings respectively,(Qian Yaopeng, 1994).

The estimated demand for seafarers depends upon two factors - the number of vessels in service(distinguishing between type, age and flag), and the manning level (including a back-up number for each vessel). The demand for seafarers, officers and ratings, is estimated individually for each country.

Five years ago, the International Shipping Federation(ISF) and the Baltic and International Maritime Council(BIMCO) published their Final Report on the worldwide supply and demand for seafarers. It revealed a 10 % shortage in the number of officers ideally required to man the world fleet. What has happened during these five years? ISF and BIMCO will publish their new study in November this year. During the five years, the growth of the world fleet has not been as much as was anticipated

and the crew shortage has not been borne out. However, one of the obvious changes is that more vessels have continuously flagged out from OECD countries to open registers. Open registers comprise of more than 54 % of world tonnage as indicated by Lloyd's Register World Fleet Statistics 1994. There are now few owners who resist the trend and rely on traditional registration. This means that the seafarers from OECD countries will continuously decrease and more seafarers from maritime labour supply centres will be in demand to work on board their vessels as they are flagged in open registers.

The demand for seafarers is not only in terms of the quantity, a very important aspect is that of quality. As mentioned earlier, beneath the obvious signs of changes, the seafarers' qualifications and their professional ability become the key for safety at sea and maritime environment protection.

#### **2.4.3 Seafarers in China**

China started supplying seafarers for the international market at the end of the 1970s, when the Government implemented its open door policy. Since 1978, the maritime industry in China has developed very fast. At present, according to the statistics of the Ministry of Communications, the total tonnage of the Chinese merchant fleet exceeds 20 million dwt and ranks 9th in the world. The total number of Chinese seafarers is about 315,000 for ocean-going vessels.

Being the main force of Chinese foreign trade transportation, the China Ocean Shipping Company(COSCO) has the largest shipping fleet within the country. According to the lecture at WMU given by Mr. Lei Hai, Vice-President of COSCO Group, currently the COSCO Group owns and operates a modern commercial fleet of over 500 vessels with more than 15 million dead-weight tons, including container



vessels, ro-ros, general cargo vessels, timber carriers, reefers, passenger/cargo vessels, bulk carriers and oil tankers.

China also has rich inland water transport resources. The total length of rivers is 430,000 km, of which 109,000 km can be used for large vessels. With further development of the reform, the national maritime framework has changed(see Appendices 1 and 2). Most notably provincial and local marine transport has developed considerably. The strict separation of inland, coastal and ocean-going structures has been conceptually changed into integrated transport of cargo along inland, coastal, and ocean-going freight rates. A large number of seafarers are needed, particularly the senior officers. China currently has some 60,000 officers and engineers, and every year the recruitment of the maritime education and training institutions for officers and engineers is about 3,500. This still does not meet the need which grows in consonance with industrial development. There exists a particular need for captains and chief engineers.

China decided to increase the number of seafarers for the international market through upgrading the knowledge of the seafarers and by training more qualified personnel. One of the obvious problems for Chinese seafarers is the language difficulty, particularly among the ratings. Language capability is becoming a more important factor with multilingual crews, both for social interactions and navigation communications, especially in emergency situations. This will be further discussed below.

## **CHAPTER THREE**

### **MARITIME CASUALTIES AND ACCIDENTS RELATED TO INTERNATIONAL CREWS**

Although modern vessels are well equipped with all kinds of effective navigational means, casualties and accidents occur from time-to-time. Since the 1970s, maritime casualties have occurred to oil tankers, bulk carriers, general cargo vessels and passenger ships. These disasters have been met by the international community with great astonishment and they have shown solicitude for the establishment and implementation of the international conventions and regulations. Maritime casualties were no longer the issue solely associated with the shipping industry, but was considered as a serious social problem.

After the tragic loss of the ro-ro ferry Herald of Free Enterprise, the International Maritime Organisation(IMO) adopted Resolution A.596(15) and started dealing with the role of the human element in maritime casualties and accidents. Since then the international community and the maritime industry have studied the issue and recognised that the great majority of maritime casualties and accidents were due to human error. The awareness of the importance of the human element in maritime casualties and accidents have been growing fast and some necessary measures have been taken for future prevention. It seems to be necessary to make further studies on the relationships between the casualties and the international crews on board the open registered vessels which have grown greatly in terms of number and tonnage in recent years.

We have already discussed open registration and international crews. In this chapter, we will analyse the casualties and accidents, and look into the causes of maritime accidents related to open registered fleets, as well as the relationships with international crewing.

### **3.1 Definition of maritime casualty**

As defined by Article 22(2) of the United Nations Convention on the Law of the Sea, 1982, and Article 2(1) of the International Convention Relating to Intervention on the High Sea in Cases of Oil Pollution Casualties, 1969 and used in various resolutions and documents of the International Maritime Organisation(IMO), "maritime casualty means a collision of vessels, stranding or other incident of navigation, or other occurrence on board a vessel or external to it resulting in material damage or imminent threat of material damage to a vessel or cargo." Article 2(g) of the International Labour Organisation Convention Concerning Minimum Standards in Merchant Ships (Convention 147 of 1978) refers to the marine casualty involving ships, particularly those involving injury and/or loss of life.

Maritime casualties or maritime accidents, concern losses, which are usually related to an enormous loss of life, vessel, cargo or operation, as well as damage to the marine environment. They may also relate to the loss or damage of marine installations, an other ship and the injury and/or loss of life of the personnel on board the ship.

### **3.2 A survey of world merchant ship total losses**

When studying shipping casualties, particularly total losses at sea, the available data and statistics are those published in the Casualty Return of Lloyd's of Shipping and Casualty Statistics of the Institute of London Underwriters.

### **3.2.1 General tendency**

The general tendency of the world's shipping casualties (total loss of ships) has gradually declined although the number of ships lost were quite high in some years. In 1982, 402 ships were lost and the total tonnage lost reached a peak in 1986 when the total lost tonnage reached 2609000 grt. This is a general decline and it is very much related to the advancement of marine technology and the utilisation of navigational equipment, and the establishment and implementation of international conventions and regulations.

Even though the general tendency has declined, we should still be aware of the fact that the situation is serious. Some of the cases in recent years are catastrophic, and human error plays a dominant role. The Exxon Valdez's grounding in 1989 resulted in a great impact on the natural environment and it is the most expensive one in pollution claims. The Scandinavian Star disaster in 1990 resulted in 158 people losing their lives. During the Liberian flag crude oil tanker Braer accident in 1993, some 85,000 tonnes of crude oil was lost in the sea. In March 1994, the Cypriot flag tanker Nassia was in collision with a bulk carrier in the Bosphorus Strait, and approximately 20,000 tonnes of crude oil was lost and polluted the coastline. The catastrophic disaster of the Estonia, which capsized and sank probably within 15 minutes in the Baltic Sea in September, 1994 caused more than 900 people to lose their lives.

Human beings learn from their experiences and major accidents, like those above encourage improvements in the operation and design of vessels. Accidents, in a certain sense, could occur because the environment in which the vessel is operating is so complicated that the seafarers never experience or could not help dealing with the

Table 1. Trends in world total losses

Year	Capacity of the Fleet		Total Losses		Total Loss Ratio	
	Ships	x 1000grt	Ships	x 1000grt	Ships	grt Basis
1950	30,852	84,583	222	260	0.72	0.31
55	32,492	100,569	178	255	0.53	0.25
60	36,311	129,770	171	358	0.47	0.28
65	41,865	160,392	277	740	0.66	0.46
70	52,444	277,470	352	613	0.67	0.27
75	63,724	342,162	336	995	0.53	0.29
1980	73,832	429,911	387	1804	0.52	0.43
81	73,864	420,835	359	1238	0.49	0.24
82	75,151	424,742	402	1632	0.53	0.38
83	76,106	422,590	340	1413	0.45	0.35
84	76,068	418,682	327	2354	0.43	0.36
85	76,395	416,269	307	1651	0.40	0.35
86	75,266	404,910	265	2609	0.35	0.64
87	75,240	403,498	219	1284	0.29	0.32
88	75,680	403,406	231	865	0.31	0.21
89	76,100	410,481	211	667	0.28	0.16
1990	78,336	423,627	188	1126	0.24	0.27
91	80,030	436,027	258	1548	0.32	0.36
92	79,726	445,109	213	1223	0.27	0.27
93	80,655	457,914	219	778	0.27	0.17

Source: Japan Maritime Research Institute Report No.47. Figures for 1993 is included.

situation. This, however, cannot be used as the excuse for the high accident rates. In order to minimise maritime casualties, the ship operating skills of seafarers or performance and management of the safety of ships by the flag states and shipping companies should be concerned and improved.

Since shipping is becoming more internationalised and more international crews will be employed on board open registered vessels, any inappropriate management and neglect in operations will resume the situation. Therefore all the parties who benefit from shipping should show their concern and contribute more to the improvement of vessel design and operation, and to the training of seafarers in order to minimise maritime accidents and casualties.

### **3.2.2 Analysis of total losses in 1993**

The total number of vessels and total tonnage lost during 1993 were 219 ships (100 grt or over) and 77.693 grt respectively. From Lloyd's Report, we get the number of 504 lives lost in the same year as the result of ship casualties.

In 1993, Panama, the U.S.A. and Honduras suffered the highest number of losses with 28, 18 and 15 vessels respectively. Panama suffered the highest gross tonnage lost, with 154,453 (19.9 %) followed by Cyprus with 79,441 (10.2 %), Liberia 78,068 (10 %) and Bahamas 55,183 (7.1 %). When we list the "top-ten" flags suffering the highest gross tonnage loss, most of them are from open registers.

From Table 3, we find that the percentage of the total losses of the major open registers is approximately 70 % of the world total losses during 1993.

Table 2. Total losses during 1993

	Number of Ships	Gross Tonnage	% of Tonnage Lost
Foundered	95	216,077	27.78
Missing	1	8,776	1.13
Fire/Explosion	35	151,480	19.48
Collision	20	50,234	6.46
Contact	10	15,729	2.02
Wrecked/Stranded	52	189,403	24.35
Lost etc.	6	145,994	18.77
<b>Total</b>	<b>219</b>	<b>777,693</b>	<b>100.00</b>

Source: Casualty Return 1993

Table 3. The top-ten flags of total losses in 1993

Flag	No. of Ships	GRT	% of Tonnage Lost
Panama	28	154,453	19.9
Cyprus	4	79,441	10.2
Liberia	4	78,068	10.0
Bahamas	2	55,183	7.1
St. Vincent	12	44,459	5.8
Malta	6	42,465	5.5
S. Korea	11	38,336	4.9
Honduras	15	33,064	4.3
Netherlands	2	26,779	3.4
The U.S.A.	18	25,570	3.3

Source: Casualty Return 1993 and own compilation.

### **3.2.3 Distribution of total losses by major open registers(1986-1993)**

Maritime casualties and accidents are associated with safety standards and quality of the seafarers manning the vessels. In this sense, it is very much related to the Government's policy towards the safety of the ships it owns. As indicated in the Report of Japan Maritime Research Institute: "it is no exaggeration to say that the technical level of shipping of a country may be assessed by the frequency of maritime casualties to that country's flag vessels."

Although some open registry states intend to meet international safety standards, the policies they adopted for implementing the open registry allow the shipowners to decide the standards and the quality of seafarers, however, their responsibility cannot be delegated.

The distribution of total losses by major open registers reflects the technical and managerial levels of their shipping, safety standards as well as the certification and manning policies. The method used is to compare the casualty ratio of major open registers with the casualty ratio of average world casualties, based on the statistics published in the annual Casualty Return of Lloyd's Register of Shipping from 1986 to 1993.

Tables 4 and 5 show us that the average total loss ratios under the major open registers were always higher than that of the world average during the period of 1986 to 1993 in terms of both number of ships and tonnage. The average ratio of total losses of the major open registers on the ship base of the whole period is 2.3 times higher than that of the world average for the same period, and it is 1.8 times higher on



**Table 4. Distribution of total losses by major open registers(ships ratio)**

<b>Flag</b>	<b>86</b>	<b>87</b>	<b>88</b>	<b>89</b>	<b>90</b>	<b>91</b>	<b>92</b>	<b>93</b>	<b>Av.</b>
<b>Bah.</b>	<b>0.78</b>	<b>0.37</b>	<b>0.33</b>	<b>0.55</b>	<b>0.11</b>	<b>0.29</b>	<b>0.09</b>	<b>0.18</b>	<b>0.34</b>
<b>Cyp.</b>	<b>1.75</b>	<b>0.87</b>	<b>0.65</b>	<b>0.63</b>	<b>0.48</b>	<b>0.88</b>	<b>0.07</b>	<b>0.25</b>	<b>0.70</b>
<b>Hon.</b>	<b>1.30</b>	<b>1.08</b>	<b>0.50</b>	<b>1.33</b>	<b>1.00</b>	<b>1.60</b>	<b>1.36</b>	<b>1.25</b>	<b>1.18</b>
<b>Lib.</b>	<b>0.44</b>	<b>0.20</b>	<b>0.26</b>	<b>0.21</b>	<b>0.25</b>	<b>0.37</b>	<b>0.24</b>	<b>0.25</b>	<b>0.28</b>
<b>Malta</b>	<b>2.71</b>	<b>1.57</b>	<b>1.92</b>	<b>0.98</b>	<b>0.36</b>	<b>1.48</b>	<b>0.75</b>	<b>0.58</b>	<b>1.22</b>
<b>Neth.</b>	<b>0.31</b>	<b>0.08</b>	<b>0.17</b>	<b>0.27</b>	<b>0.00</b>	<b>0.19</b>	<b>0.00</b>	<b>0.20</b>	<b>0.15</b>
<b>Pana.</b>	<b>0.73</b>	<b>0.46</b>	<b>0.51</b>	<b>0.55</b>	<b>0.52</b>	<b>0.58</b>	<b>0.57</b>	<b>0.58</b>	<b>0.55</b>
<b>St. V.</b>	<b>0.76</b>	<b>0.96</b>	<b>0.42</b>	<b>1.21</b>	<b>1.03</b>	<b>1.32</b>	<b>0.60</b>	<b>1.25</b>	<b>0.94</b>
<b>Av.</b>	<b>1.10</b>	<b>0.70</b>	<b>0.60</b>	<b>0.72</b>	<b>0.49</b>	<b>0.84</b>	<b>0.46</b>	<b>0.56</b>	<b>0.67</b>
<b>World</b>	<b>0.35</b>	<b>0.29</b>	<b>0.31</b>	<b>0.28</b>	<b>0.24</b>	<b>0.32</b>	<b>0.27</b>	<b>0.27</b>	<b>0.29</b>

the tonnage base comparing the average total losses ratio under the major open registers with that of the world average for that period. Such high accident rates are really a problem for the industry. The flag states should improve their control of the vessels. They have to ensure that their ships comply with the standards accepted by the flag states under the international conventions and regulations.

There are, of course, some other countries whose total loss ratios are also very high, such as South Korea, and Greece, but the major open registered vessels dominate the figures of maritime casualties throughout the world.

Table 5. Distribution of total losses by major open registers(tonnage ratio)

Flag	86	87	88	89	90	91	92	93	Av.
Bah.	0.25	0.02	0.09	0.19	0.06	0.30	0.06	0.26	0.16
Cyp.	2.70	1.08	0.93	0.55	0.31	1.01	0.01	0.35	0.96
Hon.	0.83	2.12	0.82	1.04	0.34	1.52	1.20	0.30	1.02
Lib.	1.66	0.22	0.15	0.66	0.35	0.28	0.33	0.15	0.40
Malta	0.70	0.74	0.77	0.14	0.35	1.00	1.22	0.30	0.65
Neth.	0.15	0.01	0.21	0.82	0.00	0.04	0.00	0.87	0.26
Pana.	0.42	0.32	0.38	0.21	0.55	0.32	0.58	0.27	0.38
St. V.	0.08	0.20	0.59	1.49	0.20	0.32	0.06	0.84	0.47
Av.	0.85	0.59	0.50	0.56	0.27	0.60	0.34	0.42	0.54
World	0.64	0.32	0.21	0.16	0.27	0.36	0.27	0.17	0.30

According to Casualty Statistics 1994 of the Institute of London Underwriters (ILU), again the same flags account for losses well above their share of world shipping; Panama, Malta, Cyprus and St. Vincent being the most significant.

The high accident rates of the fleets of open registers might be the owners or operators who do not maintain their vessels' standards and seafarers' quality, and there are no flag states to effectively control them. Open registers do not have the capability of supervising the safety of their vessels or do not do so effectively. As Lloyd's List reported at the beginning of 1995, the St. Vincent register had 1313 vessels totalling 6.5 million grt. Mr. Edward Nanini said that the objective of the St. Vincent Register is to continue to steadily expand in the interests of the country and its economy but never at the expense of safety and efficiency.

The issue of open registration has been disputed for a long time as we discussed in Chapter Two. Although the growth of open registration has been continuous, the flag states do have international obligations and responsibilities for ensuring that their vessels operate safely, so they need to improve their practice.

#### **3.2.4 Distribution of total losses by ship age**

Another important factor of maritime casualties is the age of the vessels. In 1993 the average age of the world fleet was 18 years, according to the statistics issued by Lloyd's Register of Shipping. The age distribution of total losses in the world between 1986-1993 indicates that as ships are getting older, there will be more accidents.

Open registers have been criticised for the age and safety record of ships registered thereof in the past. Some administrations have tried to improve the situation, such as the Liberia Register, in which the average age of the fleet was 12 years in 1993, but some registers still have aged fleets, such as Honduras, 25 years, and St. Vincent, 22 years in 1993.

According to the records of 1993, the share of ships totally lost within the age bracket of 20-24 years accounted for 29.2 % of the world's total losses of 219 ships. The percentage of ships within this age bracket of the world's total number of vessels is 15.7 % (see Table 7). The total loss ratio of the age bracket between 20-24 years for total loss percentage and the percentage of the total vessels within this age bracket of the total vessels in the world is 1.85, which is the highest among other age brackets. It is almost 3 times as high as that of ships aged 14 years or less, and 1.5 times as high as that of ships aged 15-19 years. The ratios of the other age-brackets are shown in Table 8.

**Table 6. Distribution of world total losses by ship age**

Year	0-4	5-9	10-14	15-19	20-24	25-29	30-	Total Ships
1986	3.8	8.3	19.6	31.3	17.7	12.1	7.2	265
1987	4.1	10.0	20.1	30.6	16.4	8.7	10.0	219
1988	4.3	13.0	15.2	27.3	19.9	10.8	9.5	231
1989	5.7	13.3	12.3	23.7	25.6	9.5	10.0	211
1990	5.3	6.4	14.4	26.1	22.9	9.0	16.0	188
1991	3.9	6.6	15.1	20.5	26.7	16.6	15.5	258
1992	3.3	3.8	12.7	23.9	27.2	12.7	16.4	213
1993	3.7	3.2	11.4	24.2	29.2	15.5	12.8	219
Av.	4.3	8.1	15.1	26.0	23.2	11.2	12.1	225

**Table 7. Distribution of world total vessels by age-brackets in 1993**

Years	0-4	5-9	10-14	15-19	20-24	25+	Total
1993	9945	11297	14025	15386	12628	17874	80655
%	11.4	14.0	17.4	19.1	15.7	22.1	100

“Vessels that are not adequately maintained present steadily increasing risks to the environment because designed-in safeguards are eroded.”(Professor T. Sampson 1995). From the engineering point of view, vessels are relatively safe when they are young. When the vessels are getting older, maintenance becomes important to safety and the environment. In the competitive situation existing in the world shipping

market, regular maintenance is often neglected or postponed in order to detract more from operating time and to earn profits.

Table 8. Distribution of lost ratios of age brackets on the base of 1993

Years	0-4	5-9	10-14	15-19	20-24	25+
lost %	3.7	3.2	11.4	24.2	29.2	28.3
ships %	11.4	14.0	17.4	19.1	15.7	22.1
ratio	0.32	0.23	0.66	1.27	1.86	1.28

The trend to employ smaller crews has already affected the regular maintenance of the vessels during the voyages and the competition in the shipping industry has made the freight rates offered very low. Thus it is almost impossible to earn enough money to invest in new buildings; only the large companies can do so.

Concerning aged vessels, here the ability and competency of the seafarers becomes more important. The example given by Mike Wall(1994) clearly shows the importance of the competence of seafarers. A general cargo vessel of 4,376 grt with a combined Filipino/Burmeese crew, registered in Panama, was travelling from Russia to Taiwan in a force 6 wind with only a 4 metre swell. Due to a lack of general maintenance the No.5 injection on a 6 cylinder engine became defective and the engine eventually stopped. The engineers could not remove the defective injector or isolate the unit. Without main engine power, but few other problems, the crew abandoned the vessel which was eventually towed into Hong Kong. During the condition surveys, some of the defects were found to be attributed to lack of funding from the operators, but the majority were due to lack of personnel, lack of supervision and lack of training.

Ineffective maintenance on board and neglect of regular maintenance together with incompetent crews have made the safety record of aged vessels even worse.

### **3.3 The major claims covered by P&I insurance and the main causes**

In addition to total losses, there are also some other kinds of risks in shipping, such as partial loss, cargo damage, pollution and personal injury. However, it is difficult to find sufficient information or statistics about these kinds of casualties and accidents. The lack of statistics for accidents less serious than total loss may hide serious weaknesses among certain flags. Because of inadequately trained crews and lack of safety standards, some may be likely to have a higher rate of casualties not resulting in total loss. There are also the problems of accidents to crew members on board vessels and the effect on the marine environment.

Fortunately, in recent years, the underwriters and P&I clubs have published their annual reports, which are not only annual reports, but also an analysis of the major claims. For example, the UK P&I Club's Third Annual Analysis of Major Claims includes all of those arising between 1987 and 1992.

The Annual reports of P&I clubs concentrate their analyses on the major claims. This is because the major claims of the UK Club represented only 1.4 % of the total number of claims, but accounted for 72 % of the club's total claims value during the period of 1987-1992 and 1.3% of Gard's total number of claims accounted for 68 % of the Gard's total gross liability during the period of 1987-1990.

Major claims, according to the annual reports, have been defined as claims with a gross value of \$ 100,000 or larger.

During the period of 1987-1992, there were 1971 major claims covered by the UK Club with a gross value of \$ 989 million. About 95 per cent of these claims were in respect of cargo, personal injury, property damage, pollution, and collision. There were 472 cases with Gard, of which the total claim value was \$ 249.7 million during the period of the 1987-1990 policy years.

The main causes of the major claims covered by P & I Clubs can be generally divided into two:

1. the human factor, which is considered in the broad sense of wrong operation, inadequate training, poor communications
2. the structure failure or technical malfunctions

The guardians of safety in the marine transport arena are shipowners and operators, flag states and classification societies. These entities bear the primary responsibility for assuring that vessels are operating safely. This responsibility cannot be delegated. Unfortunately, some of them have not acted appropriately and responsibly. The open registers have no effective control of the vessels registered therein, and they attract the shipowners with some flexibilities. An owner who is not fully committed to quality and instead seeking to operate a substandard ship is likely to be attracted by the open registers, and indeed by a class society not committed to performing well. Within the severe competitive market, many shipowners have tried to cut costs by registering their ships under open registration and by employing the low cost labour. They enjoy the lower taxes and freedom of crew selection and other flexibilities. Some other shipowners flag out in order to avoid the rigorous inspections and surveys imposed by Governments.

The over capacity in the shipping industry and the competitive situation in the international shipping market have led to substandard ships and substandard owners and operators.

The analysis of both clubs indicates that human error is the dominant factor in claims. The UK Club's report finds that more than 62 % are directly attributed to errors by one or more individuals, and the Gard's report summarises that 54 % of all major claims are resulting from human error by crew, officers, or pilots, while shore personnel errors led to another 7 % of the major claims.

It is impossible to fulfil the task of marine transport without merchant vessels and seafarers, and it is clearly understood that vessels operated by mariners are always under certain marine conditions. The marine transport system is composed of a crew, vessel and the marine environment. Within the system, there are close relationships and interactions between the basic factors, and the human being is the core and soul.

The ability of seafarers stems from training and experience which determines performance. A good performance depends on knowledge, skill, health and mentality. Human beings have great strengths but also inherent weaknesses. Any wrong operation, negligence and carelessness of a seafarer may result in serious damage to property, life or the marine environment.

On 11 July, 1986, the Liberian flag bulk carrier Andros Mentor was proceeding north northwest in the Gulf of Mexico along the Galveston safety fairway when it collided with the fixed offshore platform West Cameron 420A. The cause of the collision was the failure of the second mate of the Andros Mentor, to make proper allowances for the effect of the wind and sea on his vessel. When the second mate recognised the danger of collision and ordered the rudder hard left, it was too late. The direct cause of the casualty was the negligence of the second mate.



To avoid collisions, unremitting vigilance is required by masters and officers on watch wherever ships are, and there must be continuing adherence to the International Regulations for the Prevention of Collisions at Sea.

Human error is the most important element in pollution accidents. Accidental spillage of oil, cargo or bunker from ships occurs either in association with an operational procedure aboard ship, such as loading or discharging cargo, bunkering or ballasting, or in association with a casualty to the ship, such as collision or grounding. The UK Club Report indicates that errors committed by deck officers account for 36 percent of pollution claims; 6 percent by engine room staff and another 6 percent by crew. Unsurprisingly, bunkering claims are usually caused by the routine operation of engine room staff and crew, whereas deck officer errors led to collisions and groundings.

On March 24, 1989, the tankership Exxon Valdez ran aground on Bligh Reef in Prince William Sound, Alaska. The consequences of the accident were the loss of 258,000 barrels of crude oil resulting in substantial environmental and economic losses.

Nowadays more and more people are aware of the environmental issue. It is a fact that oil spills and pollution to the marine environment caused by ships have been reduced greatly since 1970s. However, any carelessness or neglect of operation of vessels or routine work of bunkering, tank washing and ballasting might cause serious damage to marine environment.

Human errors could happen in a certain sense. The severity of a human error depends on its social, economic and environmental consequences. Some human errors in society cannot cause any serious consequences and are often neglected. Human error resulting in maritime casualties and accidents often causes a loss of lives, serious damage to property, and pollution to the marine environment. As Hoyos and

Zimolong(1988) defined: "The most commonly expressed hope is to isolate the unreliable categories of behaviour and to distinguish them from natural, successful performance." Although it is very difficult to do so, it is the way to minimise human errors.

Human error is also reflected in inadequate training and language problems, particularly with the international crews. It is clearly understood that the personnel involved in the maritime industry, whether ashore or offshore, should be well trained to a high standard.

## CHAPTER FOUR

### THE SPECIAL PROBLEMS WITH INTERNATIONAL CREWS

Any maritime casualty or accident has its causes, and seldom only one. In general, a maritime casualty is the result of several causes under certain conditions. These conditions include the weather (such as fog or storm), the current or fairway, the size and equipment of the vessel, the density of the traffic and the knowledge, skills, experience and health of the seafarers.

Among the causes of an accident, human factors are involved directly or indirectly. This is also understood as the human element. For example, on August 24, 1988, the Panamanian bulk carrier "Ocean Fame" was in a collision with a Russian fishing vessel in thick fog in a traffic lane, (Canadian Investigation Report No. 531). The natural condition and density of traffic could not be blamed. The officers should have used appropriate navigational means to ensure the safety of the vessels. The two vessels collided because the "Ocean Fame" did not take appropriate action in ample time to avoid a close quarters situation, did not proceed at a safe speed in fog and did not post a look-out outside the wheel-house to give undivided attention to that task and listen for the fog signals of approaching vessels. The fishing vessel did not detect the presence of the "Ocean Fame" on radar and thus took no prior action to avoid the collision and did not have a person on watch conversant in the English language to maintain a proper VHF listening watch.

Under all conditions, a vessel is operated by human beings. Maritime casualties and accidents occur because of human errors including wrong operational practices and decisions under certain conditions.

The knowledge, skills, experience, health, mentality and behaviour of seafarers are very important and directly related to safety at sea. For international crews, the following aspects, such as inadequate training and language barriers should be given more priority because they directly affect the ability and performance of the seafarers. And, they are the important components of the human factor which remains the main cause of major maritime accidents and casualties.

#### **4.1 Inadequate training**

The traditional maritime countries, such as Norway, the United Kingdom and Japan, have a good reputation regarding their seamen's operation of vessels and practical skills. However, since the shipping recession, the total number of experienced seafarers of these countries has been reduced sharply. The UK officers, who work either on UK flag ships or UK-owned vessels, have fallen from 28,000 in 1980 to 8,600 in 1993,(Lloyd's List, 22 May, 1995). The situation in Japan has also changed greatly. The Japanese shipping industry has become short of qualified Japanese seamen, which is attributable to the sharp decrease in the number of skilled seamen and a poor level of navigation experience of the younger replacements. The Japanese shipping industry has turned to the use of foreign seamen. As of February 1994, almost 60,000 seafarers were employed on Norwegian-controlled ships in international trade, of which almost 45,000 or some 77 % are non-Norwegians,(Terje C.Gloersen, 1995).

The rapid growth in open registration has made the demand for international crews even greater. This is, of course, an opportunity for the maritime labour supplying

countries to employ their seafarers on board foreign flag vessels. At the same time, there is a new problem that the capability of training seafarers in these countries could not be increased as fast as the growth of the demand for seafarers. This has resulted in difficulties in ensuring the quality of international crews.

#### **4.1.1 The basic training**

Among the various components that make up a qualified seafarer, the basic one is knowledge. Although different vessels require that the seafarers who man them should have different knowledge both in depth and width, the necessary knowledge for safe navigation is indispensable. The more sophisticated and the higher degree of automation on board, the higher the levels of knowledge required. It is clearly understood that maritime education and training are the fundamental work and vital aspects of maritime safety, and that this provides basic knowledge to the new entrants and upgrades the knowledge to the officers and engineers of their further certificates of competency.

Within developing countries, the existing maritime education and training institutions are obviously not enough for training such a larger number of crews needed in the international market in a short time. They all have financial problems and most of them need either to revise their training programmes, or replace some of the facilities, and upgrade their training staff. New establishments need further investments. This does not mean that these countries have no ability to train qualified seafarers, but there are some differences in training levels from country to country.

With the development of the national maritime industry, developing countries, particularly the maritime labour supplying countries, have set up their own training systems, to train seafarers for both the needs of national development and international demand. Since the demand is bigger than the supply and there are

economic benefits, indeed there are some substandard training institutions and manning agents who ignore the national rules and international regulations.

Take the Philippines as an example: it is the largest maritime labour supplying centre in the world at present. Since the 1970s, the maritime education and training institutions have developed very fast, both Governmental and private ones, according to the national policy and the international demand. In general the Philippine seafarers have a good reputation for their seamanship, language, and good relationship with other nationalities, but not all of the seafarers are well-trained. At the beginning of this year, the Philippine Overseas Employment Administration said they had withdrawn the permits of 12 nautical colleges in the past years, because they could not meet the requirements of the shipowners according to the international standards. The need for seafarers is not only one of quantity, but a more important aspect is quality.

There were a large number of maritime training centres and institutions established during the 1970s and 1980s to train seafarers according to the requirements of the STCW Convention. Since the Convention is not clearly defining the exact standards and it could be interpreted freely, the levels of the training institutions are quite different. This also results in differences in competency.

#### **4.1.2 Sea-time training and practice**

Within the quality chain, the initial training of officers in a maritime college and the follow up sea-time training and practice are extremely important. Not only the basic knowledge but also the practical skills are obtained through practical training, particularly the practice of vessel manoeuvring.

The STCW Convention stipulates the requirements of sea experience for different levels of certificates. The maritime education and training institutions of individual countries have tried all possible ways to meet the international requirements. The Government authority, that is, the Maritime Safety Administration, gathers evidence through direct examination or other means and issue certificates of competency, so that seafarers can be sent on board ships. When demand increases, the obvious problems are with the training facilities, both simulators and sea practice.

During the 2nd Forum For Maritime Education and Training Institutions in Asia Pacific Region 1991, quite a large number of the participating institutions raised the question of lack of places on board ships for training cadets. The new STCW Convention Code will allow simulation and computers to be used for training, and sea-time can be reduced. Although this can solve the problem of practical training at sea and provide more opportunities to simulate the operational situation, there will also be problems of installation of this modern equipment and replacement of old ones.

Another issue relating to the quality of required periods for sea-time training and practice is the supervision of the master and senior officers. In the traditional way, the junior officers are under the supervision of the senior officers who are usually from the same country and work for the same company. They know each other and are familiar with the national requirements for their certificates. The master and the senior officers feel that they have the responsibility to train the junior officers and do the job conscientiously. The junior officers also respect their senior officers. Within this kind of situation, with the efforts of both senior and junior officers, the sea-time training can meet the national and international requirements.

The situation of vessels manned with international crews might be quite different. The quality of sea-time training and practice, and standards vary from vessel to vessel. On

board the open registered vessel, the master, the senior officers, the junior officers and the ratings are usually not from the same country. The master and the senior officers are normally from the OECD countries. The junior officers and the ratings might be from the same country or different countries, usually the maritime labour supplying countries. The quality and standards are affected by various factors, such as culture, education, relationship, workload etc., and it is difficult to define the training results. In some cases, due to the short term contract and workload, the training and supervision might be neglected.

The international crews manning many open registered vessels can not provide a satisfactory training environment for the full and effective supervision of new officers and trainees.

#### **4.1.3 The recruiting problems**

The recruitment of international crews has become a big problem for the shipowners and operators since it requires them to recruit, train and manage the payroll, as well as insurance and other benefits. So, it is quite popular for the shipowners or operators to recruit the international crews through manning agents. Although there are some exceptions, many shipowners have recruited international crews through ship management companies or manning agents on a casual basis.

The casual contracts are usually used by the shipowner. This may consider two aspects: one is that the shipowner does not know whether the crew employed are well trained and experienced or not; another is the economic consideration.

The traditional function of the manning agent is to screen and dispatch the personnel recruited for the shipowners and operators according to their requirements. But this is not always so, due to various reasons such as no suitable personnel at the moment,



time limitation, relationship, corruption and fraud. The recruitment of the crew members for the Scandinavian Star was a big problem. Most of the forty-eight Portuguese deck and engineering crew members did not have the certificates for handling life-saving equipment according to the International Convention on Safety of Life at Sea. Those who did not have the certificates should not have been allowed to serve on foreign ships according to Portuguese law. The casualty investigation report indicated that the manning agent did not have the experience of recruiting such a large number of crew for a vessel and in such a short time. The inadequately trained personnel or non-trained people on board are not only dangerous to the vessel but also in peril of their own lives. The manning agent recruited the inadequately trained and non-trained crew for the vessel. What was his legal and economic liability? The Portuguese crew was accepted by the shipowner. The reason for the shipowner to accept them could be either due to poor management or the shipowner thought that he would be lucky enough to avoid accidents. But this was not to be!

Manning agents or management companies are now getting involving in the training of seafarers. They will work on behalf of shipowners and operators to oversee the range of training programmes and sign contracts with the training institutions. The quality of the training may seem to be no problem in this way, but it is still the same. It is only transferred from the shipowners or operators to the manning agents or management companies. Quality assurance depends on whether they are standard manning agents or management companies or substandard ones. Of course the training level is also related to the training institutions. If they are standard manning agents or management companies they will implement the national regulations and the international standards. Unfortunately, there are some manning agents or management companies that ask the training institutions to meet their requirements, not the national regulations. Their requirements are usually to provide "trained" seafarers in as short a possible time and with low costs. This is true particularly for unlicensed seafarers.

In order to provide qualified seafarers for the international market, the individual national maritime safety administrations should control effectively or improve the recruiting procedures in their respective countries.

#### **4.1.4 The on board drills**

Seafarers have to be trained to be familiar with the ship, its equipment and emergency response procedures, when working on board. These responsibilities are required by the International Convention on Safety of Life at Sea. This kind of training, or on-board drills, is extremely important and it is the final chance to make up for inadequately trained personnel who must work on board safely. Usually this exercise is indicated in the shipping company training policy, but whether it is implemented depends on the master and the senior officers of the individual vessels. Because of lack of time and poor management, the Scandinavian Star did not exercise the emergency plan for abandoning the vessel, (Norwegian Official Reports on The Scandinavian Star Disaster of 7 April 1990). During the fire, the untrained crew did not try to fight the fire and did not know where to go and what to do according to the emergency plan. They lost valuable time and it resulted in the disaster. The confusion and the loss of so many lives and property is, in this sense, due to inadequate training.

The accident on the Panamanian flag bulk carrier *Kayax* which occurred in 1994 when a life boat was being launched during a safety inspection is another example. *The Sea*, (Issue May/June 1995) reported that the Korean Master, Indonesian second mate, Korean oiler and a Chinese seaman were all seriously injured when one of them released the boat while it was hanging from its davits. The problem was that none of the people in charge of the boat knew how to operate the release mechanism. The

seafarers might have learned how to do that theoretically at their training institution, but had never practised.

Australian authorities said it was one of a number of accidents which had occurred during lifeboat tests, some of which resulted in loss of life, and that it planned to raise the matter at the International Maritime Organisation.

On-board training becomes important since many untrained or inadequately trained ratings are recruited by the manning agents. On-board training, however, should be carried out according to the international regulations and national requirements.

#### **4.1.5 Case study-The Scandinavian Star Disaster**

##### **The disaster**

On 6 April 1990, the Scandinavian Star left Oslo at 2145 hours. There were 99 crew members and 383 passengers on board. Between 0145 hours and 0200 hours on 7 April a fire started in a pile of bedclothes outside cabin no. 416 on deck 4. The fire was put out. A little after 0200 hours a new fire started, aft in the starboard corridor of deck 3. This fire was almost surely started by a naked flame, and within a few minutes of ignition, flames and toxic smoke spread rapidly through the cabin sections, creating life-threatening conditions for passengers. The cabins were burned up and the wall and ceiling panels collapsed. Mayday was signalled from the Scandinavian Star at 0224 hours. One hundred and fifty-eight people had died in the fire. The captain gave up the vessel and the crew abandoned the ship at about 0320 hours. The Scandinavian Star was taken in tow at 1155 hours and berthed at Lysekil, Sweden at 2117 hours. The fire on board was extinguished on Sunday 8 April at 1600 hours, (Norwegian Official Reports on the Scandinavian Star Disaster of 7 April 1994).

## The casualty analysis

The Scandinavian Star disaster revealed a number of defects and weaknesses in the vessel, the management and the crew. Regarding to the various forms of human error revealed from the disaster, the following aspects should be considered:

- 1) The management was not ready to start the operation. It took little or not enough account of the safety of the passengers and crew. There were so many defects with the facilities of the vessel and the crew had no time to inspect and repair or replace them. The management relied on the manning agent too much for recruiting the crew members from Portugal.
- 2) So many crew members were not qualified to work on board passenger vessels. There were many deck officers that either had no safety training or had not attended courses in safety training for a long time. Most of the 48 Portuguese deck and engineering crew did not have certificates for handling of life-saving equipment, and those who did not have the certificates were not supposed to be allowed to serve on foreign ships. The manning agent did not care about the Portuguese law and the owner accepted it.
- 3) On board the ship, there were no fire and abandon ship drills due to poor management. During the fire many of the crew were unable to make themselves familiar with the emergency plan, and did not know what to do and where to go.
- 4) The inadequate training, plus the language problem, made the situation even worse. The crew could not communicate with each other efficiently or evacuate the passengers effectively.

5) In an emergency like this, taking command and organising the crew was essential. There was no command system, the captain did not give any general orders for mobilisation of various groups according to the emergency plan. This is also related to the poor management on board and within the shipping company.

6) The inadequate training and poor management also resulted in confusion. There were no real attempts to fight the fire at any time during the disaster.

### Conclusion

The poor management of both the company and the vessel itself, and the inadequate manning finally resulted in a catastrophic disaster. It indicated the importance of both shipboard and shore-based management procedures for the safe operation of ships and the disaster once again aroused people to recognise that the human element played an important part in maritime casualties.

Education, certification and training are key issues for the vital aspects to combat maritime casualties. Any untrained or inadequately trained personnel on board might be a potential danger to the property and lives and should be eliminated.

According to the requirements of the new STCW Amendment, the crews on ro-ro ferries will have to receive training in technical aspects of the ship type and also in crowd management and human behaviour. The international requirements are very clear and the implementation should be effective.

#### **4.2 The language barrier**

Another special problem with the international crews is the language barrier, which is both related to the safety of the operation of a vessel, property and personal injury on board, and the social activities.

Shipping is a traditional means of transport and has a long history. Why does the language problem become more serious now than at any time before? The reason is that the situation has changed so much that language has become one of the important components of the human factor, which is the major cause of maritime casualties and accidents.

Some fifty years ago, a vast majority of the world's merchant fleets were owned and manned by native English speaking people. After the Second World War, shipping became more and more international with many emerging nations developing and operating their own merchant fleets manned with their own nationals speaking their own native languages. The American merchant fleet rapidly declined with a large number of ships being returned to the flags of traditional maritime countries, such as Norway, Denmark and Greece, and to the newly established open registers, such as the Panamanian and Liberian flags. During the 1960s, developing countries started operating their own fleets. And at the same time, there were more ships registered with the open registers, that is to say, more nationalities of seafarers involved in shipping.

Another change is that the master and officers of each ship were from the same country and shared a common language in the past, whereas today the masters, officers, ratings and owners are often from different countries, and have different cultures and speak different languages among themselves.

When officers and crew members are from different countries and speak different languages, there is a potential danger that they fail to communicate properly with each other, and this may put the ship in danger. Language barriers can also make ship-to-ship and ship-to-shore communications difficult. Although it is difficult to find precise data of the degree to which language barriers or communication problems contribute to overall human error, it is an important aspect and priority should always be given to develop the necessary measures to improve the situation.

#### **4.2.1 Communications on board ship**

International crews are very common on board ships all over the world today. In some cases, ships crews contain more than ten nationalities. If most of the crews share a common first language, there will be no problem. Very often it would be found that they do not share a common first, second or even third language on board. In this kind of situation, the potential risk of accidents due to ineffective communications must be recognised.

Clear communications is a pillar for both safety and efficiency, particularly today with international crews on board. The increase in number of nationalities has resulted in a certain number of officers and ratings that perhaps have no previous experience with the English language being involved in international shipping. On board a ship, the language ability of the officers and ratings will directly affect the operation and safety of the vessel. The accident on the Panamanian flag bulk carrier *Kayax* mentioned previously also revealed the language problem. The accident was caused due to fact that the people in charge of the life boat not knowing how to operate the release mechanism. The instruction manual and the notices inside the boat were clearly written in Japanese and English. However, none of the people in charge of the boat had the knowledge of either language.

Under normal situations, a language barrier may not lead to obvious dangers, since the seafarers have the time to repeat again or solve the communication problems in other ways. When there is an emergency situation, it is quite different. People in the emergency situation would like to speak their own familiarised languages to protect themselves from the dangers. Seafarers who are able to communicate with each other in everyday English may not be able to exchange the necessary information in the emergency situation. That is why a list of mutually comprehensible words is not enough for the emergency situation.

The Scandinavian Star fire in 1988, another earlier fire on the same vessel, gave us a good lesson. The fuel oil leaked from the supply pipe and sprayed onto the hot exhaust manifold on the starboard engine and ignited,(United States Government Marine Accident Report NTSN/Mar-89/04). A Honduran motorman noticed this and ran to the engine control room to get the attention of the watch engineer. The Honduran motorman and the Filipino watch engineer shared no common language. The inability of crew members to communicate with each other and with passengers created confusion during the fire fighting and evacuation activities.

The vessel was then sold and the new operator of the Scandinavian Star had not learn the lesson when two years later the more serious disaster occurred, on 7 April, 1990. The communication during the emergency was a serious problem again because there were a considerable number of crew who had an insufficient command of English and in some cases none at all.

In some cases, international crews man the vessels with one or two persons within the groups that can speak the language with the officers and other nationalities. This seems quite perfect, but it makes the problem even more complicated. The people who could provide a link between the ratings and officers or other nationalities can



not always be available, particularly in emergency situations. The rest of the group might rely on the bilingual personnel and not be keen to learn the language. So it becomes even more dangerous with this kind of situation.

For the safe manning of a vessel, it is very important for the master and senior officers to be able to communicate properly with each other and with the junior officers and crew. The junior officers are requested to be able to communicate with both the senior officers and crew. The ratings should understand the orders given by the officers in command.

#### **4.2.2 Communications between ship-to-ship and ship-to-shore**

The first method of marine radio communication was the transmission of messages in Morse Code on specific radio frequencies, that is the medium frequency (MF) and high frequency(HF) bands. The Morse Code offered the ability for an international exchange of messages without regard to the differing languages of the participants. Later new technology made radiotelephony possible in the MF and the very high frequency(VHF) bands, and this new method enabled direct voice communications. The officers on duty could directly communicate with other vessels or vessel traffic service centres but only if they understood each other's language.

With the increased number of the international crew, the languages used among seafarers have increased. In order to effectively communicate with other ships or VTS centres, a common language of the sea is needed and English is the most used.

Ship-to-ship communications are needed when vessels are in radar or visual contact and heading towards each other. In many cases, collisions arise from misunderstanding the intentions of the other ship. Difficulties in communication with the other ship may result in serious consequences. The situation may be more

complicated if there are more than two vessels, when the communications must be clear to avoid a potential danger with the third vessel.

Effective communication is very much needed between a vessel and a VTS centre in the dense traffic areas. The vessel traffic service system is designed to collect necessary information from vessels and provide services to the vessels to prevent potentially dangerous situations from arising. The most important aspect for the VTS centre to function properly for the vessels is the exchange of information through effective communication.

The Guidelines for Vessel Traffic Services prepared by the International Maritime Organisation(IMO) indicate that:

“The language used should enable the VTS authority and the ship to understand each other clearly.

In local areas the primary language used may be the working language of the country where the system is established, but English should be used where language difficulties exist, in particular where requested by the master or VTS operator. For services established in areas where there are ships of many nationalities, English may be designated as the working language.”

On the other hand, IMO also adopted the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW) which provided mandatory minimum requirements of English for officers in charge of a navigational watch on ships of 200 gross registered tons or more.

English became a maritime language historically and through international practice. Today it is more widely used in industry than any other language, and it is required

by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW). The mandatory minimum requirements of English language in the international convention for certification of officers in charge of a navigational watch on ships of 200 gross registered tons or more are as follows:

“Adequate knowledge of the English language enabling the officer to use charts and other nautical publications, to understand meteorological information and messages concerning ship’s safety and operation and to express himself clearly in his communications with other ships or coast stations. Ability to understand and use the IMO Standard Maritime Navigational Vocabulary.”

Although the Guidelines and STCW Convention stipulate the requirements of the knowledge of the English language, there are still many cases where language problems in communications arise.

On December 9, 1993, the Greek owned and Panamanian registered tanker Seiko on her way to Ghent, Belgium from the North Sea called the Dover Coast Guard. Due to the suspension of pilotage because of weather conditions off the Belgian coast she had been unable to take a pilot. The Master of Seiko had almost no knowledge of English, and for some reason he had elected to proceed along the south west traffic lane of the Dover Strait TSS. When he reached the vicinity of the South Falls Buoy, approximately 15 minutes after his initial call, the Master called the Dover Coast Guard again to state his intention to anchor. The Master was advised not to anchor in the south west lane, and since he had no chart for the area he was given the coordinates for a recognised safe anchorage in the Downs. The Master was advised to resume his previous course along the south west lane. The Master’s lack of English hampered communications. In view of Seiko’s unpredictability, the Coast Guard decided to persuade the Master to take a local pilot and to seek a safe

anchorage.(Report of Lord Donaldson's Inquiry into the Prevention of pollution from merchant Shipping 1994).

This indicates that even some of the masters and officers may have an English language barrier in communications. Since they are involved in international trade and shipping, knowledge of the English language is vitally needed.

#### **4.2.3 Lack of requirements for engineering officers and ratings**

International crews are usually recruited from the developing countries, most of which are non-English speaking nations. The knowledge of English and the competency of the language are gained through education, vocational training and professional careers; therefore the levels are different. Although there are international requirements, and the seafarers are trained according to these requirements, the emphasis on technical knowledge, the understanding and implementation of the requirements of the Convention, as well as ability limitations have meant that the training varies from country to country.

English language ability is very much needed for international crews. A number of serious maritime casualties, occurring in the past have shown that between the various nationalities of crew members there was no effective verbal communication, particularly in emergency situations. The STCW Convention 1978, has certain requirements for English, but only for the deck officers, watchkeeping personnel and radio officers, and has no requirements for knowledge of English for engineering officers and ratings. This present situation is not acceptable. The new STCW Convention takes full account of the human factor, including language difficulties and has set up new requirements for the knowledge of English for all the personnel on board, which will be further discussed in the following chapter.

#### **4.3 Special problems with Chinese seafarers employed overseas**

At the end of the 1970s, China started to provide seafarers for the international maritime labour market. The total number of seafarers employed by foreign shipowners was not large in the early years. The ISF Guide to International Maritime Labour Supply 1990 indicates that foreign employers started to employ Chinese crews for two reasons: one is that the owners of Hong Kong registered vessels sought to establish a nationality link between the vessel's flag, beneficial ownership and the crew; the other is that the owners felt comfortable with the integrity of Chinese crews and used them to avoid any difficulties likely to be encountered with the ITF. Later on, with the ability and availability of Chinese seafarers, the employed number increased, and reached its peak in 1987.

Due to political reasons, the employment in 1989 and 1990 dropped sharply. After these two years, Chinese seafarers' overseas employment has developed steadily. At present, a large number of Chinese seafarers are working on board foreign flag vessels. According to the statistics of the Chinese manning agencies, the total number is probably 30,000. So far there is no exact number published by the government.

During the mid-1980s, many people in the maritime industry predicted that within 10 to 15 years, China would become the largest maritime labour supplying centre due to the increasing employment rates and the manpower availability, but this situation has not emerged. There are many reasons for this, such as policy, management and the ability of Chinese seafarers.

Regarding the qualifications of Chinese seafarers, the training and certification, recruiting procedures, as well as the problems of Chinese seafarers evaluated by the market are addressed below.

#### **4.3.1 Training and certification of Chinese seafarers**

China is signatory to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW). According to the requirements of the Convention, China has established its own maritime education and training, examination and certification system to ensure the competence of Chinese seafarers on board both national ships and foreign vessels.

According to the relevant regulations, no Chinese citizen is permitted to be employed on board national or foreign ships unless that citizen has had not less than 6 months of professional training at sea or is a graduate from a maritime university or college, or has had not less than three years sea service.

All seafarers on board ships of 200 gross tonnage or more shall complete special training, such as fire fighting, manoeuvring of survival craft, survival at sea and first aid at sea.

Applicants for participation in examinations as masters and deck officers on board ships sailing in unlimited navigation shall complete special training, such as radio communications, radar observation and simulator, and use of automatic radar plotting aids.

Seafarers working on the deck and in the engine-room of a tanker all complete corresponding particular training related to oil tankers, gas carriers or chemical tankers.

Applicants for participation in examinations as masters of ships of 1,600 gross tonnage or more sailing in unlimited navigational areas and chief engineers on board

ships of main propulsion machinery of 3,000 kw propulsion power or more shall have received corresponding professional training of not less than three months.

The training courses for the above mentioned requirements for seafarers are conducted at maritime educational and training institutions under the supervision of the Harbour Superintendency Administration of the People's Republic of China.

At present, the Chinese maritime education and training institutions can be considered in three categories: education of higher learning, vocational training and adult education and training.

### 1. Education of Higher Learning

There are 7 maritime education and training institutions of higher learning in China, 5 of which are under the roof of the central government and 2 under the authorities of the local governments.

The specialities offered at these institutions, relating to marine technology are: Navigation, Marine Engineering, Marine Electrical Engineering and Radiocommunications. The students have 6 months sea-time training during their four years study at school. They are awarded both an academic degree and professional certificates, that is, a second officer or third engineer, or second-class radio officer certificate according to their individual subjects on completion of their studies. The three-year students receive their diplomas and third mate or fourth engineer officer certificates upon successful completion of their study.

The total number of students at these institutions of higher learning is about 7,000 at present.

## 2. Vocational Training Schools

There are 25 maritime vocational training schools. These schools can be divided into two kinds:

- Specialised maritime vocational schools; and
- Maritime technical schools

### Specialised maritime vocational schools

There are 12 specialised maritime vocational schools six of which are run by the central government and six are run by the local governments. These specialised maritime vocational schools have two systems. The two-year schools enrol senior middle school graduates and the four-year schools enrol junior middle school graduates. The graduates of these schools can be ratings or watchkeeping officers. They need to participate in certain examination subjects, if they want to become officers.

### Maritime technical schools

The maritime technical schools train ordinary seamen. There are 6 maritime technical schools run by the central government and 7 run by the local authorities. They all enrol senior middle school graduates to study at school for one year and sea training for half a year. The central government controlled schools provide ordinary seamen for ocean-going vessels, while the local schools provide ordinary seamen for inland water transportation. These schools have strong relationships with shipping companies. If the graduates want to be marine officers or engineering officers, they have to continue their further studies in maritime universities or colleges.



The total number of students at both kinds of vocational schools is more than 10,000 at present.

### **3. Adult Education and Training**

Adult education and training is conducted by three adult education and training institutions and the adult education and training departments of the maritime universities.

Adult education and training includes correspondence courses, certificate and upgrading certification courses, and special training courses for deck officers, ratings, special types of vessels and emergency requirements.

In order to enhance the seafarers' certification training, the Ministry of Communications has established Shanghai and Dalian Mariners' Training Centres, to train seafarers particularly for the international market.

The training programs and curricula are designed according to the national legislation and regulations and STCW requirements. Examinations are carried out and certificates issued by the Harbour Superintendency Administration. The maritime education and training institutions are listed in Appendix 3.

#### **4.3.2 The recruiting procedures**

During the past twenty years, the Chinese government has expanded its training ability and improved its seafarers' training facilities in order to meet the national requirements and the international demand. According to the statistics of the Harbour Superintendency Administration of the country, there are 315,000 Chinese seafarers

now, principally serving on board national vessels. The large number of Chinese seafarers is the potential resource for the international maritime labour market.

The Chinese seafarers are normally recruited to the international market through three channels or three major suppliers:

1) China Marine and Seamen Service Corporation(MASES)

MASES was established by the Ministry of Communications and designated as the national maritime manning agency for the Chinese seafarers' overseas employment. Its main tasks are to co-ordinate crew contracts, organise seafarers' training and contracts with owners or manning agencies for the recruitment.

At present, MASES's headquarters is located in Beijing and it has several offices in major sea-port cities in China and Hong Kong. Every year a large number of seafarers are recruited by this agency.

2) China Ocean Shipping Company(COSCO)

COSCO is the largest shipping company in China. As mentioned earlier, COSCO has a large modern commercial fleet of over 500 vessels. The company currently employs more than 50,000 seafarers and staff members. The company also supplies Chinese seafarers to foreign shipowners.

3) The International Maritime Technical Service Corporations

The third channel to be considered is the international maritime technical service corporations, comprising a large number of manning agencies which are affiliated to the shipping companies run by the local authorities or organisations. These manning

agencies normally recruit seafarers to foreign owners, managers or manning agencies through the international maritime technical service corporations in the coastal provinces.

Seafarers' seamen's books and other necessary certificates according to the requirements of the STCW Conventions are issued by the Harbour Superintendency Administration of the People's Republic of China in accordance with training, sea experience and examinations.

Foreign shipowners, if they recruit Chinese seafarers, are required to enter into a crewing agreement through the above mentioned manning agencies. At present, Chinese seafarers are employed on various types of vessels, such as bulk carriers, general cargo ships, container vessels, and a few tankers. The shipowners are mainly from Hong Kong, Singapore, Taiwan, Japan, South Korea, and also some from European countries and the U.S.

The contract is usually for one year. A certain number of seafarers are engaged in overseas employment continuously, depending on the type of the supplying companies. A large number of the seafarers revert to national vessels and replacement crews are then introduced into the system. This causes complaints by the foreign shipowners, because shipboard or company continuity is difficult to establish. It has not been possible to develop special pools of seafarers for individual owners so they can have their own experienced seafarers returning to their company vessels on a regular basis after leave periods.

#### **4.3.3 The problems and market evaluation**

The Chinese seafarers have been engaged in the international maritime labour market for more than 15 years now. During this period international shipping has changed

greatly, both in the development of technology and management. Although the government of China has made efforts to increase the ability of Chinese seafarers and improve the management system, there is still a lot to do to meet the quality requirements.

Chinese seafarers are seen as well-disciplined and hard-working. In general, the Chinese officers and ratings have a good basic knowledge and seamanship training and they mix well with most other nationalities on board ships. There are also some weaknesses with Chinese seafarers. The most obvious one is the language difficulty. Shipowners usually worry about the language ability of Chinese seafarers and this has also limited the overseas employment opportunities.

The officers have their English language training at maritime universities and colleges, as well as at vocational training schools.

There are two factors affecting language ability. One is that after graduation, the seafarers are employed by the national shipping companies when they have received only a limited amount of English language instruction. With the local shipping companies trading in the coastal areas, some of them may have very little chance to practise their English language skills. Once they are employed by foreign owners, their weakness in the English language is exposed. Those first employed by the ocean-going shipping companies are much more capable and most of them are able to communicate effectively. The other factor is that the criteria and the methods used for providing English training at the maritime education and training institutions needs to be improved.

Some of the ratings and petty officers usually do not speak or comprehend English. Most ratings employed on board foreign vessels are graduates of the vocational training schools and training centres. Some of them have attended English language

training programs, but not enough. Due to the one-year contracts, it is a fact that just when they are getting used to the environment on board a foreign vessel and can communicate with others, most complete their contracts and leave the vessel. The replacement group will begin anew with the same English language problems.

If a full compliment is used by a foreign shipowner, there will not be any serious language problems for the ratings and petty officers. Very often an individual or a few ratings are employed with other nationalities. In this kind of situation, there will be some serious problems for some seafarers who have very little knowledge of English or none at all. The language ability limits the degree of interaction with other nationalities and to a certain extent limits the performance of their skills.

The other issue with Chinese seafarers and their limited employment opportunities is related to their practical skills, or the gap between training and job requirements, and between theory and practice. This is particularly true for the young people. They have very good theoretical knowledge from maritime education and training institutions, but their practical skills are weak due to less attention being paid to practical training at some of these training institutions. There are many personal injury cases showing that the competence of a certain seafarers needs to be improved. Although China is one of the countries who still have training vessels, the on board training programs need to be revised and enhanced.

The rotating replacement method has meant most Chinese seafarers have only a short time for employment in the international market, which affects the continuity of management and the improvement of language ability as discussed in the previous section.

In order to continue to provide seafarers for the international maritime labour market, China needs to improve its standards of competence through revising the curriculum at maritime education and training institutions and more practically it needs to eliminate the gap between training and job requirements, while enhancing the language ability of officers and ratings. Once this is done, employment opportunities will increase significantly.

## **CHAPTER FIVE**

### **THE NEW STCW CONVENTION, ITS IMPACTS ON INTERNATIONAL CREWS, COMPANIES AND MARITIME EDUCATION AND TRAINING INSTITUTIONS**

The current STCW Convention was established in 1978 by an International Conference on Standards of Training and Watchkeeping for Seafarers. It is the only international convention regarding the requirements of seafarers' education and training.

In order to establish global minimum standards of competence of seafarers, to harmonise the global training and examination of seafarers, to accept the certificates granted under the international standards and achieve safety and efficient manning of ships, the STCW Convention was adopted in 1978 and came into force in 1984. By November 1, 1994, 106 member states had ratified the STCW Convention, representing 92.98 % of world tonnage.

The Convention has been largely successful over a period of 17 years. The successes are reflected in the establishing of initial basic international standards, formulating criteria for certification for maritime administrations, providing the method to achieve the international goals of safety at sea and cleaner oceans. Another important role it has played is in providing guidelines for the developments of maritime education and training in developing countries.

Since the Convention was adopted some 17 years ago, great changes have occurred in the maritime industry. This combined with the imperfections of the Convention itself,

have made the STCW Convention, 1978 out of date and unsuitable for today's problems. The limitations of the Convention are reflected in the following aspects:

1. Although it provides the basic standards, precise and measurable procedures for assessing the quality are lacking;
2. The free interpretation of the Convention results in inadequate control of training quality;
3. The traditional training method and certification systems could not meet the industrial requirements;
4. Other new challenges, such as human error considerations, and the increased number of international crews are not adequately addressed by the Convention.

Since the late 1980s, several maritime casualties have revealed the problems of management of shipping companies and the serious problems in crew competence, particularly with the vessels manned with international crews. This has led to the International Maritime Organisation deciding to revise the STCW Convention, 1978 ahead of schedule.

Within two years, the draft was drawn up with the efforts of the Organisation, consultants and individual delegations and countries.

During the Conference of Parties held June 26 to July 7, 1995, a series of Amendments to the STCW Convention were adopted. It was agreed that the Amendments will enter into force on 1 February 1997, under the convention's tacit amendment procedure.



The new STCW Convention will in general have a great impact on international crews, shipping companies and maritime education and training institutions in the following aspects.

### **5.1 The recognition of certificates**

International crews are those from maritime labour supplying countries working on board ships flying foreign flags. The certificates held by international crews are normally issued by their own maritime administrations.

In the current situation, the certificates of international crews are recognised by the flag states without taking any responsibility for the competence of the international crews and the validity of the original certificates. The only responsible authorities for the competence of the certificates issued to the international crews are their own respective maritime administrations. Since the criteria used for training and certification are different from country to country, the competence of crews varies. In order to change this situation and realise identical global standards, the regulation for recognition of certificates has been amended.

According to the new regulation, flag states will be responsible for verifying that the holders of certificates issued by another party comply with the requirements of the new STCW Convention, when serving on ships of a flag state. The maritime administrations of flag states can confirm this through all necessary measures, such as inspection of facilities used for training seafarers, examination of the procedures of training, and the requirements concerning standards of competence, as well as review of the issue and endorsement of certificates and the record keeping to ensure full compliance with the new STCW Convention.

Since international crews work on board ships flying other foreign flags, their certificates need to be recognised by flag states, otherwise they will find no jobs. In order to be recognised, their own training criteria, training facilities and issue and endorsement of certificates must be in compliance with the new STCW Convention. This might be a hard job for some countries and can only be realised through unremitting efforts by some other countries. Regardless, if the maritime labour supplying countries want to continue providing seafarers to the international market, they need to meet the requirements.

Under the current STCW Convention, the commitment of the competency of the seafarers and the safety at sea depends on the individual governments. With the new STCW Convention, it is agreed that all countries should submit to the International Maritime Organisation full details of the compliance procedures, such as a clear statement of the education, training, examination, competence assessment and certification procedures, and other implementation matters.

Recognising certificates issued by another party requires that a report be provided to IMO summarising the measures taken to ensure compliance with Regulation I/10 of the new STCW Convention.

IMO will have the power to control a nation's certificates and will be able to react to ineffective administrations by refusing to approve their certificates. As Mr. S. E. Chapman(1995) says, in the future, the reports published by the Maritime Safety Committee will make it clear which countries are in compliance and which countries are not. In other words, whose certificates are credible and whose are just paper.

The intention of recognition of certification and the approval of certificates is to realise the comparable international standards. The critical issue for the maritime labour supplying countries is to improve their seafarers' competency through training

and the necessary procedures for assessment in accordance with the requirements of the new STCW Convention if they want their seafarers employed in the international market. This is a difficult job, but they need to do that because the qualifications of their seafarers are very important in the international maritime labour market and they also have the obligations to improve the competency of their seafarers to meet the requirements of safe navigation and environment protection.

## **5.2 The new defined standards and requirements**

One of the major changes of the new STCW Convention is the adoption of a new STCW Code, which is divided into two parts. Part A of this Code contains mandatory provisions which give in detail the minimum standards required to be maintained by Parties and standards of competence required to be demonstrated by candidates. Part B of this Code contains recommended guidelines intended to assist Parties to the new STCW Convention in implementing, applying and enforcing its measures.

The new defined standards for training watchkeepers and the basic requirements for seafarers stated in Part A of the STCW Code provide maritime education and training institutions with identical criteria. This certainly will greatly influence maritime education and training in developing countries and promote the improvement of their maritime education and training.

Today, the training of seafarers is normally carried out in maritime education and training institutions of a country. The training at the training institutions affects the competence of the seafarers directly. According to the present certification system, the competence is based on the knowledge gained at a maritime education and training institution and a certain period of sea experience. This will not change much in the future. The assessment will be an examination and demonstration. Thus a

better defined criteria seems more important for the training and assessment provided by institutions.

The present STCW standards are not precisely defined. They are designated in terms of knowledge requirements. For example, the knowledge requirements for a master are laid down under many headings, but there is no guarantee of competence to perform specific tasks. Thus the competence of seafarers is quite different. The new standards are designated in terms of competencies and the new STCW Code also provides guidance on how such competence must be demonstrated. For example, the mandatory minimum requirements for certification of officers in charge of a navigational watch on a ship of 500 gross tonnage or more are clearly defined and tabulated in Table A-II/1 (see Appendix 4). Column 1 lists the competence to undertake at an operational level, the task, duties and responsibilities. Column 2 identifies the knowledge requirements for the subjects. Columns 3 and 4 describe the evidence to demonstrate having achieved the required standards of competence and the criteria to evaluate competency.

The specific standards of competence defined in the STCW Code will greatly help to increase the training levels in developing countries, and encourage maritime education and training institutions to reach the common international standards. In addition, the new STCW standards of competence also challenge the maritime labour supplying countries and their maritime education and training institutions to overcome existing limitations. They may have various problems, in general, such as lack of facilities, lack of qualified instructors, and problems of funding. These problems have already affected their development. To meet the new objectives seems even more difficult. However, to improve the qualifications of seafarers, and minimise maritime casualties and accidents, the international standards of competence are needed. The maritime labour supplying countries and their training institutions should try whatever possible ways to solve their problems.

### **5.3 The responsibilities of companies**

The new STCW Code includes a regulation related to the responsibilities of the shipping companies. This is also in connection with the International Safety Management Code which was adopted at the 18th session of the IMO Assembly as Resolution A. 74 (18). The ISM Code contains provisions for ensuring owners are responsible for employing certificated seafarers and it is recognised by the new STCW Code A-I/14.

In order to ensure that the seafarers can be expected to perform their functions properly, the owners' responsibility is also taken into account. This includes a recognition that on board training programs should be managed and co-ordinated by the company which manages the ship on which the seagoing services are to be performed; the company training officer should be responsible for overall administration of the program of training, including monitoring the progress of the prospective officers and issuing guidance as required to ensure that all concerned with the training program play their parts. Newly employed seafarers should be given a reasonable opportunity to become familiar with the shipboard environment, operating procedures and other arrangements.

Seafarers should be familiar with their specific duties, installations of the vessel, as well as the procedures and characteristics that are relevant to their routine or emergency duties. It is most needed that shipping companies should ensure that the ship's complement can effectively co-ordinate their activities in an emergency situation and perform functions vital to safety and marine pollution prevention.

Compliance with the requirements for shipping companies will go far to eliminate accidents, such as the Scandinavian Star fire. The seafarers are also required to

follow the companies' policy and procedures. Although this should be a normal part of vessel management functions, ensuring that such activities take place really will help seafarers to perform their work properly, particularly during emergency situations.

#### **5.4 The use of simulators in training**

The new STCW Code takes into account technical innovations. One of these is the use of simulators in training. Under the new STCW code, simulator training becomes mandatory in the use of radar and automatic radar plotting aids.

The advantages of the use of simulators has been well acknowledged in the maritime industry. It has become the best training equipment to imitate various situations of vessel operation for officers' training. It is difficult for seafarers to obtain operational opportunities to learn vessel navigation and control skills. The use of simulators in training can provide an alternative means to acquire many of the necessary skills in a risk free environment. " In the simulation context, skill implies a combining of mental and physical dexterity in the face of audio/visual cues to perform tasks to meet specific objectives, with the implication that the skills learned will transfer to the real world", (Prof.P.Muirhead and Prof.G.Zade 1994). Simulation training is necessary in navigation and collision avoidance. The most important thing in using simulators in training is that the training tasks set up must relate to the real world. The Code states that each party shall ensure that the aims and objectives of simulator-based training are defined and overall training tasks are selected so as to relate as closely as possible to shipboard tasks and practices.

The use of simulators in training provides a possible means for the watchkeeping officers to gain knowledge and operational skills. At present, radar simulators are available in most of the maritime labour supplying countries, but not in sufficient

quantity. Some countries have to share the equipment among maritime training institutions. In order to meet the mandatory requirements of the use of simulators in training, these countries have to either install new equipment or make better use of the existing ones.

### **5.5 The English language requirements**

The language difficulty with international crews as discussed in Chapter Four is not only a problem of social interaction, but is also related to the safe operation of the vessel. The reasons for language difficulties, as discussed, are that so many seafarers who have had no previous English language experience have become involved in international shipping. The lack of requirements in the English language for engineering officers and ratings is also an important reason. The current STCW Convention has English requirements for deck officers and radio officers only. The new STCW Convention takes into full account of the human element by addressing the language issue and has made mandatory requirements for all seafarers at different levels according to their duties. The requirements for English language competence for the deck officers are almost the same as that of the current Convention, but in consideration of the proliferation of international crews on board vessels, the following is added: the officers in charge of a navigational watch of ships of 500 tons gross tonnage or more should be able to perform the officer duties and also communicate with a multi-lingual crew.

The new requirements of the English language competence for engineering officers in charge of a watch indicate that they should have adequate knowledge of the English language to enable the officers to use engineering publications, to perform engineering duties, and to communicate clear and understandably.

The new requirements for the ratings forming part of a navigational watch and steering the ship state that they should be able to comply with helm orders in English. The communications are at all times required to be clear and concise.

For radio personnel, the new requirements are to be able to conduct messages relevant to the safety of the ship and persons on board, and protection of the marine environment in the English language.

All seafarers are required to communicate clearly and effectively at all times relating to personal safety and social responsibilities. The competence of communications clearly and effectively indicated in the new Convention means the ability to use an elementary English vocabulary with an emphasis on nautical terms and situations.

These requirements of the new STCW Code will certainly change the present situation in communications on board ships among international crews, and in the ship-to-ship and ship-to-shore situation. The increasing employment of international crews and their ability to communicate in English could promote vessel safety by reducing the risk of human error in communicating essential information.



## **CHAPTER SIX**

### **ANALYSIS OF THE PROBLEMS AFFECTING THE QUALIFICATIONS OF INTERNATIONAL CREWS AND POSSIBLE WAYS TO OVERCOME THEM**

The high accident rates of the open registered fleets manned with international crews have revealed that the qualifications of such crews are a critical issue and challenge the maritime industry. International crews, however, also present opportunities and possibilities for international shipping. Since marine transportation is still very important in world-wide trade and international crews are today and in the foreseeable future the major labour source of the industry, the only way to operate vessels safely, environmentally and commercially is to improve the qualifications of such crews.

To improve the qualifications of international crews is not an easy task and it requires a long-term strategy. The reasons for this are as follows:

First, the training of a qualified mariner is a long continuous process of commitment. For example, to train a new entrant to be a master or senior officer at least requires 7 to 10 years.

Second, although the maritime labour supplying centres are relatively stable, some of them will decline and new ones will enter the market.

Third, the improvement of the qualifications of international crews needs more capital investment. The traditional ways of investment should be continued and new methods and sources need to be invented and developed.

Finally, within the quality chain, many individual organisations are involved. Good performance and close co-operation among these organisations are needed.

The new STCW Convention has been adopted and the new defined standards and requirements have been established and will enter into force February 1, 1997. To meet the requirements of the international standards, there are still many problems that developing countries are facing. This chapter will analyse the main problems and try to find possible ways to overcome them.

### **6.1 Lack of training investment**

One of the most important factors affecting the qualifications of international crews in developing countries is the financial problem. The shortage of investment has caused maritime education and training institutions to operate irregularly in some countries or only allowed the present situation to be maintained. Not very many have developed further.

Many of the maritime education and training institutions were established during the 1970s and the 1980s to meet the national needs and international demand. Although the individual governments have interests in and benefits from maritime education and training, and tend to provide the necessary support and finance, the investment probably is not sufficient. In some countries, the increasing rates of investment are not as high as the inflation rates. The training facilities in some maritime training institutions are obviously insufficient and out-of-date.

In the past, seafarers and the shipowners were from the same countries and both governments and shipowners invested in maritime training and certification upgrading courses in one way or another, depending on the individual countries. When seafarers worked continuously for the same company, the quality was assured by a long-term commitment to continuous upgrading and training.

When international crews entered into the international maritime labour market, the situation changed. As discussed in Chapter Four, the training ability in maritime labour supplying countries could not meet the increased demand of international crews, particularly in quality. In developing countries the maritime training was short of capital to change training conditions and to increase training capability.

At present, the shortage of qualified seafarers is still the challenge of the industry. Maritime administrations, seafarers' unions and maritime education and training institutions want to increase their training levels and with the adoption of the new STCW Convention they should improve their performance. But this must be accomplished at a time when there are no restrictions in investment.

Financial problems related to shipping abound in the world today. How can maritime training be improved with sufficient capital? Maritime training must seek alternative resources and approach seafarer training on a co-operative basis. The most probable and available partners for co-operation are shipowners and manning agencies.

Most established owners and managers have been aware of the importance of the qualifications of the seafarers on board their vessels, and are also looking for new ways to improve their competence and increase the knowledge of the seafarers working for their companies. The problem is that no shipowner wants to invest his money to train seafarers and then have them leave. Shipowners are now generally prepared to invest in recruiting, training and continuous upgrading of their manpower.

The shipowners who are willing to see their interests best served by qualified crews manning their ships are prepared to invest in training and retraining. This situation provides a good opportunity both for maritime education and training institutions and established shipowners to co-operate with each other. This co-operation is different from what existed previously. In the past, both government and shipowners, or even seafarers, invested in training, but they were all from the same countries. While in some countries this system still works, the new market situation will increasingly require that co-operation should be established between the maritime training institutions and shipowners or manning agencies from many different countries.

Co-operation to run a school jointly would not only solve the financial problems of training, but would also reduce the gap between training levels and job requirements.

A good example of this is the Norwegian Training Centre-Manila. It was established by the Norwegian Shipowners' Association in 1990. The centre provides short training courses for the Philippine crews working on board Norwegian-controlled ships. In addition to running training courses, the Norwegian Training Centre-Manila also manages development activities in the Philippines. This is because of the large number of Filipino seafarers on Norwegian-controlled vessels. So the Norwegian Shipowners' Association has given first priority to joint programs for the education and training of Filipino seafarers.

The co-operation between maritime education and training institutions and shipowners can be in various forms due to the requirements of both sides. These forms include:

1. Investing in providing training facilities, computers and simulators or replacing the old models in order to increase the practical skills of the seafarers;

2. Conducting special training courses for the special requirements of the shipowners, such as the Norwegian Training Centre-Manila;
3. Providing a certain number of qualified seafarers for a company every year according to the company manpower planning;
4. Establishing a special fund for upgrading the qualifications of the training instructors in maritime education and training institutions as required in the new STCW Code;
5. Developing new training curricula to meet the needs of the shipping company.

The co-operation between training institutions and shipowners can be further developed if it is included within long-term planning. Training institutions can gradually raise their standards to enhance the safe operation of vessels.

## **6.2 Maritime safety legislation and administration**

Seafarers training, examination and certification, and manning are three inseparable parts of maritime safety. The only organisation which can co-ordinate the control, monitoring and implementation of all these functions is the national maritime administration. They thus perform a vital role in maritime safety and seafarer quality assurance. Although structures and functions of the maritime administrations of the developing countries vary, the basic functions are the same.

According to the STCW Convention, each Party should have a well established system to ensure the qualification of their seafarers, including legal and administrative measures. Some developing countries have well established maritime legal and

administrative measures, while others are quite weak in these aspects. Some countries do not have effective systems to ensure their seafarers' qualification. Their examination and certification process may be in such relatively easy terms as to negate its value. This is to a certain extent also related to the imprecise or lack of measurable procedures of the current STCW Convention.

Under the new STCW Convention, the maritime labour supplying countries need to have a concise explanation of their legal and administrative measures provided and taken to ensure their seafarers' quality, and are required to inform the International Maritime Organisation of these measures in order to have their certificates recognised internationally.

In order to ensure the qualification of their seafarers, the maritime labour supplying countries have to:

1. Define the basic problems they have and aware of the pressure;
2. Revise or update, or establish effective national maritime legislation and administrative procedures and measures;
3. Set up, or enhance, the quality assurance system according to the new STCW Convention;
4. Train the necessary national examination officers.

Another function the maritime administrations of developing countries should undertake is to increase their investment in ensuring their seafarers' quality through measures, such as investment in training, establishing seafarers' information/registration database, and training examiners. If they are not directly

responsible for financial affairs (in some countries education authorities and local authorities are responsible for financial matters), the maritime administration should persuade the relevant organisations to increase their investment in maritime training in order to implement their individual national maritime policy and international obligations.

In some developing countries, the financial problem is so serious that the maritime education and training could not be further developed. This critical issue should be given a priority, otherwise the international standards would be hollow words for them.

### **6.3 Problems with maritime education and training institutions**

According to the List of Maritime Training Institutions prepared by IMO, there are almost 500 Maritime training institutions in the world. This is not a complete list. In reality, the total number is larger than this. However, the entities provide the training of seafarers for international shipping.

Among these institutions a large number of them are in developing countries, training seafarers for both the national fleets and the international labour market.

The high accident rates and domination of the causes of the casualties by human error in recent years have revealed that the procedures used for training and certification of seafarers have not been successful. The intention of the adoption of the new STCW Convention is to solve the problem through establishing the new defined standards of competence. To reach these standards, the new entrants to the industry will have to be trained and be awarded appropriate certificates. The basic training and assessments, or part of the assessments, are carried out at maritime education and training institutions.

How can we be sure that training is carried out in accordance with the new adopted standards and that certificates can be relied on? According to the new standards of competence, governments have the responsibility to ensure that the standards of competence are implemented in their individual countries and approved by IMO. The new STCW Convention puts pressure on national maritime administrations and they have international obligations to implement the standards. Administrations will have to require training institutions to improve their work.

One problem that maritime education and training institutions now face is the free interpretation of the international standards with no precise standards or criteria to follow. This has made training disparate.

Another issue with training institutions is that some of them lack modern technology, which has resulted in outmoded training. This means that the qualifications of the training staff at these maritime training institutions needs to be upgraded.

Lack of sufficient training facilities is another major issue affecting competence. Although the individual governments of developing countries have tried to install training equipment with their own investments, such as in China and India, and through bilateral funding projects to install modern training facilities, such as in The Philippines, Pakistan, Myanmar and Fiji, the total number of facilities is far from sufficient considering the large number of seafarers to be trained at training institutions. In some countries, the training equipment needs to be shared among training institutions.

In order to improve the qualifications of international crews, a review of training programs is needed that evaluates the training quality of seafarers, finds problems and



means to overcome them. Solutions need to be sought through both internal effort and external help.

Maritime training is one of the most important parts in the quality chain. What should maritime education and training institutions in the developing countries do to meet the requirements of the new standards of competence of the new STCW Convention? Awareness of the pressure of international obligations is very important. Each maritime training institution in a developing country may have its own problems in training qualified seafarers. This should be identified through both internal and external evaluation. The internal evaluation can be on the quality related aspects, such as: training facilities-- type of equipment, quantity and model; training instructors-- qualification and quantity; training materials--availability and content; methodology--applicability. The external evaluation is needed to identify the qualification levels of their trainees in terms of knowledge, competence and suitability. This can be carried out by the users of the trainees. Once the weaknesses are identified or recognised, it is easier to find solutions.

IMO will initiate a technical co-operation program to help developing countries to raise their training standards. The important issue of training institutions is that they should know what weaknesses they have and what they can solve through their own efforts and what areas need co-operating solutions. Thus their evaluations would form an essential basis for further developments.

#### **6.4 Lack calibre of people entering the seafaring profession**

The long recession of shipping has had an effect on the calibre of young people choosing to enter the seagoing trade. The better quality youth now choose other professions. This is a real challenge for the industry. Rapid development of science and technology, modern equipment installations on board vessels, and short turn-

around time in port have reduced the charm and adventure of a seafaring career. However, the responsibilities of seafarers are now much greater than at any time before. The person who is in charge on the bridge has the responsibility for human lives, the environment and economic value that is placed in his hand. The personal suitability of such an individual is extremely important.

Although the most abundant resources available in most developing countries are human resources, those that pursue a career in the maritime industry are minimal. The maritime industry needs more high calibre young people. The maritime administrations should be aware of this and try whatever means possible to attract such young people to a seafaring profession. This is also the duty of education authorities and maritime education and training institutions. This can be done through changing the seafaring profession's social status through increasing salaries and giving favourable policies, such as priority for choosing the seafaring profession. When higher calibre young people are engaged in seafaring, in the long run, the maritime industry will benefit as well as all other ancillary positions, such as surveyors, managers, pilots, administrators, examination officers, training staff and so on.

#### **6.5 Practical skills of international crews**

International crews are relatively weak in practical skills in general. This is one of the major reasons for accidents and personal injury. There are several reasons for this.

Maritime education and training systems can be generally divided into two models: one is a step-by-step provision of maritime training and examination. This model starts with pre-sea training, followed by post-sea training after a requisite amount of sea-service at the prescribed level prior to the examination for each grade of certificate. An advantage of this model is that theoretical studies, training and sea

experience are well arranged and combined even through they may not meet the requirements of an academic degree. A disadvantage is that it is costly.

The other model is one of continuously ranged studies and examinations. This combines maritime training with an academic degree. The weaknesses of this model are that the knowledge may not be properly absorbed and the emphasis on theoretical learning diminishes the value of practical training.

Today, there is a tendency for some developing countries to change their step-by-step model into one of continuous studies and examination. This is because the trainees need not only for professional certificates, but also an academic degree considering other developments and requirements of the society in which they will find their future work. There is a gap between training and job requirement with the continuous learning process. It is clear that the step-by-step methods of training provide highly qualified and capable officers, but this costs too much. The weaknesses of practical skills in the continuous model should be improved by revising the curriculum to meet requirements of the new STCW Convention.

Another issue related to practical skills is the tendency for more and more young people from inland areas to be recruited by the shipping industry. These persons do not have a basic understanding of seafaring ways to begin with and do not have the seafaring cultural influence. To bring them to the professional level requires relatively much work.

Other aspects at the training institutions relating to competence in practical skills are insufficient training facilities and poor arrangements for practical training. Since most of the training institutions are short of training facilities, with a large number of trainees, each individual's training and practice time is relatively limited. In addition, some of the practical skills are assessed through written examination which means

that some of the trainees do not concentrate on or understand the importance of practical training. This deficiency is compounded by the fact that when international crews are on board vessels, they usually do not have a satisfactory training environment under the supervision of the senior officers.

Competence of seafarers has now been given a priority. The new STCW Convention is constructed in terms of competence. The training procedures are changed, so both the training at maritime training institutions and shipboard training should meet the requirements of competence.

The following steps can be considered to improve the practical skills of international crews:

1. Revise the training programs according to the requirements of the new STCW Convention;
2. Acquire necessary training facilities and equipment through co-operation as discussed in section 6.1 and other ways, such as government investments, bilateral agreements, international or regional technical co-operations;
3. Enhance the practical training activities, such as simulation, fire-fighting etc;
4. Ensure that each trainee has enough training time and individual practice, and has abilities assessed by an effective method;
5. Maritime administrations should require companies and manning agencies to ensure that seafarers are provided on-board training programs according to the new STCW Convention and the procedures should be approved by the administrations. The companies and senior officers or supervisors on board ships have the responsibility to

train junior officers and other trainees. This should become international practice through international obligations.

## **6.6 Language proficiency improvement**

Language difficulty has become a problem in communications with international crews because more nationalities of seafarers have become involved in international shipping, and they have little or no previous experience of English. English language studies are available in most non-native-English speaking countries for training marine officers, but for petty officers and ratings, this varies, with some countries having no such training at all.

The manning patterns at present require international crews to have a certain knowledge of English to communicate with each other in order to have social interaction, operate vessels safely and ensure personal safety in emergency situations. The new STCW Convention has set up the requirements of English language competence for all seafarers.

Since the improvement of language is different from country to country, a specific example is needed. In China, an English language instruction is available at all maritime universities, colleges and vocational training schools for marine officers. For petty officers and ratings, in some schools English language instruction is available. In maritime universities and colleges, the students have to meet two requirements: one is the national English language proficiency test for university and college students; the other one is for the profession, viz, the STCW requirements. To improve the English language ability of Chinese seafarers, the following measures need to be considered.

### **6.6.1 More priority to the English language**

The knowledge of nautical science and technology of the Chinese seafarers is evaluated to be quite good, while English language ability is not satisfactory. The English language should be given a priority. This subject should be as important as the technical subjects. This depends on the national shipping manning policy and overseas employment policy and university or college training program. It is suggested that the overseas employment regulations should contain that seafarers who have no English language training or no English language ability cannot be recruited for foreign vessels. In order to ensure training quality, the training institutions should set up the necessary programs differing for officers and ratings according to the requirements of the new STCW Convention and the necessary assessment measures. More priority given to the learning of maritime English will encourage the students and the trainees to improve their language capability and increase their ability for work.

### **6.6.2 The use of the Standard Maritime Communication Phrases**

English language instruction at universities and colleges is divided into two parts. One is for national examination and the other for the profession. Although it is divided into two parts, the continuous learning will increase the language ability. The problem that affects the competence of communication is that the Standard Maritime English Vocabulary, now renamed as IMO's Standard Marine Communication Phrases, is not well developed as teaching materials or used correctly and properly or given enough priority.

The awareness of the importance of language communication problems creating hazardous navigation is not emphasised sufficiently at training institutions. There is a

gap between language learning and its practical use. Too much emphasis is placed on the basic knowledge and the theoretical learning of English has limited practical language use for on board communications. Maritime English, as it is defined, " is the entirety of all those means of the English language which being used as a device for communication within the maritime community - internationally contribute to the safety of shipping and the organisation of the seaborne business", (Dr.P.Trenkner 1994). The pressure to increase the English language competence is not fully appreciated by the national maritime administrations, maritime training institutions, or by the teaching staff.

Professional English training should concentrate on the practical ability of competency to carry out the duties and the safety of shipping. Thus the training institutions need not only standard phrases, but also necessary standard training materials to meet the requirements of the Convention.

### **6.6.3 Improvement of the training methodology**

Although modern audio-visual means are used in English language training, the teaching methods at training institutions are still traditional ones. The problems in China are centred on the large groups of students, and limited number of teachers. Students do not have enough time and opportunities to practise their English and there are not many audio/visual materials related to maritime English studies. This is not suitable for lecturing maritime English. Students need to have sufficient knowledge and background of the practical world and enough time for practice. Audio-visual means should be improved and used more, particularly for small group activities. It is also suggested that IMO should develop more maritime English training programs/materials for training institutions, particularly for the non-English speaking countries through technical co-operation among interested parties and training institutions.

#### **6.6.4 The qualification of the training staff**

The instructors of English language should have more knowledge of nautical science and maritime communications. Chinese English instructors normally graduate from language institutes or general technical English programs. Their abilities of English are quite good and through working at the maritime training institutions they gain a certain knowledge about maritime affairs, but not sufficient, especially for the importance of communications in safe navigation. This can be solved through the way of on-the-job-training. Members of the language teaching staff can work on board vessels for a certain time to familiarise themselves with the English communication phrases used in the real world and obtain an appreciation for the importance of communications in maritime safety.



## CHAPTER SEVEN

### CONCLUSION AND RECOMMENDATIONS

The rapid growth of open registered fleets and the popularity of international crews have become international issues. The high accident rates on board vessels from open registered fleets have revealed that the qualification of international crews on board open registered vessels is a challenge for the maritime industry. The problem is centred on crew members incompetency to operate vessels safely and inability to perform their job properly. Lack of adequate training, particularly in the practical skills, is a significant problem in some developing countries. With multiple-nationalities on board ships today, language difficulties have also become a critical issue to be solved.

International crews also provide opportunities for the maritime industry. They are now the main labour force for international shipping and will be for many years to come. In order to improve their qualifications and eliminate human error in vessel operations, the international community has made great efforts. One of overwhelming prominence is the adoption of the new STCW Convention.

To train a qualified seafarer is not an easy job. It is a long, continuous process of commitment. The maritime administrations of the maritime labour supplying countries have the international responsibility to implement the international conventions and ensure their seafarers' competency for safe navigation. The maritime education and training institutions where the basic training and assessment are carried out, should try innovative measures as recommended to perfect their work and raise their training standards. The international maritime community also has the

responsibility to establish international standards along with an obligation to help the maritime labour supplying countries to raise their standards to meet the international requirements.

The new STCW Convention takes into full account the human factor, and has defined standards for training, both theoretical and practical, and for assessment and certification. The following summarises the analysis and recommendations for improving the quality of international crews.

1. Training co-operation. In order to solve the financial problems and reduce the gap between training and job requirements, maritime education and training institutions and shipowners, manning agencies should co-operate with each other to train qualified people for mutual benefit.
2. Enhancement of the functions of maritime legislation and administration. The individual national maritime administration is the key link within the quality chain. An effective national maritime mechanism with a good performance is needed.
3. Evaluation and perfection of maritime education and training institutions. Maritime education and training institutions, where the basic training and assessment are carried out need to be evaluated to find their weaknesses so they can perfect themselves through internal efforts and external help.
4. More high calibre young people should be encouraged to be engaged in the seafaring profession.
5. Competence in practical skills needs to be improved through the new and revised programs at individual maritime education and training institutions and through on board training.

6. The English language proficiency of international crews should be improved to communicate effectively and eliminate the potential danger to safe navigation.

The last one to emphasise, but not the least in importance, rests with the seafarers themselves. As IMO's Secretary-General, Mr. W.A. O'Neil(1994) indicated: " When the revised version is adopted we should at least be confident that the standards it contains are adequate and that anyone who achieves them will be able to do the job." Seafaring is demanding. International crews engaged in international shipping should improve themselves to achieve the standards needed to do their jobs properly.



## APPENDIX 2

### THE SKETCH MAP OF INLAND WATER AND COASTAL TRANSPORT

#### IN CHINA



**APPENDIX 3**  
**A LIST OF CHINESE MARITIME EDUCATION**  
**AND TRAINING INSTITUTIONS**  
**(under the roof of the central government)**

1. Education of higher learning
  - a. Dalian Maritime University
  - b. Shanghai Maritime University
  - c. Jimei Navigation Institute
  - d. Guangzhou Marine College
  - e. Wuhan University of Transport Science and Technology
2. Specialised maritime vocational schools
  - a. Dalian Marine Transport School
  - b. Nanjing Marine Transport School
  - c. Shanghai Marine Transport School
  - d. Nanjing Water Transport School
  - e. Chongqing Water Transport School
  - f. Harbin Navigation School
3. Maritime technical schools
  - a. Tianjin Mariner School
  - b. Guangzhou Mariner School
  - c. Shanghai Marine Technical School
  - d. Guangzhou Marine Technical School
  - e. Shanghai River Transport Technical School
  - f. Wuhu River Transport Technical School
4. Adult education and training
  - a. Qingdao Ocean-Shipping Mariner's College
  - b. Shanghai Marine Transport Workers' University
  - c. Workers' University of Changjiang National Steamship Company

**APPENDIX 4**

**A COPY OF SPECIFICATION OF MINIMUM STANDARDS  
OF COMPETENCE FOR OFFICERS IN CHARGE OF A  
NAVIGATIONAL WATCH ON SHIPS OF 500 GROSS  
TONNAGE OR MORE**

**CHAPTER II**  
**STANDARDS REGARDING THE MASTER AND DECK DEPARTMENT**

**Section A-II/1**

**Mandatory minimum requirements for certification of officers in charge of a navigational watch on ships of 500 gross tonnage or more**

**Standard of competence**

- 1 Every candidate for certification shall:
  - 1 be required to demonstrate the competence to undertake at operational level, the tasks, duties and responsibilities listed in column 1 of table A-II/1;
  - 2 at least hold an appropriate certificate for performing VHF radiocommunications in accordance with the requirements of the Radio Regulations; and
  - 3 if designated to have primary responsibility for radiocommunications during distress incidents, hold an appropriate certificate issued or recognized under the provisions of the Radio Regulations.
- 2 The minimum knowledge, understanding and proficiency required for certification is listed in column 2 of table A-II/1.
- 3 The level of knowledge of the subjects listed in column 2 of table A-II/1 shall be sufficient for officers of the watch to carry out their watchkeeping duties<sup>1</sup>.
- 4 Training and experience to achieve the necessary level of theoretical knowledge, understanding and proficiency shall be based on section A-VIII/1, part 3-1 - Basic principles to be observed in keeping a navigational watch and shall also take into account the relevant requirements of this part and the guidance given in part B of this Code.
- 5 Every candidate for certification shall be required to provide evidence of having achieved the required standard of competence in accordance with the methods for demonstrating competence and the criteria for evaluating competence tabulated in columns 3 and 4 of table A-II/1.

**On-board training**

- 6 Every candidate for certification as officer in charge of a navigational watch of ships of 500 gross tonnage or more whose seagoing service, in accordance with paragraph 2.2 of regulation II/1, forms part of a training programme approved as meeting the requirements of this section shall follow an approved programme of on-board training which:

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<sup>1</sup>IMO Model Course 7.03 - Officer in Charge of a Navigational Watch may be of assistance in the preparation of courses.



- .1 ensures that during the required period of seagoing service the candidate receives systematic practical training and experience in the tasks, duties and responsibilities of an officer in charge of a navigational watch, taking into account the guidance given in section B-II/1 of this Code;
- .2 is closely supervised and monitored by qualified officers aboard the ships in which the approved seagoing service is performed; and
- .3 is adequately documented in a training record book or similar document.\*

**Near-coastal voyages**

7 The following subjects may be omitted from those listed in column 2 of table A-II/1 for issue of restricted certificates for service on near-coastal voyages, bearing in mind the safety of all ships which may be operating in the same waters:

- .1 celestial navigation; and
- .2 those electronic systems of position fixing and navigation that do not cover the waters for which the certificate is to be valid.

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\*IMO Model Course 7.03 - Officer in Charge of a Navigational Watch - and a similar document produced by the International Shipping Federation may be of assistance in the preparation of training record books.

Column 1	Column 2	Column 3	Column 4
COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	METHODS FOR DEMONSTRATING COMPETENCE	CRITERIA FOR EVALUATING COMPETENCE
<p>Plan and conduct a passage and determine position</p>	<p><i>Celestial Navigation</i> Ability to use celestial bodies to determine the ship's position</p> <p><i>Terrestrial and Coastal Navigation</i> Ability to determine the ship's position by use of:</p> <ol style="list-style-type: none"> <li>.1 landmarks</li> <li>.2 aids to navigation, including lighthouses, beacons and buoys</li> <li>.3 dead reckoning, taking into account winds, tides, currents and estimated speed</li> </ol> <p>Thorough knowledge of and ability to use navigational charts and publications, such as sailing directions, tide tables, notices to mariners, radio navigational warnings and ships' routing information</p> <p>NOTE: ECDIS systems are considered to be included under the term "charts"</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> <li>.1 approved in-service experience</li> <li>.2 approved training ship experience</li> <li>.3 approved simulator training, where appropriate</li> <li>.4 approved laboratory equipment training</li> </ol> <p>using chart catalogues, charts, navigational publications, radio navigational warnings, sextant, azimuth mirror, electronic navigation equipment, echo sounding equipment, compass</p>	<p>The information obtained from navigational charts and publications is relevant, interpreted correctly and properly applied. All potential navigational hazards are accurately identified</p> <p>The primary method of fixing the ship's position is the most appropriate to the prevailing circumstances and conditions</p> <p>The position is determined within the limits of acceptable instrument/system errors</p> <p>The reliability of the information obtained from the primary method of position fixing is checked at appropriate intervals</p> <p>Calculations and measurements of navigational information are accurate</p> <p>The charts selected are the largest scale suitable for the area of navigation and charts and publications are corrected in accordance with the latest information available</p>

Table A-II/1  
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PROFICIENCY	COMPETENCE
<p><i>Electronic systems of position fixing and navigation</i></p> <p>Ability to determine the ship's position by use of electronic navigational aids</p> <p><i>Echo sounders</i></p> <p>Ability to operate the equipment and apply the information correctly</p> <p><i>Compass - magnetic and gyro</i></p> <p>Knowledge of the principles of magnetic and gyro compasses</p> <p>Ability to determine errors of the magnetic and gyro compasses, using celestial and terrestrial means, and to allow for such errors</p> <p><i>Steering control systems</i></p> <p>Knowledge of steering control systems, operational procedures and change-over from manual to automatic control and vice-versa.</p> <p>Adjustment of controls for optimum performance</p> <p><i>Meteorology</i></p> <p>Ability to use and interpret information obtained from shipborne meteorological instruments</p> <p>Knowledge of the characteristics of the various weather systems, reporting procedures and recording systems</p> <p>Ability to apply the meteorological information available</p>	<p>Performance checks and tests to navigation systems comply with manufacturer's recommendations and good navigational practice</p> <p>Errors in magnetic and gyro compasses are determined and correctly applied to courses and bearings</p> <p>The selection of the mode of steering is the most suitable for the prevailing weather, sea and traffic conditions and intended manoeuvres</p> <p>Measurements and observations of weather conditions are accurate and appropriate to the passage</p> <p>Meteorological information is correctly interpreted and applied</p>

Table A-II/1  
Page 2 of 11 pages

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	METHODS FOR DEMONSTRATING COMPETENCE	CRITERIA FOR EVALUATING COMPETENCE
<p>Maintain a safe navigational watch</p>	<p><i>Watchkeeping</i></p> <p>Thorough knowledge of the content, application and intent of the International Regulations for Preventing Collisions at Sea</p> <p>Thorough knowledge of the basic principles to be observed in keeping a navigational watch</p> <p>Thorough knowledge of effective bridge team work procedures</p> <p>The use of routing in accordance with the General Provisions on Ships' Routing</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> <li>1. approved in-service experience;</li> <li>2. approved training ship experience</li> <li>3. approved simulator training, where appropriate</li> <li>4. approved laboratory equipment training</li> </ol>	<p>The conduct, hand over and relief of the watch conforms with accepted principles and procedures</p> <p>A proper lookout is maintained at all times and in such a way as to conform to accepted principles and procedures</p> <p>Lights, shapes and sound signals conform with the requirements contained in the International Regulations for Preventing Collisions at Sea and are correctly recognized</p> <p>The frequency and extent of monitoring of traffic, the ship and the environment conform with accepted principles and procedures</p> <p>A proper record is maintained of the movements and activities relating to the navigation of the ship</p> <p>Responsibility for the safety of navigation is clearly defined at all times, including periods when the master is on the bridge and while under pilotage</p>
<p>Use of radar and ARPA to maintain safety of navigation</p> <p>Note: Training and assessment in the use of ARPA is not required for those who serve exclusively on ships not fitted with ARPA. This limitation shall be reflected in the endorsement issued to the seafarer concerned.</p>	<p><i>Radar Navigation</i></p> <p>Knowledge of the fundamentals of radar and automatic radar plotting aids (ARPA)</p> <p>Ability to operate and to interpret and analyse information obtained from radar, including the following:</p>	<p>Assessment of evidence obtained from approved radar simulator and ARPA simulator training plus in-service experience</p>	<p>Information obtained from radar and ARPA is correctly interpreted and analysed taking into account the limitations of the equipment and prevailing circumstances and conditions</p>

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<p>Use of radar and ARPA to maintain safety of navigation (continued)</p> <p>Note: Training and assessment in the use of ARPA is not required for those who serve exclusively on ships not fitted with ARPA. This limitation shall be reflected in the endorsement issued to the seafarer concerned.</p>	<p>Performance including:</p> <ol style="list-style-type: none"> <li>.1 factors affecting performance and accuracy</li> <li>.2 setting up and maintaining displays</li> <li>.3 detection and misrepresentation of information, false echoes, sea return, etc., racons and SARTs</li> </ol> <p>Use including:</p> <ol style="list-style-type: none"> <li>.1 range and bearing, course and speed of other ships, time and distance of closest approach of crossing, meeting overtaking ships</li> <li>.2 identification of critical echoes; detecting course and speed changes of other ships; effect of changes in own ship's course or speed or both</li> </ol>	<p>Action taken to avoid a close encounter or collision with other vessels is in accordance with the International Regulations for Preventing Collisions at Sea</p>	<p>Decisions to amend course and/or speed are both timely and in accordance with accepted navigation practice</p> <p>Adjustments made to the ship's course and speed maintain safety of navigation</p> <p>Communication is clear, concise and acknowledged at all times in a seamanlike manner</p> <p>Manoeuvring signals are made at the appropriate time and are in accordance with the International Regulations for Preventing Collisions at Sea</p>
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<p>Use of radar and ARPA to maintain safety of navigation (continued)</p> <p>Note: Training and assessment in the use of ARPA is not required for those who serve exclusively on ships not fitted with ARPA. This limitation shall be reflected in the endorsement issued to the seafarer concerned.</p>	<p>.3 application of the International Regulations for Preventing Collisions at Sea</p> <p>.4 plotting techniques and relative and true motion concepts</p> <p>.5 parallel indexing</p> <p>Principal types of ARPA, their display characteristics, performance standards and the dangers of over reliance on ARPA</p> <p>Ability to operate and to interpret and analyse information obtained from ARPA, including:</p>	
	<p>.1 system performance and accuracy, tracking capabilities and limitations, and processing delays</p> <p>.2 use of operational warnings and system tests</p> <p>.3 methods of target acquisition and their limitations</p> <p>.4 true and relative vectors, graphic representation of target information and danger areas</p> <p>.5 deriving and analysing information, critical echoes, exclusion areas and trial manoeuvres</p>	

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COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	METHODS FOR DEMONSTRATING COMPETENCE	CRITERIA FOR EVALUATING COMPETENCE
Respond to emergencies	<p><i>Emergency procedures</i></p> <p>Precautions for the protection and safety of passengers in emergency situations</p> <p>Initial action to be taken following a collision or a grounding, initial damage assessment and control</p> <p>Appreciation of the procedures to be followed for rescuing persons from the sea, assisting a ship in distress, responding to emergencies which arise in port</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> <li>.1 approved in-service experience</li> <li>.2 approved training ship experience</li> <li>.3 approved simulator training, where appropriate</li> <li>.4 practical training</li> </ol>	<p>The type and scale of the emergency is promptly identified</p> <p>Initial actions and, if appropriate, manoeuvring of the ship are in accordance with contingency plans and are appropriate to the urgency of the situation and nature of the emergency</p>
Respond to a distress signal at sea	<p><i>Search and rescue</i></p> <p>Knowledge of the contents of the IMO Merchant Ship Search and Rescue Manual (MERSAR)</p>	<p>Examination and assessment of evidence obtained from practical instruction or approved simulator training, where appropriate</p>	<p>The distress or emergency signal is immediately recognized</p> <p>Contingency plans and instructions in standing orders are implemented and complied with</p>

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<p>Use the Standard Marine Navigational Vocabulary as replaced by the IMO Standard Marine Communication Phrases and use English in written and oral form</p>	<p><i>English language</i></p> <p>Adequate knowledge of the English language to enable the officer to use charts and other nautical publications, to understand meteorological information and messages concerning ship's safety and operation, to communicate with other ships and coast stations and to perform the officer's duties also with a multi-lingual crew, including the ability to use and understand the Standard Marine Navigational Vocabulary as replaced by the IMO Standard Marine Communication Phrases</p>	<p>Examination and assessment of evidence obtained from practical instruction</p>	<p>English language navigational publications and messages relevant to the safety of the ship are correctly interpreted or drafted</p> <p>Communications are clear and understood</p>
<p>Transmit and receive information by visual signalling</p>	<p><i>Visual signalling</i></p> <p>Ability to transmit and receive signals by Morse light</p> <p>Ability to use the International Code of Signals</p>	<p>Assessment of evidence obtained from practical instruction</p>	<p>Communications within the operator's area of responsibility are consistently successful</p>

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COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	METHODS FOR DEMONSTRATING COMPETENCE	CRITERIA FOR EVALUATING COMPETENCE
Manoeuvre the ship	<p><i>Ship manoeuvring and handling</i></p> <p>Knowledge of:</p> <ol style="list-style-type: none"> <li>1 the effects of deadweight, draught, trim, speed and under-keel clearance on turning circles and stopping distances</li> <li>2 the effects of wind and current on ship handling</li> <li>3 manoeuvres and procedures for the rescue of person overboard</li> <li>4 squat, shallow water and similar effects</li> <li>5 proper procedures for anchoring and mooring</li> </ol>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> <li>1 approved in-service experience</li> <li>2 approved training ship experience</li> <li>3 approved simulator training, where appropriate</li> <li>4 approved training on a manned scale ship model where appropriate</li> </ol>	<p>Safe operating limits of ship propulsion, steering and power systems are not exceeded in normal manoeuvres</p> <p>Adjustments made to the ship's course and speed maintain safety of navigation</p>

**Function: Cargo handling and stowage at the operational level**

Monitor the loading, stowage, securing and unloading of cargoes and their care during the voyage	<p><i>Cargo handling and stowage</i></p> <p>Cargo handling, stowage and securing</p> <p>Knowledge of the effect of cargo including heavy lifts on the seaworthiness and stability of the ship</p> <p>Knowledge of safe handling, stowage and securing of cargoes including dangerous, hazardous and harmful cargoes and their effect on the safety of life and of the ship</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> <li>1 approved in-service experience</li> <li>2 approved training ship experience</li> <li>3 approved simulator training, where appropriate</li> </ol>	<p>Cargo operations are carried out in accordance with the cargo plan or other documents and established safety rules/regulations, equipment operating instructions and shipboard stowage limitations</p> <p>The handling of dangerous, hazardous and harmful cargoes complies with international regulations and recognized standards and codes of safe practice</p>
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COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	METHODS FOR DEMONSTRATING COMPETENCE	CRITERIA FOR EVALUATING COMPETENCE
<p>Ensure compliance with pollution prevention requirements</p>	<p><i>Prevention of pollution of the marine environment and anti-pollution procedures</i></p> <p>Knowledge of the precautions to be taken to prevent pollution of the marine environment</p> <p>Anti-pollution procedures and all associated equipment</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> <li>1. approved in-service experience</li> <li>2. approved training ship experience</li> </ol>	<p>Procedures for monitoring shipboard operations and ensuring compliance with MARPOL requirements are fully observed</p>
<p>Maintain seaworthiness of the ship</p>	<p><i>Ship stability</i></p> <p>Working knowledge and application of stability, trim and stress tables, diagrams and stress calculating equipment</p> <p>Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy</p> <p>Understanding of the fundamentals of watertight integrity</p> <p><i>Ship construction</i></p> <p>General knowledge of the principal structural members of a ship and the proper names for the various parts</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> <li>1. approved in-service experience</li> <li>2. approved training ship experience</li> <li>3. approved simulator training, where appropriate</li> <li>4. approved laboratory equipment training</li> </ol>	<p>The stability conditions comply with the IMO intact stability criteria under all conditions of loading</p> <p>Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice</p>

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COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	METHODS FOR DEMONSTRATING COMPETENCE	CRITERIA FOR EVALUATING COMPETENCE
Prevent, control and fight fires on board	<p><i>Fire prevention and fire-fighting appliances</i></p> <p>Knowledge of fire prevention</p> <p>Ability to organize fire drills</p> <p>Knowledge of classes and chemistry of fire</p> <p>Knowledge of fire-fighting systems</p> <p>Knowledge of action to be taken in the event of fire, including fires involving oil systems</p>	<p>Assessment of evidence obtained from approved fire-fighting training and experience as set out in section A-VI/3</p>	<p>The type and scale of the problem is promptly identified and initial actions conform with the emergency procedure and contingency plans for the ship</p> <p>Evacuation, emergency shut-down and isolation procedures are appropriate to the nature of the emergency and are implemented promptly</p> <p>The order of priority, and the levels and timescales of making reports and informing personnel on board, are relevant to the nature of the emergency and reflect the urgency of the problem</p>
Operate life-saving appliances	<p><i>Life-saving</i></p> <p>Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescue boats, their launching appliances and arrangements and their equipment including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids.</p> <p>Knowledge of survival at sea techniques</p>	<p>Assessment of evidence obtained from approved training and experience as set out in section A-VI/2, paragraphs 1 to 4</p>	<p>Actions in responding to abandon ship and survival situations are appropriate to the prevailing circumstances and conditions and comply with accepted safety practices and standards</p>

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COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	METHODS FOR DEMONSTRATING COMPETENCE	CRITERIA FOR EVALUATING COMPETENCE
Apply medical first aid on board ship	<p><i>Medical and</i></p> <p>Practical application of medical guides and advice by radio, including the ability to take effective action based on such knowledge in the case of accidents or illnesses that are likely to occur on board ship</p>	<p>Assessment of evidence obtained from approved training as set out in section A-VI/4, paragraphs 1 to 3</p>	<p>The identification of probable cause, nature and extent of injuries or conditions is prompt and treatment minimizes immediate threat to life</p>
Monitor compliance with legislative requirements	<p>Basic working knowledge of the relevant IMO Conventions concerning safety of life at sea and protection of the marine environment</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>Legislative requirements relating to safety of life at sea and protection of the marine environment are correctly identified</p>

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