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EFFICIENCY AND EFFECTIVENESS IN MARITIME SAFETY ADMINISTRATION

By

LI SHUBING
China

A dissertation submitted to the World Maritime University in partial
fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

MARITIME ADMINISTRATION AND ENVIRONMENT PROTECTION

2000

DECLARATION

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

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

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ABSTRACT

Title of dissertation: **Efficiency and Effectiveness in Maritime Safety Administration**

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This dissertation endeavours to examine the concept of maritime safety administration from a global point of view. The essential mandate and functions of maritime safety administration have been carefully studied and discussed, together with trends in the changing environment in the shipping industry. An attempt is made to identify possible ways of achieving efficiency and effectiveness from various perspectives.

Chapter 2 makes an in-depth review and discussion of the roles and functions of maritime safety administration, and provides background information on government intervention and policy with respect to national shipping industries.

Trends in the changing environment in shipping and safety are identified in Chapter 3. Three broad areas, (status of world shipping, technology, and safety issues), are discussed.

As a government specialized agency, coordination and cooperation between the maritime safety administration and the shipping industry is essential, especially in the areas of survey and inspection, search and rescue, and pollution preparedness and response. This is discussed in Chapter 4.

An overview of innovation in the public sector and its influences on maritime safety administration is presented in Chapter 5, so as to provide a better understanding of the difficulties and challenges faced by maritime safety administrations.

In Chapter 6, efficiency and effectiveness of maritime safety administration are examined, and possible approaches to improve efficiency and effectiveness are identified.

The general results of the study are summarised in the conclusions at the end of the dissertation. Some suggestions to improve the work of maritime safety administration are proposed.

KEYWORDS: maritime, safety, administration, policy, international.

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LIST OF ABBREVIATIONS

BIMCO	Baltic and International Maritime Council
CLC	International Convention on Civil Liability for Oil Pollution Damage
CMI	Comité Maritime International
COSCO	China Ocean Shipping (Group) Company
DGPS	Differential Global Positioning System
DSC	Digital Selective Calling
DWT	Dead Weight Ton
ECDIS	Electronic Chart Display and Information System
EGC	Enhanced Group Calling
EIA	Environmental Impact Assessment
ENC	Electronic Navigational Chart
EPRIB	Emergency Position-Indicating Radio Beacon
FSA	Formal Safety Assessment
GMDSS	Global Maritime Distress and Safety System
GIS	Geographic Information System
GT	Gross Tonnage
HF	High frequency
IACS	International Association of Classification Societies
IAMSAR	International Aeronautical and Maritime Search and Rescue
ICAO	International Civil Aviation Organization
ICS	Incident Command System
ILO	International Labour Organization
IHO	International Hydrographic Organization
IMB	International Maritime Bureau
IMO	International Maritime Organization
ISF	International Shipping Federation
ISM	International Safety Management
ISO	International Standardisation Organization
IT	Information Technology
ITU	International Telecommunication Union

LL	International Convention on Load Lines
LLMC	Convention on Limitation of Liability for Maritime Claims
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environment Protection Committee
MOU	Memorandum of Understanding
MSA	Maritime Safety Administration
MSC	Maritime Safety Committee
NPM	New Public Management
OECD	Organization for Economic Co-operation and Development
OILPOL	International Convention for the Prevention of Pollution of the Sea by Oil
OPA	Oil Pollution Act
P& I	Protection and Indemnity
PSC	Port State Control
PSCO	Port State Control Officer
PTP	Prevention Through People
QSCS	Quality System Certification Scheme
RCC	Rescue Coordination Centre
SAR	Search and Rescue
SBT	Segregated Ballast Tank
SENC	System Electronic Navigational Chart
SOLAS	International Convention for the Safety of Life at Sea
SRR	search and rescue region
STCW	The International Convention on Standards of Training, Certification and Watchkeeping for seafarers
ULCC	Ultra Large Crude Oil Carrier
UNCLOS	United Nations Convention of the Law of the Sea
UNCTAD	United Nations Conference on Trade and Development
VLCC	Very Large Crude Oil Carrier

VTS	Vessel Traffic Service
WHO	World Health Organization
WMU	World Maritime University
WWNWS	World-Wide Navigational Warning Service

CHAPTER I

INTRODUCTION

In view of the great importance of administration today, it seems rather strange that the theoretical foundations are hardly sufficiently clear in this field. This is obvious when people try to harmonize the various conceptual interpretations of the term "administration". Historically, the development of the concept of administration can be traced as far as the 15th century (Strunz, 1995, p.54). At that time the term was used in connection with the private-law activities of the territorial princes. In the 18th century, it was still used mainly in the context of the private economy, which referred particularly to the administration of assets, estates, property, and goods. During the same century, the concept shifted from such private-law matters to the activities of the State, referring to the administration of State property, or the administration of an authority.

The term administration went through further conceptual changes at the beginning of the 19th century. It continued to be used directly for administrative activities in organizations on the one hand. On the other hand, it was eventually emphasised for the function of management in the modern State, the function of enforcement with authority. Generally speaking, the term of administration can be defined in both negative and positive ways (Winkle, 1958, p.66-86). In the negative definition "Administration is any activity by the State that is neither legislation nor jurisdiction." The positive definition of the term is that "Administration is any activity aimed at the practical implementation of State functions, and it is the enforcement of laws by all non-judicial organs."

In the maritime industry context, the term "administration" or "competent authority" is quite broadly used in government laws and regulations, especially in the international conventions. In SOLAS Convention 74, Chapter I, Regulation 2(b), "Administration means the Government of the State whose flag the ship is entitle to fly." Article 2(5) of the MARPOL 73/78 Convention states that "Administration means the Government of the State under whose authority the ship is operating." In the Convention C180 of the ILO, Article 2(a), "the term 'competent authority' means the minister, government department or other authority having power to issue regulations, orders or other instructions having the force of law in respect of seafarers' hours of work or rest, or the manning of ships." Although the term "administration" is defined in different ways, suitable for the purpose of particular applications, it is generally

1

accepted that in the maritime industry the "administration" is the government department or agency exclusively responsible for the work of maritime safety and prevention of pollution from ships, normally called the "maritime safety administration".

According to Vanchiswar (1996, p.61) "the maritime safety administration is the specialised executive arm of a maritime government to implement or enforce the regulatory (and allied) functions embodied in the national maritime legislation, especially those pertaining to registration of ships, maritime safety, marine personnel, maritime casualty investigations and protection of the marine environment." Due to the quite broad scope of maritime activities over which the government exercises its obligations, each maritime safety administration established in a specific country may reflect its own historical, customary and geographical features. Therefore, the organizational structure of the maritime safety administration must conform to the local circumstances, follow the development, and meet the requirements of that particular country. Some are called "the maritime safety administration", while others are entitled "the coast guard" or even "the maritime administration", which is usually regarded as having more functions than the maritime safety administration.

On the other hand, shipping is an industry of international nature. It is generally believed that maritime law has been well developed at the international level, particularly with respect to public maritime law, which later becomes the prerequisite and mandate of the maritime safety administration. So, the traditional roles and functions of maritime safety administrations in various countries must have something in common, and they will continue to be the basic functions of the maritime safety administration for the years to come. These roles and functions can be broken down into five broad areas, namely: flag state control, port state control, search and rescue, pollution preparedness and response, and navigational services.

The maritime safety administration is part of the State's public administration. "The objective of the maritime safety administration within the framework of a country's overall maritime activities is to provide the Government with the machinery which would enable it to satisfactorily and efficiently undertake those functions which are embodied within the country's Merchant Shipping Legislation, i.e. National Maritime Laws."(Vanchiswar, 1996, p.6-7). To understand the roles and functions of the maritime safety administration, the government intervention in, and general policy

towards, maritime activities should be reviewed and discussed. In every maritime country, the government's general policy in shipping may include two broad aspects, namely promotion of, and participation in, international shipping, and implementation of international obligations. Under international conventions, such as UNCLOS, SOLAS, MARPOL, and ILO C147, flag States and coastal States have certain rights and obligations. To enjoy these rights and to protect their national interests, States have to fulfil their obligations by ratifying the conventions, giving them legal effect, and enforcing them.

During the second half of the last century, especially the past three decades, great changes have taken place in the world shipping industry. This changing environment of shipping has challenged the maritime safety administration to adapt itself to meet contemporary requirements. As a major driving force, world trade has been increasing steadily. As a result, the world fleet has expanded in response to the demands of the world trade. At the same time, the structural changes of world trade have encouraged ships to become more diversified. Container ships and other sophisticated designs, such as LNG/LPG, are growing much faster than traditional ones.

Science and technology has changed the shipping industry significantly from the perspective of ship design and building to ships' navigation and management. Ships are becoming much bigger, and much faster, while ships' bridges are increasingly equipped with advanced and automatic equipment.

Perhaps the most important change with respect to maritime safety has been the re-thinking of the safety issue. Today the world maritime community believes that additional rules and regulations are not necessarily the only way to improve safety and prevention of pollution. Instead, taking proactive, rather than reactive initiatives, and enforcing existing regulations may be more effective in achieving the objectives of safety. In so doing, a safety culture needs to be encouraged within the safety net, and all entities in the shipping industry must play a broader role in the future management of safety.

Although the maritime safety administration is a government specialized agency with its objective directed towards maritime safety and prevention of pollution from ships, its broad functioning still falls generally under the definition of public administration. Therefore, the key roles of the maritime safety administration includes planning, decision-making, and coordination, as well as monitoring and supervision. In

order to fulfil its duties and obligations efficiently and effectively, coordination and cooperatioin with the shipping industry is essential. This is particularly true in the areas of survey and inspection, search and rescue, and pollution preparedness and response.

Change in the public sector is the rule rather than the exception. The goal of perfect government management has existed as long as there has been a government. Although change is a common experience in the public sector, the reform activity during the 1980s and 1990s has been extraordinary, not only in the number of reform initiatives but also in the fundamental nature of the changes being considered. The ideas contained in these reform efforts are mainly driven by the introduction of commercial performance into the public sector under the pressure of the general public, which is demanding deregulation, decentralisation, privatisation, etc.

The desire to improve organizational performance has focused particular attention on the pursuit of greater efficiency and effectiveness, which has been regarded as paramount in both private and public organizations. This pursuit, which has dominated government thinking in the last two decades and continues in the new millennium, merits detailed scrutiny. To improve its efficiency and effectiveness, the maritime safety administration should have a clear understanding of the issue "how safe is safe". Based on this understanding, the work of the maritime safety administration may be improved by encouraging quality shipping, improving transparency, and establishing partnerships with the shipping industry.

The purpose of this dissertation is to examine the necessity of maritime safety administration and the possible measures to achieve its objectives efficiently and effectively in a global sense, through discussions on the basic roles and functions of the maritime safety administration, the changing environment in shipping industry, and coordination and cooperation between the maritime safety administration and the shipping industry. Special emphasis is given to issues related to improving the work of the maritime safety administration with its limitation on aspects such as personnel, budget, and other abundant resources.

CHAPTER II
ROLES AND FUNCTIONS OF
MARITIME SAFETY ADMINISTRATION

In the maritime world, seafarers, shipowners, governments and others have been concerned for years about the safety of ships, their crews, cargoes and passengers. This is illustrated clearly by the fact that although various governments and the shipping industry have made significant and continuing efforts to improve the situation of safety at sea, serious maritime accidents have occurred from time to time. More recently, increasing attention has focused on the environment and the urgent need for the earth's resources to be preserved for the benefit of future generations. This has had a marked impact on all industries, including the shipping industry. The enormous loss of lives and properties, and the damage to the environment have made it clear that safety and prevention of pollution from ships have to be given top priority of consideration in the shipping industry, especially by governments.

The maritime safety administration is a specialised government agency, principally responsible for maritime safety and prevention of pollution from ships. Its prerequisite and mandate is not only embodied in national legislation but also stipulated in public international laws, mainly in international conventions.

On the other hand, as part of the public administration, the roles and functions of the maritime safety administration have to be considered within the framework of the government's overall maritime policy. Therefore, it is of great importance to understand the concept of government intervention in shipping, and its general policy: promotion of, and participation in, international shipping, and implementation of international obligations.

2.1   The Importance of Maritime Safety

The unpredictability of the weather and the vast power of the sea make it understandable that for centuries people have considered shipping as a high risk industry and seafaring as one of the most dangerous occupations in the world. The catastrophic consequences of natural and man-made disasters have given rise to ongoing concern within the shipping industry as well as the general public and the government. It is not surprising that the political response to a disaster is so strong that rules are often changed after the catastrophe.

In the early stage of shipping practice with sailing vessels, it was a common assumption that little could be done to make shipping safer. It was not until the beginning of the nineteenth century when the first steam engine was used on the vessel "Charlotte Dundas" (Rinman & Brodefors, 1983, p.25) that the fatalistic attitude towards safety began to change. Along with the industrial revolution of the eighteenth and nineteenth centuries and the rapid development of technology and international trade, more and more efforts have been made to ensure the safe delivery of passengers and cargoes by sea. Especially in the second half of the twentieth century great changes have taken place in shipping regulation and management internationally and nationally, which has made the shipping industry increasingly safe. Today shipping is regarded as the safest, most efficient and most environmentally friendly means of transportation.

Although the rate of shipping casualties has fallen steadily in the past years, as shown in Tables 2.1, 2.2 and 2.3, the safety situation is still serious if we look at the

Table 2.1
Total losses of ships and gross tonnage before 1984

Year	Capacity of the fleet		Total losses		Total loss ratio (%)	
	Ships	x 1000grt	Ships	x 1000grt	Ships	x 1000grt
1950	30,852	84,583	222	260	0.72	0.31
1955	32,492	100,569	178	255	0.53	0.25
1960	36,311	129,770	171	358	0.47	0.28
1965	41,865	160,392	277	740	0.66	0.46
1970	52,444	277,470	352	613	0.67	0.27
1975	63,724	342,162	336	995	0.53	0.29
1980	73,832	429,911	387	1804	0.52	0.43
1981	73,864	420,835	359	1238	0.49	0.24
1982	75,151	424,742	402	1632	0.53	0.38
1983	76,106	422,590	340	1413	0.45	0.35
1984	76,068	418,682	327	2354	0.43	0.36

Source: Japan Maritime Research Institute Report No. 47

following major accidents that have occurred during the last few decades:

- The collision of the passenger ship MV Dona Paz in the Philippines in 1987 with the loss of more than 4,000 lives.

- The capsize of the ro-ro ferry Herald of Free Enterprise off Zeebrugge in 1987 with the loss of 193 lives.

- The grounding of the oil tanker Exxon Valdez in Alaska in 1989 giving rise to heavy pollution in an ecologically sensitive area.

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Table 2.2
Total losses of ships of more than 100GT

total losses	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
oil tankers	19	23	12	9	16	10	21	10	12	13	9	11	9
other liquids	0	0	0	0	1	0	0	1	1	0	0	0	0
bulk dry carriers	21	14	17	8	13	18	22	13	6	16	9	15	10
bulk dry/oil carriers	1	6	1	0	0	2	2	4	2	3	1	0	0
self discharging bulk dry	0	0	0	0	0	0	0	0	1	0	0	0	0
other bulk dry cargo		0	0	0	1	5	3	6	6	1	9	7	0
general cargo	155	128	105	110	100	100	127	103	111	78	89	92	60
passenger ships	0	2	0	2	5	5	10	4	4	4	9	4	1
passenger general cargo	0	0	0	0	0	5	5	0	1	3	1	0	3
container ships	5	2	3	4	2	1	1	6	1	0	0	6	3
refrigerated cargo	0	0	0	0	9	3	5	6	3	8	4	4	4
ro/ro cargo	2	6	3	6	2	4	2	4	5	5	6	1	1
passenger roro cargo	9	8	8	4	3	2	8	4	8	7	1	5	3
other dry cargo	0	0	0	0	0	1	1	2	1	1	1	3	0
liquefied gas carrier	1	2	1	4	1	2	0	1	2	1	2	2	3
chemical tankers	1	2	2	3	6	3	4	4	5	2	3	2	2
fish catching	66	44	51	60	65	63	90	85	81	61	74	48	30
other fishing	0	0	0	0	2	0	0	1	4	3	2	3	0
tugs	10	8	8	8	10	10	10	3	9	11	8	4	3
supply ships	4	3	4	1	4	4	4	3	4	2	5	4	1
research					0	0	1	1	2	0	1	2	0
dredgers	1	1	0	2	2	3	4	3	4	0	2	4	1
miscellaneous	12	16	4	10	2	3	1	1		2	1	4	1
total	**307**	**265**	**219**	**231**	**244**	**244**	**321**	**265**	**273**	**221**	**237**	**221**	**135**

Source: Lloyd Register of Shipping

- The fire on board the Scandinavian Star off Norway in 1990 with the loss of 158 lives.

- The Aegean Sea swept onto the rocks whilst manoeuvring to enter port off the north- west tip of Spain with heavy pollution from her cargo of oil.

- The collision involving the tanker Maersk Navigator in the Malacca Straits.

- The capsizing of the ro-ro passenger ferry Estonia in the Baltic Sea in 1994 with the loss of more than 800 lives.

- One of the world's worst ever oil spills, the accident of the Amoco Cadiz, which ran aground off the north-west coast of France and spilled nearly all of her 230,000 tonnes of crude oil cargo into the sea.
- The grounding of the crude oil tanker Sea Empress in February of 1996 resulting in the discharge of approximately 72,000 tonnes of oil into the seas around the coast of south-west Wales.

Table 2.3

Lives lost (as a result of total losses of ships)

lives lost	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
oil					9	9	48	2	15	70	2	3	8
bulk dry					66	94	154	28	41	148	84	50	80
general cargo					317	72	217	78	219	149	192	168	94
passenger general cargo						13	39			145	2		2
ro-ro cargo						15			5	51	28	1	2
passenge ro-ro cargo					1		608	1	58	876		342	
passenge							17	9			3	4	
others					470	288	1103	148	401	1474	325	645	201
total	**619**	**1067**	**3841**	**763**	**688**	**389**	**1204**	**246**	**504**	**1552**	**379**	**690**	**218**

Source: Lloyd Register of Shipping

More recently, the Chinese ro-ro passenger ship "Da Shun" ran aground and capsized near the port of Yan Tai in 1999 with a loss of more than 200 lives. The Malta-registered tanker "Erika" broke in two during a storm at the end of 1999 and spilled thousands of tonnes of its heavy fuel oil cargo into the sea. The oil subsequently washed up on the French coast.

All the facts imply that despite the significant and continuing efforts of many ashore and afloat, in both government and the industry, accidents continue to happen. The enormous loss of lives and property and the damage to the environment has led to demands for action, although the number of fatalities compared with, for example, road accidents is comparatively small. So it is clear that safety is and will remain the top priority in shipping and will continue to be a focal point for the general public. As stated by French President Jacques Chirac when visiting the oil-drenched coast after the accident of Erika, "It is no longer acceptable that the community bears the brunt of damage caused by the rampant pursuit of profit."

2.2 Prevention of Pollution from Ships and Its Consequences

Until quite recently, despite the introduction of many millions of tonnes of oil and other wastes into the world's oceans, there had been little evidence to show that serious problems were caused by the sea being used as a dump for man made wastes. The sea was considered so big that it had enough ability to assimilate the wastes.

However, this attitude began to change as a result of the adoption of the International Convention for the Prevention of Pollution of the Sea by Oil, 1954 (OILPOL 54), which was initiated by the United Kingdom government. This convention mainly covered operational pollution by oil. It recognised that most oil pollution resulted from routine shipboard operations in which the common practice was to clean oily residues of vessel's tanks, and then simply pump them into the sea where they were left to disperse.

OILPOL 54 also prohibited the dumping of oily wastes within a certain distance from land and in "special areas" where the danger to the environment was especially acute. Although OILPOL 54 covered neither accidental pollution nor pollution from substances other than oil and only a few countries (8 out of 32 countries attending the 1954 conference) regarded oil pollution as requiring action, this convention was a milestone in the prevention of pollution from ships.

During the 1950s and 1960s tankers grew rapidly in size. The first 100,000-tonne crude oil tanker was delivered in 1959 and a 200,000-tonne oil tanker was put into service in 1966. The growth in maritime transport of oil as well as other chemicals gave rise to more and more attention to the potential threat of pollution.

In 1967, the oil tanker Torrey Canyon ran aground while entering the English channel and spilled 120,000 tons of crude oil into the sea. This resulted in the biggest recorded oil pollution incurred up to that time. The event stimulated shock waves through the maritime industry and the general public of bordering coastal States. It raised urgent questions about what provisions should be put in place to prevent pollution from ships as well as what constituted adequate compensation to persons who suffered oil pollution damage resulting from maritime casualties, which was non-existent at the time.

As a result of the strong reaction, some international conventions were adopted, including the International Convention on Civil Liability for Oil Pollution Damage, 1969, the International Convention on the Establishment of an International Fund for

Compensation for Oil Pollution Damage, 1971, the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969, and the International Convention for the Prevention of Pollution from ships, 1973, one of the most important instruments ever created by IMO.

Another example that illustrates the significant consequences arising from the reaction to oil pollution accidents was the Exxon Valdez incident, which resulted in the USA adopting unilateral legislation, the Oil Pollution Act 1990 (OPA 90). Even though the maritime world did not accept this expanded regulation without having reasons of doubt about its aims, the OPA 90 had a massive impact on shipping generally, not just tanker owners, with the result that some companies were no longer prepared to take the risks involved in trading to the US.

This legislation was a clear indication of an environmentally driven measure. Whilst it was said at the time that the US had "shot itself in the foot" and that shipowners would not trade to the US, this had not happened as widely as was feared. Although there is little doubt that the legislation has achieved its major purpose from the viewpoint of US politicians and the public, the cost to the shipping industry in time and energy has been immense, and remains so.

Over the years the shipping industry has seen increasing attention being paid to the prevention of pollution from ships. New conventions and more and more rigorous regulations have been developed with respect to prevention of, and response to, pollution as well as liability and compensation mechanisms. This situation will continue and possibly even speed up due to continuing severe accidents.

However, it may also be argued that pollution from ships is not as serious as it has been regarded. Shipping is not the main contributor to the pollution of the seas, although statistics are rather poor to document this. One study, which compares the years 1973 and 1981 (see table 2.4), concluded that less than 50% of all pollution could be attributed to shipping. These figures are consistent with those of a Japanese study in 1991, as shown in table 2.5.

One problem with pollution from ships is that big accident spills often happen within a small area and attract a lot of attention, although such spills play a minor role in the total pollution in volume terms. The case of Exxon Valdez is a clear example of how a relatively small spill in the wrong place makes volume statistics quite worthless. Table 2.6 indicates that the Exxon Valdez accident created a comparatively small oil

spill, but the cleanup costs after this accident were the most expensive, involving billions of dollars.

Table 2.4

Sources of oil pollution to the seas (million tonnes)

Source	1973	1981
Shipping	2.1	1.5
of which accident	0.2	
Land based sources	2.7	1.2
Other sources (offshore, natural, etc.)	1.3	0.6
Total pollution	6.1	3.3

Source: Bongaerts & de Bievre, 1987

Table 2.5

Causes of oil pollution

Cause	Percentage
Industrial spill and sewage systems	37
Vessel operation	33
Tanker accidents	12
Atmosphere	9
Natural sources	7
Other causes	2

Source: JAMRI, 1991

Table 2.6

Some memorable tanker accidents

Year	Vessel	Oil spill (tonnes)	Place
1967	Torrey Canyon	124 000	England
1978	Amoco Cadiz	221 000	France
1979	Atlantic Empress	257 000	West-India
1983	Castillo de Bellver	239 000	South Africa
1989	Exxon Valdez	36 000	Alaska
1991	Haven	140 000	Italy
1993	Braer	79 000	Shetland

Source: various data

The central question is of course whether shipping provides safe enough transportation. Taking into account the total number of trips undertaken per year, tanker shipping has a quite impressive track record. If we assume that larger ships, on average, make 5 trips per year and the smallest ships 15 trips per year, then international tanker shipping undertakes about 32, 000 trips per year. Since 1967, some 35 major accidents have occurred. In this period, tanker shipping made more than 800,000 trips. So in 99.9956% of the cases no major accident occurred. One might therefore argue that the overall performance of tanker shipping is quite good and is constantly improving.

To understand the consequences of pollution from ships, another fact is worth mentioning. Up to now, there have been no successful response actions taken after major oil spill accidents because of the inefficiency of the equipment even though millions of dollars have been spent on preparedness and response. Most of the equipment designed to contain and recover spilled oil are efficient in calm waters, with no currents and calm wind. But unfortunately these conditions are not very frequent at sea, especially in the open sea. Therefore, in most cases the spilled oil spreads and is finally naturally dispersed.

2.3 Government Intervention and Policy

Shipping is an international business. Historically, ships have always enjoyed the "freedom of the seas". A hundred years or more ago many shipowners were also ship's masters and traders. Their business was often inherited from their families and almost all commercial transactions were handled with private organizations.

However, the "freedom of the seas" has gradually eroded from the early days of shipping due, directly or indirectly, to government intervention, directed principally at the protection of national economy and trade, as well as for reasons of security. Today, national governments of maritime States are deeply involved in the shipping industry. Governmental policy with respect to shipping can be seen as the promotion and participation of international shipping and the implementation of international obligations under international laws.

2.3.1 Historical Evolution of Government Intervention

Freedom of the seas

Because of the international nature of shipping, the ship has always enjoyed the "freedom of the seas". This concept has two meanings. On the one hand, ships are able to navigate the oceans and to enter and leave the ports of other countries without

hindrance. On the other, one is free to trade one's ships so long as there is no interference in the commercial operations by others.

However, both these aspects have been subject to erosion, often under private and public international laws. Today ships are subject to more and more statutory rules and regulations in compliance with international conventions, most of which are technical standards – navigation, safety, construction, pollution control, etc.

Under the United Nations Convention of the Law of the Sea (UNCLOS 1982), ships enjoy freedom of navigation on the high seas. On the other hand, the flag State is required to discharge its duties under Article 94, UNCLOS: "Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag." and "Every State shall take such measures for ships flying its flag as are necessary to ensure safety at sea." In general, the flag State has exclusive jurisdiction over ships flying its flag, and over persons working on such ships in terms of issuing and withdrawing certificates of competence, except that (Intervention Convention 1969) a coastal State has the right to take such measures on the high seas as may be necessary to prevent, mitigate or eliminate danger to its coastline or related interests from pollution by oil or the threat of such pollution following a maritime casualty.

Ships also enjoy the right of innocent passage through the territorial sea and international strait under UNCLOS. A coastal State shall not intervene in the passage so long as it is not prejudicial to the peace, good order or security of the coastal State.

In internal waters, according to a great principle of public international law, the ports of every State must be open to foreign vessels and can only be closed when the vital interests of the State so require to. This means that under international customary law, ships have the right of access to ports and other internal waters. While it is undoubtedly true that the international ports of a State are presumed to be open to international merchant traffic, what is doubtful is that such a right would be subject to substantial restrictions. First, it is clear that States have the right to nominate those of their ports that are open to international trade, which is often expressed in law as "designated ports of entry". Second, a State may close even its international ports for the reason of protection of its vital interests. It is very difficult to justify what interest can be regarded as vital to the State. Third, States have a broad right to set up conditions

for access to their ports. For example, ships must obtain permission before entering or leaving a port.

There are two different approaches to State jurisdiction over ships within its territorial waters, namely plenary and limited jurisdiction. Under the common law system, States have total rights of jurisdiction, but under the civil law system, States shall not intervene in the "internal economy" or internal affairs of ships unless if it is requested by the master or flag State. Yet, the difference between plenary and limited doctrines is theoretical rather than practical. In fact, the actual enforcement practice of States is more or less uniform.

Government protection of trade

Despite the fact that shipping was initiated mainly by private practitioners hundreds of years ago, and shipowners, mariners and traders are frequently confronted with rules and regulations enacted by public administrations, government intervention has always existed throughout the evolution of the shipping industry in order to respond to the collective needs and concerns of the general public. In the early stage of shipping development, government intervention was mainly directed at the protection of national interests, trade and the security of ships and seafarers. As the importance of shipping in national economic development has increased, many interventive measures have been created by the governments of various maritime countries. However, the economic globalization and liberalization movement is now pushing governments towards facilitating and fostering the establishment and expansion of enterprises through market mechanisms, while maintaining sustainable development.

From the very beginning of history, maritime trade was carried on by merchants who conveyed their own commodities. Seafarers who discovered new resources and virgin territories kept their own business a secret. As the business expanded, maritime insurance and inspection systems, with the aim of securing seaworthy vessels for the cargo owners, were developed and spread everywhere as a common practice. The shipping generally enjoyed freedom from government power at that time.

This situation did not change much until the sixteenth century when the major transoceanic shipping routes were controlled by Spain and Portugal. In 1520, Magellan circumnavigated the globe, and subsequently the Pope ratified the division of the world into two parts, subject to Spain and Portugal. These two countries then established their

colonies worldwide and the governments protected their exclusive shipping and trading routes, which largely destroyed the "freedom of the seas".

In the seventeenth century England and the Netherlands gained increasing market shares of the sea traffic and challenged the Spanish and Portuguese powers. However, as early as the reign of Henry VII (1485-1509), the British monarch passed the first "navigation" law, which gave a preferential position to English vessels in the carriage of goods to and from Britain. Thus he invented the principle of flag discrimination: a form of protectionism often termed cargo reservation or cargo preference, which remains even today in certain protectionist areas of the world.

While the "navigation" law was a historical action against the Spanish and Portuguese monopolies, the real growth of protectionism was the British Navigation Act which was adopted in 1651 under Cromwell, and its subsequent development and enforcement. This government intervention had a significant impact because of the rapidly expanding trade to and from British colonies. Under the Act all goods trading between Britain and British colonies had to be carried by British ships. No foreign ships could be used. In its evolution, the law was further strengthened in favour of British ships. For example, colonial ships were required to route through English ports where a levy was imposed.

The Navigation Act was partly repealed in 1841 and finally repealed in 1853 partly as the result of the pressure of the free-trade expansionist voice, and partly because of the strength of British shipowners and shipping, which was so strong that they no longer needed protection. However, the influence of the protectionist policies remains even today although measures are not necessarily the same as the Navigation Act.

Over the years, a number of protectionist forms have been adopted by governments to promote and protect national shipping industry. These may be broadly categorised as follows:

National regulations or requirements

- Flag reservation which reserves all or part of national export and import cargoes to national-flag ships, and restricts employment of seamen on board national-flag ships;
- Other forms of discrimination in favour of the national flag through the use of a freight booking centre which allocates cargoes on a preferential basis;

- Cabotage, which reserves domestic trade to the national flag;
- Trade restrictions imposed by a requirement that all goods exported are sold on c.i.f. terms and imported goods are purchased on f.o.b.
- Access to ports and port facilities, setting up conditions for access to and from ports, favourable to the national fleet;
- Access to military and strategic cargoes.

Financial treatment

- Subsidies, which include direct subsidies to the national shipbuilding industry, ports, and the national fleet;
- Investment incentives, designed to encourage national carriers to invest in new or second-hand tonnage;
- Fiscal treatment, which is in favour of national shipping, e.g. depreciation and taxation policies;
- More beneficial credit arrangements for national shipowners building ships in their own countries;
- Social security and welfare systems to support national seafarers training and employment.

Bilateral and multilateral arrangements

- Bilateral liner agreements designed to divide the shipping market between two countries;
- Common shipping policies, e.g. European Union and North American trade union;
- United Nations Convention on a Code of Conduct for Liner Conferences, which covers a number of aspects, such as market shares, pricing policy, relationship between lines and their customers and membership criteria for liner conferences.

Security at sea

The seventeenth century also saw a great increase in piracy. Between 1609 and 1616 Turkish pirates seized a total of 466 merchant vessels. In a ten-day period in 1625 the pirates attacked 27 English merchant vessels in the Mediterranean with about 1,000 seamen on board (Rinman &Brodefors, 1983, p.14). These attacks caused great losses to shipowners. In order to prevent pirate attacks and to protect nationals, governments

provided regular military expeditions at that time. Portuguese, Spaniards, Dutch and English sailed in heavily armed ships against pirates.

The world was subsequently relatively peaceful without serious pirate incidents for many years. Unfortunately, piracy and armed robbery returned sharply in the 1980s, especially in South East Asia due to economic, social and political reasons. According to the statistics by the International Maritime Bureau (IMB), annual piracy and armed robbery incidents against ships have exceeded 200 since 1996. Table 2.7 provides the total number of incidents by location between 1991 and 1999. This situation has impressed on government the need for action. In 1983, Sweden submitted a report to the Maritime Safety Committee (MSC) of IMO calling for the consideration of piracy and armed robbery problems. Since then the issue has become a regular agenda item in IMO

Table 2.7

Piracy and armed robbery incidents by locations (1991-1999)

locations	1991	1992	1993	1994	1995	1996	1997	1998	1999
South-east Asia	102	70	85	70	118	141	110	99	166
Indian Ocean		5	3	3	16	24	37	22	43
Latin America			6	11	21	32	37	35	24
Africa			7	6	21	25	46	42	49
Others	5	31	2		12	6	17	4	3
total	107	106	103	90	188	228	247	202	285

Source: compilation from data of IMB report, 1999

Meetings and several IMO Resolutions have been adopted by the Organization, including guidelines for measures to prevent acts of piracy and armed robbery against ships. Since 1998, IMO has organized missions of experts in South East Asia, South America, West Africa and the Indian Ocean to impress on governments the need for action, and to motivate political will to act on both national and international levels. Although some steps have been taken nationally, regionally and internationally, it is likely that this problem will continue until meaningful national actions are implemented by all the governments concerned.

The development of maritime law

Maritime law has a long history. It has been developed from customary law and practice and even present legislation and application can be traced back to very early times. Maritime law can be categorised into international and national law. Because of

the international nature of shipping today, almost all aspects of deep-sea shipping have been regulated by international law. Maritime law can also be divided into private and public law. Although maritime law was initiated from private law, public law, especially public international law, has been well developed, this latter being the mandate of the maritime safety administration.

As early as Roman Times, merchant navigation included a system of insuring vessels. This took the form of a loan raised by the merchant of the shipowner from a banker on the security of the vessel and/or the cargo. This loan was to be repaid if the voyage was successfully concluded but would be written off if the vessel and/or the cargo was lost. In A. D. 554 the Roman emperor Justinian I introduced a particular regulation concerning marine insurance which laid down that the normal premium on maritime loans should be 6 per cent. Later on, this insurance system was widely practised in the Mediterranean countries and gradually became an international rule. Several international marine insurance terms used today can be traced from ancient times. For example, the term average was derived from the Italian *avaria*, which means loss due to damage.

Similarly, salvage law and the law related to the carriage of goods by sea were developed in the same way. Not only private law but also public law was developed in the very early stage of shipping, the latter having emerged from the need to protect merchant ships from piracy in order to enable them to continue their trade. The initial maritime law was even codified, for example, the Roman maritime law which covered subjects such as the sea, the ship, and the cargo, as well as the obligations of those engaged in shipping and dispute settlement mechanisms.

Maritime private law, which governs the legal relationships between individual entities or groups of individuals, includes, *inter alia*, insurance law, rules with respect to salvage, contractual law related to the carriage of goods by sea, liability and compensation for loss of life or injury, for loss or damage of properties, ships and cargoes, for damage to the environment, and other civil liabilities. Because of its customary nature and diversified practice, maritime private law differs significantly from country to country. Some of the laws depend, to a large extent, on the domestic rules, for example, laws with regard to insurance and shipping contracts. However, some governments and non-government organizations, such as UNCTAD, IMO, CMI, and industry unions, have made great efforts to harmonize as far as possible the private

international maritime laws. Some of them have been successfully adopted as international conventions, including the United Nations Convention on a Code of Conduct for Liner Conferences 1974, the International Convention on Maritime Liens and Mortgages 1993, the International Convention on Arrest of Ships 1999, the Athens Convention Relating to the Carriage of Passengers and their Luggage by Sea (PAL) 1974, the International Convention on Civil Liability for Oil Pollution Damage (CLC) 1969, the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND) 1971, and the Convention on Limitation of Liability for Maritime Claims (LLMC) 1976.

Others have also achieved uniformity to some extent, for example, standard shipbuilding contracts, standard charterparties, and bills of lading.

Maritime public law, which concerns matters related to the distribution and exercise of rights, duties and obligations by public authorities, and the legal relations between States and individuals, or among States, can be grouped mainly into three categories, namely maritime safety, pollution prevention and maritime security. During the second half of the last century, considerable progress had been made in harmonising public international law through inter-governmental organizations, mainly IMO, ILO, WHO and ITU. Today, almost all of this field has been covered by international conventions.

Public international maritime law forms the basis on which the maritime safety administration has been established and mandated. But it can be effective only when national law has been enacted and implemented. Since maritime law has been well developed at the international level, the key issue is the State's progress in implementation and enforcement. This will be discussed in more detail in Section 2.4.

Whilst international law regulates most shipping fields, it is also necessary for States to enact national laws which are not within the sphere of international law. For example, government authorities have obligations to regulate non-convention ships (smaller, fishing or domestic-sailing ships).

2.3.2 Government general policy in shipping

Recent maritime history demonstrates that a properly defined government shipping policy, tailored to its particular national conditions, is vital for the country's maritime development. All government functions, or functions of public authorities within the scope of maritime administration, have to be those assigned to it within the

framework of the government's overall maritime (shipping) policy and duly reflected in its maritime legislation. Some economists define shipping policy as "A totality of economic, legal and administrative measures by which the State influences the position of its fleet in the national economy and in the international freight market." It is quite correct from the economic point of view that one of the most important functions of the government is to strive for the development of the national economy and international trade in which shipping plays a very important part. In fact today, under the generally peaceful environment, government policy in all countries, whether developed or developing countries, is economically oriented. However, as an instrument of the State with the ultimate goal to meet and maintain the continuously increasing requirements of the general public, the national government has a large variety of goals, not only those described by the economists, but also those which can be justified for the good of the general public. As mentioned earlier, government general policy in shipping falls into two broad areas, namely promotion of, and participation in, international shipping, and implementation of international obligations.

Promotion and participation of international shipping

How to achieve the maximum gain for a national shipping industry in the international market has always been a major concern of all governments. The natural tendency of all nations, including the traditional maritime countries and newly developing maritime States, is to look at shipping from their own national standpoint, and to see where they can gain an advantage. As discussed before, historically, a large number of interventionist measures have been developed and practised by various governments, which have mainly taken the form of national regulations or requirements, financial treatment, or bilateral and multi-lateral arrangements.

It would be wrong to say that all protectionist measures are negative and therefore should be abolished. In fact, some of them have become international customary practice recognised by all countries, such as cabotage, and bilateral and multi-lateral agreements. It is also broadly acknowledged that some kind of protection is essential to promote national shipping development, especially in the newly developing maritime countries where shipping and related industries are too weak to compete on equal grounds in the international market.

However, protection is not the norm. With market mechanisms now playing an increasingly important role in the development process, the role of government is

progressively shifting towards providing an appropriate enabling environment for private enterprise, and facilitating and fostering the establishment and expansion of private business. A number of governments in both developed and developing countries have successfully pursued pro-active policy interventions in order to: influence savings and investment rates; promote the efficient functioning of markets; improve access to international markets; stipulate the diffusion of technology; and create the best possible conditions for ensuring the competitiveness of their shipping and other related commercial activities. However, there is growing recognition in nearly all countries that governments, in promoting shipping development, should rely closely on market forces as the primary means of ensuring optimum allocation of resources.

Another important role of the government in promoting its shipping industry is to provide necessary services, which contribute to enhanced economic performance. Typically, it falls to the government to ensure the provision of port infrastructures, including dredging of channels, maintenance of navigation support services, icebreaking, and so on. The government role is also directed at promoting human resource development, providing facilities for training of seafarers, ensuring a free flow of information and the advancement of science and technology, as will as setting up systems of labour and social welfare conditions.

Implementation of International Obligations

The rights and duties of flag States, port States and coastal States have been embodied in various international regulations or conventions adopted by competent international organizations, namely IMO and ILO. To enjoy these rights and to protect their national interests, States have to fulfil their obligations.

When a State becomes a party to an international convention by the process of ratification or accession, the legal effect of it is that the State then becomes bound by the convention and is therefore obliged to implement it by incorporating its provisions into national law. If the State fails to implement the convention, it is nevertheless still bound by the convention *vis a vis* other State parties, but it cannot enforce the convention against them, unless that convention becomes part of its law by whatever legal process applicable in that State's jurisdiction. The implementation of an international convention to which a State has become a part is therefore an essential step without which the State Party cannot benefit insofar as the application of that law within its jurisdiction is concerned.

In this connection, a flag State , whether a contracting party to an international convention or not, will be bound by the convention *vis a vis* other contracting Parties. Ships flying its flag will be subject to the requirements of the convention when they visit ports of contracting Parties, which is often referred as "no more favourable treatment". If a ship fails to meet the requirements of the convention because its flag State has not ratified it, for example, the ship has no a required certificate, then the ship will be detained. In fact, due to this reason some ships have been forced to change their flag. On the other hand, when and only when a State has become a Party to a convention and has given it legal effect by enacting national law with respect to the convention, the State is able to enforce ships visiting its ports.

National interests with respect to implementing international obligations related to safety and pollution regulations can be identified as follows:

- To protect citizens from loss of life and personal injury;

- To protect against property or other economic losses caused by accidents;

- To protect the environment and maintain sustainable development; and

- To maintain a good national reputation, and thereby to promote the opportunities for economic development.

However, some countries, especially developing countries, have faced difficulties in implementing international obligations due to their economic difficulties, legislation, infrastructure, law enforcement resources, or expertise. Once these difficulties are overcome, these countries will certainly be active in implementing the conventions because of the advantages mentioned above which are so attractive for the countries to do so.

2.4 Traditional Roles and Functions of Maritime Safety Administration

The Maritime Safety Administration (MSA) is part of the government executive. Its objective under the framework of a country's overall public administration, and within the government general policy, is to provide the government with the machinery which enables it to satisfactorily and efficiently undertake those functions embodied in the country's Merchant Shipping Act or Maritime Law. The organizational arrangement of the MSA in various countries reflects the particular constitutional, political, social and historical characteristics. It is not necessarily a single solution in all countries. In fact, some are within broad maritime administrations; others are comparatively independent organizations, either as a maritime safety administration or coast guard.

However, the roles and functions of the MSA, which can be identified from different perspectives, are similar in all countries because its rationale and mandate are mainly provided for under various international conventions.

2.4.1 Public Administration

As part of the public administration, the maritime safety administration has attributes that are common to other public sectors. The role and function of the MSA may be considered to fall into three broad categories: policy development, regulation, and provision of services.

Policy-making can be defined (Barber, 1983, p.59) as the determination of major objectives, the selection of methods of achieving these, and the continuous adaptation of existing policies to the problems that face a government. It is a complex process involving individuals and organizations outside, as well as within, the political influence. Policy-making is effectively a two-part process. First is the analysis and choice presentation, which involves the primary determination of problem areas, definition of the issues involved therein and an examination of the methods of problem-solving. Second is decisions on policy, which includes the making of the actual decision as to the choice and implementation of alternatives presented.

A good policy-making process should be based on risk analysis, cost/benefit analysis, impartiality and scientific approach, and should be directed at the efficient assignment of responsibilities, and resource identification and allocation, in both public and private sectors. But due to the nature of public administration, it is quite often criticized that the public section has negative features: a tendency towards balance and compromise; lack of professionalism; lack of long-term strategies; and a failure of make effective use of professionals.

Another role of the Maritime Safety Administration is the development and administration of legislation and regulation. The MSA is one of the main government organizations responsible for the establishment and maintenance of the national Merchant Shipping Act, which is the body of laws that control maritime activities, including social and safety matters. Since the activities of the MSA rely on these laws, this role is essential. The MSA can only function effectively when the laws are in place.

As mentioned earlier most of the regulations and standards with respect to safety and pollution prevention have already been established at the international level. Hence,

one of the major legislative activities of the MSA is to transfer international conventions into national law in order to enforce them.

There are two doctrines in the transforming process. In the monistic system, a convention can become part of domestic law simply as a consequence of its ratification or accession by the State. Virtually no legislative action is required. However, it requires that the legislation must be officially published. On the other hand, in the dualistic system, legislative action is always required for an international convention to be effective after ratification or accession.

Moreover, the MSA is a specialised organization. It provides a series of services, including:

- Training, examination and certification of seafarers;

- Search and rescue;

- Navigational services, such as hydrographic survey and aids to navigation; and

- Pollution prevention and emergency response.

2.4.2   Areas of Function

The role and function of the maritime safety administration can be broken down into different areas, namely flag state control, port state control, search and rescue, pollution preparedness and response, and navigational services.

Various international conventions stipulate the respective jurisdictions of flag State, port State and coastal State. UNCLOS 82 is the blueprint covering all aspects of the functions of the maritime safety administration. Detailed requirements are described in the generally accepted international regulations established by the competent international organizations, such as IMO, ILO, ITU and WHO.

Flag State Control

An important function of the maritime safety administration is flag State control which is directed at ensuring vessels flying its flag meet the requirements for safety of life, property and the marine environment. Article 94 of UNCLOS 1982 describes in general the duties of the flag State:

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 the 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, 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 matter 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.

While UNCLOS, Article 94 provides the general prescription of the flag State's duties and obligations, the itemized list of flag State duties are expected to be, *inter alia*, the following:

- Ship registration and related functions;
- Survey, inspection and certification of ships;
- Training, examination and certification of seafarers;
- Dealing with matters of safe manning and labour conditions;
- Casualty inquiries/investigations;
- Investigation of allegations of non-conformity, deficiency or pollution reports;
- Making offences punishable; and
- Ensuring the safety of fishing and other non-convention vessels.

Ship registration is a process which establishes the legal tie between a ship and its flag State. Registration is used as evidence of the right to fly the flag of the State, and therefore, the ship enjoys all rights and privileges granted by its flag State on the one hand. On the other hand, the flag State extends its jurisdiction to ships flying its flag and has the right to enforce its ships in conformity with its national law. By registration the flag State also declares, in fact, that a vessel meets the relevant national requirements. Moreover, another purpose of registration is to record property rights and registerable changes on the ship, for example, the shipowner and mortgages.

UNCLOS, Article 91 and 92, regulates the nationality and status of ships:

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 the 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.

<p style="text-align:center">Article 92</p>

<p style="text-align:center">Status of ships</p>

1.   Ships shall sail under the flag of one State only and, save in exceptional cases expressly provided for in international treaties or in this Convention, shall be subject to its exclusive jurisdiction on the high seas. A ship may not change its flag during a voyage or while in a port of call, save in the case of a real transfer of ownership or change of registry.

2.   A ship which sails under the flag of two or more States, using them according to convenience, may not claim any of the nationalities in question with respect to any other State, and may be assimilated to a ship without nationality.

In order to ensure that ships meet the requirements of various international conventions, such as Load Line, SOLAS, MARPOL, and Tonnage, as well as national regulations, the flag State must carry out surveys and inspections on its ships, and issue relevant certificates as the evidence of compliance. Because of the special knowledge and expertise required, almost all of flag States have delegated, to a certain extent, some of the statutory surveys, inspections and issuance of certificates to classification societies. However, the responsibility with respect to safety and pollution remains with the flag State.

While the safety of ships' construction and equipment is ensured by surveys and inspections, the competence of seafarers is controlled by training, examination and certification. Because of the dominant importance of human errors as the principal factor leading to maritime accidents or incidents, as established by many studies, all traditional and developing maritime countries have accepted that the training and certification of seamen must be a responsibility of their governments.

The International Convention on Standards of Training, Certification and Watchkeeping for seafarers, 1978, as amended in 1995 and 1997 (STCW Convention) provides duties and obligations of State parties, for example:

"Regulation I/6

Training and assessment

Each Party shall ensure that:

.1 the training and assessment of seafarers, as required under the Convention, are administered, supervised and monitored, and

.2 those responsible for the training and assessment of competence of seafarers, as required under the Convention are appropriately qualified."

The requirements for safe manning and labour conditions are described in IMO and ILO conventions as follows:

SOLAS, Chapter V, Regulation 13:

(a) The Contracting Governments undertake to maintain or adopt measures for the purpose of ensuring that all ships shall be sufficiently and efficiently manned.

(b) Every ship shall be provided with an appropriate safe manning document or equivalent issued by the Administration as evidence of the minimum safe manning.

ILO C109, Article 21:

1. Every vessel shall be sufficiently and efficiently manned for the purpose of:

   (a) ensuring the safety of life at sea;

   (b) preventing excessive strain on the crew and avoiding or minimising as far as practicable the working of overtime.

2. Every Member undertakes to maintain efficient machinery for the investigation and settlement of any complaint or dispute concerning safe manning.

In addition, in 1999 IMO adopted Resolution A. 890(21) as a guideline for the principles of safe manning.

Maritime casualty investigation is one of the main functions of the maritime safety administrations of all States. The purpose of casualty investigation is to enable governments and the shipping industry to take necessary steps to prevent, as far as practicable , the occurrence of similar casualties in the future. Casualty investigations identify the circumstances of the casualty and determine as precisely as possible the causes by gathering and analysing information and drawing conclusions.

Casualty investigation can be divided into two categories, namely preliminary/administrative and formal/judicial investigations. The form and procedure of an investigation depends mainly on the domestic laws of various States. The

preliminary investigation is usually conducted by a qualified and experienced investigator of the maritime administration. On the other hand, a formal investigation is held in addition to, or instead of, a preliminary inquiry, as may be required by national law, especially in common law countries. While a formal investigation is held by a Court, the role of the maritime administration in the formal investigation is to assist the Court, as may be required, in every possible manner, with its special knowledge and expertise.

Whilst States may take different approaches in conducting casualty investigations, the rights and obligations of States, whatever flag States, coastal States, or interested States, with respect to casualty investigation are stipulated in various international conventions, including UNCLOS, Article 97, 94(7), 217(4), (6), 2, 220, 221 and Article 226, SOLAS, Regulation 21, LL, Article 23, MARPOL, Article 6(2), (4), (5), Article 12, and ILO C147, Article 2(g). In 1997, IMO adopted the Code for the Investigation of Marine Casualties and Incidents, which is a guideline for holding casualty investigations. Under the IMO Code (paragraph 4.11) the substantially interested States, which may be encouraged (IMO Code, paragraph 9.1, 9.2 and 9.3) to take part in a casualty investigation, include: the flag State; the coastal State in whose internal waters or territorial sea a casualty has occurred, or to whose interests or environment the casualty has caused/threatened serious harm; the State whose nationals have been involved in the casualty; and any other State that is considered significant by the investigating State.

The flag State has the duty to investigate all incidents or deficiencies of its ships with regard to safety and pollution when asserted by any State or any person, as required by many conventions. For example, MARPOL, Article 4(1) states that: "Any violation of the requirements of the present Convention shall be prohibited and sanctions shall be established therefor under the law of the Administration of the ship concerned wherever the violation occurs. If the Administration is informed of such a violation and is satisfied that sufficient evidence is available to enable proceedings to be brought in respect of the alleged violation, it shall cause such proceedings to be taken as soon as possible, in accordance with its law."

In addition to the duties and obligations of the flag State under international conventions, the flag State has an essential function to ensure the safety of fishing and non-convention ships. This is often a neglected area in many countries and deserves

attention by the respective national maritime safety administration because it is a domestic matter but part of the MSA's functions. In order to fulfil this function, domestic law and regulations should be in place, and a system needs to be established, at least in order to ensure:

(1) the inspection and certification of safety equipment of fishing vessels and other small craft, and

(2) competent manning of such vessels/craft.

Port State Control

Although the primary responsibilities for ensuring that ships comply with safety and pollution standards fall on the flag State, port State control is envisaged as a back up system, which is intended as a means of diminishing the number of sub-standard ships, which result from irresponsibility or incompetence on the part of flag States.

PSC can be traced as far back as SOLAS 1929. Its basic concept is that all countries have the right to inspect ships visiting their ports to ensure they meet IMO requirements regarding safety and pollution prevention standards, and ILO requirements relating to working conditions and welfare of seafarers. The international legal framework regarding PSC can be found in a number of conventions, including UNCLOS 82, SOLAS 74, MARPOL 73/78, LL66, STCW 78, and ILO C147.

When provisions for PSC were introduced in SOLAS and other conventions, initially it was assumed that their application would be a national concern. Generally speaking, because there were no recommendations on how many ships should be inspected and what procedures and standards should be followed, there were few actions taken on PSC until the Paris Memorandum of Understanding (MOU) on PSC, which was signed in 1982 within the region covering Europe and the North Atlantic. Since then, PSC, as a major tool for enforcing compliance with marine safety and standards, has became more and more active, and practical experience has shown that PSC works best when it is organized on a regional basis.

Following the Paris MOU, the Latin American agreement/MOU, joined by 10 States, was signed in 1992; the Tokyo MOU, covering Asia and the Pacific and joined by 17 countries, was signed in 1993; the Caribbean MOU, joined by 22 States and Territories, was signed in 1996; the Mediterranean MOU, covering southern and eastern Mediterranean countries and joined by 8 States, was signed in 1997; the Indian Ocean MOU, joined by 15 States, was signed in 1998; and the Abuja MOU was concluded by

19 west and central Africa nations on 22 October, 1999. A first draft of a regional PSC agreement for the ROPME (Regional Organization for the Protection of the Marine Environment) sea area was discussed in July 1999 in Manama, Bahrain and a second meeting is expected to see the signature of an MOU on PSC in the Persian Gulf region. A first preparatory meeting for the establishment of a port State control system in the Black Sea region took place in Varna, Bulgaria in September 1999, and the MOU for this region is expected to be adopted and signed in 2000.

With the adoption of these MOUs, most of the world's oceans will be covered by PSC. At present, great progress has been made under the Paris, Latin America and Tokyo MOUs. The Paris MOU recently held its thirty-second meeting and a major issue was how to disseminate more information. The Paris and Tokyo MOUs have signed a joint declaration to tighten PSC in both regions and to maximise its deterrent effort. The Latin America MOU held its fifth meeting in 1998, adopting new Codes. Other MOUs have been mainly addressing issues such as training of PSC officers, adoption of PSC manuals and regional Codes. In addition, each MOU has its different regional considerations. For example, one of the major considerations in Caribbean countries is focused on non-Convention sized ships (Rial, 1999, p.5).

The rationale reflecting the growing need for PSC is to protect port State interests; to promote and encourage flag State implementation; and to rectify failures of flag State control, classification society standards, shipowners/operators responsibilities, and the insurance industries (Mukherjee, 1999). Whilst flag State implementation enforces ships which are entitled to fly its flag, port State control is aimed at inspecting foreign ships visiting its ports. However, FSI and PSC are not separate but complementary to each other with the same basic concern: ensuring that IMO and ILO standards are implemented. Yet, prior to the existence of formalised regional PSC agreements, the same inspectors did both jobs. As the PSC role has developed, PSC officers have been trained with specialised knowledge with respect to inspection procedures, regional Codes and manuals, and PSC is now a separate, specialised area.

The three main elements of an effective but fair PSC inspection are procedure, standards and personnel. First, the procedure to be followed in conducting PSC is very important. According to IMO Resolution A. 787 (19), in the pursuance of control under the applicable conventions, the initial inspection should be for the relevant certificates of the ship and crew. Such certificates, if valid, shall be accepted unless there are clear

grounds for believing that the ship, its equipment or crew do not substantially meet relevant requirements of conventions. If so, the PSC officer should proceed to a more detailed inspection and ensure that the ship does not leave the port, except for a single voyage for repair, until identified deficiencies are rectified. In so doing, relevant Administrations and officials of the flag State should be informed. However, when exercising control, all possible efforts must be made to avoid unduly detaining or delaying a ship. Second, in order to implement PSC, it is necessary to put in place the appropriate safety and pollution standards. Every regional MOU needs to achieve uniformity of PSC standards, not only for convention ships but also for ships below convention size. Especially important rules are the conditions and procedures for detaining ships, and PSC officers should ensure that "no more favourable treatment is to be given to the ships of countries which are not Parties to the Convention." (IMO Resolution A.787). Third, PSC should be carried out by qualified PSCOs, as indicated in IMO Resolution A. 787(19), who must fully follow the procedures stipulated, and apply the related standards.

It is clear that something more needs to be done about the part played by the flag State, on which the primary responsibility for safe ships will continue to be placed, irrespective of the actions of port States. After all, PSC acts only as a back-up system and a deterrent to stop sub-standard ships, and no PSC can undertake to fully inspect all ships visiting its port. So it is reasonable to conclude that in the future, PSC may only be scaled down in circumstances where flag States have fully implemented their duties, including those duties in which shipowners/companies, classification societies and other industries are involved.

Search and Rescue

"Every State recognizes the great importance of saving lives and the need to be directly involved in rendering aeronautical and maritime search and rescue (SAR) services to persons in distress." (IAMSAR Manual, Vol. I, p.1-1). Search and rescue is a vital function of the designated public organization, the maritime safety administration, because not only is it a government commitment under certain international conventions, but also it represents the public interest of the State.

A State's concern and involvement with SAR may offer the following advantages:

- The reduction of loss of life and suffering by providing rescue services

- Promotion of the use and enjoyment of the maritime environment, tourism and economic development
- Forming an integral part of any local, national or regional emergency management system
- Providing positive publicity and enhancing a State's reputation
- Promoting cooperation and communication among States and between organizations

Government obligations with respect to search and rescue are included in a number of international conventions.

UNCLOS, Article 98, sets out the obligation of the flag State to require the master of a ship flying its flag, to render assistance to any person found at sea in danger of being lost, to proceed with all possible speed to the rescue of persons in distress, or, after a collision, to render assistance to the other ship, its crew and its passengers. Article 98 further states that every coastal State shall promote the establishment, operation and maintenance of an adequate and effective search and rescue service.

In the SOLAS Convention, Chapter V, Regulation 2 requires Contracting Governments to take all steps necessary to ensure that the "danger message" received will be brought promptly and free of charge to the attention of those concerned. Regulation 4 states "The Contracting Governments undertake to encourage the collection of meteorological data by ships at sea and to arrange for their examination, dissemination and exchange in the manner most suitable for the purpose of aiding navigation."

Ships routing systems which contribute to safety of life at sea, safety and efficiency of navigation and /or protection of the marine environment are described in Regulation 8. Under Regulation 8-1, it is possible for governments to introduce mandatory ship reporting systems, subject to approval by IMO.

Regulation 10 states:

"The master of a ship at sea which is in a position to be able to provide assistance on receiving a signal from any sources that persons are in distress at sea, is bound to proceed with all speed to their assistance, if possible, informing them or the search and rescue service, that the ship is doing so."

Regulation 15 lays out basic obligations of governments with regard to SAR operations:

"Each Contracting Government undertakes to ensure that any necessary arrangements are made for coast watching and for the rescue of persons in distress at sea around its coasts. These arrangements should include the establishment, operation and maintenance of such maritime safety facilities as are deemed practicable and necessary having regard to the density of the seagoing traffic and the navigational dangers and should, so far as possible, afford adequate means of locating and rescuing such persons."

Government functions and obligations regarding search and rescue are embodied in the International Convention on Maritime Search and Rescue (SAR Convention), which was adopted by IMO in 1979. The aim was to develop an international SAR plan, so that, no matter where an accident occurs, the rescue of persons in distress at sea would be coordinated by a SAR organization and, when necessary, by cooperation between neighbouring SAR organizations. Parties to the Convention are required to ensure that arrangements are made for the provision of adequate SAR services in their coastal waters.

The maritime safety administration is the principle organization responsible for search and rescue operations. The functions required in order to fulfil government obligation regarding SAR are as follows:

First, in order to establish or improve the national SAR system, the legal framework should be in place. It is the duty of the MSA to examine and/or to improve the national legislation, so as to implement international obligations and to organize SAR operations.

Second, whilst many organizations, private or public, may be involved in SAR operations, such as companies, associations, and the navy, the MSA normally has the duty to coordinate the assignment of responsibilities. The primary resources of a SAR organization are the operational facilities made available to it by various authorities. Although these facilities remain administratively under their respective authorities, their operations for SAR are coordinated and guided by the national SAR coordinator. The MSA must arrange for the efficient use of the primary SAR facilities and ensure that adequate and effective SAR services are in place when an accident occurs. These

arrangements should be made either by law or by agreements in order to ensure the discharge of responsibilities of the organizations concerned.

Third, normally the MSA will play a key role in SAR coordination and operational functions. It is not necessary, and may be impossible, for the MSA to provide all SAR facilities. In fact, actual rescue services may well be provided by volunteers as the cases in countries such as Germany and UK. However, this does not release the MSA from the responsibility to effectively organize and coordinate SAR operations.

Finally, it is the function of the MSA to ensure the establishment of effective communication facilities, which are absolutely key in SAR activities.

Prevention of Pollution from Ships

In the field of the prevention, control and abatement of marine pollution, the functions of the MSA are directed towards the following:

- To prohibit the deliberate discharge of oil and other harmful substances into the sea by regulating ship operations such as tank cleaning and deballasting.

- To minimize pollution arising from maritime accidents by applying safety standards for construction, equipment, navigation, cargo handling and crew qualification, all of which are mainly the functions of flag State control.

- To mitigate the effects of pollution, once it occurs, by being prepared for, and responding to, the incidents.

- To impose sanctions against discharge in contravention of regulation requirements.

The work that is directed towards the minimization of accidental pollution is carried out within the general framework of maritime safety. Thus two principal functions of the MSA, namely maritime safety and pollution prevention are closely inter-related and contribute to the protection of human life, property and the environment arising from maritime activities.

Prevention of pollution from accidents is the major concern of flag State control. The duties and obligations of the flag States in this area have been described before. On the other hand, prohibition of the deliberate discharge of oil and other harmful substances into the sea and combating or response to the pollution by accidents are within the function of the coastal State's maritime safety administration. In this connection, a State's rights and obligations can be found in international conventions.

UNCLOS, Article 211 states that coastal States may, in the exercise of their sovereignty within their territorial sea, adopt laws and regulations for the prevention, reduction and control of marine pollution from foreign vessels. In addition, States which establish particular requirements for the prevention, reduction and control of pollution of the marine environment as a condition for the entry of foreign vessels into their ports or internal waters or for a call at their offshore terminals shall give due publicity to such requirements and shall communicate them to the competent international organizations.

Article 198 and 199 require that "When a State becomes aware of cases in which the marine environment is in imminent danger of being damaged or has been damaged by pollution, it shall immediately notify other States it deems likely to be affected by such damage." and "States shall jointly develop and promote contingency plans for responding to pollution incidents in the marine environment."

The International Convention for the Prevention of Pollution from ships, MARPOL 73/78, adopted by IMO in 1973 was the most important convention with respect to prevention of pollution from ships. It covers all the technical aspects of pollution and some aspects of accidental pollution from ships, but does not apply to the disposal of land generated wastes into the sea by dumping within the meaning of the 1972 London Dumping Convention, nor the release of harmful substances directly arising from the exploration and exploitation of sea-bed mineral resources.

This convention establishes strict standards for discharge and for equipment and facilities on board ships. It requires coastal States to establish receiving facilities in their ports. Any violation of the convention, such as the unlawful discharge of harmful substances or non-compliance with convention requirements in respect of the construction and equipment of a ship, wherever such violation occurs, is made punishable either under the law of the coastal State or under the law of the flag State.

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, 1972 prohibits the dumping of certain hazardous materials, and requires a prior special permit for the dumping of a number of other identified materials and a prior general permit for other wastes or matter. Among other requirements, Contracting Parties undertake to designate an authority to deal with permits, keep records, and monitor the condition of the sea.

The International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969, affirms the right of a coastal State to take such

measures on the high seas as may be necessary to prevent, mitigate, or eliminate danger to its coastline or related interests from pollution by oil or the threat thereof, following a maritime casualty.

The International Convention on Oil Pollution Preparedness, Response and Cooperation, adopted in 1990, provides for a global framework for international cooperation in combating major incidents or threats of marine pollution. Article 1 states that Parties undertake to take all appropriate measures to prepare for, and respond to, an oil pollution incident.

Article 6 states that "Each Party shall establish a national system for responding promptly and effectively to oil pollution incidents." Detailed requirements are described in Article 6 to Article 10.

Although the responsibility of prevention of pollution from ships falls in principle on the maritime safety administration, the organizational arrangement is different from country to country. For example, in China the State Ocean Administration is the principal authority responsible for the prevention of marine pollution by dumping of wastes, and the State Bureau of Environment Protection is responsible for the control of all kinds of pollution in general.

Navigational Services

This area includes aids to navigation, hydrography, pilotage, vessel traffic service (VTS), and communications. The role of navigational services is to facilitate ship navigation and to protect against loss of life or property, or damage to the environment.

Due to historical, economic and technical reasons, the role and functions of the maritime safety administration in respect of this area vary from country to country. Aids to navigation and vessel traffic services are within the MSAs in some countries, such as USA, Australia, Japan, China and Sweden, but they are the responsibility of other levels of government or non-government organizations in countries like UK and Germany. Hydrographic survey and the production of nautical charts and publications in many countries are assigned to the navy. In most countries, pilotage, and communication services are provided by private organizations although they are restricted, to some extent, on their flexibility for public services.

In any case, since navigational services are so important in shipping, and directly affect maritime safety, conceptually the MSA must maintain a general oversight

in this area, especially where the responsibilities under international laws are concerned. While the MSA does not necessarily provide direct navigational services, its coordination and cooperation role remains important.

CHAPTER III
TRENDS IN THE CHANGING ENVIRONMENT

During the second half of the 20th century, the world shipping industry has witnessed a tremendous evolution, not only in the ship itself but also the industry as a whole. Ships and shipping companies are no longer the same structure as fifty years ago when the industry was dominated by some traditional maritime countries. World economic and trade development is the major driving force in the trends and processes of the shipping industry. As 95% of world trade by volume goes in whole or in part by sea, increasing world seaborne trade requires shipping to adapt to meet such demand. At the same time fierce market competition makes it natural for shipowners to seek to increase the productivity of their fleets and save operational expenses. Technology has provided the opportunity for shipping evolution in many ways. To achieve economies of scale, ships have become much bigger based on the revolutionary changes in cargo handling in ports. The first VLCC oil tanker of more than 200, 000 DWT, the *Idemitsu Maru*, was launched in 1966 and the largest ULCC, *Batillus* of 554, 000 DWT, was built in 1977, just as examples. Today, many ships have been equipped with automatic navigation systems, ECDIS with DGPS and radar image. Information technology has been widely used in both commercial transactions and management.

As far as maritime safety and prevention of pollution from ships is concerned, governments of maritime States have become convinced of the need for greater international cooperation. In the fifty years since the inauguration of the International Maritime Organization (IMO), more than 40 conventions have been adopted under the umbrella of IMO with respect to maritime safety and pollution prevention. However, with the experience gained from the past, people believe that regulation and enforcement is not the only way to deal with safety and pollution prevention. Many now feel that quality shipping should be encouraged within the industry and emphasis should be shifted to deal with human factors, which is the major cause of maritime accidents or incidents.

3.1   Increasing Demand of Shipping and Fragment

Shipping is nothing by itself. Its purpose is solely to transport cargoes, by whatever type, tanker, bulk carrier, or container ship, or cruise ships and ferries to transport passengers from one place to another. Equally world trade without shipping would quickly come to a halt. Thus, shipping and world trade are closely correlated to

each other. Shipping has already been regarded as the safest, most efficient and environmentally friendly means of transportation. Since World War II, developing countries have participated extensively in world shipping, both through the development of national fleets and provision of seafarers.

3.1.1 World Trade and Shipping

According to UNCTAD statistics (1999, p.5), the world seaborne trade expanded at around 3% per annum between 1990 and 1996. Table 3.1 shows the development of international seaborne trade from 1990 to 2000 by different commodities. Of these, world tanker shipments reached an average annual growth rate of 3.4% in the 1990s. But the growth rate slowed after 1998 due to the serious financial crisis that has prevailed in Asian countries since 1997. In contrast the total seaborne dry cargo trades grew at an annual rate of 5.7% during the 1970s and then fell to 2.3% during the next decade of the 1980s. Since 1990, the average growth rate has picked up again to 3.5% a year.

Table 3.1

Development of international seaborne trade

Year	Tanker cargo		Dry cargo				Total (all goods)	
	Millions of tons	Annual change %	Total		Of which: main bulk		Millions of tons	Annual change %
			Millions of tons	Annual change %	Millions of tons	Annual change %		
1990	1 755		2 253		968		4 008	
1991	1 790	2.0	2 330	3.4	1 005	3.8	4 120	2.8
1992	1 860	3.9	2 360	1.3	990	-1.5	4 220	2.4
1993	1 945	4.6	2 385	1.1	993	0.3	4 330	2.6
1994	2 007	3.2	2 478	3.9	1 028	3.5	4 485	3.6
1995	2 049	2.1	2 602	5.0	1 082	5.3	4 651	3.7
1996	2 127	3.8	2 631	1.1	1 092	0.9	4 758	2.3
1997	2 172	2.1	2 781	5.7	1 157	6.0	4 953	4.1
1998	2 181	0.4	2 884	3.7	1 200	3.7	5 064	2.2
1999	2 223	1.9	2 950	2.3	1 227	2.3	5 173	2.2
2000	2 256	1.5	3 099	5.1	1 289	5.1	5 355	3.5

Source: UNCTAD secretariat on the basis of data supplied by specialised sources.
Main bulk includes iron ore, grain, coal, bauxite/alumina and phosphate.

Data on total demand for shipping services in terms of ton-miles are provided in table 3.2. World seaborne trade by volume increased marginally by 2.2% in 1998, whilst the total shipping performance measured in ton-miles in 1998 decreased by 1.1%. The decrease in ton-miles reflected mainly the changing trade structures and consignment reductions in average transport distances of oil products and some major

dry bulk commodities such as coal and grain. Table 3.2 also shows that the demand for shipments of oil and major dry bulk increased slightly in general during the last 30 years, while liner shipments of containerised cargo increased far more than others. This supports the view that world seaborne trade is growing faster in value-added commodities than in raw material.

Table 3.2

World shipping performance by types of cargo (billions of ton-miles)

Year	Oil		Three major bulk		Other cargo		total	
	billions of ton-miles	Annual change rate %	billions of ton-miles	Annual change rate %	billions of ton-miles	Annual change rate %	billions of ton-miles	Annual change rate %
1970	6 487		2 049		2 118		10 654	
1980	9 405		3 652		3 720		16 777	
1985	5 157		4 158		3 750		13 065	
1990	7 821		4 900		4 440		17 161	
1993	9 166		4 988		4 840		18 994	
1994	9 329	1.78	5 171	3.67	5 100	5.73	19 600	3.19
1995	9 170	-1.70	5 623	8.74	5 395	5.78	20 188	3.00
1996	9 403	2.54	5 570	-0.94	5 705	5.71	20 678	2.43
1997	9 727	3.45	5 945	6.73	6 000	5.17	21 672	4.81
1998	9 790	0.65	5 695	-4.21	5 940	-1.00	21 425	-1.14

Source: calculation based on data from UNCTAD report 1999.
a   Oil includes crude oil and oil products
b   Three major bulk are iron ore, coal, and grain.

Comparative time-series data on the world fleet for 1996, 1997 and 1998 are given in table 3.3. The world merchant fleet reached 788.7 million dwt at the end of 1998. This represents a 1.6% increase over 1997, when the world fleet had expanded at a rate of 2.3% as compared with 1996.

The combined tonnage of oil tankers and dry bulk carriers continue to dominate the world fleet, representing 71.8%, 71.3% and 70.3% in 1996, 1997 and 1998 respectively. General cargo ships and container ships accounted for 12.8% and 7.8% of total tonnage in 1998, and followed a general trend that the volume of conventional general cargo decreases and the volume of container traffic increases with a strong growth rate of 9% in 1998. This also supports the view that world seaborne trade is increasing in value rather than in volume.

Table 3.4 shows the distribution of the number of ships and deadweight ton (dwt) of the world fleet by groups of countries in selected years. In 1998, the world total fleet expanded by 1.7% to 788.7 million dwt. Tonnage shares of both developed market-economy countries and developing countries in the world total tonnage have

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Table 3.3

World fleet size by principal types of vessel, 1996—1998 (x1000 dwt)

Principal types	1996	1997	1998	Percentage change 1997/1998
Oil tankers	271 454	272 023	279 509	2.8
	35.8	*35.1*	*35.4*	
Bulk carriers	272 564	281 012	275 519	-2.0
	36.0	*36.2*	*34.9*	
Ore/bulk/oil	21 922	20 256	17 720	-12.5
	2.9	*2.6*	*2.2*	
Ore/bulk	250 642	260 756	257 799	-1.1
	33.1	*33.6*	*32.7*	
General cargo ships	104 642	103 880	101 259	-2.5
	13.8	*13.4*	*12.8*	
Container ships	48 766	56 108	61 147	9.0
	6.4	*7.2*	*7.8*	
Other types of ships	60 745	62 904	71 291	13.3
	8.0	*8.1*	*9.0*	
Liquefied gas carriers	15 507	16 021	16 471	2.8
	2.1	*2.1*	*2.1*	
Chemical tankers	7 913	7 846	7 740	-1.4
	1.0	*1.0*	*1.0*	
Miscellaneous tankers	699	920	885	-3.8
	0.1	*0.1*	*0.1*	
Ferries and passenger ships	4 492	4 614	4 803	4.1
	0.6	*0.6*	*0.6*	
Others	32 134	33 503	41 392	23.5
	4.2	*4.3*	*5.2*	
World total	758 172	775 927	788 725	1.6
	100.0	*100.0*	*100.0*	

Source: UNCTAD secretariat on the basis of data supplied by Lloyd's Maritime Information Services (London).

a   Percentage shares are shown in italics.

Table 3.4

Distribution of world tonnage (dwt) by groups of countries

Flags of registration	Number of ships			Tonnage in dwt (millions)			
	1996	1997	1998	1980	1990	1997	1998
World total	1954	2204	2365	682.8	658.4	775.8	788.7
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Developed market-economy countries	592	675	728	350.1	219.0	202.5	202.6
	37.1	*30.6*	*30.8*	*51.3*	*33.3*	*26.1*	*25.7*
Major open registry countries	683	800	887	212.6	224.6	361.0	376.8
	32.7	*36.3*	*37.5*	*31.1*	*34.1*	*46.5*	*47.8*
Developing countries	584	638	667	117.1	206.1	200.2	197.5
	29.9	*28.9*	*28.2*	*17.1*	*31.3*	*25.8*	*25.0*

Source: calculation on the basis of data from UNCTAD report 1999.
a.   Percentage shares are shown in italics.
b.   Developing countries include countries of Central and Eastern Europe, socialist countries of Asia, and other developing countries.

decreased since 1990, while shares of major open registry countries have continuously increased during the same period. Analysis of the open registry fleets (UNCTAD, 1999) indicates that the share of tonnage owned beneficially by developing countries has increased since 1980s and reached one third in 1998. On the other hand, developed countries' overall share represents about two thirds of the total tonnage registered in open registry countries. If the total tonnage registered in major open registry countries is broken down and separated by two thirds being added to the tonnage of developed countries and one third being added to the tonnage of developing countries, the two groups represent 57.57% and 40.93% respectively of the world total tonnage. This gives a general sense that developed countries still control more than half of the world tonnage, whilst developing countries are dominating a large proportion of the world fleet.

Table 3.5 provides data on the age distribution of the world merchant fleet by types of vessels and by groups of countries. By country grouping, the major open registry countries have the lowest average age of all ships (14.30 years in 1998 versus 14.48 years in 1997), as a growing tendency to place new buildings under open registry

flags can be observed. Comparatively, the average age of tonnage registered in developing countries is the oldest, representing 76.5% of vessels over 15 years.

Table 3.5

Age distribution of the world merchant fleet by types of vessel, as at 31 December 1998

Country grouping	Types of vessel	Total	0-4 years	5-9 years	10-14 years	15 years and over	Average age in 1998
World total	All ships	100	17.8	16.6	14.3	51.4	14.54
	Tankers	100	13.8	22.3	8.7	55.1	15.00
	Bulk carriers	100	22.3	13.7	19.3	44.7	13.56
	General cargo	100	8.9	9.2	15.6	66.3	17.28
	Container ships	100	33.9	18.2	14.8	33.0	10.99
	All others	100	14.2	14.5	14.2	57.1	15.57
Developed market-Economy countries	All ships	100	17.5	16.9	15.6	50.0	14.41
	Tankers	100	13.0	18.1	10.1	58.8	15.68
	Bulk carriers	100	18.1	14.2	22.8	44.9	13.97
	General cargo	100	14.7	14.1	20.8	50.3	14.84
	Container ships	100	37.9	19.2	12.8	30.0	10.24
	All others	100	15.0	18.8	16.6	49.5	14.50
Major open-Registry countries	All ships	100	19.1	17.5	12.8	50.7	14.30
	Tankers	100	14.4	24.1	7.0	54.6	14.83
	Bulk carriers	100	23.8	13.5	17.0	45.6	13.49
	General cargo	100	11.2	10.6	17.3	60.9	16.44
	Container ships	100	32.0	18.6	15.3	34.1	11.28
	All others	100	17.6	12.3	11.6	58.5	15.48
Developing countries	All ships	100	10.0	11.4	16.1	62.5	16.67
	Tankers	100	9.4	14.9	16.0	59.7	16.27
	Bulk carriers	100	12.6	11.0	18.7	57.7	15.97
	General cargo	100	3.7	6.4	13.4	76.5	18.96
	Container ships	100	24.5	14.8	20.4	40.3	12.84
	All others	100	6.4	10.9	13.7	69.0	17.72

Source: calculation on the basis of data from UNCTAD report 1999.

3.1.2 Competition between Shipping and other Models

To large extent, the image of shipping in the general public is unfortunately seen only in the light of tragic incidents of whatever nature, loss of life, personal injury or oil pollution. Some others see it is as unnecessary since today "everything goes by air". Those who think this is so do not consider the immense tonnage of oil, primary commodities and manufactured goods which are carried by sea, day by day, safely, cheaply, and efficiently without incident, and in an environmentally friendly manner. In fact, aircraft and land transportation models carry only a fraction of world trade. More than 95% of the world import and export goods goes in whole or in part by sea. In addition, technology has created an increasing number of opportunities to make shipping more competitive, compared with other modes of transportation.

In a comparison with major transport modes, table 3.6 gives a conceptual sense with respect to the characteristics of different models. From the comparison, the character of shipping in reality today is that:

- It is the primary method of carrying commodities, especially cost sensitive rather than time sensitive commodities in large volume and over huge distances.
- It is the most environmentally friendly means of transport.
- It is essentially safe: losses, grounding and collisions are the exception.
- It is the cheapest and most cost-effective means of transport for cargoes other than high-value, low-density goods.

Table 3.6

Comparison of major transport modes

	Rail	Road	Sea	Air	Inland water
Speed	Low	High	Very low	Very high	Very low
Cost saving	High	Low	Very high	Very low	Very high
Reliability	Very high	Very high	High	High	High
Safety	Very high	High	High	Very high	Very high
Flexibility	Low	Very high	Very low	Low	Low
Availability	Low	Very high	Low	High	Very low
Environment friendly	Good	Very poor	Very good	Good	Very good
Vehicle size	<3000t	<40t	>3000t	<100t	<5000t
Door-to door potential	Low	Very high	Very low	Low	Very low
Suitable cargo (packing)	All	General cargo	All	General cargo	All
Economical distance	long	short	Long/very long	Long/very long	long

Source: Ma, S. Maritime Economics

Since the end of the World War II, the improvements in transport by sea have contributed to the growth of world trade. Transit time has been shortened considerably thanks to new technology in transport and cargo handling at ports. Transport cost per ton-mile has been dramatically reduced due to the effects of scale economies achieved by increasing ship's size. On the other hand, technology has created new markets for shipping. Fresh fruits, meats and vegetables were not transported by sea until reefer-

ships were launched. Similarly, the break through in LNG/LPG transport technology brought a new and increasing maritime demand.

Although various differences can be seen in various modes of transport, the service objective of delivery of cargoes and passengers is the same for all modes. Growth and globalization of world economic activities continue to lead developments in the logistics market. Along with simpler procedures for the delivery of goods, consumers expect service companies to provide an efficient door-to-door delivery for a flat rate. Through information and communication technology, companies offering logistic services are becoming ever more active in providing cheap and effective multi-modal transport services. This trend will not only change the structure and concept of the whole transport system but also require the development of a regulatory and legal framework, for example, the duties and obligations of States under public international law on the one hand, and commercial transactions under private international law on the other.

3.1.3   Shipping Development in Developing Countries

During the last thirty years, the structure of the world shipping industry has changed significantly. This is mainly reflected in three aspects, i.e. shipbuilding industry, national fleet development, and the provision of seafarers. The general trend shows a decline in the share of traditional maritime countries in all these fields, while the percentage of developing countries has increased.

According to the statistic of Lloyd's Register of Shipping, about thirty countries had a significant merchant shipbuilding industry. However, during the period from 1977 to 1995, Europe's market share fell from 41% to 17%, while the Far East grew from 46% to 75%. Japan and South Korea dominated the industry, between them producing two-thirds of the world ships in 1995. Traditional or developed maritime countries, such as the UK, Spain, and the USA suffered significant decline, and some countries, for example, Sweden, stopped building ships almost completely. Yet countries like Japan, Denmark, Germany and Netherlands experienced some stability in the shipbuilding industry during the same period.

In contrast, developing countries have increased their share in shipbuilding since the 1970s, including South Korea, China, Poland, Romania, and Brazil. One of the reasons for the structural change in leading shipbuilders is the close link between trade, shipping and shipbuilding, as stated by Professor Stopford (1997, p.459): "Despite the

international nature of the shipbuilding market and the absence of trade barriers such as tariffs and transport cost, the concept of a home market seems to be very strongly established in the shipbuilding industry. Even in the intensely competitive world of the 1990s, shipbuilders are very dependent upon the fortunes of their home fleet."

3.1.4   World fleets and seafarers

The world fleets of different countries can be divided into three groups according to UNCTAD Report (1995). The first group (Group I) is the traditional or developed maritime countries, including Australia, Canada, Denmark, France, Germany, Greece, Italy, Japan, Netherlands, Norway, Spain, Sweden, Turkey, UK and USA. Group II, the new maritime or developing countries (areas), includes Brazil, China, Hong Kong, India, Indonesia, South Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, and Taiwan. Group III is the open registry countries, including Bahamas, Cyprus, Honduras, Liberia, Malta, Panama, and Saint Vincent.

According to a statistical analysis (Li & Wonham, 1999, p.137-144), from 1977 to 1996, the world fleet in general grew in terms of the number of merchant ships, with an average growth rate of 1.12%. Two peaks appeared in 1989-1990, (average growth rate 4.18%) and in 1994-1995, (average growth rate 2.67%) while the lowest points were −1.50% in 1985-1986 and −1.03% in 1988-1989 respectively. It is not surprising that the top four fastest growing fleets were Bahamas, Malta, Saint Vincent and Honduras, all of which are open registry countries. Excluding open registry countries, the fastest growing fleets were China, Malaysia, and the Philippines.

If the world fleets are grouped into the growing group and the declining group, the statistics show that the growing group fleets are all developing countries, except Australia. In contrast, most of the declining group fleets are traditional maritime countries or developed countries.

Another perspective can be derived from a more detailed analysis of different fleets in groups defined by the UNCTAD. Group I, the traditional maritime states, was decreasing continuously throughout the period 1977-1995. The average growth rate was −1.35%. But in this group, Australia, Turkey and USA are exceptions, maintaining a positive growth rate. Compared with Group I, the fleets in Group II were quite stable, with an average growth rate of around 2.4%. In this group, China and Malaysia were the top growing States, while Russia and Poland experienced declines. The fastest growing group was Group III, the open registry countries. The average growth rate reached was

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3.7%, about three times more than the world mean growth rate. While, since 1994, the growth rate in Group III has been under 5%, it can be predicted that the number of ships in this group will continue to increase. In this group, only Liberia suffered a loss and all others had growth rates above the world average.

From these statistics, some conclusions can be drawn. First, the world fleet in general is increasing. Second, the world fleet has become segmented. The efforts of developing countries to expand their participation in world shipping have been very successful during the last three decades. Third, the open registry fleets have been enlarged and their growth seems to continue. This means that world maritime policy in general has accepted the fact of open registry.

A joint survey of world maritime manpower was completed by the Baltic and International Maritime Council (BIMCO) and the International Shipping Federation (ISF) in 1990 and updated in 1995 and in 2000. This survey gave detailed information on the world seafarer supply and demand situation, identifying a shortage of 18,000 officers worldwide in 1995. The survey also forecast a continuing lack of qualified and competent officers to meet future demand while anticipating an over-supply of ratings. The BIMCO/ISF study has been widely recognized and the value of such a detailed study merits solid recognition. Another survey was carried out by the ISF in mid-1998 which confirmed the conclusion of the BIMCO/ISF study and especially concluded that the number of competent and qualified officers may have been over-estimated although this survey was not regarded as scientific, being based on the perceptions of officials in ISF member associations. Whilst the preliminary data in the BIMCO/ISF survey provides a unique source for research, a deliberate study of the data, which challenged its reliability, was conducted by Professors Li and Wonham, of Cardiff University, UK in 1999. With this study a more accurate situation as to the demand and supply of world seafarers was revealed.

The study of Professor Li and Wonham was based on the following preconditions:

First, the supply of seafarers by a country is the number of active seafarers who are qualified seamen, including both those who are currently employed and those who are looking for jobs at sea, but excluding those qualified seafarers not seeking work on board ships. Demand for seafarers from a country is the number of posts which

constitute the minimum complement to operate a ship safely according to technical, managerial and legal requirements.

Second, the data relating to Chinese seamen in the BIMCO/ISF survey is questionable. The supply of Chinese seafarers in the survey was 76,481 in 1995 and the demand was 87,920. This suggests that China has a shortage of 11,439 seafarers to man its national fleet. However, the fact is that Chinese seafarers not only man their own ships but also are employed on foreign ships. The inaccuracy of the survey is attributed to the fact that the data with regard to Chinese seamen was taken from one major shipping company, i.e. COSCO, because of the lack of official data and the concept of a qualified seafarer, which may affect the calculation since Chinese seafarers used to be regarded as incompetent with the English language. In fact, according to Chinese researchers, a total of 330,000 qualified seamen were available to man ships in 1995.

Third, the shortage of 18,000 officers in 1995 calculated by BIMCO/ISF is doubtful because it is not easy to believe that the world fleet can work properly with a 4.22% shortage of officers. On the other hand, if it is true then world demand could be over-estimated.

Finally, the survey, which forecasts that there will be a surplus of 297 Chinese seafarers in the year 2000, does not support its conclusion that Chinese seafarers are the obvious long term alternative to those from the Philippines. The latest study done by the Chinese government forecasts that the supply of Chinese seafarers to foreign ships will rise to 60,000 in the year 2010, of whom 32,000 will be qualified officers.

From the preliminary data collected by BIMCO/ISF with the supplement of the Chinese data, the main suppliers and clients, consumers are given in table 3.7 (supply or demand of more than 10,000 seafarers). A positive surplus means the country is a supplier and the negative surplus means the country is a consumer.

From table 3.7, it can be concluded that:

First, it is quite logical that all open registry countries are major consumers of seafarers.

Second, except for open registry countries, most of the developing countries are suppliers of seafarers, although some of them, such as Singapore, Hong Kong, Thailand, and Kuwait have already faced problems in recruitment of their national seamen.

Third, some traditional maritime countries have become big consumers of foreign seafarers, including Japan, Germany, Greece, and Norway. On the other hand,

some developed countries, i.e. UK and Italy have become maritime labour suppliers. In 1995, UK was in a position to provide 10,205 seafarers for the foreign fleet, together

Table 3.7

Major suppliers and consumers of seamen (1995)

flag	supply			own demand			surplus		
	officers	ratings	total	officers	ratings	total	officers	ratings	total
China	117800	212200	330000	26447	61473	87920	91353	150727	242080
Philippines	49430	195352	244782	7251	10056	17307	42179	185296	227475
Turkey	15000	65000	80000	8622	8538	17160	6378	56462	62840
India	12000	31000	43000	3748	8436	12184	8252	22564	30816
Indonesia	14510	37900	52410	8743	16870	25613	5767	21030	26797
Croatia	6500	14300	20800	1057	1078	2135	5443	13222	18665
Ukraine	14000	24000	38000	7920	13968	21870	6098	10032	16130
Myanmar	5025	10070	15096	604	1407	2011	4421	8663	13084
Cabo Verde	99	13202	13301	147	211	358	- 48	12991	12943
Latvia	6170	8135	14305	1458	2490	3948	4721	5645	10357
UK	11000	12500	23500	6264	8031	13295	5736	4469	10205
Italy	14500	17800	32300	8507	13632	22139	5993	4168	10161
Panama	320	2500	2820	54559	49862	104421	-54239	-47362	-101601
Cyprus	30	1970	2000	20955	19394	40349	-20952	-17424	-38349
Liberia	45	500	545	15777	21738	37515	-15732	-21238	-36970
Japan	23788	18749	42537	31212	44573	75785	-7424	-25824	-33248
Bahamas				9764	13493	23257	-9764	-13493	-23257
Malta				9350	12963	22313	-9350	-12963	-22313
Singapore	647	534	1181	9637	8652	18289	-8990	-8118	-17108
St. Vincent				5985	8092	14077	-5985	-8092	-14077
Germany	5960	5765	11725	9205	15790	24995	-3245	-10025	-13270
Greece	22000	18000	40000	18755	32239	50994	3245	-14239	-10994
Norway	13150	8850	22000	13157	18930	32087	-7	-10080	-10087

source: BIMCO/ISF, and Li and Wonham

with Italy who could provide 10,161 seamen. This is mainly due to the decline in the number of their national ships, most of which have transferred to open registry. According to a twenty year (1977-1995) world fleet study (Li, 2000), the annual average growth rate of the number of national ships in traditional maritime countries is

-1.35% with the top four declining fleets being Denmark, UK, Greece, and Spain. However, since the introduction of a new maritime policy adopted by the developed countries, especially the second registry policy initiated by Norway, (i.e. the Norwegian International Ship Register (NIS)) and followed by Denmark (DIS), Germany (GIS), France and so on, ships that are currently registered in open registry countries may return to their national flag in the future. In fact, from 1995 to 1996, the decline of their fleets almost stopped at a growth rate of -0.33%. As a result, the national demand for their seafarers may be expected to increase.

Furthermore, the BIMCO/ISF survey pointed out that the average ratio between officers and ratings on a world basis is 1:1.4 and the ratio of traditional maritime countries is 1:1.2 in 1995. This means that developed countries contribute more officers than ratings, compared with developing countries. It also reflects the better education systems and experience that exist in developed countries.

Next, although the BIMCO/ISF survey concluded, with great concern, that the manpower would not be enough to man the world fleet in the coming years, actually the situation seems to be not as serious as supposed. The shortage of seafarers will be mainly those officers who are fully competent to be employed on different ships, whatever their type, size, ownership or management, and who have a good command of English and skill in communicating with colleagues from different cultures and backgrounds. In contrast, ratings will be over-supplied in most of countries.

Finally, studies of the world fleet and world seafarers reveal that the shipping industry and manpower will be diversified with the result that ship registration and seafarer supply have now become part of the shipping services, and the active participation in world shipping by the developing countries has already taken place.

3.2   Technology

The last century, especially the second half, saw an unprecedented evolution in science and technology, which has deeply influenced human life and activities everywhere. What was impossible yesterday may now well be possible today.

Shipping industry is not the exception. Indeed, from ship design and construction to ship scrapping, from port evolution and ship navigation to the industry's management practices, everywhere has experienced such great changes that qualified people working in the industry some years ago may no longer be able to find a job without updating their knowledge.

In order to understand the revolutionary changes and its consequence within the scope of safety and pollution prevention, the development of ship technology itself, as well as navigation and communication are examined in the following sub-sections.

3.2.1 Revolutionary Changes in Shipping Technology

Over the years, two aspects relating to technological change in shipping are very evident. The size of ships has become considerably bigger; and ship speed has steadily increased.

As world seaborne trade has increased and shipping competition has intensified, bigger ships have been built aimed at achieving economies of scale. The first generation of oil tankers, of which the "Gluckauf", built in 1886, is generally regarded as the prototype, was small, at around 3,000-5,000 DWT. During the second World War, the famous US-built T2 standard tanker, the most numerous class ever built, was about 15,000 DWT. Competition pushed size ever upwards, with the Greek supertanker "Universe Apollo" of 114,350 DWT in 1959, which was the first to top 100,000 DWT. After that, seven years passed before Japan's "Idemitsu Maru" broke the 200,000 DWT barrier and only a further three years before Gulf Oil's "Universe Ireland" reached 330,000 DWT.

The bulk carrier has evolved in the same way as the oil tanker. At the turn of the twentieth century, the Swedish ore-carrier "Vollrath Tham" of 8,000 DWT was built. The next increase in size occurred in the early 1920s when the US Ore Steamship Co. ordered five ore carriers of 22,300 DWT. Since the 1950s, some very large bulk carriers have been launched, notably the ore/oil carrier "Sinclair Petrolore" of 60,400 DWT in the 1950s, panamax size (50,000-70,000 DWT) in the 1960-70s, and even bigger vessels of up to 300,000 DWT in the 1986s.

Perhaps the most spectacular development is in the container ship sector. The idea of containerisation was first introduced by the US truck driver Malcolm McLean in the 1950s. In the 1960s, container ships were actually put into service with a capacity of about 1,500 TEU, which doubled the carrying capacity of a conventional general cargo ship. Container ships have since grown rapidly in size. The last twenty years has witnessed the development of containerships from one generation to another. The 6,000 TEU, which was introduced first by Maersk, is now the largest container ship in service. The German ship yard HDW has finished the design of a 8,000 TEU ship, while designs are already in being for Malaccamax vessels of 18,000 TEU (BIMCO, 2000).

Table 3.8 and 3.9 gives a general idea of the changes in world ship size during last two decades. It will be noticed that almost all types of world fleet have increased in size significantly, especially new built ships. The only exception is chemical carriers which have remained almost stable during this period.

Table 3.8

Average size of world fleet by types and years (Bulk and Tanker)

Year/period	Pre-1979	1979/83	1984/88	1989/93	1994/98	1999	2000
Bulk carriers							
Number	1 695	959	1 037	477	1 202	208	108
DWT (x1000)	58 486	44 405	51 960	34 835	74 734	13 374	8 680
MDWT	34 505	46 303	50 106	73 029	62 175	64 298	80 370
Crude tankers							
Number	610	227	125	323	256		
DWT (x1000)	90 653	21 879	15 531	53 896	44 715		
MDWT	148 611	96 383	124 248	166 861	174 668		
Oil product tankers							
Number	289	243	246	182	174		
DWT (x1000)	8 694	8 866	10 774	8 139	7 667		
MDWT	30 083	36 486	43 797	44 720	44 063		
Chemical carriers							
Number	71	100	75	50	135		
DWT (x1000)	1 980	2 407	1 729	1 035	3 167		
MDWT	27 887	24 070	23 053	20 700	23 459		
Total tanker							
Number	970	570	446	555	565	248	144
DWT (x1000)	101 327	33 151	28 034	63 070	55 450	20 430	18 570
MDWT	104 461	58 160	62 857	113 640	98 142	82 379	128 958

Source: calculation based on data from Annual Shipping Outlook 1999, Simpson
    Spence & Young (SSY) consultant Ltd.
Note: 1. Bulk carriers include general bulk carriers, ore carriers, bulk/container, bulk
    cement and chip carriers.
    2. Data in 1999 and 2000 is ships on order as at 1st March 1999.
    3. MDWT: mean dead weight ton.

The main engine design has shifted with the times. From the late 1979s to the early 1980s, the main objective was low consumption. During the 1980s, lower manufacturing cost became key and in the 1990s, the directing interest has been how to reduce exhaust emissions.

Table 3.9

Average size of world fleet by years of building

Ship's age	0-4 years	5-9 years	10-14 years	15-19 years	20 years & above
Container ships					
Number	1 016	384	304	299	379
DWT (x1000)	27 838	11 164	9 088	6 276	26 648
TEU	1 995 177	729 442	587 132	366 536	368 244368 244
MTEU	1 964	1 900	1 931	1 226	971
All passenger ships					
Number	437	535	396	360	1 159
GT (x1000)	2 464	1 642	774	439	2 506
MGT	5 638	3 069	1 955	1 219	2 162
Total world fleet					
Number	9 624	10 241	11 704	14 223	40 036
GT (x1000)	118 851	86 657	80 190	85 050	161 145
MGT	12 349	8 462	6 852	5 980	4 025

Source: compiled based on data from World Fleet Statistics 1998, Lloyd's Register.
Note: MGT: mean gross ton

Sulzer has created an "intelligent Engine" concept which includes reliability, operational economy, flexibility, emission and maintenance requirements, plus condition monitoring and fault diagnosis systems with self-correcting functions to avoid engine failure, plus computer based management features, such as maintenance planning and spare parts control.

B & W aims for reliability with high output, and shorter and lighter engines. It has developed a CoCoS (Computer Controlled Surveillance) monitoring and diagnosis system in order to supervise the engine conditions, save on repairing and maintenance cost and the management of spare parts. In the future, B & W engines will have a self-correction function to correct abnormalities, and all "button" controls in the engine room will be replaced by "key" controls by computer.

Conventional large diesel engines have been replaced, or supplemented by the introduction of medium and high-speed engines, and gas turbines for the larger and faster craft. In addition, the compact medium speed engines are increasingly being used in the "power station" concept, which uses a "diesel-electric" system for power

generation and supply to all on board services. For example, one arrangement is a special rudder plus bow and stern thrust using an azimuthing device, while another example is an integrated main and auxiliary engine system.

3.2.2 Information Technology and Navigation

Today the impact of information technology (IT) on society is unbelievably broad and complex. The primary characteristics of IT are that it is capable of processing large volumes of data, manipulating, correlating, coordinating and assigning data into parameters and functions to generate, in digestible form, information in order to be understood by people who will be able to perform efficiently in their work. In recent years, information technology has been applied widely in many areas of the shipping industry, such as the Internet, automatic navigation systems, as well as electronic chart display and information systems (ECDIS) and the differential global positioning system (DGPS).

The Internet, together with the associated technology, is developing so rapidly that nobody can safely predict what services and what possibilities it will offer in 12 months' time. Generally speaking, a maritime safety administration can use it in three ways. The first, and simplest way is to send and receive e-mails. A straightforward e-mail connection allows a single site to send and receive text messages more effectively and cheaply than any other currently available method. For the cost and time involved in sending a message to 20 destinations by telex or fax, an Internet user can reach 5000 destinations. Second, the Internet can be used as an information broadcasting system. A carefully designed web site can be easily accessed by interested users. In this way, a maritime safety administration may open the information door to industry and the general public, for example, introduction of the administration, ship's registration, information about port State control, and new regulations. Moreover, the maritime safety administration may use the Internet to provide certain services, such as information on navigational charts and publications, navigational warnings, and training information. Finally, the Internet can also be used as an information source. A few carefully selected key words will draw down only those items of interest to the user, filtering out extraneous matter and saving time on seeking out options or reading through listings, manuals and catalogues. For example, it will save significant time when an officer of a search and rescue unit or port State control searches for information on a vessel, once it is available in the Internet.

The revolution in maritime technology has essentially eliminated the traditional skills employed in getting from A to B, giving us instead bridge layouts like the cockpit of a plane and paving the way to one-man operation, a comfortable seat, movement and hands-on alarm systems and voyage data recorders. One example is the ECHO (European Chart Hub Operation) project, which allows the ship to receive electronic navigational charts (ENCs) around the world and to receive and update the chart data in minutes on board (On-The-Bridge, 1998). The trend towards an integrated navigational system has as its aim to connect all the different systems, such as navigation, engine monitoring and control, cargo monitoring, propulsion, hull stress and loading conditions, weather routing and engine maintenance, into one integrated control system.

Rapid advancements in technology particularly in the areas of satellite navigation, telecommunications and IT has led to a drastic change in navigation aids. With the growing need within the maritime industry to improve navigation safety, the electronic chart display and information system (ECDIS) has emerged as a promising navigational aid to maritime navigation and piloting.

ECDIS is a real-time geographic information system (GIS) that is capable of integrating different navigational positioning systems and ship sensors with the electronic navigational chart (ENC). It can determine vessel position continuously in real time with an accuracy consistent with the requirements of safe navigation. This accuracy can be easily achieved using the differential global positioning system (DGPS), which is now available worldwide. Ship sensors such as the echo sounder, speed log, gyrocompass, auto-pilot, and radar/ARPA can all be integrated with an ECDIS. When ECDIS and radar/ARPA are superimposed on a single display, they also serve as a device for collision avoidance detection.

In general, the ECDIS is able to provide the following functions:

- Real-time display of a vessel's position on the ENC
- Danger monitoring alarms against land, charted objects and unseen hazards
- Anti-grounding warnings
- Anti-collision warnings
- Capability to carry out route planning, route monitoring
- Automatic chart updates

ECDIS was initiated and developed mainly under the framework of IHO, the International Hydrographic Organization, during the last twenty years. In order to harmonise the standards of ECDIS globally, the IHO has adopted two important standards, namely the Specifications for Chart Content and Display Aspects of ECDIS (IHO-52) and the Transfer Standard for Digital Hydrographic Data (IHO-57). In 1995, during its 19th Session, IMO adopted an Assembly Resolution A.817(19) on Performance Standards for Electronic Chart Display and Information Systems. For an electronic chart to be considered an ECDIS it must comply with the performance standards mentioned above, which specify the components, features and functions of the system, the primary purpose of which is to contribute to safe navigation, including functional requirements for back-up arrangements for ECDIS.

Resolution A.817(19) defines ECDIS as a navigation information system which, with adequate back-up arrangements, can be accepted as complying with the up-to-date chart required by regulation V/20 of the 1974 SOLAS Convention, by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigational sensors to assist the mariner in route planning and route monitoring, and by displaying additional navigation-related information if required.

3.2.3 Communication

Another aspect of technological development, which has deeply influenced ships' operation, is communication. In this connection, three applications are identified with respect to safety and pollution prevention, i.e. vessel traffic systems (VTS), ship reporting systems and the Global Maritime Distress and Safety System (GMDSS).

Vessel Traffic Service (VTS) is a specially designed system which controls vessel traffic and provides consulting services in special areas, especially those in which the volume of traffic or the degree of risk justifies such services. Based on advanced communication systems, a VTS system includes such functions as information provision, traffic organization, navigation assistance and support to allied activities, which contribute to safe navigation, traffic efficiency and environment protection.

In June 1997, IMO adopted a new regulation on VTS in SOLAS Chapter V (Regulation 8-2), which states that vessel traffic services should be designed to contribute to the safety of life at sea, safety and efficiency of navigation and the protection of the marine environment, adjacent shore areas, worksites and offshore

installations, from possible adverse effects of maritime traffic. However, the VTS system is generally an individual government concern on a voluntary basis and follows national regulations in terms of technical standards.

In addition, to enhance maritime safety and pollution prevention, "A ship reporting system, when adopted and implemented in accordance with the guidelines and criteria developed by the Organization pursuant to this regulation, shall be used by all ships, or certain categories of ships or ships carrying certain cargoes in accordance with the provisions of each system so adopted." (SOLAS, Regulation 8-1).

The initiation of action for establishing a ship reporting system is the responsibility of individual governments, but governments are expected to refer proposals for the adoption of such systems to IMO, which will collate and disseminate to other countries all relevant information with regard to any adopted ship reporting system.

Another applicable area of the advanced communication technology is the Global Maritime Distress and Safety System (GMDSS), which has significant importance for a ship's safety at sea. The GMDSS was introduced by means of amendments to SOLAS in 1988, and it became fully effective from 1 February 1999. On that date, the Morse Code was phased out and all passenger ships and all cargo ships of 300 gross tonnage and upwards on international voyages were required to carry certain equipment designed to improve the chances of rescue following an accident.

The basic concept is that search and rescue authorities ashore, as well as ships in the immediate vicinity of the ship in distress, can be rapidly alerted through satellite and terrestrial communication techniques to a distress incident, so that they can assist in a coordinated SAR operation with the minimum of delay. Whilst the global search and rescue plan was designed to provide a global system for responding to emergencies, the GMDSS was established to provide it with the efficient communication support it needs. Both GMDSS and SAR are crucial to maritime safety and they are designed to ensure that any emergency at sea will result in a distress call, and the response to that call will be immediate and effective. It means that the days when a ship could vanish without trace should have come to an end.

The components of the GMDSS include:
- Inmarsat
- Enhanced Group Calling (EGC)

- Emergency position-indicating radio beacons (EPIRBs)

- High frequency (HF) service

- Digital Selective Calling (DSC)

- Medium-range service

- Short-range service

- Radar transponders

- NAVTEX

- Radio personnel

- World-Wide Navigational Warning Service (WWNWS)

In the long run, the development of new communication systems will offer shipping great opportunities. The development of global satellite systems which can be used by anyone equipped with a hand-held mobile telephone, could be used by people at sea as well as those on land or in the air.

3.3   Safety Net and Safety Culture

Shipping is not only one industry. It can be regarded as many different industries, from ship design and building through ship operation to ship scrapping, consisting of an integrated shipping chain. Within the chain, all participants are contributors to maritime safety, but they have different roles during the process of safety management. They comprise of the "safety net".

It is worth noting that the general public is really only aware of disasters involving the loss of passengers' lives and damage to the environment. Very few outside the shipping world realize the causes of maritime incidents and the losses of hundreds of seafarers' lives and enormous property loss.

When analysing maritime accidents the 80-20 rule can be applied. That is 80% of the accidents are due to the human failure/human factors, which also can be termed substandard practice, and only 20% fall into the category of failing technology, also known as substandard conditions. However, if Rules and Conventions are examined the ratio is opposite. 80% of the conventions such as SOLAS, MARPOL, Load Line and Class Rules deal with technical matters and only 20% are focused on the human side.

Apart from the safety net, the difference in cultures is another important factor influencing safety practices. Attitudes, communications, conflict-solving strategies and the like are all worthy of attention with regard to maritime safety.

3.3.1 Safety Net

Although the shipping industry has improved its performance over the years, accidents still happen from time to time. Quality shipping is not the norm for most parties in the maritime industry. As mentioned earlier, 90% of maritime accidents are attributed to human factors. Obviously, the shipowner is the prime actor responsible for the quality of his ship and its operations. But he does not work on his own. He operates within a system of flag State, shipbuilder, banker, insurer, charterer, cargo owner and classification society, who are all involved in the shipping business in one way or another and, therefore, comprise the safety net. However, in the case of substandard shipping, they are driven primarily by the lure of low costs, market share and short run profits.

The parties within the safety net can be categorised into three groups according to the nature of their behaviours. The first group is the public sector, including flag States and port States. The second group is made up of the private parties or commercial side, of which the shipowner is the key player with respect to safety and pollution prevention. Others in the second group include the shipbuilder, banker, insurer, charterer, cargo owner, and port authority. The third group is the classification society, which is a non-profit making entity but with a public attribute in terms of statutory survey and certification.

Figure 3.1 gives a general understanding on the relationship of different parties within the safety net. The different roles of the parties within the safety net, and the relationship between the safety net and safety culture, will be discussed in more detail in chapter VI.

Figure 3.1

The relationship of different parties within the safety net

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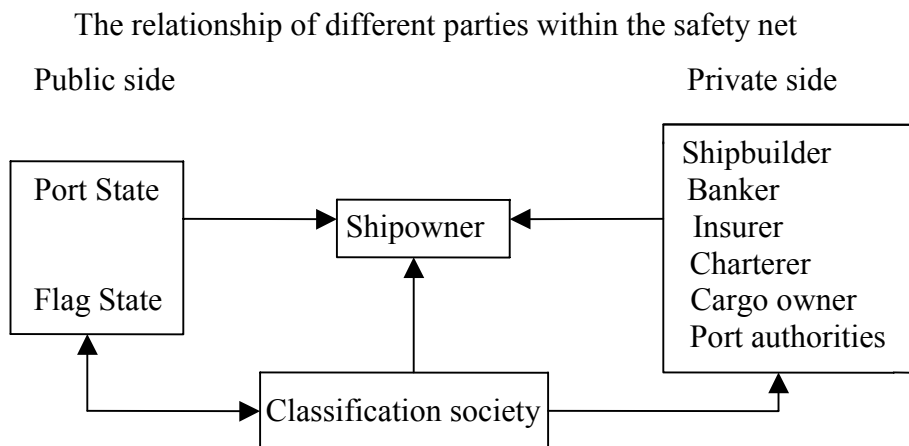
3.3.2 Safety Culture

Safety culture can be defined (Dyrhaug & Holden, 1996) as "A series of beliefs, norms, attitudes, roles and social and technical practice which are established to minimize the exposure of employees, managers, customers and third parties to hazard." Similarly, another definition is given by Weick (1987, p.113): "Safety culture is a clear understanding of the system and its safety features, positive attitudes towards safety measures, and an incentive system that encourages safety in operations." Safety culture is an organizational attribute, in which individuals' behaviour towards safety is heavily influenced by collective attitudes and traditional customs of particular organizations. Therefore, safety culture varies from different organizations, especially in the organizations which have multi-national employees.

The first effort to measure safety culture was studied by Zohar (1980, p.112-127), who examined the effects of a safety culture in industrial organizations in Israel. He used factor analysis to identify components of the safety culture which permitted the distinction between high-accident and low-accident companies. He found eight factors affecting safety culture:

- Perceived management attitudes on safety
- Effect of safe working practices on promotion
- The social status of individuals
- The status of the safety officer
- The status of the safety committee
- The importance/effectiveness of safety training
- The risks at the workplace, and
- Enforcement versus guidance.

A factor which is not in Zohar's findings but which might differentiate between organizations with a positive safety culture is the thoroughness and degree of sophistication with which accidents and other safety related events are investigated and analysed.

From the definition of safety culture and its influencing factors identified above, it seems to be generally accepted that attitudes and perceptions affect one's propensity towards having accidents. But an organizational safety culture directly influences

individual behaviour in the organization. For example, pilots are more likely to model their own behaviour after the behaviour they have learned or observed from their predecessors in the organization, because they believe it to be the norm of the organization.

It is generally agreed that safety culture has an effect on factors such as communications, decision making, conflict solving, attitudes, motivation, leadership, etc. which are recognised human factors with regard to accidents or incidents, and an organizational safety culture can be improved by addressing commitment from top leaders. This is part of the answer as to why the ISM Code and STCW Convention are advocated by the maritime industry. One proposal has been suggested by some scholars that the safety culture is to reduce human errors by reducing the likelihood of errors, trapping errors before they have an operational effect, and mitigating the consequences of errors.

3.4   Formal Safety Assessment

Formal Safety Assessment (FSA) is a structured and systematic methodology designed to arrive at a balanced regulation of maritime safety or marine pollution risks which takes account of both technical and operational/human issues. It is a tool for pro-active control of risks, rather than reactive decisions, by identifying hazards, assessing risks and taking preventive measures. By using Formal Safety Assessment, not only can new safety or environmental regulations and other preventive measures be proposed by risk assessment, but also the regulations and measures can be justified by cost/benefit assessment, thereby ensuring that reasonable regulations will be put into practice.

FSA was first introduced to IMO by the United Kingdom in 1993 based on experience already gained by other industries, such as the nuclear power industry and the offshore oil production industry. The UK proposed that, as a strategy, IMO should gradually introduce the FSA in the setting up of its regulations in maritime safety and ship's design as well as safety management. FSA includes five steps:

- Hazard identification
- Risk assessment, and evaluation of influences on risks, using both quantitative methods and expert judgements
- Identification of alternative options to control risk
- Cost/benefit assessment of each option
- Recommendations for decision-making on risk control/management measures

In 1997, Guidelines for the application of FSA were approved by the IMO's two main technical bodies, the Maritime Safety Committee (MSC) and the Marine Environment Protection Committee (MEPC). Far from being a formal application of regulations, these guidelines are deliberately meant to be of an interim nature, and to remain as long as it is necessary to gain experience with FSA.

Their principal aim is to ensure that FSA trial applications are conducted, and documented, in a uniform and systematic manner. The interim guidelines also include a standard format for the consistent reporting of trial results.

Since 1998, a number of exciting FSA trial applications have been studied by individual IMO member governments and industry bodies. These studies include a number of FSA projects, including, for example, the International Association of Classification Societies' (IACS) application to bulk carrier safety and ballast water management; FSA application on ro-ro ship safety undertaken by Scandinavia countries; a USA and Sweden FSA project on shipping management; and a FSA project on high-speed craft conducted by China.

The MSC, at its May 1999 meeting, discussed a proposal submitted by IACS to extend the scope of the FSA interim guidelines to include a human reliability analysis. This matter will be further considered in more detail at the MSC next session in May 2000 with a view to incorporating a new Appendix.

In spite of the interesting and inspiring trial applications, however, it is widely accepted that it is far too early to make FSA an integral part of the official rule-making process and, therefore, no firm conclusions should be drawn from FSA trials for the time being.

FSA may be open to discussion that it is not focused on the right problems, or is not addressing them properly, unless some negative features can be removed.

First of all, since FSA starts with hazard identification and risk assessment, whether FSA will help us to exert a proper measure of control over ship safety and pollution risks unavoidably depends on political considerations. FSA can do no more than provide a basis for making decisions on risk criteria, or on target levels of risk. However, the issue of whether or not particular risks are tolerable is a matter of awareness, perception and willingness to pay, which varies from country to country.

Second, the results of accident investigation provide unique, real-life information about actual hazards and risks which can then be used for hazard evaluation

and risk assessment in the FSA process. The availability of authentic, reliable and accurate data is vital to the credibility of the FSA. However, there is no such thing as "total information". Human nature does not allow us to know absolutely everything. So, false facts will lead to wrong decisions.

Moreover, "expert judgement" is widely used in casualty investigation and it is also an integral part of FSA. Due to the lack of reliable and comparable data, the qualitative considerations in FSA will shape FSA considerably, in terms of both the practical development of the methodology and the results obtained from its applications.

Finally, although FSA will undoubtedly be expected to form part of the future management of maritime risk, it cannot succeed unless every player in the industry feels sufficiently inspired to take up his responsibility for safety with respect to transparency of information, consistency of conduct, and scientific exercise without political intervention.

To conclude, political influence and quality of information do not necessarily prevent us from action. At the end of the day, people need to be convinced of the usefulness of new approaches and techniques if proposals for new or improved regulations are to gain credibility. As more experience is gained with FSA applications, it may be expected that a better understanding of this particular technique and its use within the FSA process will evolve. The technique of FSA will undoubtedly play more and more of a role for the benefit of the whole industry in the future.

CHAPTER IV
COORDINATION AND COOPERATION

The nature of public administration has been defined as "…decision-making, planning the work to be done, formulating objectives and goals, establishing and reviewing organizations, directing and supervising employees, exercising controls and other functions performed by government executives and supervisors. It is the action part of government, the means by which the purposes and goals of government are realised." (Barber, 1972, p.1). Public administration is basically the administrative side of the government, a part of the executive, as opposed to the legislative and judicial powers.

Although the maritime safety administration is a government specialized agency with its objective directed towards maritime safety and prevention of pollution from ships, its nature still falls generally into public administration. Therefore, the key roles of the maritime safety administration should include planning, decision-making, coordination, as well as monitoring and supervision. In this connection, three areas are worthy of discussion: the classification society, search and rescue, and pollution preparedness and response.

4.1   Classification Society

As part of the public administration, it is not rationally and economically feasible for a maritime safety administration to duplicate the work and techniques of the classification society. As a result, naturally all maritime safety administrations in various countries have delegated, to some extent, the statutory work of ships' inspections and certification to classification societies. However, international conventions stipulate that, in every case, the administration shall fully guarantee the completeness and efficiency of the inspection and survey, and shall undertake to ensure the necessary arrangements to satisfy this obligation. Therefore, it is essential for the MSA to have some means of monitoring the work of classification societies to which they have delegated responsibilities, and to establish a close cooperative relationship with the societies so as to ensure that the work is being adequately and satisfactorily performed.

Traditionally, the classification society has had, in principle, two main functions. One is to produce rules and regulations and apply them to ships' classification, which is the assessment of ships (and offshore units) against those rules developed to govern

structural integrity and essential engineering systems for their intended purpose. Another function is to undertake statutory surveys, inspections, and certification on behalf of flag States that delegate the roles to the society. There are over 40 classification societies in the world, but only a handful of them are considered to be of sufficient size and technological competence to undertake the tasks at hand. In 1968, this smaller group created the International Association of Classification Societies (IACS). IACS members classify more than ninety percent of the world's merchant tonnage. The basic functions of all IACS members are similar to each other, including:

- Preparation and promulgation of rules and guidelines for the design, review and construction of ships and a variety of other marine craft and structures, including material specifications and detailed regulations for periodic surveys. These rules are modified from time to time in order to keep pace with developments in shipbuilding and marine engineering; they are the standards by which the eligibility of vessels submitted for classification is determined;

- Publication of an annual record of the essential details of hull and machinery of all classed vessels and the due dates of principal surveys;

- Review and analysis of the plans and specifications of proposed new vessels, or conversions of existing vessels, to verify that they meet the standards set by the society's rules;

- Carrying out structural analysis of new or unusual vessels for which rules have not yet been developed. This may incorporate computer-aided research;

- Survey during construction of the hull and its propulsion machinery, boilers, and vital auxiliaries; and survey of the conversion of existing vessels, for compliance with the rules;

- The testing of materials for construction of hull and machinery;

- Survey of the completed vessel throughout its classed life as called. Reports of these surveys are forwarded to the shipowner from which he is able to confirm the maintenance of the vessel, establish due diligence for insurance arrangements and claims, and satisfy government requirements;

- Carrying out statutory surveys such as Load Line, SOLAS, MARPOL, and Tonnage measurement; and issuance of the relevant certificates under the authority of the cognisant government and international convention;

- Issuance of cargo gear or crane registers. These normally are statements of compliance with internationally recognised standards for safety of cargo handing gear and are required in practically all ports prior to loading or discharging cargo;

- Issuance of certificates of character of classed vessels such as Classification Certificates, Certificates of Fitness to Proceed, Confirmation of Class and Maintenance of Class. These are usually essential for insurance or sale purposes; and

- Maintenance of a history of the surveys from the moment of keel laying, and lasting the vessel's entire classed life. The classification society is able to collate this data on both hull and machinery towards improvement of design and operation. The classification society performs these tasks for all ships classed with it, and is thus able to formulate an overall picture.

To understanding the roles which classification societies have played, it is important to note that the rules and regulations produced by classification societies do not work alone. There is an extremely important relationship between these rules and the conventions and regulations adopted by the International Maritime Organization. IMO conventions exclude detailed regulations for ship structures and essential shipboard engineering systems and instead, the classification rules complement the IMO conventions. For example, the 1966 Load Line Convention requires, *inter alia*, that before a Load Line Certificate can be issued to a ship, the ship must be of adequate strength. The Convention states that ships built and maintained in conformity with the requirements of a classification society recognised by the flag Administration may be considered to possess such strength.

Another example can be found in the SOLAS Convention. SOLAS 74 requires that every cargo ship of 500 gross tons and over engaged in international trade must have a Cargo Ship Safety Construction Certificate, and all passenger ships intended for international voyages must have a Passenger Ship Safety Certificate. The Convention requires that these Certificates should be issued on the basis of the material and scantling of the structure, boilers and other pressure vessels and their appurtenances, main and auxiliary machinery including steering gear and associated control systems, electrical installation and other equipment being in all respects satisfactory for the service for which the ship is intended. The only detailed, authoritative, internationally known rules for these vitally important items are those of the classification societies.

Thus, the very general regulations of SOLAS 74 regarding ship structure and essential engineering systems and its more detailed regulations for other safety items such as subdivision and damage stability and structural fire protection, together with the detailed rules of a classification society regarding ship structures and essential engineering systems, are to be complied with before a Cargo Ship Safety Construction Certificate or a Passenger Ship Safety Certificate can be issued.

Because of the lack of specialised personnel and techniques required in the processing of ships' surveys and certification, at present more than 100 governments in the world have authorised the classification societies, in view of their expertise and the worldwide availability of highly qualified surveying staff, to implement the statutory regulations of the conventions and related codes and resolutions, either wholly or in part, and issue statutory certificates on their behalf. However, it must be kept in mind that delegation administrations still retain their responsibilities and obligations under the conventions that they have ratified.

In view of their retained responsibilities and obligations, the decisions by administrations as to what statutory work to delegate, and to which organization, is crucial. Therefore, it is vital that the MSAs, when authorising organizations to apply the regulations of the IMO conventions on their behalf, must ensure full compliance with Regulation XI/1 of the SOLAS Convention, which requires that the recognised organizations, normally the classification societies, shall comply with the guidelines developed by the IMO, including the "Guidelines for the Authorization of Organizations Acting on behalf of the Administration" adopted by the Organization by Resolution A. 739(18), the "Specifications on the Survey and Certification Function of Recognized Organizations Acting on behalf of the Administration" adopted by the Organization by Resolution A. 789(19), and MSC/Circ. 710/MEPC/Circ. 307, Model Agreement for the Authorization of Recognized Organizations Acting on behalf of the Administration. The Guidelines and Specifications contained in these two IMO Resolutions are very stringent and realistically it is believed that only the IACS classification societies can comply with them (Smith, 1996, p.14).

Since delegation does not release the MSA from its responsibilities, monitoring and supervision of the work of the classification society is necessary. It therefore follows that each delegated organization should have such a satisfactory quality system that can demonstrate the quality of its service. (IACS, p.15-16).

The activities of the classification societies in undertaking inspections of ships and issuing statutory certificates are normally performed under contracts between the societies and administrations and therefore the degree of liability of a society that would result from any negligence follows the terms of these contracts. In this connection, Mitsuo (2000. P.116) argues that "classification societies are only accountable to the administrations that recognise them and then only in accordance with the agreed contract terms. Societies are therefore not liable to other parties involved in the statutory survey and certification work that they undertake." Even if they are subject to a degree of liability set up by the contract, this liability should be limited to an amount related to the statutory survey fees.

In recent years, questions have been raised regarding the conduct of classification societies. This presents general problems for the societies, especially for the statutory work.

First, although it has always been alleged that the classification society is a non-profit-making organization, it is after all a service business and competition exists among societies. It is not necessary for the classification society to make as much profit as possible to satisfy shareholders, who do not exist in the society. The charging level is set simply to cover the cost of conducting the society's activities. However, every classification society must compete with others for larger market shares and this in turn will influence the behaviour of the society.

Second, there are several situations where commercial pressure is exerted on class with negative effects on safety. For example, shipowners may sit on classification societies' committees when they are trying to decide on ship specifications. Inevitably, safety comes at a price: through additional steel, for example, to bolster scantlings. It is at this point that commercial considerations often prevail and the society could make compromises on safety standards for the simple reason of competition.

Third, because the insurance mechanism for ships and cargoes is based on the condition that ships are surveyed and certified by a competent classification society, the society owes its duty of care to marine underwriters, and therefore is liable for having supplied inaccurate information on the ships for which the underwriters provide cover. Moreover, the society has full liabilities for the work which has been delegated by the maritime safety administration. However, it is argued that fees charged for the service of the society cover only the expenses it incurs in carrying out the surveys themselves,

together with remuneration for staff members and research costs, as well as expenditure on the maintenance of offices and administrative functions. They do not cover any level for the compensation of damage. If it becomes the strong wish of the maritime community to make societies liable to pay financial compensation for any loss or damage to vessels or cargo, a fundamental change to the existing classification system will become inevitable. In such circumstance, survey fees would have to be raised to a level that would cover any compensation for liability for the total value of the loss of ships and their cargoes, and this would place a huge financial burden not only on shipowners but also on others involved in the maritime industry.

Realiseing the problems faced by the classification societies, the Comité Maritime International (CMI) in 1997 has initiated a study to look at the "principles of conduct for classification societies", which is intended to be consistent with, and to develop further, the Guidelines for the authorisation of organizations acting on behalf of the Administration, established by the IMO.

According to the CMI documents, each classification society which adopts these Principles of Conduct shall ensure that the agreed services pursuant to its rules for classification, or its agreement for statutory certification, are performed impartially and in good faith, and undertakes via its contracts with clients to perform all agreed services related to ship classification and statutory certification using reasonable skill, care and judgement. Each classification society which adopts these Principles of Conduct accepts the following duties:

- To publish rules for the classification of ships and guidelines for other services, to review them regularly, and to update them when necessary;
- To carry out its plan approval and its surveys in accordance with the requirements set forth in its rules and regulations and its other published requirements;
- To establish and maintain an international network of offices to provide survey and certification services where they are customarily required;
- To utilise suitably qualified persons in the performance of its services;
- To achieve and to maintain compliance with the International Association of Classification Societies (IACS) Quality System Certification Scheme (QSCS), as revised, or, at the discretion of the individual society, with a published quality system based upon the ISO 9000 series of quality system standards and which is at least equivalent to the IACS QSCS in effect; and

- To carry out a programme of technical research and development related, but not necessarily confined, to improvement of ship and equipment safety and of classification standards.

In addition, a set of "model clauses", for inclusion in agreements between the societies and governments, has been developed by the CMI in 1999. It includes, *inter alia*, the following items:

1. (a) The duties and functions of the Classification Society pursuant to this agreement are specified.

   (b) The Administration shall be given the opportunity to verify that the quality system and performance of the Classification Society continues to comply with the requirements specified in the contract. In this regard the Administration may utilise appropriate audit methods, including recognition of audits performed on the Classification Society by an independent body of auditors effectively representing the interests of the Administration, such as the IACS QSCS auditors. The Principles of Conduct for Classification Societies adopted by the CMI shall be the standard for measurement of performance by the Classification Society.

   (c) The Classification Society shall report to the Administration, in accordance with the procedures agreed between them, the information concerning surveys and certification performed by the Classification Society on behalf of the Administration, and shall promptly notify the Administration of any change in the status of the classification of a ship which is classed by the Classification Society and is flying the flag of the State.

2. In carrying out the duties and responsibilities specified in the agreement, whether pursuant to applicable international agreements, conventions, national legislation, or the agreement, the Classification Society acts solely as the agent of the Administration, under whose authority or upon whose behalf it performs such work.

3. In any claim arising out of the performance of a duty or responsibility, or out of any certification with regard to work covered by the agreement, the Classification Society and its employees and agents shall be subject to the same liabilities and be entitled to the same defences (including but not limited to any immunity from or limitation of liability) as would be available to the

Administrations' own personnel if they had themselves performed the work and/or certification in question.

4.2 Search and Rescue

Search and rescue (SAR) is a vital function of the maritime safety administration. It is not only a government commitment under certain international conventions, but also represents the public interest of the State. As pointed out earlier, depending upon national policy and circumstances, the MSA may have either a coordinating role or a participating role (when another national government agency has the coordinating role). In either case, the MSA needs to ensure that there is in place a necessary national "contingency plan" and organization to respond to maritime distress situations in its waters.

The duties and obligations which State Parties undertake to meet for search and rescue are set out clearly in the UNCLOS, SOLAS, SAR Convention, Salvage Convention, as well as relevant IMO Resolutions and Circulars, and they are discussed in Chapter II. In order to carry out national and international SAR services, an organizational structure and various resources, dedicated or available for assignment, are essential. There are many interested parties which could be integrated into the resources for the operation of SAR services. This large variety of parties can be categorised into groups of organizations.

First, many government departments can give valuable aid to SAR operations, and these may include:

- Coast guard authories. Where established, these authorities are typically the primary source of maritime SAR assistance.
- Military services. Often the military services, especially the Navy, are the best source of all-weather facilities and trained personnel.
- Transport departments. They can usually provide air and sea transport facilities and communications networks.
- Marine and fisheries departments. Vessels and crews, and vessel reporting systems.
- Meteorological departments. Weather information.

Second, in many countries volunteer groups are very important resources for SAR, including:

- Lifeboat associations. They may provide trained personnel, specialised equipment, medical assistance, and more important, the quick reaction or first aid for an emergency.

- Auxiliaries. Auxiliaries, both maritime and aeronautical are organizations which provide training and an operational framework for privately owned craft that volunteer to do SAR.

- Recreational boating organizations and yacht clubs. Yachts and other private small boats are sources from which volunteer assistance may be obtained. Those sources will have various levels of training in SAR operations.

- Shore based volunteer clubs. These are involved mainly in land search and rescue, for example, aviation clubs, jumping clubs and mountain climbing and hiking clubs.

Third, a number of commercial businesses may be able to contribute substantially to SAR, in view of their location, equipment and the nature of their business. They may include:

- Air and helicopter services. These may provide assistance by responding to SAR requests to air crews to keep a visual or radio watch for vessels lost in the vicinity of their route.

- Port services. Utility vessels, tugs, and other craft employed in port services are very important facilities for SAR because normally they are available on a full time basis.

- Salvage companies. Undersea salvage equipment and personnel, vessels and crews, salvage expertise, equipment and ocean going tugs.

- Crop and insect spraying corporations. Aircraft and helicopters.

Finally, others which may be added into the resources for SAR may include:

- Local police forces. Police departments are focal points to which the general public often report abnormal observations. In addition, they may provide services such as communications facilities, traffic control, and fencing and guarding of accident sites.

- Other institutions. Institutions situated in isolated locations are particularly valuable to the SAR system. Examples include aids to navigation stations, hydrographic organizations and survey vessels, and missionary and medical stations.

- Other governments, international bodies. These include neighbouring States, IMO, ICAO and others.

The SAR system, like any other system, has individual components that must work together to provide the overall service. Development of a national SAR system typically involves establishment of a national SAR plan and facilities, along with capabilities to receive alerts and to coordinate and provide services throughout the search and rescue regions (SRRs). As a government organization, the maritime safety administration is designated to be responsible for the overall activity of search and rescue, which in most cases is embodied in national legislation. The key roles of the MSA with respect to SAR should be considered to be the establishment and maintenance of a national SAR plan; the maintenance of basic facilities; and the coordination of various resources which may contribute to SAR operations.

The basic requirements for developing an effective SAR system include:

- Provision of the legal framework for SAR services;

- Arrangements for the use of all available resources, and provision of others, if necessary;

- Establishing geographic areas of responsibility with associated rescue coordination centres (RCCs) and rescue sub-centres (RSCs);

- Staffing, training, and furnishing other personnel support to manage and operate the system;

- Adequate and functioning communications capabilities; and

- Agreements, plans and related documents, to achieve SAR goals and to define working relationships between the various participants.

To implement its SAR obligations, the maritime safety administration must maintain basic facilities including a rescue coordination centre and other resources directly under control of the MSA, for example, designated SAR units. However, the MSA does not necessarily have to provide all direct SAR operations. It is extremely important for the MSA to make use of all possible resources to achieve its objectives.

In order to ensure that adequate and effective SAR services are in place when an accident occurs, arrangements for use of all available resources should be made, normally by agreements between the MSA and resourcing organizations. These agreements will define the duties and obligations of all parties, coordination and cooperation methods, financial arrangements, and any matter that will improve the certainty of the SAR operations.

It is normally impractical to charge those assisted, since they would be unable to afford the full cost in most cases and the charge may prompt those in danger to delay calling for assistance until it is either too late to save them, or until the resulting level of SAR effort needed is much greater. Therefore, as a general guidance, although SAR facilities can be identified from various sources, priority of consideration should be given to calling upon public departments for assistance, rather than upon private concerns, because the latter may demand considerable payment for services.

4.3   Pollution Preparedness and Response

Although the need to prevent spills of materials that are marine pollutants cannot be overemphasised, pollution preparedness and contingency planning are based on the assumption that spills of oil and hazardous materials will occur while these materials are being produced, stored, transported, or utilised. The government programs and their respective budgets should be primarily based on emphasising pollution prevention programs because experience has shown that the money spent to correct problems after they occur is nearly always many times greater than what would have been required to prevent the disaster. Once the incident has occurred, the extent of the damage and its associated cost most often relate exponentially to the amount of time that it takes to make an effective response to control, contain and clean-up the spill. Contingency planning, therefore, is the most important and sensitive way to deal with an emergency situation in order to respond effectively and promptly to a marine incident.

While the duties and obligations of States with respect to pollution prevention and environment protection have been stipulated in various conventions, principally MARPOL 73/78 and OPRC 1990, national legislation provides the means to address the assignment of responsibilities, the designation of the competent national authority, the requirement for contingency planning at local, regional, and national levels, and the operational arrangements for coordinating on-scene response. The organizational structure for government responsibility of environment protection varies from country to country. In most countries, the Ministry of Environment assumes the overall responsibility for prevention of pollution, including pollution generated from land, water, and air. Due to the nature and characteristics of marine pollution, the maritime safety administration is normally designated as the competent authority for prevention of pollution from ships. However, the MSA will not usually be expected to work alone in this area. Because of many interests presented during a pollution incident, which

involves a large number of organizations, both private and public, cooperation and coordination among organizations is essential for the success of the response. The main function of the MSA should be focused on contingency planning and the coordination of on-scene response.

Contingency planning for marine emergencies is a complex process. Generally speaking, there is no unique model of contingency planning for all emergency situations in different areas. A contingency plan in a given area depends on various factors and particular conditions such as industrial activities, geographic features, and the various facilities available in this area. Even if a contingency plan has been established there is a continuing need for actual testing, personnel training, as well as periodical reviewing and updating.

There are three elements which must be completed when undertaking contingency planning, namely identifying the threats, identifying the threatened, and developing the threat response.

The first task in contingency planning is to collect information and to identify the threats which the area faces. Threats exist in all industries which are users of hazardous materials or involved in the disposal of materials, (for example, a chemical inventory), and all types of transportation. According to Professor Sampson (2000), the levels of threat may be differentiated by the probability of accident or incident they present and the resulting consequences for human life, property and the marine environment, once such accidents occur. The common and very likely probability of accidents with catastrophic or major consequences can be regarded as a high level of threat. In contrast, a very unlikely probability of accidents with minor consequence may be treated as constituting a low level of threat. Contingency planning should take the threat level into consideration when deciding upon its planning features and elements.

Another important element in contingency planning is to identify what is at risk. The threatened elements include the food chain, air purity, water intakes, wild life, fisheries, tourism, public health and others, depending on the particular geographic location. It is very important to assign different priorities to the elements at risk in the contingency plan in order to ensure that those aspects with higher priorities will be protected first in case of emergency.

To identify the threats and the threatened, an environmental impact assessment (EIA) is a very useful tool which not only identifies the requirements of engineering

controls and other practices to be employed to prevent routine pollution, potential accidents and catastrophic events, but also gives suggestions on possible reactions during a catastrophic event.

Establishing the best possible response when an accident happens is the key element in an emergency plan. Since the interests presented by various entities are large, and the priorities to be protected are quite varied, decision-making for the first response and availability of the necessary equipment are both extremely important in order to minimize the consequences of the incident. This requires actions to be throughly pre-planned in a contingency plan, without which relatively minor environmental emergencies may have long-term, serious negative effects, and the marine environment may be unnecessary degraded.

Major pollution incidents, especially when associated with casualties, draw a large number of invited and uninvited organizations, which may include those illustrated in figure 4.1 (AETC, 1991, p.21). Each usually has an obligation to attend the emergency and be part of the response team. Each invariably has something to offer at some stage. In the early phases of an operation, medical, fire fighting, damage control, and safety/security resources may be most desperately needed. Later phases require investigation, cleanup, and restoration of damaged resources. The person(s) leading operations must not dismiss organizations that may be required later, nor should they be permitted to freelance, i.e., operate independently with little or no coordination with, or accountability to, other elements of the response organization.

In a maritime incident, everyone is eager to help; most will join a multi-agency response team if asked, particularly if they have a stake in the success or failure of the team's efforts. However, aspects of organizational behaviour and human nature must be overcome. Many are blind to concerns and issues outside their normal purview. Bureaucratic organizations may have difficulty operating in a crisis environment. Strong personalities can clash. Fear of losing control leads to power struggles. Pervasive political concerns muddy reality. Some organizations lack confidence in others and thus will duplicate tasks.

Elements of the loosely bound multi-agency response organization may lack clear accountability and authority for their actions. Those actions may influence the extent of property loss, environmental damage, diminished public and political goodwill, and loss of livelihood, health, and perhaps lives. The news media, public, and

Figure 4.1

Types of organizations participating in responses to major marine incidents
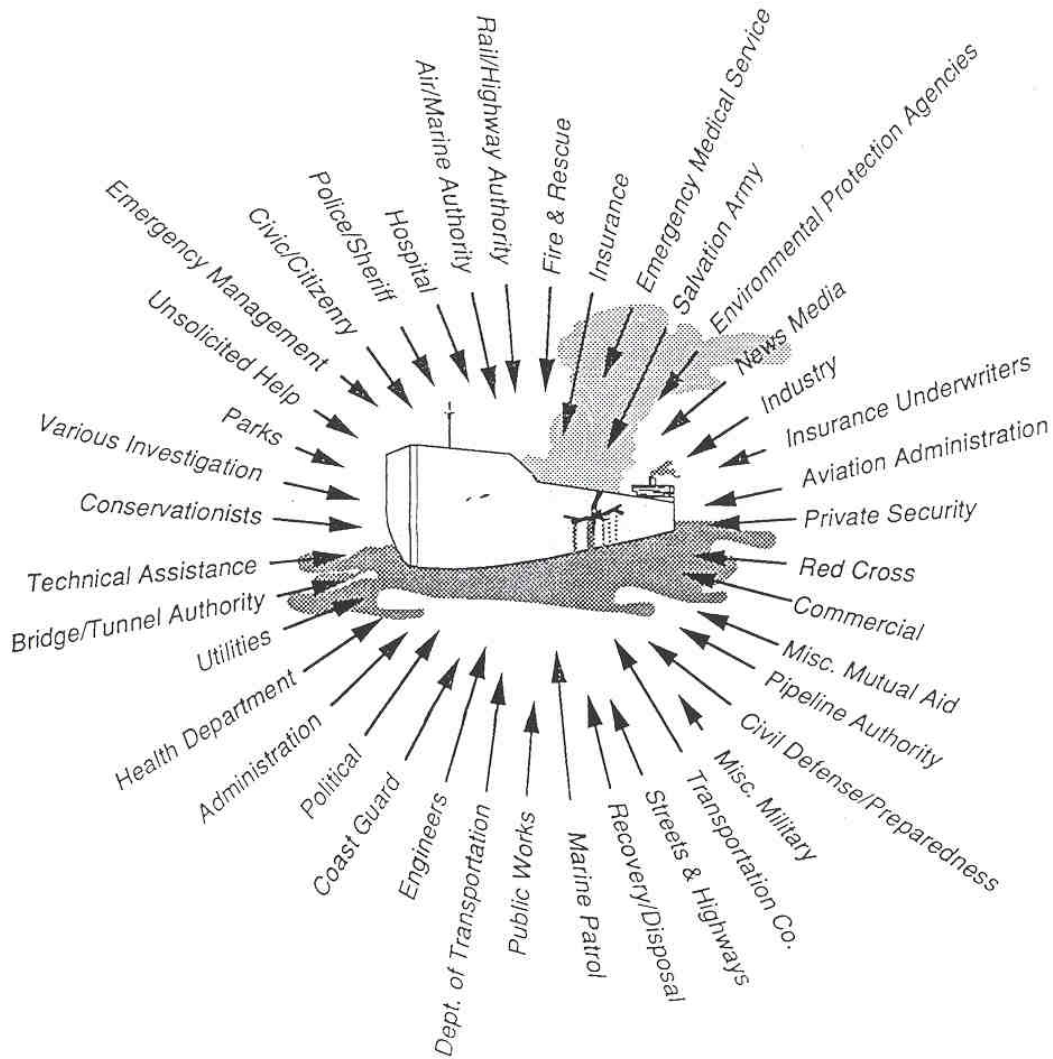
Source: picture scanned from Spitzer, J. D. (1992, p.2)

politicians will search for scapegoats. Harmed parties will file lawsuits and allege negligence. Professional careers may be tarnished or ruined. Poorly thought-out actions, perhaps by freelancing organizations and individuals weakly connected to the response organization, may be difficult to defend.

The level of cooperation and coordination among various entities may form different types of organizations responding to an incident. The following three types may exist in practice:

Type A   Autonomous Organizations, Minimal Coordination. Each organization is narrowly focused on what is within its purview. Interaction with other organizations may be limited to what is necessary to reduce conflict. Different mandates and procedures, lack of confidence or trust in other organizations, and poor communication foster redundant efforts. Organizations may purposely remain independent, or they may be left out by other agencies that are working together.

Type B   Autonomous Organizations, Affirmative Coordination. There are affirmative efforts to coordinate activities. Resources are shared, but are closely controlled by the "owner" organization. Multi-agency/organization teams are formed to address different activities; however, individual members have primary allegiance to their respective agencies and organizations.

Type C   Organizations Formed into a Single Response Organization. Representatives of participating organizations are formed into one response organization. Positions in the organization are based more upon individual expertise rather than agency affiliation. Concerns and unique procedures of individual organizations are accommodated; however, the response organization works for one leader and is focused on one action plan.

Type C is considered as the best in order to achieve efficient and effective response to marine accidents. But it depends largely upon national legislation, pre-arrangements in the contingency plan, personnel training, response exercises, and maintenance of resources. To establish an effective management system for the preparedness and response to pollution incidents, the Incident Command System (ICS) has been demonstrated as a good example.

The Incident Command System (ICS) is an emergency management system developed in USA during the 1970s, having been initiated to respond to a series of fires. Since the ICS has been proven to be a sound and credible management system for establishing organizational relationships, and controlling personnel, facilities, equipment, and communications, it has been gradually incorporated into the "all-risk" system, including the contingency plan for marine emergency incidents.

The basic components of ICS include a common terminology, a modular organization, integrated communications, a unified command structure, a consolidated action plan, a manageable span of control, designated incident facilities, and

comprehensive resource management. The ICS modular organizational structure can be divided into operations, planning, logistics, and finance, as shown in figure 4.2.

Figure 4.2

ICS modular organizational structure
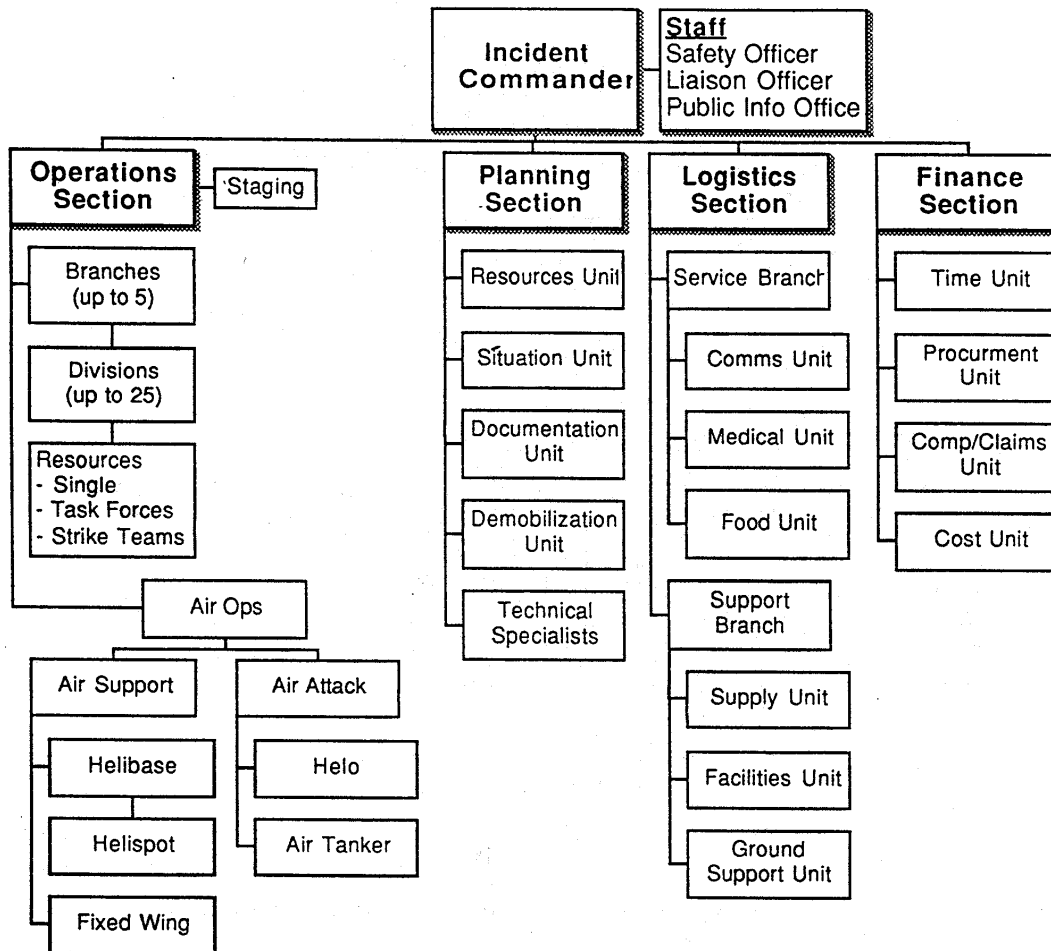
Source: picture scanned from Spitzer, J. D. (1992, p.13)

To incorporate ICS into a contingency plan, relevant legislation must be in place, which defines the duties and obligations of the various parties concerned, as well as response procedures, and the authorities of responders.

There are many advantages or benefits in using the ICS. First, because many interests may be involved in the response of incidents, especially in major pollution accidents, the coordination of a multi-agency response is essential for effective and successful response. The ICS is an excellent way to solve organizational problems with

respect to power struggles, duplication of tasks, confidence, and so on. Second, the loosely bound multi-agency response organization may lack clear accountability for effective actions. The ICS requires pre-planned tasks to be designated to groups of organizations, including operational, planning, logistic and financial tasks. Once accidents occur, all groups of organizations will function properly and effectively. Moreover, the incident commander, at the top of ICS structure, is given the authority to access personnel, equipment, logistic and financial matters, which are key elements in making sure the response is successful.

On the other hand, the ICS may be considered to have some shortcomings. Since the ICS is a model designed for "all-risk" systems, dealing with all natural and manmade disasters, it is not likely to be in a form that is suitable for every particular incident. In order to make a maritime contingency plan more effective and practicable, the general theory of ICS should be supplemented by detailed planning, with the consideration of factors and conditions in a given area. Moreover, the ICS approach has been confirmed to be a sound management system in USA, and perhaps other countries. Due to historical, social and political influences in organizations, both public and private, whether or not this system is suitable for each country should be carefully studied. It is safe to say that the theoretical model of the ICS must be tested, exercised, and even practised in reality so as to ascertain its credibility.

CHAPTER V

INNOVATION IN PUBLIC ADMINISTRATION

The previous chapters have discussed the traditional roles and functions of the maritime safety administration, the trends in the changing environment of the shipping industry and the key roles of the MSA in coordination and cooperation in the pursuit of achieving its goals and objectives. However, an examination and discussion of the efficiency and effectiveness of the MSA is not complete without looking at the characteristics of public administration, to which the MSA belongs. Although the MSA is a specialized and professional government agency dealing solely with safety and pollution issues, it generally follows the same track as the generic public sector/public administration.

Change in the public sector is the rule rather than the exception. The requirement for perfect government management has gone on as long as there has been a government. But each solution to improve government performance tends to create its own new set of problems, which in turn creates a new set of reforms. Efforts to change the way, in which the public sector functions, have always been directed at meeting the contemporary requirements within a particular environment.

Although change is a common experience in the public sector, the reform activity during the 1980s and 1990s has been extraordinary, not only in the number of reform initiatives, but also in the fundamental nature of the changes being considered. The ideas contained in these reform efforts are mainly driven by the introduction of commercial performance into the public sector in response to pressure from the general public, which have been demanding deregulation, decentralisation, privatisation, etc.

5.1 New Public Management

Change in the public sector is the rule rather than the exception. Governments, government leaders, and their civil servants continue to seek better ways of governing and of meeting contemporary requirements. Government reforms may vary from country to country, depending on the particular situation prevailing in each country, but there have been some things in common, that have paralleled the movements of globalization and commercialization.

The traditional system of administration had persisted for decades and on the whole had been extremely successful. It produced and administered a massive expansion in social programs, instituted large-scale economic management for the

public sector, and initiated a host of remarkable policies. What then happened to cause the large-scale rethinking of governance that occurred from the early 1980s? There is no single answer but instead a confluence of events that has resulted in a fundamental reassessment, and initiatives to move traditional administration away from its roots.

One explanation for the change is that significant shifts in the economy have forced governments to respond. The presumption is that as economic growth has slowed, or became less certain or both, government has no longer been able to fund increasing costs. Certainly any significant new programs have faced difficulties in being adopted. Further, if the costs of delivering existing services could be reduced by making administration more efficient, then by all means that should be done. The desire to be more economically competitive in an emerging global economy has begun to outstrip most other concerns on the agenda of government so that any reductions in tax costs, regulation, and perceived public sector inefficiencies have been welcomed.

There is a new set of ideas to innovate the public sector, of which the market model for reforming government is the most important, with prolonged influence (Peters, 1996, p.21). The fundamental premise is that reform in government is best achieved by using the market and accepting the assumption that private-sector methods for managing activities (regardless of what they are) are almost always inherently superior to the methods of the traditional public sector. From the market point of view, the principal problem with traditional bureaucratic public services is that they do not provide sufficient incentive for individuals working within them to perform their jobs as efficiently as they might. Another problem is that bureaucrats frequently maximize the size of their organizations and budgets as a means of enhancing their own personal power and income.

The market approach to governance has gradually been concentrated on a theory, called New Public Management (NPM). Hood (1991) describes the key elements of NPM as including:

- Hands-on professional management in the public sector;
- Explicit standards and measures of performance;
- Greater emphasis on output controls;
- A shift to disaggregation of units in the public sector;
- A shift to greater competition in the public sector;

- Stress on private sector styles of management practice;
- Stress on greater discipline and parsimony in resource use.

The NPM concept supports the idea that management is generic and can be applied across different organizations in different sectors. Although there is the counter-argument that the public sector is different from the private sector and hence managing in the public sector is intrinsically different from the private sector, the theory of NPM has been successfully practised during the last two decades through a series of government reforms varying from country to country and from agency to agency. Indeed its influence has spread to almost all government departments, not only in developed countries but also developing countries. Using this theory, some innovative changes in maritime safety administration can be explained, such as deregulation, total quality management, contracting out of services.

5.2   Budget versus Accountability

Accountability is a process where a person, or groups of people, are required to present an account of their activities and the way in which they have or have not discharged their duties. They are required to present this account to a nominated person or agency.

Accountability is, of course, not exclusive to the public sector. Private sector organizations attach great importance to accountability as a method of examining how people discharge responsibility and the financial performance of the organisation. However, it has been argued that the concept of accountability takes on greater importance in the public sector for a number of reasons:

- Public sector organisations are the guardians of monies collected through taxation and policies approved through the democratic processes, and the public demands that those responsible for public monies and public policies present a public account of their activities.

- Because of the responsibilities entrusted to public servants, high standards of conduct from them are expected. These standards will cover the way in which they spend money, the way in which policy is determined and put into practice, and sometimes even the way in which they conduct their private lives.

- The goals of private sector organisations tend to be much more precise and more widely understood than those in the public sector. A characteristic of public sector organisations is that they often have multiple goals which may conflict with each

other. For example, the prison system has as two of its main tasks: firstly to keep in custody, with such degree of security as is appropriate, having regard to the nature of the individual prisoner and his offence, sentenced prisoners for the duration of their offence, and secondly to provide for prisoners as full a life as is consistent with the facts of custody, in particular making available the physical necessities of life.

- The diversity of public sector organisations and the huge variations in the activities that they undertake mean that differing methods of accountability will apply in different situations. It is therefore difficult to generalise about the process of accountability in the public sector. The mechanisms of accountability in local authorities are different from those in central government It is, however, possible to detect certain trends such as the increasing importance that is being attached to management accountability in all parts of the public sector.

- The scale of public sector organisations, which are frequently large organisations with long chains of command, often present logistical problems in controlling the activities of those charged with putting policies into practice.

5.2.1 Responsibility and Accountability in Public Sector

There is a link between accountability and responsibility. Responsibility is a duty or obligation of a person or organization. It can be viewed in three ways (Simon, 1950):

- Responsibility as legal authority - for example having responsibility for a job;

- Responsibility as a moral obligation - the irresponsible parent may not fulfil his or her obligations to their children;

- Responsibility as responsiveness to values - where a public servant is charged with carrying out the wishes of others with particular reference to the values that are held by those charging the servant with carrying out the function.

On the other hand, accountability is those methods, procedures and forces that actually determine what values will be reflected in administrative decisions. Accountability is the enforcement of responsibility. In other words, accountability is the method or process to achieve the objectives of a government or its administrations in the context of public administration. Accountability works in different ways in different situations, depending on various factors in a particular situation. Therefore, accountability can be viewed from different perspectives.

First, more important forms of accountability have concentrated on the political dimension. The senior civil servant in the government department would be accountable to the Cabinet or Parliament for the discharge of his office. This is known as the doctrine of "ministerial responsibility", one of the conventions upon which the system of the government depends. The model assumes that powers are vested in the appropriate minister, with civil servants taking decisions under the name of the minister. For example, rules are often set up or changed in safety matters after a major disaster, which have arguably had more political intention than technical solution.

Second, while political accountability involves an account being presented to an external and public audience, managerial accountability is concerned with internal processes. This may involve a shift in the nature of the account from a potentially more global set of considerations to a more restricted set of considerations about how things are done with particular reference to organizational objectives and resource considerations. The process moves on to issues such as how the policy should be put into practice, how this can be done within the available resources, and how the implementation of the policy is to be reviewed.

Managerial accountability is concerned with issues such as cost effectiveness, efficiency, budgetary control, monitoring performance and policy effectiveness. Systems of accountable management may be introduced to delegate responsibilities to those nearest the point of service delivery in a hierarchical sequence.

There is an inevitable tension between on the one hand the demands for political accountability where control is exercised from the top down, often with layers of administration exercising supervisory functions, and on the other managerial accountability where decisions are often delegated down the hierarchy as close as possible to the point of delivery. Decentralisation of decision-making conflicts with the traditional requirement for control through hierarchical chains of command.

Third, the actions of public sector organizations are subject to challenge in the courts of law, which is the doctrine of *ultra vires* that limits the powers of public bodies to that which the law empowers them to do. Quite often decisions or actions of a public department are criticised, not only by the clients but also by other departments, on the basis that they have exceeded their powers.

A government is also subject to scrutiny over its proper discharge of public funds. Thus, public officials operate within a framework of controls. However, these

controls are sometimes not clear. There are areas of uncertainty. For example, it is difficult to judge how much money should be spent on search and rescue services, or on preparedness for emergency incidents.

Furthermore, accountability in the public sector has to be directed to the consumer or client. In response to demands for a more accountable administration, there has been a development in machinery through which individuals who feel aggrieved at the decisions of the administration can attempt to gain redress. In many cases there is the opportunity to appeal against an administrative decision to a tribunal. This opportunity exists if, for example, a planning application is refused or where an application for a social security benefit is denied.

Throughout the last two decades, in most countries, especially the OECD countries, public sector organizations have been under attack for being unresponsive to the needs of consumers. Many critics have argued that such organizations have grown in size to serve their own interests rather than concentrating on financial control and meeting the needs of those to whom they are supposed to be providing a service. This criticism has led many organizations to reconsider the way in which they organize and deliver the services they provide in order to be more accountable and responsive to their customers. In doing so, market mechanisms, and contracting out some kinds of services, have been introduced in the public sector. Some critics have argued that market accountability and accountability through contracts have weakened public accountability generally. Attempts to improve accountability through the use of contracts may be problematic where the contract is not legally enforceable or where responsibility is not clearly specified between the contractor and the client.

Finally, the public sector has many areas where professionals have a dominant role in the application of their expertise to specific areas of work, for example, the maritime safety administration. This can lead to distortions in policy. It is quite possible that the wishes of political masters may be for one set of policy preferences while the professional group tend to prefer another. The resolution of this conflict may be in favour of the trends of the profession rather than the policies of the politicians. Politicians may not wish to exercise direct political control over certain areas of work in the public sector, for example areas where professionals make scientific judgement about a particular issue such as safe levels of chemicals for transportation by sea.

5.2.2 Budget in the Public Sector

Any debate about the role and function of the public sector inevitably involves the issue of finance, which is known as the government budget. Every organization, whether public or private, has its own budget, that covers resourcing of the organization and its expenditure. However, one of the traditionally cited differences between public and private organizations is the role of the budget. In the private sector , a budget will be a set of projections about likely future activity. The decision on the budget in a private organization is more likely to be made on the basis of cost/benefit analysis and profit production, driven by market forces, but it takes the risk on revenue uncertainty. In the public sector, the budgetary process will take the form of allocating resources through a political process. It is political, not necessarily because politicians are involved, but because it involves the representation of organizational interests and has scope for bargaining and conflict.

Budget development is a complex process, and it is controlled by the national accounting system in a hierarchical way, including supply estimates, cash limits, vote accounting and the government public expenditure planning arrangements. Normally, it starts with proposals from the "bottom" organizations, which are called to submit estimates in connection with the strategic plans and business plans. The estimates are then assembled and analysed. Finally, decisions on the budget estimates will be made from the "top" to "bottom".

According to Bozeman & Straussman (1990, p.64), budget Processes have three broad functions. First, they try to enforce spending limitations through various kinds of controls. A good example is the common requirement that agencies submit spending plans to show how they will spend their appropriations over the fiscal year. Typically, a central budget office will allocate the budget piecemeal over the fiscal year to avoid overspending. Budgets also try to achieve an efficient allocation of resources; therefore, managers are often asked to show the "output" that will be produced for a given budget level. This reflects a management orientation toward budgeting. And third, budgets usually are prospective; in other words they say something about what should happen in the future and thereby exhibit a planning orientation.

Budgeting in the public sector is quite problematic. It may be influenced by many factors, for example, the economic situation, political and economic priorities, public expectation, and organizational bargaining by various interests. So, it is quite

often that "budget planning begins as chaos and ends in panic" (Hodgson, 1999, p.56). Government budgeting is the fundamental pre-condition under which the government departments are able to proceed with their tasks and programs. As a general observation on government budgeting versus obligations, the principle trend is that the public sector is under pressure to cut down on taxes and thereby reduce government expenditure, but at the same time more requirements of government services are expected. So, how to manage these contradictory questions is a major concern of organizations in the public sector.

5.3   Provision of service

Public services largely depend on the resources a public organization has obtained and managed. While public organizations are rarely in a position to maximize profits as a strategy to enhance pecuniary gain, the rational public manager is motivated to maximize the organization's budget. The budget is the single most visible indicator of an organization's health and status. Reputation, salary, power, patronage, and output of the organization are all related to the organization's budget. Therefore, to enable public organizations to fully fulfil their obligations and to provide sufficient and efficient services, resource management in the public sector tends to seek increases in the amount of resources, so as to have stable growth, and to maintain autonomy and control over resources.

In line with the idea of "new public management", many reforms have been taken in the public sector, which have mainly been directed towards managing public resources and introducing market mechanisms to the public sector.

First, the cost recovery mechanism is an important way to resource public organizations. Services provided by government are not necessarily always financed directly from money in the general fund. User charges often provide some advantages by having people who benefit from a service pay for all or part of the cost of that service. Government services can be delivered to individuals and communities. As a general principle, cost recovery is based on services provided to distinct groups of beneficiaries rather than to the general public. Other principles in the cost recovery mechanism include (Hodgson, 1999, p.93-94):

- Consultation – users should be able to participate by being regularly and freely consulted, not just being informed.
- Costing methodology – should be clear, transparent.

- Allocation – costs should be fairly allocated to all beneficiaries.

- Revenue – should not exceed costs for any particular user group.

- Delivery characteristics – user charges should recognise the manner in which service is delivered.

- Level of cost recovery – should recognise a group's ability to pay.

- User charges – should be structured so as to:

  - recognise the value of the service received

  - recognise operational differences

  - encourage certain practices, behaviours

- The impact of charges – should be assessed before introduction.

- Fees should be set on the basis of clear levels of service.

- An effective dispute resolution mechanism should be established.

Second, some government services can be contracted out. While the major features of the service would still be determined by government, the actual delivery of the service may be provided by commercial organizations. This may have advantages such as to improve the competitiveness among service providers, to improve the quality of the services, to save public resources without decreasing levels of service, and to improve the efficiency and effectiveness of the services.

Moreover, public services may be privatised. Once the regulations are established by the government, the responsibility to deliver certain services can be transferred from the public sector to private companies. Costs associated with the delivery of services are borne by the companies or the customers.

In the maritime safety context, apart from policy and regulation, all the three reforms mentioned above have to be seen in the services provided by the maritime safety administration. Cost recovery may includes services such as ship registration, survey, inspection and certification of ships, training, examination and certification of seafarers, port State control (in case of detention), aids to navigation, and ice breaking. Examples of services, which may be contracted out, are statutory survey and inspection (delegation to classification societies), hydrographic survey, and dredging of channels. Services, which may be delivered totally by private companies, include pilotage, maritime communications, and salvage.

In conclusion, public administration has much flexibility with respect to the provision of services. This flexibility has principally two purposes, increasing incomes

or cutting down expenditures, and improving quality and efficiency of the services. Public services can be arranged into three categories, namely consolidated, contract and regulated, as shown in table 5.1. A consolidated arrangement is a service that is planned, financed, and delivered by the public administration itself. A common example

Table 5.1

Arrangements of public service provision

Arrangements	Planning	Finance	Delivery
Consolidated	X	X	X
Contract	X	X	
Regulated	X		

in the maritime safety administration is regulation and investigation of casualties. In a contract arrangement, the services are planned and financed by public organizations, but they are actually delivered by other organizations, either non-profit or commercial bodies. Generally speaking, the maritime safety administration still has the responsibility for services contracted to other organizations. Furthermore, commercialised or privatised services will be financed and delivered by private entities. The public administration will only plan and regulate these kinds of service.

CHAPTER VI
EFFICIENCY AND EFFECTIVENESS

The desire to improve organizational performance has focused attention on the pursuit of greater efficiency and effectiveness, which has been regarded as paramount in both private and public organizations. This pursuit, which has dominated government thinking in the last two decades and continues in the new millennium, merits detailed scrutiny. In this chapter, firstly the definitions of the terms and how these concepts have been applied in the public sector will be examined, and secondly the efficiency and effectiveness of the maritime safety administration will be discussed from various perspectives.

6.1   Efficiency and Effectiveness Defined

In terms of physics and engineering, efficiency can be defined as the difference between the amount of energy a machine needs to make it work, and the amount it produces. According to COLLINS, "efficiency is the quality of being able to do a task successfully, without wasting time and energy." Efficiency may also be defined as "Given the objectives, and the means to pursue the objectives, the minimising of inputs to the programme in relation to the outputs from it" (Treasury and Civil Service Committee, 1982, para. 52).

Efficiency is concerned with the relationship between the inputs and outputs. Therefore an efficient programme is "one where the target is being achieved with the least possible use of resources. Similarly, on the way to achieving the target, the actual output should be secured with the least use of resources" (Treasury and Civil Service Committee, 1982, para. 52). Thus, efficiency is about getting more for less. It can be achieved by minimising inputs in relation to outputs or, alternatively, maximising outputs in relation to inputs or both. The determinant of this relationship will be the process that transforms the inputs into outputs. For the public service, the emphasis has been on managerial reform and the introduction of new working practices. Advocates of competitive tendering argue that "the process of preparing a tender encourages the in-house organization to ask fundamental questions about what needs doing and how it should be done." (Lawton & Rose, 1994, p.156).

On the other hand, "an effectiveness measure reveals the extent to which objectives have been met: it makes no reference to cost." (Treasury, 1992, p.33). Effectiveness is about achieving what we want to achieve. It is about the relationship

between intended outputs and actual outputs. In the private sector, companies will set their targets for expected profit and shares of the market. It will then be able to compare how they actually performed against those targets. But effectiveness in the public services is a more problematic concept because in many cases it is very difficult, or even impossible, to set a definite target, for example, the target for a search and rescue service.

Efficiency and effectiveness are norms of operation in private sector. Companies have to compete in the market place against a number of competitors who are equally keen to maximise profits. Therefore efficiency and effectiveness can be easily measured. In contrast, it is argued that the public sector in general lacks efficiency and effectiveness and it is much more difficult to apply those principles used in the private sector, because of a number of problems:

- Many public sector organizations are monopoly suppliers of a good or service. For example, there is only one maritime safety administration. If the client is not satisfied with the service, he or she cannot go elsewhere for that service. In a competitive environment there is an incentive to be efficient. Inefficiency leads to reduced profits, lower dividends for shareholders and ultimately closure. A monopolist does not have that incentive.

- A private company has a clearly identifiable product and therefore its objectives are definite. Objectives of a public organization are usually ill-defined with only vague description, for example, "safer shipping and cleaner oceans".

- In the public sector it is not always easy to identify the customers. For example, in many cases the customer could be a member of the public with whom the civil servant is dealing. It could also be the minister in charge of the service or it could be the taxpayer. Ministers may be anxious to reduce the overall expenditure on services while the general public wants more services.

- Strategic planning in a public organization is more difficult because of the short-term consideration. Due to the shortness of the political cycle it is sensitive to greater and more open accountability.

- Functions of a public organization are limited by statute. On the other hand, there is no clear boundary between organizations having similar responsibilities, for example, the maritime safety administration and the environment department in

relation to environment protection. So in many cases public organizations tend to shift responsibility onto others when things go wrong.

- The public sector is principally funded by appropriation rather than by charging for goods or services.

These problems make the pursuit of efficiency and effectiveness in the public sector more difficult. Various initiatives have been undertaken to improve performance. The early 1980s were dominated by the government's efficiency strategy in OECD countries. But critics of the strategy argued that it was aimed at reducing the inputs to the process rather than improving the ratio between inputs and outputs.

Study of strategies to improve public sector performance, or its efficiency and effectiveness, must be seen in the context of a particular industry and its related environment. In the maritime safety administration, its efficiency and effectiveness could be improved by understanding the concept of safety, pursuing quality shipping, increasing transparency, and establishing partnerships with the main players in the shipping industry, the shipowner or operator.

6.2   How Safe is Safe

Shipping is in many ways suffering from a bad public image. On the few occasions that large accidents occur, the press immediately labels shipping companies as irresponsible profit hunters with no concern for safety and environment. On the other hand, during any long period between disasters, safety standards are often portrayed as too onerous and obstructive. It is quite understandable that total safety can never be achieved in any mode of transport. But this understanding raises a general question: how safe is safe? To answer the question, different people have different opinions, depending on their positions.

The politician and the general public will view shipping as safe if there is no maritime accident, at least no big accident, especially in relation to damage to the environment. It is important to understand the idea of values in the decision-making process of politicians. Values can underpin the thinking of those involved in the provision of services and dictate the nature of what they provide, how they provide it and to whom they provide the services. As past experiences have shown major accidents lead to a strong reaction from politicians and the general public. The politicians may expect and promise a higher level of safety in return for votes.

The attitude or opinion of the major player, the shipowner, is quite different from politicians. Safety matters are part of their daily work, and are treated in the same commercial way as other consideration. Although it may be argued that accidents cannot be measured in monetary terms, especially in relation to loss of life, they do need to be calculated in terms of value from the viewpoint of shipowners. Since the objective of the shipowner is to obtain maximum profit, all his activities will be directed so as to be in line with that objective. Thus, shipowners will tend to take safety measures if they can be justified economically, especially in the longer term.

In this connection shipowners' observations with regard to IMO regulations and standards are as follows according to Lua C. E. (2000, p.9):

First, the IMO must decide which regulations and requirements are "absolute musts" for so-called standard ships and standard shipping. The shipping industry does not need more rules and regulations. There are already more than enough of them in existence.

Second, shipowners must comply with the IMO's "absolute must" list, for example those regulations and standards that control the hardware, the specifications of ships, and those that control the "software", such as STCW and the ISM Code.

Third, flag States must insist that ships flying their flags comply with the IMO "absolute must" list of regulations and requirements.

Finally, port States, as they inspect ships, must identify and act against those ships that fail to meet IMO standards.

Some industrial unions and organizations such as BIMCO and INTERTANKO, which represent the voice of shipowners, work closely with IMO and various governments in the formulation of rules and regulations. They suggest (BIMCO, 2000, p.12) that:

"One of BIMCO's major activities continues to be its fight against the increasing regulatory burden placed upon the shipping industry. Alarmed by the sheer volume of rules and regulations, many of which serve no purpose, BIMCO aims to ensure that further initiatives for new legislation reflect the true state of shipping today." And

"BIMCO submits a number of position papers and keeps the IMO informed of shipping's point of view on the various issues. Furthermore, BIMCO actively urges that uniform application and

enforcement of existing international conventions and regulations be undertaken worldwide."

The position of the maritime safety administration with respect to the question "how safe is safe" is quite sensitive for the shipping industry because the MSA is the body that produces rules and regulations in the aspect of safety and pollution prevention. Since it is the government arm responsible for this part of the work, in most cases the maritime safety administration will make policies reflecting political will and the opinion of the general public. But the result is not always satisfactory. The following example demonstrates clearly how answering the question "how safe is safe" can be problematic.

After OPA 90 it became clear that the shipping community needed to do something to satisfy public opinion, and several member States pressed for IMO action. At a meeting in London in March 1992, the IMO had an excellent opportunity to do something to stall public criticism. The result was, however, not very radical.

A series of suggestions to reduce pollution and to get older ships out of the world fleet were suggested. Among them there was one proposal initiated by Sweden and Norway. The main purpose of that proposal was to encourage early scrapping of tankers to get a younger fleet with higher standards as a means of reducing public criticism on the tanker industry.

The main elements of the Swedish-Norwegian proposal were:

- Pre-MARPOL ships must have segregated ballast tanks (SBTs) at the age of 22 and 30% protective location;
- Pre-MARPOL ships must introduce hydrostatic loading at the age of 26;
- MARPOL ships must introduce hydrostatic loading at the age of 22.

The main objective was to propose restrictions so that only the very best pre-MARPOL ships might consider investing in segregated ballast tanks at the age of 22. This would have forced the majority of the 1972-74 built vessels out of the market by 1994-96.

The influence of this proposal has been studied with the following findings:

- Conversion to SBT for pre-MARPOL ships costs 5.7 million US$;
- Reduction of cargo capacity in case of hydrostatic loading is 22% for pre-MARPOL ships and 5% for MARPOL ships.

In this case investments in SBTs are carried out for the majority of pre-MARPOL ships when they reach the age of 22 and they are all scrapped at the age of 26. The MARPOL ships proceed with reduced cargo capacity until the age of 26 and are then scrapped.

The Swedish-Norwegian more radical approach was not able to attract sufficient support during the IMO meeting because age was not a good criterion for judging the quality of vessels, as studied by some researchers. Too many good tankers would have to be scrapped much too early under the radical proposal. Instead the result of the IMO decisions was:

- Older tankers can sail without any specific changes until the age of 25;
- More control and inspection of older ships;
- After the age of 25 the ships must either have 30% protective location or introduce hydrostatic loading;
- After the age of 30 all vessels must have a double hull.

6.3   Who is Safer

There are some generally accepted understandings on the safety records of the world maritime industry. These understandings have become the basis for maritime policy-making and legislation. First, open registered ships are more risky than closed registered ships. Second, ships of traditional or developed maritime countries are better managed and therefore safer than those of developing or new maritime countries. These understandings, however, may be true when taking samples, but they are not supported by systematic study using statistics.

One study was carried out by Li and Wonham (1999, p.137-144), who analysed the accidental total loss numbers of the world fleet from 1977 to 1996, based on data published by Lloyd's Register of Shipping. The study included cargo and passenger ships of not less than 100 gross tonnage (gt), and grouped the world fleet into three categories, namely traditional maritime countries, developing maritime countries, and open registry countries according to the definition given by UNCTAD. The main indicators used in this study were as follows:

- Total loss rate (R_{loss}). A total loss rate of a country in each year can be calculated by using the formula:

$$R_{loss} = 1000 \times N_{loss} / N_{ship} \ (‰)$$

N_{loss} is the number of total loss and N_{ship} is the number of total ships of that country.

- Mean total loss rate (R_{av}). The mean total loss rate gives a general idea of the safety record over a period of 20 years (1977-1996), which can be calculated by using:

$$R_{av} = (R_{77} + R_{78} + \cdots\cdots + R_{96}) / 20$$

where $R_{77} + R_{78} + \cdots\cdots + R_{96}$ are the total loss rates in different years.

- Aggregated total loss rate (R_{ag}). Mean total loss rate may be distorted by some years good or bad luck, especially in a small fleet. For this reason aggregated total loss rate is introduced by using formula:

$$R_{ag} = 1000 \times N_{al.loss} / N_{al.ship} \, (‰)$$

where $N_{al.loss}$ and $N_{al.ship}$ are the sum of total loss number and all ships in the 20 years respectively for each country or group.

The results of this study were as follows:

First, the safety record of the world fleet in general has been greatly improved during the past 20 years. The highest point of R_{loss} was 6.85‰ in 1978 and the lowest point was 2.12‰ in 1996. As a mean each year the accidental total loss rate per thousand ships decreased by a rate of 6.28%, with an aggregated total loss rate (R_{ag}) of 3.91‰.

Second, according to their aggregated total loss rate, the best players in the world fleet are Russia, China, Brazil, Sweden, Hong Kong, Poland, Netherlands and Australia whose R_{ag} are below 2‰; the middle players include Germany, France, Japan, Canada, USA, UK, Mexico, Liberia, India, Malaysia, Indonesia, Peru, Singapore, Italy, Bahamas, Norway, Spain, Turkey, Denmark and Philippines whose R_{ag} are above 2‰ but below 6‰; and the worst fleets of safety record are South Korea, Panama, Greece, Malta, Saint Vincent, Taiwan, Cyprus, and Honduras whose R_{ag} are above 7.5‰.

Furthermore, it is interesting to note that some traditional maritime nations have bad safety records, for example the loss rates of Spain, Denmark, and Greece are higher than the world mean, while the world best players are three developing countries, i.e. Russia, China, and Brazil. The worst record belongs to the Honduras fleet whose R_{ag} is 13.13‰.

Moreover, the comparison between groups is given in table 6.1. The safety records of the three groups have been much improved with the mean improved rates of 7.35, 7.58, and 10.45% respectively. Group III has the highest improvement rate, its accidental total loss rate dropping from 16.44‰ in 1979 to 3.64‰ in 1996.

Table 6.1

Comparison of total loss rate by groups

Groups	R_{av} (‰)	R_{ag} (‰)
Traditional maritime countries	3.38	3.49
Developing maritime countries	2.81	2.77
Open registry countries	8.31	7.69

Source: Li & Wonham calculation based on data from Lloyd's Register of Shipping.

Although the statistics may be inaccurate and incomplete, since many accidents or incidents are not reported for one reason or another, especially in the developing countries, it is possible to obtain some insights from the study. First, open registered ships have a higher risk than those registered in closed registry countries, but the safety records of open registry countries have continuously improved in general. Second, there is not much difference between the safety records of traditional maritime countries and developing maritime countries. In fact, the latter is better than the former. Third, countries with the best safety records such as Russia, China, and Brazil have some common characteristics: state owned shipping companies have dominated the national fleet; and manning of their fleet is generally homogeneous, which merits further study. It can be argued that state owned shipping companies lack efficiency in the market place, but they may give more consideration to safety, and homogeneous seafarers not only contribute to better communications between each other but also have much more coherence in their daily operations, which is also important for maritime safety.

6.4   Quality Shipping

As mentioned earlier the rate of maritime accidents has fallen over recent years and pollution has been reduced. This indicates that the existing regime for the management of safety and pollution prevention is having some success. It is also worth noting that the regulations developed by IMO and shared by its member States address a significant portion of the requirements applying to the construction, equipment and operation of ships, and are generally meeting the key IMO objective of "safer ships and cleaner oceans". There are also many standards developed and set by others, including the shipping industry itself, which are also important in achieving the IMO objective.

Although the current regulatory and enforcement regime has been generally accepted as the effective way to achieve safety and environmental protection, legislative requirements are not the only way to maintain standards. Sub-standard shipping is still a

world-wide problem. It remains an ongoing concern for all responsible maritime administrations, as well as for conscientious shipowners and operators. Therefore, all parties within the safety net of the maritime industry (see chapter III) also have a role to play. Quality shipping and quality service become the general norms for all organizations, public and private.

6.4.1 Different Roles within the Safety Net

Shipping is a complex business within which many interests are involved in its operation. Generally speaking, parties in the industry can be grouped into the public side, the private side, and something in between, the classification society. All these contribute to the safety and comprise the safety net. But they have different roles in maritime safety and in the way they contribute to quality shipping.

The flag State

From the viewpoint of public administration, the role of the flag State can be said to be regulation, enforcement, and provision of services. The responsibility of the flag State for ships flying its flag is well-defined and has been discussed in Chapter II. In order to ensure quality services provided by the flag State, it should meet the basic requirements, including:

- Enough staff to efficiently register ships;
- Competent technical people to handle compliance with international requirements, and to be able to issue crew documentation;
- A close relationship with the classification societies and its own cadre of flag State inspectors around the world;
- World wide representation in order to maintain close contacts with its clients;
- The capacity to investigate all casualties, and the willingness to follow-up on all port State detentions; and
- Participating in all international forums, especially IMO.

Port State

The ultimate "stick" which penalises an owner is holding a ship in port until deficiencies affecting safety are fixed. Port State control has the potential to be a most useful tool to discourage the operation of sub-standard ships, not only by direct detention but also by its deterrent effect. Effective port State control, that prevents ships from proceeding to sea with a risk of danger to human life and to the marine

environment, can only be achieved through port State inspections by well qualified and well trained port State control officers.

However, the responsibility for ensuring that ships comply with international standards still falls on the flag State. Since port State control works on a random basis, normally within a percentage of inspection, it is not possible to capture all substandard ships.

For this reason some measures have been proposed in various regional MOUs. For example, many regional agreements include guidance for the selection of ships to be inspected, the so-called target factors. Target factors normally include type and age of ships, flag, classification society, previous detention records, all of which are recognised to be a good indication of the condition of ships and therefore can be used as a useful tool to select ships to be inspected in order to achieve more efficiency and effectiveness of port State control.

It should be mentioned that target factor is only a guidance for selecting ships. Each State or port may have its own priority list of ships to be inspected depending on the trade pattern and past experiences.

Shipowner

An owner is ultimately responsible for the quality of the ships he operates. No one else in the safety net has the same degree of control over ships. The owner has the knowledge and capability to provide quality management. The tools he uses are quite extensive, and there is more than one prescription for success. These tools may include crew selection, training, vessel's construction, maintenance and repair, bridge management, and safety management systems on board and on shore.

However, one of the common and primary concerns of the shipowner is his responsibility to generate profits in order to safeguard his business. Any activity has to be justified by the loss and benefit ratio from a shipowner's point of view. Therefore safety measures and quality shipping have to give the shipowner incentives. It can be argued that quality shipping will provide shipowners with some advantages, including:

- If the port and flag States recognise the quality offered by the owner, probably on the basis of historical record showing excellent safety performance and inspection results, the shipowner will benefit through less frequent and less onerous checks and inspections.

- Self-regulated performance, or the development of a safety culture will lead to less government intervention by adopting more stringent regulations.

- Self-regulation and quality shipping may allow the owner to gain access to certain trades and cargoes.

- As seafarers have a significant interest in a ship's safety, commitment to quality shipping from the shipowner will encourage the crew to improve their performance.

Insurer

The business of hull insurance is, in general, not to seek quality, but to seek profit. Underwriters may not always put their knowledge to use, and may underwrite tonnage they know to be substandard, at unrealistic rates in pursuit of premium income. Cargo insurance may be considered to have some policy that encourages quality shipping. However, although there are some additional premiums for older ships, there appears to be no way that cargo insurance can police its risk, other than on a basis of prior experience.

It is suggested (Quality Shipping, 2000, p.1-8) that the policy of the P& I clubs could be used to address the issue of quality shipping by discriminating financially against substandard ships for the extra risk they bring, and ensuring that this is reflected in higher premiums paid by their operators, because the primary function of the P & I club is to provide mechanisms by which shipowners can finance and distribute the liability costs connected with operating their ships, rather than seeking profit. The clubs generally have such policies, because they have a duty to treat members equitably. The risks that each individual member brings to the club therefore cannot be considered on a purely commercial basis, but must be underwritten by applying the same principles as are applied to every other member.

Not only does this mean that a club will try to arrive at a reasonable rate for a particular risk, but also that it may deem there to be no reasonable rate at all for some owners, whose standards are considered to be incompatible with those of other members. The premium rate will reflect the club underwriter's judgement of the risk, which in turn will be strongly influenced by the insurance claims' record. If the increased risk accompanying a badly maintained or operated ship has been crystallised in the form of a claim, then this will affect the premium rating.

Another role that the P & I clubs may play in contributing to quality shipping is to help their members to achieve a practical understanding of regulatory issues,

particularly where regulations have a potential impact on liability. For example, in recent years, most of the clubs have produced a lot of materials and provided much advice for the introduction of the ISM Code, helping members to comply with it in time. They have also agreed to a common policy to deny coverage, and to refuse entry or renewal, to ships and operators who fail to maintain valid ISM certificates when required.

Charterer

The shipowner's commitment is the single most important factor for quality shipping. The charterer's position is to make a choice as to the selection of the ships he will use. A good process of choice is based on knowledge, experience and data, and a bad choice is mostly based on price. The more rigorous process typically yields the better results – the avoidance of ship casualties in the conduct of business.

It would be nice to think that charterers only take ships which are of high quality. It may at present be true in the tanker market, but not true in others (Smith, 2000, p.5). Fortunately more and more charterers are tending to make the right decision as stated by Moore (2000, p.8) "Our chartering-decision process is a balanced assessment of many factors. And one of the single most critical factors is our knowledge of the owner. We do not just look at the ship. The owner and his commitment to quality is extremely important to us."

Classification society

The classification society is one of the most important influences for safer shipping. Shipowners and their associations, the IMO, flag States and port States, each respects class rules for structural design and essential engineering systems as the technical foundation for a safer world fleet. Recognising this central role of class, the 1 July 1998 revision to SOLAS 74, on "Recognised Organizations" requires that "A ship should be designed, constructed and maintained in compliance with the structural, mechanical and electrical requirements of a classification society, recognised by the Administration, or with applicable national standards of the Administration which provide an equivalent level of safety". This is a precondition for meeting other SOLAS safety standards for new ships. In turn, compliance with IMO conventions is the basis of the ISM Code – the yardstick of international shipping safety for both flag State and port State control regimes.

Because of the special knowledge and expertise required in ship's survey and inspection, almost all flag States have delegated, to a certain extent, some statutory surveys and certifications to classification societies. Obviously, the role of classification societies in quality shipping is essential. However, it is argued that a classification society does not always do its job properly as it is expected. Although it is asserted that the classification society is a non-profit making body, it is remunerated by the shipowner, and competition exists between societies. Moreover, classification societies in many cases are under pressure from shipowners to lower standards applied to their ships, and some of the societies do make compromises.

Recognising these problems, the International Association of Classification Society (IACS) has established a quality programme, which is concerned with the internal quality systems of its members as well as with auditing and certifying quality systems by IACS.

6.4.2   The Key Role of Maritime Safety Administration in Quality Shipping

From the viewpoint of the maritime safety administration today the shipping industry is in a period of transition, transition from the prescriptive rules and regulations common in the past to a more self-regulatory and self-responsible attitude and culture that is being developed and implemented by those seriously interested in quality shipping for the future. The challenge for the MSA is how to encourage these quality operators to implement the highest practicable standards, whilst discouraging those who fail to meet the requirements.

Although all parties within the safety net are expected to have a positive part to play in achieving quality shipping as discussed before, there is still a long way to go to achieve the ideal situation, since the idea of quality shipping is far from uniform for all parties, especially those whose impetus is mainly driven by profit. So, government regulations and enforcement will continue to be the major means to ensure safety, together with the function played by port State control.

On the other hand, regulation is not the only way to achieve safety. Safety culture will play an ever increasing role in the future. It is generally accepted by the maritime industry that additional safety rules do not necessarily improve the safety situation. On the contrary, such rules possibly only have the effect of widening the gap between the majority of industry players who endeavour to comply with the standards and those who deliberately do not. The costs for the "good" shipowners would increase,

thus only encouraging the "others" by providing them with an additional competitive advantage.

In this connection, the policy of the maritime safety administration should be "carrot + stick", enforcing and promoting the application of existing rules by all parties on the one hand, while encouraging and fostering safety culture or self-regulation through close cooperation with the maritime industry on the other hand. Measures to foster safety culture and quality shipping may include:

- Partnerships in the rule-makiing process. Maritime sector operators, particularly shipowners and charterers, can only be expected to become fully committed to complying with government regulations when they understand the rules, and more reliable data is made available on the quality of ships and their operations.

- Prevention through people (PTP). Although it is often effective to regulate solutions to targeted problems, an important initiative for enhancing safety and pollution prevention for the years to come will be the expansion of cooperative government/industry partnerships that address the safety issues. According to North (2000, p.103), the US Coast Guard has formal partnerships with nine industry associations. These partnerships have resulted in positive non-regulatory prevention actions, including an analysis of causes of spills associated with tank-barge cargo transfers and a study of communication and bridge resource management for tanker entry into coastal waters.

- Incident registration system. This system could be developed as a maritime information safety system that will enable the capture of safety information and near-miss marine incidents, including those events or circumstances that, if they had been allowed to progress without interruption or luck, may have resulted in a marine casualty and potential environmental damage.

- Regulation in favour of safety and pollution prevention. Government regulations can be made to give shipowners impetus for self-regulation. For example, the Swedish Maritime Administration adopted a policy in 1996 in cooperation with Shipowners' Association and Swedish Ports' and Stevedores' Association to employ vigorous measures in order to decrease ship-generated air pollution (SMA, 1999). In this policy, an oil tanker carrying a cargo of mineral oil products in bulk which has attained an emission level of maximum 2g/kWh will be charged a maximum amount

of SEK 100,000. Following a linear scale, with an increasing rate of SEK 6,000 per g/kWh, the amount for an emission level exceeding 12 g/kWh will be SEK 160,000.

6.5   Transparency

In view of its global character, shipping has traditionally been regulated in the field of safety, primarily at the international level, through the IMO. There are extensive international standards which today are generally comprehensive in their coverage. Emphasis has already shifted in the world maritime community and in many countries to ensure the effective uniform implementation of existing IMO standards and regulations relating to maritime safety and environmental protection, placing particular emphasis on the human factors and quality shipping, for which the STCW and ISM Code could be considered as the milestones in fostering self-regulation.

However, the problem is that shipowners who ignore these standards can continue to trade, due to gaps in the safety net in their flag States and because of trading partners who continue to do business with them irrespective of the observance of safety requirements. If a quality mentality could be introduced to a wider range of maritime players, pressure on the substandard operators would increase considerably.

New, additional safety rules, on the other hand, would not necessarily improve the situation. On the contrary, they could often only have the effect of widening the gap between the majority of industry players who endeavour to comply with the standards and those who deliberately do not. This may have the effect of encouraging market players to obtain an additional competitive advantage by decreasing safety standards. Similarly, reputable class societies, charterers, ports, and the like could be let down by competitors who "cut corners" on safety.

There is, therefore, a general interest in the industry in promoting the application of existing safety rules by all parties. The Quality Shipping initiative is an effort to translate this interest into something more concrete through cooperation with the maritime industry as a whole.

In this context, the issue of transparency should be taken very seriously. Increased transparency and information are obviously essential components in raising quality awareness. Maritime sector operators, particularly shipowners and charterers, can only be expected to become fully committed to the pursuit of quality when more reliable data is made available on the quality of ships and their operation.

Today, technology has given people the opportunity to gain access to more and more information. Many port State control officers check their databases every day looking for targeted ships for inspection. Any information about shipping can be promptly transferred to all people interested, by simply sending an e-mail or putting the information on a web site.

At the same time, transparency is a general requirement with regard to the public good and it will be ever more important in ensuring safety and prevention of pollution in the future. The requirements of transparency in shipping industry include the following aspects:

- Ship register. Data from ship registration, which include both registrations by flag States and by classification societies, provide the basic information in the shipping industry. It is not only the record of property rights and registerable changes on the ship, for example, shipowners and mortgages, but also valuable information that can facilitate programs such as search and rescue, pollution incident response, and anti-piracy and armed robbery actions. Access to ships' information could be largely improved by using advanced technology, such as the internet.

- Government policy and regulation. Government policy and regulation can be effectively implemented only when they are understandable to the public and the industry, and are uniformly interpreted. Moreover, it is very important for effective dialogue and cooperation between government authorities and the shipping industry in the process of regulation. Any ambiguity or abuse of policy making may result in the opposite effect from that being regulated. Transparency and good cooperation may also yield positive non-regulatory actions.

- Casualty investigation. The purpose of casualty investigation is to enable the governments and the shipping industry to take necessary steps to prevent, as far as practicable, the occurrence of similar casualties in the future (see Chapter II). So, more positive action to prevent accident and pro-active measures through research and development, such as Formal Safety Assessment (FSA) depends, to a large extent, upon the release of information from casualty investigation. Moreover, shipowners, charterers, insurers, and others in the transport chain will certainly benefit from the complete release of information on casualty investigation from a safety point of view.

- Port State control. In recent years, experience has shown that the information on deficiencies and detentions in port State control has played a very important role in fostering quality shipping. Since port State control works mainly on a regional basis, requirements for exposing ships' information with respect to safety standards could be made within the regional MOUs. This may provide the opportunity to demonstrate who are the sub-standard shipowners and the sub-standard flag States, and in turn port State control may establish target factors for inspections. It would be also possible to reveal what has been done by the charterers and classification societies, so that others, such as bankers and underwriters, may make their better business judgement by analysing the information.

- Classification societies. Because of their essential role, many in the shipping industry rely on the results of classification societies. Obviously, the data and information provided by the societies are vital for the industry. Today public awareness and the availability of technology requires more transparency from the societies, not only information on the ships that they have surveyed but also the practices and procedures the societies have followed.

The interest in greater "transparency" of information by both regulators and the industry has emerged as one of the main themes of recent high level meetings between regulators and the service sector of the shipping industry (insurers, shipowners, brokers, charterers, classification societies and financiers). In July 1998, a joint European Commission and United Kingdom Conference on Quality Shipping was held in Lisbon to consult the industry on the common ground between commercial interests and public policy on safety and pollution prevention. The conference was concluded in no doubt that "providing greater transparency is a key to further progress." (Cubbin, 1999, p.62). Essentially, the service sector of the industry needs improved access to information on substandard ships in order to identify those that it may wish to avoid doing business with. Again, the seminar on Quality Shipping held in Singapore on 24-25 March, 2000 repeated the same topic that all parties within the safety net could contribute more to maritime safety and pollution prevention under conditions of greater transparency.

Although both public and private organizations recognise the potential for all parties to make use of existing information to improve safety records, efforts to improve transparency, may not be entirely straightforward. There is national legislation and possible legal liability in relation to information held as a commercial confidence to

consider, technical barriers to shared information to be addressed, and terms of access or exchange to be negotiated. Moreover, naturally, people always tend to safeguard their own interests, rather than providing full and total information. Human nature may create the major barrier for transparency.

In short, transparency is an important step to improve safety and encourage quality shipping, which has been recognised by both public and private sectors. On the other hand, government departments and service sectors of the shipping industry have been under continuous pressure to provide greater transparency and information. This may also provide an opportunity for collaboration between regulators and the industry players in improving standards of health, safety and pollution prevention.

6.6   Partnership

In general, private enterprises primarily pursue the goal of making a maximum profit at the end of a certain period. On the other hand, the supreme goal of public administrations is to make a maximum contribution towards public welfare by formulation of rules and regulations, and further by provision of certain goods and services to the general public as a whole. Individual interests of private enterprises are thus faced with, and even conflict with, the goal of promoting social welfare.

This conflict of interest is also reflected in the shipping industry. From a shipowner point of view, the maritime administration, or the maritime safety administration may be considered as a quite bureaucratic body preoccupied with "red tape" – regulation and punishment. The image of the maritime safety administration is also stamped with inefficiency, a tendency to compromise and balance, and a barrier to private shipping enterprises. However, the fulfilment of the objectives of the maritime safety administration is not at the exclusive discretion of individual organizations. It must pursue the general good and reflect the collective will of the shipping industry. In this connection, the efficiency and effectiveness of the maritime safety administration could be achieved under condition of close cooperation with, and partnership between, the MSA and the shipping service sectors, mainly the shipowners or operators.

Partnership may start with the rule-making process. Shipowners should be given opportunities to express their opinions with respect to regulations. The "government-driven" measures or regulations can be even more effective if they are developed in consultation with the shipping industry. Moreover, partnership between public and private sectors may improve existing regulations with the wide knowledge of the

shipping industry, or even produce non-regulatory solutions to improve safety and pollution prevention.

Partnership may also be achieved by regular two-way communications. Feedback from the clients of the goods and services provided by the public administration is valuable information to evaluate and improve the performance of the public sector.

Partnership is a very important means of fostering quality shipping and improving the safety situation. In this aspect, the Chinese experience may be considered as a good example to achieve objectives of the public administration by cooperation with the shipping industry.

In China, the development of the transport industry has always been guided by the principles of "Safety first" and "Prevention essential". In following the requirements of the Ministry of Communications, the transport enterprises carry out the policy of "Safety, good quality, low price, efficiency and convenience". There are regular quartely meetings in the Ministry and its subordinate departments.

They are chaired by the Vice-Minister in charge of maritime transportation and those who take part include: the heads of the relevant departments in the Ministry, coastal and river regional maritime safety administrations, port authorities, the China Classification Society and shipping companies. The only subject discussed in the meeting is safety. They analyse the recent casualties, discuss how to improve measures and make the necessary amendments to the existing rules and regulations when necessary.

Besides, for the most part, following the requirements of the Ministry, shipping companies have a specified department looking after the safety of operation in their respective companies. For example, in the China Ocean Shipping (Group) Company (COSCO) there is a Safety Supervision Department. Furthermore, there are departments with the same character, even same name, in its subsidiary companies. One of the vice-presidents or managing directors is responsible for safety. He chairs the monthly meeting that discusses any safety matters. In addition, usually immediately after the aforesaid meeting held by the Ministry, the participants of the shipping company and its subsidiary companies have a follow-up meeting to discuss further their own safety matters.

The 10th of the first month in each season is appointed as "Safety Day" on every ship. On that day the crews on board ship usually gather together to check operations. The company collects all the information on its ships from this activity and holds a safety meeting within the company on the 15th of the month. Then the head or the responsible member of the company takes the information on the whole company, with their recommendations, to the Ministry's meeting.

Furthermore, all shipping companies in China are required to establish a mechanism for safety management in their daily operations. It is a self-running mechanism with inter-relation, inter-action and inter-coordination of the functions: netted organization, distinct responsibilities, strict monitoring, prompt feedback, reasonable adjustment and proper encouragement.

So, there is a complete safety check system from the Ministry all the way down to the fundamental unit, the ship. Safety is of top priority in the duty of seafarers, managers, and officials – all the way up to the Minister of Communications in China.

CHAPTER VII

CONCLUSION

Maritime safety administration is, in general concept, a government specialised agency responsible for the work of maritime safety and prevention of pollution from ships. However, the organization of governmental activities is basically dependent on the constitution of a State and other legal instruments. Historical development of the State also plays an important role in matters such as public administration. Therefore, the organizational structure of the maritime safety administration is not necessarily a unique solution in various countries. But, since shipping is an international business, the justification and mandate of the maritime safety administration have been, to a large extent, described in public international laws, mainly the conventions adopted by such international organizations as IMO, ILO, ITU and WHO.

Like any other public organization, maritime safety administration has to continuously adapt itself to meet contemporary requirements. The changing environment in shipping industry has provided great opportunities to the maritime safety administration, but it has also brought challenges to this organization. Therefore, how to enhance and improve the work of the maritime safety administration so as to achieve its objectives efficiently and effectively under limited resources is a major concern of all maritime countries.

This dissertation endeavours to identify the basic mandate and functions of the maritime safety administration, and to discuss and identify the possible measures which may be employed in the maritime safety administration in order to fulfil its roles and functions in a most efficient and effective way. The author believes that a well motivated and harmonised maritime safety administration can improve itself to the required level of government services.

The following are the essential conclusions of this dissertation:

1. <u>Roles and functions of the maritime safety administration</u>

The traditional, basic roles and functions of the maritime safety administration in all countries are similar and can be summarised as follows:

- Flag State control. Flag State control is intended to ensure that vessels flying its flag meet the requirements for safety of life and property, and for the protection of the marine environment. Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.

- Port State control. Port State control is a major tool for enforcing compliance with maritime safety and standards. It is envisaged as a back up system, intended as a means of diminishing the number of sub-standard ships, which result from irresponsibility or incompetence on the part of a flag State. However, the primary responsibilities for ensuring that ships comply with safety and pollution standards still remain with the flag States.

- Search and rescue. It is a vital function of the maritime safety administration because not only is it a government commitment under certain international conventions but it also represents the public interest of the State.

- Prevention of pollution from ships. It is one of the most important functions of the maritime safety administration. The role of States, whether as a flag State, port State, or coastal State in this field has been increasingly addressed in recent years.

- Navigational service. Due to historical, economic and technical reasons, the roles and functions of the maritime safety administration in respect of this area vary from country to country. But because navigational services are so important in shipping and directly affect maritime safety, the maritime safety administration must maintain a general oversight in this area, and ensure that the services provided by whatever organizations are in line with the requirements of maritime safety, especially where the responsibilities under international laws are concerned.

2.   The importance of maritime policy

The maritime safety administration is part of the public administration of a maritime State. Its policies and activities have to conform to the government's general policy for the State's maritime development. Recent maritime history demonstrates that a properly defined government shipping policy, suitable for its particular national conditions, is vital for the country's maritime development. Every country, when making its maritime policies and regulations will certainly need to consider how to achieve the maximum gain for the national shipping industry in the international market, especially in the long run. Generally speaking, the government's general policy in shipping falls into two broad areas, namely promotion of, and participation in, international shipping, and implementation of international obligations.

3.   The need to adapt to the fast changing environment

The changing environment under which organizations operate definitely has an impact. The maritime safety administration must adapt itself to meet contemporary

shipping requirements. In the maritime context, the trends of the changing environment may be determined from certain aspects as follows:

First, shipping has already been regarded as the safest, most efficient and environmentally friendly means of transportation. Along with the development of world trade, the world fleet has been steadily growing. However, world seaborne trade is increasing faster in value than in volume. This has an influence on the structure of the world fleet. The number of container ships and other specialised ships such as LNG/LPG has increased, while traditional ships have decreased or been stable. More importantly, since World War II, developing countries have participated extensively in the world shipping industry, both through the development of national fleets and the provision of seafarers.

Second, during the last century, especially the second half, we have seen an overwhelming development in science and technology. It has deeply influenced human life and activities. In the shipping industry, great changes have taken place in all aspects, including ship design, building, port operations, ship navigation and ship management. From the viewpoint of safety and pollution prevention, three aspects of revolutionary changes should be noted, namely the development of ship itself, navigation and communication.

Third, perhaps the issues of the safety net and safety culture are not new to the shipping industry. What has changed is people's attitude towards safety and pollution prevention. It is now generally accepted that rules and regulations are not the only way to improve maritime safety. All parties within the safety net, public or private organizations, can contribute more towards safety, if safety culture is fostered and quality shipping is encouraged.

Moreover, recent experiences have shown that pro-active actions to respond to accidents or incidents, rather than reactions, are more effective in improving maritime safety. Technology has provided people with new approaches and techniques, such as Formal Safety Assessment (FSA), for the formulation of rules and regulations.

4.   The importance of coordination and cooperation

As part of the public administration, the key roles of the maritime safety administration should be centralised in planning, decision-making, formulating objectives and goals, and other activities performed by government executives and supervisors. Therefore, it is not necessary for the maritime safety administration to

provide directly all goods and services within the scope of its roles and functions. Instead, priorities should be given to coordination and cooperation with all parties in the shipping industry so as to utilise as many resources as possible in achieving its objectives efficiently. In this connection, it is of extreme importance for coordination and cooperation by the maritime safety administration with respect to the classification society, search and rescue, and pollution preparedness and response.

5.   The influence of "New Public Management"

Under pressure from the general public for governmental reforms, which in general require the public administration to cut down on its budget while taking on more responsibilities, with the emphasis on efficiency and effectiveness, the public sector has introduced certain measures to satisfy these requirements, including deregulation, decentralisation, privatisation, etc. As a result of the reforms, the maritime safety administration has to seek possible solutions, which include adopting cost recovery mechanisms, contracting out of services, and the like, so as to decrease its budget without reducing levels of services.

6.   Establishing appropriate levels of service

It is of great importance for maritime safety administration to understand the question "How safe is safe"? This is quite important and sensitive for the shipping industry because the maritime safety administration is the government wing responsible for the generation of policies and regulations related to maritime safety and pollution prevention.

7.   Improving efficiency and effectiveness

The efficiency and effectiveness of the maritime safety administration could be improved in many ways. Among these, quality shipping, transparency, and partnership may be identified as having priorities in achieving, efficiently and effectively, the objectives of the maritime safety administration.

Reforming public administration is never without its problems and it is never possible to achieve change overnight.

In the new millennium increasing globalisation and a fast changing working environment, especially technology changes, will mean growing interdependency. International events and factors will increasingly influence issues that have traditionally been domestic for the past years.

Reforms can be advocated and planned, but they cannot succeed without clear political guidelines and strong political support.

Governments need to be in a constant state of readiness and possess the ability to respond rapidly to changing situations. In order to be able to serve the citizens and the economy in the best possible way, a government has to address the fundamental question of what it does and what it does not do. Governments must concentrate on doing only the most essential, most important tasks, and on doing the right things at the right time.

Maritime safety is a broad and complex field. The author hopes that this broad examination of the concepts, mandate and functions of maritime safety administration, and trends in the changing safety environment, as well as proposals for enhancing efficiency and effectiveness in maritime administration, will make a useful contribution to the international debate.

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