

**Enhancing Implementation Capability of
National Maritime Administration for
Preventing Marine Pollution**

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C O N T E N T S

Abstract

I. Introduction

II. State of vessel-source marine pollution

1. Pollution by tanker accidents
2. Pollution by tanker operations
3. Pollution by chemicals
4. Pollution by garbage and sewage

III. Regulatory regime for ship safety and vessel-source marine pollution prevention

1. Regime for ship safety
2. Regime for vessel-source marine pollution prevention

IV. Cause analysis of contemporary vessel-source marine pollution

1. Diversity of interested parties of shipping
2. Fierce international competition of shipping
3. Big difference in ship safety indicators by nations
4. Limitation of enforcing oil spill activities
5. Limitation of international countermeasures

V. Summary, conclusions and suggestions

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Abstract

Almost of all the impediments to enhancing ship safety and preventing vessel-source marine pollution arise from the interaction between direct and indirect factors. The direct factors come from human errors and failure in compliance with the international convention standards for the operation of vessels. The indirect factors derive from the will and attitudes of the countries taking little responsibilities with appropriate seriousness for policing their fleets.

By focusing on these aspects, this paper intends to propose a new international regime to improve the implementation capability of national maritime administration of each member government of IMO(International Maritime Organization).

I. Introduction

It is widely known that considerable progress has been made in reducing vessel-source marine pollution due to the adoption and ratification of international conventions pertaining to both ship safety and marine pollution prevention. However, the estimate of the

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relative contribution of the oil entering the sea from marine

transportation activities reportedly amounts to 24% of total discharges into the world's oceans.¹⁾ In addition, pollutions by chemicals and the disposal of wastes at sea are becoming serious issues. As the reduction in accident rate has slowed and even reversed, the sea is still being contaminated by catastrophic oil spill disasters and operational pollutions.

Such a state of marine environment is caused mainly by the gap between the incentive and capability of national maritime administration in implementing all the international measures, not by the lack of international legislation for ship safety and marine pollution prevention.

This paper perceives realities that the above mentioned gap can be an indicator of the implementation capability of a national maritime administration and the size of that gap in turn is determined by the combination of quantitative and qualitative components; the former derive from technological measures and human resources, while the latter depend on the social context and organizational culture of each nation's maritime administration.

By focusing on these aspects, this paper intends to propose a new paradigm for ship safety and pollution prevention which has to be adopted by IMO to upgrade implementation capability of maritime administration for its member governments.

And also this paper deals with the government of vessel-source marine pollution and its countermeasures, an analysis of the current situation of shipping contributions to the marine pollution, and recommendations for resolving the issues.

II. State of vessel-source marine pollution

1)IMO, Impact of oil and related chemicals on the marine environment, GESAMP Reports and Studies No. 50, 1990, p. 25.

1. Pollution by tanker accidents

The estimate of oil entering the sea from marine transportation activities has been reduced from 1.47 million tons in 1981 to 0.57 million tons in 1989(in table 1), due to the development of improved standards, navigational aids, training and watchkeeping, and traffic separation schemes. But this does not necessarily mean that the fight against marine pollution is over. The amount of oil entering the sea from the marine transportation sources can be subdivided as shown in table 2.²⁾

Although the oil pollution arising from tanker accidents contributes a comparatively small percentage of the total oil entering the sea in a year, the consequences can be disastrous to the immediate area. In addition, volumes spilled annually from tankers are highly variable, making trends difficult to predict accurately. Tanker accidents are infrequent, unexpected, and are potentially very damaging; their negative consequences often persist for more than 10 years.³⁾

2) Ibid. pp. 25 and 64.

3)Wreck of Exxon Valdez: On March 24,1989, the Exxon Valdez went aground in Prince William Sound, Alaska, and discharged 42 million liters of crude oil. Approximately 2 - 3,000 animals were killed outright. Tens of thousands of seabirds died, including 150 bald eagles. Clams, mussels and fish were contaminated. Cleanup costs and compensation amounted to more than 3.4 billion dollars[Ibid. of 1) p. 51. and US coast Guard, Proceedings of the Maritime Council, May-June 1992, p.3].

Wreck of Amoco Cadiz: In the night of 16 to 17 March 1978, the tanker Amoco Cadiz went aground. Spillage of most of her cargo of 223,000 tons of light crude oil resulted in the worst incident of oil pollution to that date. Oil on erosion platforms lasting three to five years and in sheltered mud flats, enduring for more than 10 years, were the extremes. Amphipod populations had not returned to pre-spill levels after eight years[Ibid. of 1), p. 43].

Table 1. Estimated inputs of petroleum hydrocarbons into the ocean due to marine transportation activities (U.S. National Academy of Sciences)

	1981		1989	
	(million tonnes)	%	(million tonnes)	%
Tanker operations	0.7	47.6	0.159	27.9
Tanker accidents	0.4	27.2	0.114	20.4
Bilge and Fuel oil discharge	0.3	20.4	0.253	44.4
Dry-docking	0.03	2	0.004	0.7
Marine terminals (including bunkering operation)	0.022	1.4	0.03	5.3
Non-tanker accidents	0.02	1.4	0.007	1.2
Scrapping of ships	-	-	0.003	0.5
Total	1.47	100	0.57	100

Table 2. Relative contribution of petroleum hydrocarbon inputs to the world oceans

	1985 (%)	1990 (%)
Natural sources	8	11
Offshore production	2	2
Maritime transportation	45	24
Atmosphere	10	43
Land-based discharges and run-off	34	50
-refineries		
-municipal waste water		
-industrial waste water		
-urban run off		
-rivers		
Dumping at sea	1	0
Total	100	100

Sources: GESAMP Reports and studies No. 50, 1993, pp. 24 - 25, 27.

2. Pollution by tanker operations

Another problem which no nation will be able to ignore is the marine pollution by the oil discharged or spilt from ships and terminals in the course of their normal operations other than tanker accidents. Actually, a much greater quantity of oil enters the seas as a result of normal tanker operations, usually associated with the cleaning of cargo residues which takes place when the ship is returning from the port of discharge to take on another cargo of oil. In 1985 the US National Academy of Science estimated that 48.5% of oil pollution resulted from transportation and terminal operations, of this only 12.5% came from tanker accidents, while 21% was the result of tanker operations and 11% stemmed from non-tanker shipping.⁴⁾

The effect of operational pollution may seem less dramatic because it is spread throughout the oceans of the world. However, the heavy concentrations of such pollution in port and harbour areas, and other coastal areas where wind and tide tend to concentrate such matters give rise to a number of chronic pollution problems.

3. Pollution by chemicals

Pollution by chemicals at sea is also becoming a serious issue. The carriage of dangerous, hazardous, and noxious substances by sea is not a new phenomenon. But today, the product, be it a hydrocarbon, a highly toxic weed-killer, or radioactive waste, is perhaps more dangerous. Many of the chemicals carried by sea are far more dangerous to the marine environment than the oil. Some of them are so poisonous that even a tiny amount measured in parts per million can kill fish and other marine life and pose serious health risks for those who come in contact with them. They can build up in the food chain until they are present in large enough quantities to present a danger to human health. Some of them are so persistent that they can

4)R. Hartley, *Ships of the Shame*(Inquiry into Ship Safety), Australian Government Pub., 1992, p.45.

last for tens or even hundreds of years. The United States Coast Guard has reported that chemical spill cleanups may be five times as lengthy and up to ten times as costly as the cleanups of an equivalent volume of oil.⁵⁾

4. Pollution by garbage and sewage

The oceans are also polluted by garbage and sewage. Persistent forms of garbage, in particular, plastics including synthetic ropes, fishing nets, and plastic bags are now widely recognized as posing a severe threat to the marine environment and, in particular, to marine mammals.

III. Regulatory regime for ship safety and vessel-source marine pollution prevention

The fight against vessel-source marine pollution is inextricably linked to the prevention of accidents at sea, because safety at sea and vessel-source marine pollution are closely-related, and safe ships are less likely to be involved in marine pollution.

Therefore, to achieve the reduction of vessel-source marine pollution, comprehensive efforts have to be made in the areas of ship safety assurance, casualty prevention, incident response, and claim compensation. The main conventions and treaties related therewith are as follows:

1. Regime for ship safety

One of the most important of all international treaties concerning the safety of merchant ships is the International Convention for the Safety of Life at Sea (SOLAS), which deals with the measures involving such matters as construction, equipment, navigational procedures, communications, and crew standards.

⁵⁾Simon Barker, Hazardous goods at sea: are safe ships and clean seas mutually exclusive? A Canadian perspective, *Marine Policy*, 1992, July p.307.

Beside the defect of equipment and design, human error has become one of the large contributors to marine accidents. Ships carrying hazardous and noxious cargoes with complex and sophisticated equipment on board require highly-trained and skilled personnel. These situations resulted in establishment of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers(STCW 1978), which deals with the global standards for maritime training.

2. Regime for vessel-source marine pollution prevention

1) Regulatory regime for combating pollution from ship operation

The keystone of marine environment protection regulatory structure is the International Convention for the Prevention of Pollution from Ships(MARPOL 73/78) and its related Protocol. It deals not only with oil but also noxious liquid substances carried in bulk, hazardous chemicals, harmful substances carried in packages, and sewage and garbage.⁶⁾

2) Responding to pollution

In the case of oil pollution accidents on the high seas, the coastal state has to take such measures as may be necessary to prevent, mitigate or eliminate danger to its coast line or related interests from pollution by oil or threat thereof. For this purpose, Intervention on the high seas

6)The main elements of MARPOL 73/78 are as follows: ①Discharge into the sea of oil and chemicals, sewage and garbage necessary in the normal operation of ships strictly limited and prohibited in particularly environmentally-sensitive sea areas. ②Establishment of shore-based reception facilities for oil and chemical residues, garbage and sewage. ③Strict ship construction and equipment standards which minimize to the extent practicable the release of oil and chemicals in case of an accident. ④Mandatory provision for ship inspections and surveys to ensure compliancy with international standards. ⑤Incidents involving oil and other harmful substances must be reported without delay. ⑥Cooperation between Governments in the detection of violations and enforcement of the rules(from IMO, Strategy for the Protection of the Marine Environment, 1989, 8, P.13).

in cases of oil pollution casualties, 1969 Convention(Intervention) entered into force 1975; it empowers coastal government, assuming certain established criteria are met, to direct or to give orders to those involved, be they owners, masters, or salvors.⁷⁾

To establish an international system for responding to major oil spills, International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990('90 OPRC) was established. Although not yet in force, it covers the contingency planning and response requirements of the shipping industry, the offshore industry, harbor, port and terminals and a co-ordinating governmental body.⁸⁾

3) Regulating dumping

In an effort to regulate deliberate dumping into the sea of land-generated wastes, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter(the London Dumping Convention or LDC) was adopted in 1972. It provides effective guidance to Contract Parties concerning the selection of dumping sites, dumping techniques, and monitoring programmes. This convention has been effective in promoting the control of all sources of marine pollution and value of a comprehensive waste management approach.

4) Liability and compensating for pollution:

The cost of cleaning up oil spills and the economic losses can run into billions of dollars. For Example, as mentioned previously, the cost of the Exxon Valdez case exceeded 3.4 billion dollars.

In response to the economic impact of major oil spills, the Civil Liability Convention(CLC) was adopted in 1969. This treaty establishes

7)Michael L.Stacey, Legislation, Regulation and Government administration, Marine Police, 1994, 18(6), p.503.

8)S. Bonsall, Emergency Response to Protect the Marine Environment, Seaway 1994. 1. p.12.

strict liability for pollution damage for the owner of seagoing vessel actually carrying oil in bulk as cargo.

But sometimes the financial burden of paying compensation have to be borne partly by the oil cargo interest, for example, oil importers. This resulted in the establishment of the International Oil Pollution Compensation Fund(IOPC Fund) in 1978. The IOPC gives supplementary compensation to persons who cannot receive full compensation under the CLC.

IV. Cause analysis of current vessel-source pollution

From the standpoints of international shipping the causes of contemporary vessel-source pollution are analyzed as follows:

1. Diversity of interested parties of shipping

The owner/operator of ship is globally diversified. Water knows no bounds, and as a result shipping tends to be a global industry not restricted by jurisdictional ties in the same way as land-based industries. The owner, operator, manager, underwriter, and classification society for a ship is multinational. Such global diversity tends to be the norm in the shipping industry rather than the exception. Because of such a multinational interested parties, sometimes it is difficult to establish liability for compensation for the spill accidents.

2. Fierce international competition of shipping

Shipping has been left to the mechanism of fierce international competition. The blind pursuit of cheaper and cheaper freight rates cannot be avoided in the name of international competitiveness. Limitless commercial pressure has driven freight rates lower and lower to the point where owners and operators buy the cheapest crews possible and avoid essential maintenance of the ships and of their life-saving equipment.

Some of the shipowners/managers are reluctant to pay attention to the essential ship safety issues, due to the commercial pressure. This in turn has led to a decline in the quality and standards of ship management. This decline has been exacerbated by the failure of many ship owners including managers, and classification societies to observe convention standards. Consequently, the progress of ship safety is likely to be impeded by the vicious circle of following substandard interested parties:

①Substandard owners who are reluctant to invest money for the building of new ships or even for the maintenance of existing ships, exposing ships to the risk of loss.

②Substandard classification societies, who readily accept changes in the class of vessels already rejected by the more reputable classification societies.⁹⁾

③Substandard flag states, particularly flags of convenience, which fails to ensure that ships on their registers comply with IMO convention standards; this contributes to the increasing number of shipwrecks, scuttling of vessels, maritime fraud, and pollution incidents.¹⁰⁾

④Substandard underwriters, who fail to differentiate between high and low quality tonnage realigning premiums to reflect the level of risk.

⑤Substandard crew, who are lacking in training and experience, and come from less traditional maritime nations on very low wages.

3. Big difference in ship safety indicators by nations

A survey of average tonnage/loss ratio between 1985 and 1989 which could indicate relative degree of the safety records of flag state fleet is shown in table 3 and that in 1994 in table 4. In both of the cases,

9)The main reason why this phenomena could occur is that they are paid by the shipowner and they are in competition for the available business.

10)Open registries now amount to one third of world tonnages, grown from 21.6% in 1970 to 34.1% in 1990(from C.C. Dayton, The Development of Port State Control for the Asia-Pacific Region, Proceeding of Maritime Technology 21st Century 1993 Conference).

some of the countries have large variation from average. For instance, they show some of the nations to have the worst record with an average loss ratio of 1.14% and UK to have the best one with that of 0.01%.¹¹⁾

Another safety record of the flag state fleet which could be represented by the survey of delays/detentions rate per flag state is shown in tangle 5. It is also the ship delays/detentions records by inspecting 20.6% of the vessels visiting ports of 14 MOU(Memorandum Of Understanding) countries in 1989. The report shows Honduras to have the worst delays/detentions record, with more than one in five of its ships halted, because of deficiencies while the UK with a detection rate 3.794%.¹²⁾

In summary, the differences in both average loss ratios and delays/detentions rates of ships per flag state by nations are too big to be justified. The safety records of fleets from emerging maritime countries are generally worse than those of traditional maritime countries.

11)The Telegraph, Average Loss Ratios 1985 - 1989 for fleets by flag of 2 million gross tons and over in 1989, Nov. 1990. p. 19.

12)The Telegraph, More Faulty Ships, Sept. 1990, p.19.

Table 3. Fleets by Flag of Million Gross Tons and Over (in 1989) (Source: The Institute of London Underwriters)

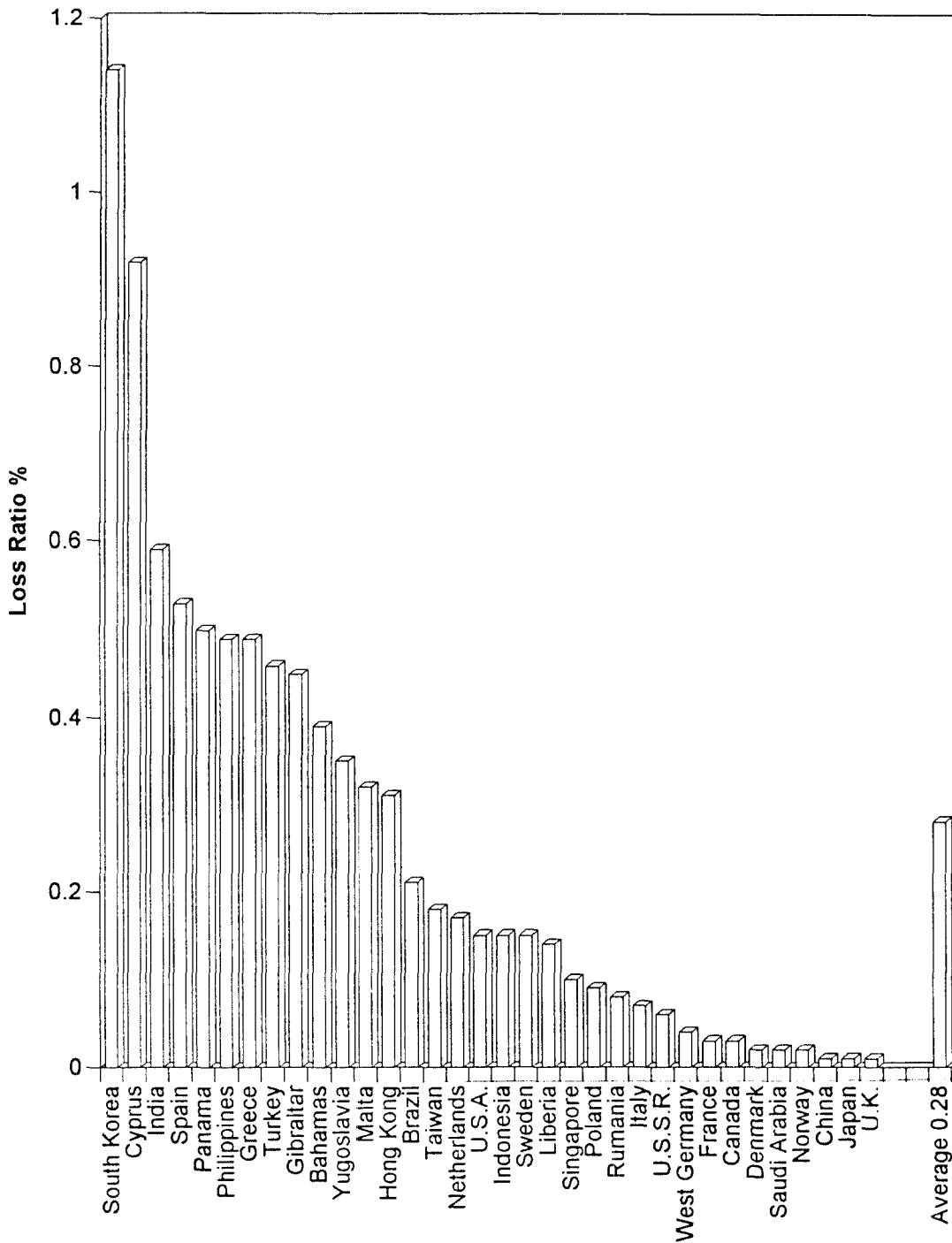


Table 4. Total Losses by Flag 1994
 (Source: The Institute of London Underwriters)

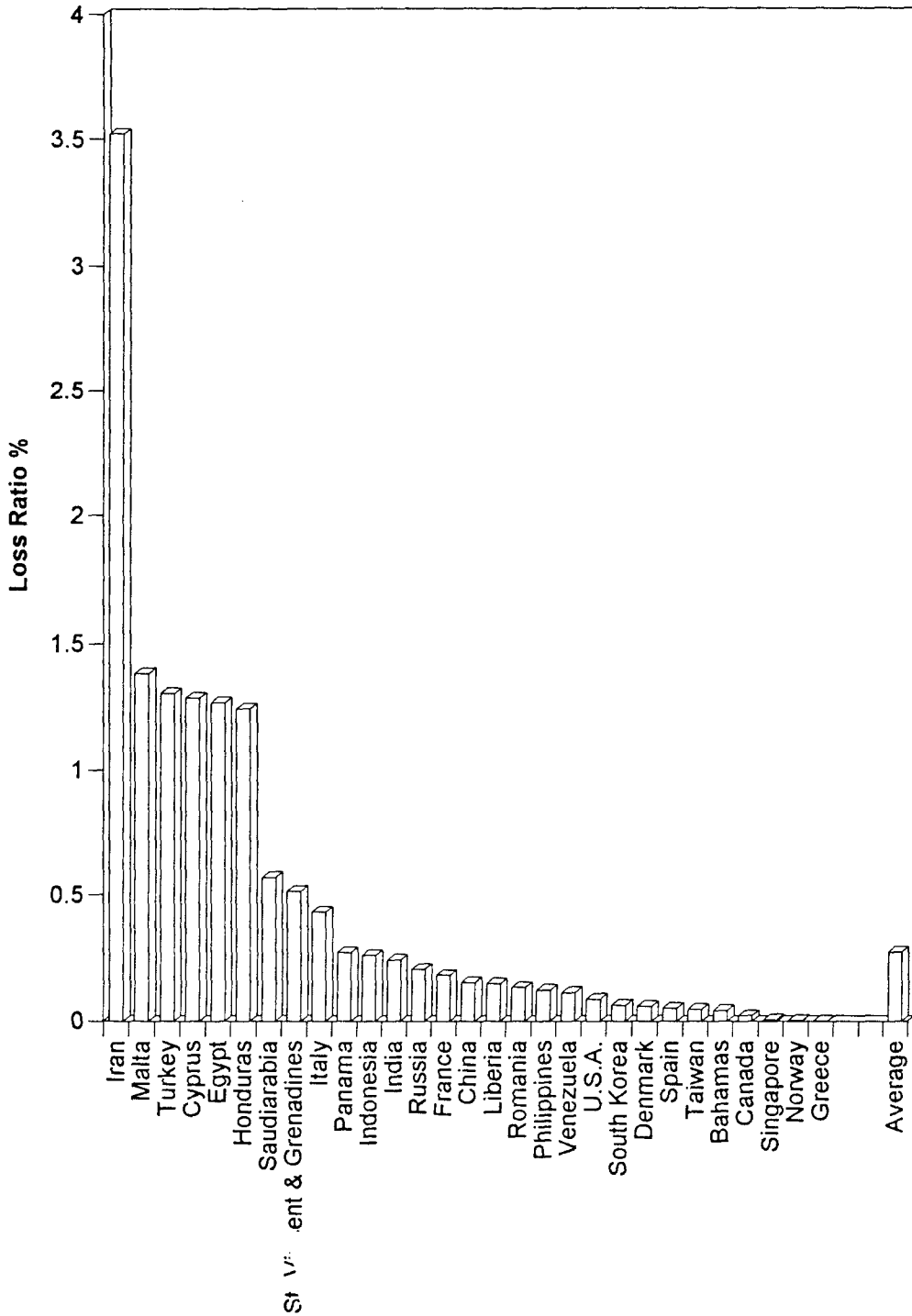
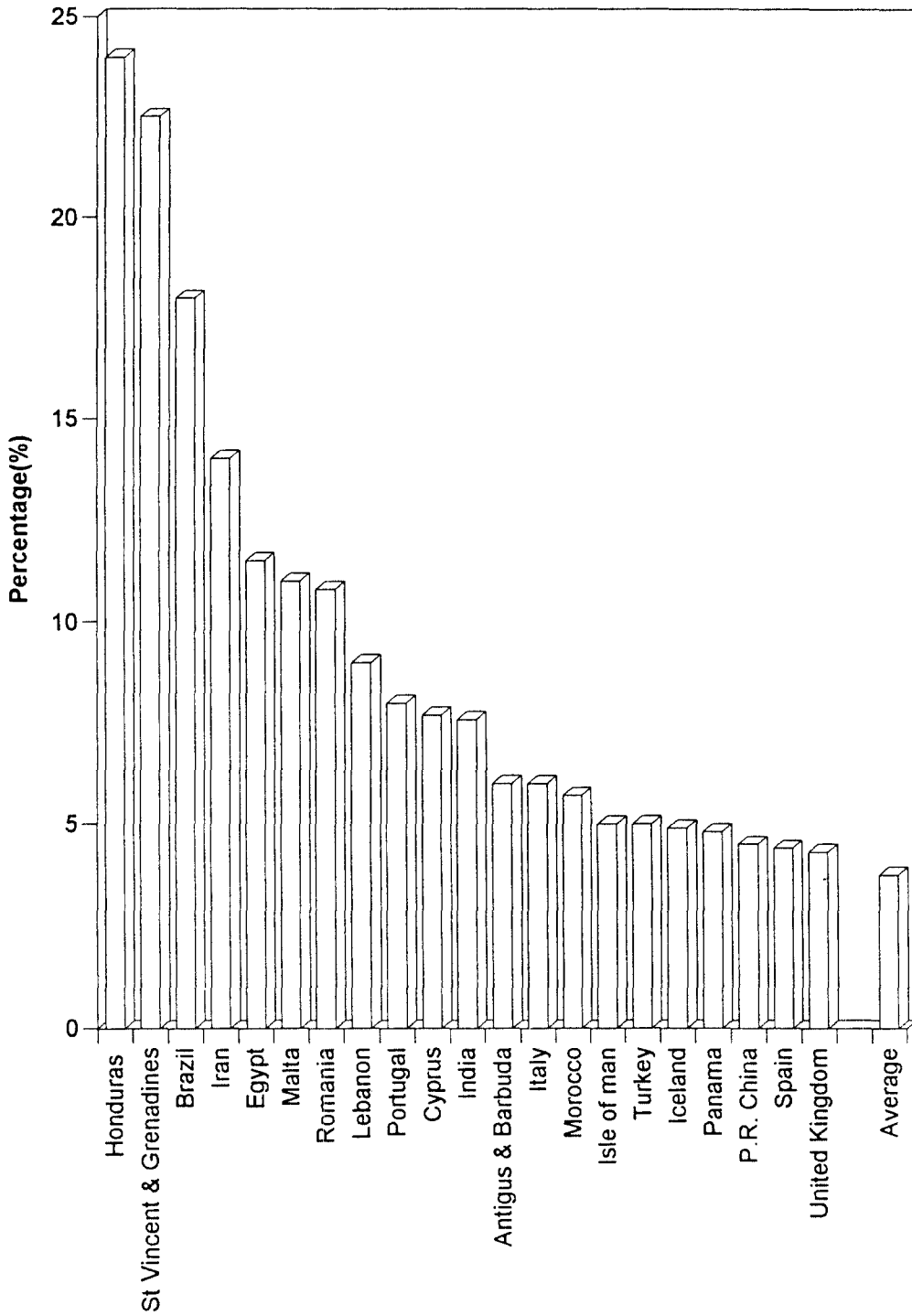


Table 5. Delays/Detentions per Flag State 1989
 (Source: The Telegraph, 9, 1990)



4. Limitation of enforcing on pollution law offenders

Detection and prosecution for spill activities are sometimes difficult to enforce because of the follows:

- ①A very small chance that vessels involved in illegal discharges will be detected.
- ②If a vessel is detected there is an extremely small chance that this detection will be followed by prosecution.
- ③If a vessel's owner is prosecuted there is only a small chance of ultimate success since the burden of proof is on the prosecuting authorities and in many cases proof is considered insufficient.
- ④When a judge does impose a fine, these fines generally appear to be very low in comparison to the price the vessel would have to pay for using port reception facilities.¹³⁾

5. Limitation of the international countermeasures

Recently developed countermeasures for ship safety and pollution prevention have limitations as follows:

1) Limitation of the Port State Control(PSC)

Port State has no control over the standards of design, construction or equipment of the arrived ship, and the crews with already determined standards of training and qualification. Any deficiencies in these basic elements are very difficult for the port state to detect. And even if they can be detected, correction is not easy.¹⁴⁾ There were too many deficient vessels slipping the supervisory net, despite the commitment of the signatories to ensure that 25% of all ships were inspected, because of the limitation of the inspector's job; the fact that they were often unable to examine ships properly because of the cargo in holds

13)IMO, Cleaner oceans: the role of IMO in the 1990s, p.13.

14)D.Bell, Port State Control, versus flag state control: UK government position [Marine Policy, Sept. 1993, p. 367].

and tanks and water in ballast tanks. Inspectors also wasted too much time examining the documents on well-found vessels, while vessels more deserving of the inspectors' attention escaped scrutiny.¹⁵⁾

2) The limitation of ISM Code(the International Safety Management Code for the Safe Operation of Ships and for Pollution Prevention)

The quality of safety management of both shore and shipboard sides could be enhanced by acceptance of ISM Code, which deals with management rather than technical issues.

Unfortunately in developing such a safety culture with this code, questions are still to be remained about whether demands being placed upon shipmaster would be reasonable and whether masters would not be constrained by an owner insisting that a particular route or speed should be maintained despite bad weather, thus risking safety. No one expects that an owner will not insist that a ship must arrive in port with clean ballast if there is no time to complete this operation or if there are inadequate facilities for it. Anyone cannot expect that living welfare and employment conditions will not fall below those needed to ensure good morale and motivation.

3) Limitation of Flag States Implementation Sub-committee

IMO established recently Flag State Implementation Subcommittee to assist administration to achieve a more appropriate level of compliance with the international legislation. And they concentrate on how the functions of flag state administration could be delegated to other bodies, which may be authorized to act on behalf of an administration.¹⁶⁾

15)Michael Grey, Safer Ships-Cleaner Seas, Nautical Year Book 1995, pp. 34, 36.

16) The main subject to be dealt with by the FSI sub-committee are: ①Guidelines for delegation of authority to bodies acting on behalf of flag state. ②Minimum standards for bodies acting on behalf of flag states. ③Guidelines to flag states on monitoring bodies acting on behalf of flag states. ④minimum requirements of training and experience for staff assigned to the implementation of IMO

Namely, it would appear that the agencies dealing with ship inspections such as classification societies will come under closer scrutiny and guidelines have been submitted on how to delegate powers to them and how to judge the good from the less effective.¹⁷⁾

They seem to concern heavily on the identification of needs of developing countries and on the making of proposal for technical assistance. But flag states compliance cannot be achieved merely by providing technical assistance to developing countries.¹⁸⁾

V. Summary, conclusions and recommendations

1. Summary

Enhancing both ship safety and vessel-source marine pollution prevention has confronted limitations, because existing countermeasures are not enough to regulate flag state's reluctance in complying with international conventions due to the unique characteristics of shipping regime.

Shipping has been left to the limitless competition burdening with even operating cost pressure. This in turn brings about substandard owner, substandard operator, substandard manager, substandard underwriter and substandard classification societies. Such a state of shipping is worsen by open registries of ships.

Big differences of ship safety records by nation are enough to back up stories that some of the flag states lack national infrastructure to adequately police their fleets and that some of the port states are not able to take responsibility for enforcing treaty obligation. This could

instruments. ⑤Availability of qualified staff to implement and monitor IMO instruments(from Shin Ho-Chul, Safety at Sea, New Prospect of Shipping in the Era of 2000, Asia Pacific Sea Transport Conference., 1993. And C.J. Parker, Port and Shipping Management: Work Shop Presentation, Marine Policy, Sept. 1993, p.393).

17) O.H.J. Dijkhoorn, Port and shipping Management: the Role of IMO. Marine Policy, Sept., 1993, p.366].

18) Andre Nollkaemper, Agenda 21 and Prevention of Sea-based Marine Pollution, Marine Policy Policy, Nov. 1993, p.552.

lead to the high potential of casualties at sea which contribute to the marine pollution.

2. Conclusions

IMO has developed more than thirty international treaties, several hundred codes, and numerous recommendations. But almost all of the IMO's efforts have focused on helping and cooperating in terms of scientific and technological measures and human resources but IMO has not concerned on the quality of member government's implementation capability of maritime administration.

This one-sided orientation of IMO has led to the large gap between law enactment and law enforcement for both ship safety and marine pollution prevention; that is one of the reasons why IMO has been powerless to ensure observance of its conventions particularly in some of the emerging maritime countries.

3. Recommendations

IMO has to make more aggressive efforts to maintain a high standard of implementation capability of maritime administration of each member government.

IMO has to introduce a new international regulatory paradigm to improve the quality of national maritime administration; several different types of maritime administration standards have to be suggested so that one of them can be chosen by recipient governments depending on their cultural and social backgrounds. Any types of maritime administration standards have to include the following factors:

① Maritime administration has to ensure the effective integration of various functions into a synergistic whole and the self-contained instrument capable of providing a full range of systematic maritime

services such as waterway management, vessel traffic control, aids to navigation, marine inspection, oil spill response, and cleanup operations.
19)

②Quick cooperation has to be ensured nationally by establishing matrix organization minimizing the vertical steps of bureaucracy and removing barriers between divisions.

③Minimum requirements for the training and education of the administration staffs have to be specified in the same way as those of seafarers are stipulated in STCW convention.²⁰⁾

④A quality assurance program for national maritime administration has to be adopted by self-testing and examining the implementation capability of member governments in the same way that the quality assurance program for classification societies is examined by IACS to restore confidence in the classification system.²¹⁾

⑤International standards and procedures for improving implementation

19)To maintain the most effective maritime administration standard in a country, missions for ship safety and marine pollution prevention should be integrated into a single independent instrument with decision-making autonomy for both policy and on-the-spot implementation. On the contrary, if such missions are dispersed into several different departments and subordinated to economic oriented divisions, as in Korea, function vacuum of administration, overlapping of budgets, evading of obligations, shifting of responsibilities between divisions are likely to happen(Lee, Sang-jib, The Letter of Recommendations to the President Kim Youn-sam of Korea for the Reformation of Maritime Administration, June, 1993).

20)To solve the issue with the safety and availability of seafarers, IMO has started to amend the convention on Standards of Training, Certification and Watchkeeping(STCW) so that it could be provide a achievable common international minimum standards of professional competence for seafarers commensurate with the need to ensure safe of ship operation and protection of marine environment. It has also proposed that there be some form of international accreditation for the national training systems around the world[from Ibid. of 6) p.85].

21)International Association of Classification of Societies[IACS] is currently implementing a quality assurance program with which members will have to comply if they are to remain members of the Association by establishing the Quality System Certification Scheme. The central objectives of it are to ensure that IACS members have their own internal quality systems, and that members conform with standards laid down by the IACS including the 'Code of Ethics'[from Ibid. of 6), pp. 66-68].

capability of maritime administration have to be laid down in a similar way as those for enhancing safety management of ships are laid down in ISM Code.²²⁾

⑥ Reasonable administration infrastructure has to be maintained where experts can enjoy both rights and obligations in implementing convention standards. Function vacuum of monitoring ships and oceans has to be minimized by establishing multi-mission service system for the effectiveness of on-the-spot implementation.

⑦ The standards' frameworks have to deal with the implementation capability for vessel inspection, monitoring of shipping activities, responding of ocean management, traffic service, contingency plan, human resources trained, modernized facilities and equipment, quick communication system, and a philosophy for establishing priorities.

In short, IMO has to make a resolution to maintain a high quality of implementation capability of national maritime administration for ship safety and pollution prevention. IMO has to be ready to overcome problems and conflicts in dealing with domestic administration issues of member governments.

22) The fundamental requirement of the ISM Code is that a safety management system be in place in the company, including the follows: ① Safety and environmental protection policy. ② Instructions and procedures to ensure safe operation and protection of the environment. ③ Defining levels of authorities and lines of communication, between, and amongst, shore and shipboard personnel. ④ Procedures for reporting accidents and non-conformities. ⑤ Procedures to prepare for and respond to emergency situations. ⑥ Procedures for internal audits and management views (from Capt. M. Pickthorne, International Safety Management Code, Oct. 1994, Seaways P.22).