



IMPLEMENTING A SEA POLLUTION AND SAFETY MANAGEMENT SYSTEM IN THE NAVIGATION COMPANIES

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Abstract

The paper presents the main causes of the sea accidents and disasters, which call for the implementation of a sea pollution and safety management system (SMS) in the navigation companies, for certification purposes, in compliance with the International Management Code for the safe vessel operation and pollution prevention (ISM). For this purpose the objectives of the ISM codes are presented and which are to be found in the implemented Management System.

From the main causes of the safety deficiencies in vessel operation, by applying the cause-effect method, it was found necessary to implement a sea pollution and safety management system in the navigation companies able to provide more safety in ship operation, an implementation in the absence of which the international traffic would no longer be possible.

Thus the basic SMS implementation stages have been established taking into account the related international legislation.

Key words: conventions for sea pollution prevention, ISM code, sea pollution and safety prevention, SMS implementation

1. Introduction

The world economic growth reported in the last decades has been accompanied by an increase in the foreign trade and implicitly in the world sea trade. At the same time, the evolution of the world and European sea transport has been marked by more acute exigencies as regards safety, quality and sea-going vessels pollution prevention, the major cause being the large number of accidents and related high casualties along with heavy sea pollution (Bătrâna, 2004).

The maritime transport is an ample and complex economic activity both as amount of cargoes shipped annually and as material value. Its complexity also comes from its particular environmental conditions where it takes place – seas and oceans – which call for special safety measures (Bauchet, 1992).

The causes of sea accidents and their effects are constantly investigated by international organizations and institutions having authority in regulation, statistics, and insurance along with sports associations. They are investigated, classified and the conclusions are further turned into rules

norms or international conventions for the purpose of reducing or eliminating similar accidents in the future (Voicu et al., 2000). Therefore, international organizations such as UNO, EC and specialized agencies such as IMO (International Maritime Organization), ILO (International Labour Organization) have elaborated a significant number of conventions, regulations, rules, norms, international standards that contain essential criteria for the sea safety and sea pollution prevention.

Due to the IMO member governments having accepted the constant modifications to the rules and conventions referring to ship safety at sea and sea and air pollution prevention, their evolution is constant. Thus the IMO OILPOL 1954 convention was first modified in 1969, and in 1973 a much sever convention was adopted, "the Convention for Prevention of Sea Pollution by Ships". The latter's ratification was initially slow, but a number of accidents that occurred in the period 1976-1977, determined the call for the Conference on Oil tankers safety and Pollution Prevention in 1978, the Convention of 1973 being amended under the form known today as MARPOL 73/78 (MARPOL73/78, 1997).

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In 1967-1977, a series of accidents of some oil tankers have result in new modifications to the SOLAS Conventions (International Convention for the Safety of Life at Sea) adopted in 1974 and MARPOL (Convention for the Prevention of Pollution from Ships). SOLAS, the most important convention, has been repeatedly modified as a response to major disasters (SOLAS, 1974).

In 1989 IMO adopted the International Convention for Saving (SALVAGE, 89) and the International Convention on Oil Pollution Preparedness and Cooperation (OPRC, 1990), for the purpose of introducing a global system of response to the major oil discharges (International Convention on Oil Pollution Preparedness and Cooperation, 1995).

The navigation disasters resulting in casualties and severe contamination of the marine environment made it that in 1993 the IMO General Assembly elaborate and adopt the International Code of Safety Management (ISM, 1993). This is integral part of the International Convention SOLAS and it became compulsory for all vessels over 500 GRT (Gross Tons), since July 1, 2002. The ISM Code was elaborated to make from safety a major priority in the shipping companies' management (ISM, 2002).

Navigation accidents have had a considerably strong impact on the national economies, on companies and civil society as a whole. That why all over the worlds the new norms and regulations have had a major impact on the management of both navigation and shipping companies.

Within this world-wide strive for a safety and unpolluted marine transport with the slogan "Safer Shipping and Cleaner Oceans" a large number of programs are focused on two fundamental objectives: maritime safety and sea pollution protection.

The concern for achieving these two objectives covers international organizations, governments, navigation companies, ship owners, crews. It can be assessed that these objectives are the objectives of a World Management of Sea Safety Assurance.

The paper intends to present the main causes of a poor safety in ship operation and the need for implementing the Safety Management System and sea pollution prevention in the navigation companies.

2. Case-study

2.1. Applying the cause-effect method to establish the main causes resulting in poor safety at sea

Elimination or reducing naval accidents is only possible if there is full knowledge of their causes. Statistics reveal that the most frequent causes resulting in naval accidents are: complex technology, improper operation and maintenance of equipment, fittings, featuring old service life, improper spare parts, ships' age, the company itself, the management and last but not least the human factor.

An item on which all studies on naval accident coincide is that most of them are based on human error. The human element is a multidimensional

complex source which affects sea safety and sea environment protection. It is involved in the entire range of human activities performed by the ship crew, the on-shore management, regulating organisms, recognized organizations, shipyards and other relevant institutions, being necessary the cooperation of these factors for an efficient and safety orientation of the human element.

The proportion of the human error influence is variable but, in general, it is very high. Thus, a study carried out by the Institute of Shipping Economics of Bremen, Germany revealed that 75% of the accidents have been caused by two factors: the too heavy work the crew had to performed, especially in the harbour, and their unsuitable training (Alexiu and Alexiu., 2002).

An analysis carried out by United Kingdom Protection & Indemnity Club, shows that 60% of the accidents are caused by human error. The human error is also responsible for 50% in the case of pollution, 65% in case of staff injury, and 90% in case of collisions. The supervising by the Advisory Committee on Pollution of the Sea of numerous cases of oil discharges in the Great Britain waters in 1990, has found out that the human error is the cause of 66% of the cases (MEPC, 1999).

The Australian Ministry of Transports and Communications reported in 1992 that approx. 75% of the accidents investigated were caused by human errors. A report published by the American Bureau of Shipping Marine Service in 1994 revealed that, statistically 65% of the major damages reported are due to human operating errors, out of which 27% are due to uncertain practices (IMO, 1994). Although percentages may vary, all studies on the subject show that most maritime accidents take place due to an error which might have been avoided.

Consequently, any attempt to reduce accidents at sea should focus on the elimination of the human error, the human factor being considered almost unanimously to be the cause of 80% of the naval accidents (Branch, 1996). An evaluation of the possible causes resulting in poor safety is made by the cause-effect method (Ishikawa diagram). Evaluation is based on the data from the literature and the main causes of maritime accidents are investigated. Major causes can be thus revealed along with sub-caused which effect is poor safety in ship operation.

In conformity with the statistic data published, the rate of accidents which further led to marine disasters is as follows: complex technology 5%, improper equipment operation /handling 8%, old equipment 3%, ship aging 4%, human error 80%. Taking into account the percentages, the cause-effect diagram (Fig. 1) highlights the major causes which are based on human factor.

The diagram highlights that the major causes for human factor error are: no plans for emergency situations, no planned actions, lack of information, lack of standards, unclear instructions, no proper knowledge and experience and, last but not least, no motivation.

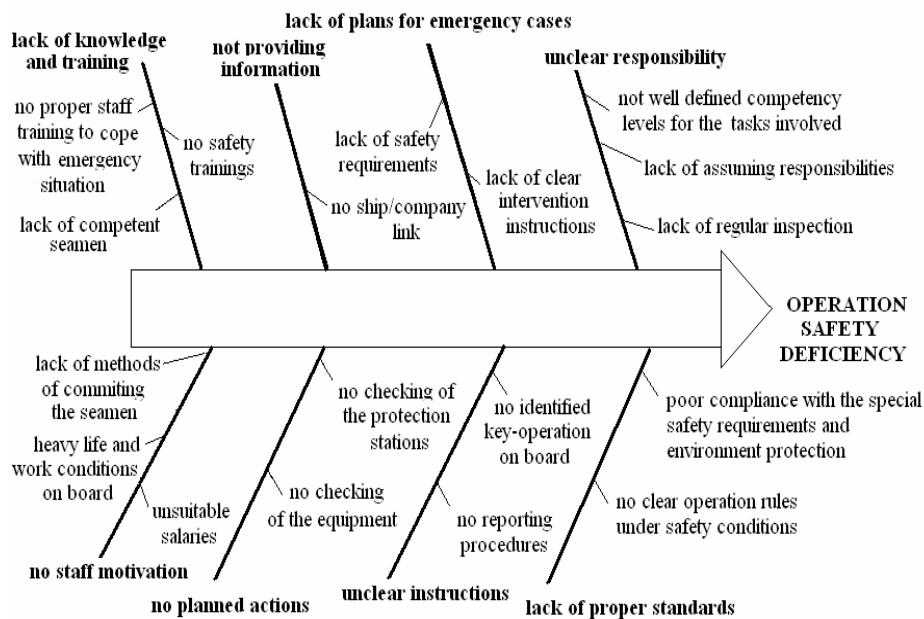


Fig.1. The cause-effect diagram (sursa : original)

All such causes can be eliminated and human errors avoided or reduced by implementing a Safety Management System.

Management and human resources is the key for success in a company nowadays. Maintaining a navigation company in the sea traffic implies to accept the idea that improving sea safety depends on the human factor.

2.2. Necessity of implementing a Safety Management System in the navigation companies

The new requirements and rules of the international maritime organisations bring in front of the navigation companies a number of problems such as (Iordanoaia, 2003):

- Pollution protection and prevention of the environment and especially the marine environment;
- Safer marine operation procedures;
- Methods of response to emergency situations, identified or likely to occur;
- Development of integrated management systems of quality -environment – safety;
- Training of the onboard staff so as to be able to work safely on board, to know and observe the international norms and rules on safety and environment protection.

Taking into account all this, as well as the causes affecting safety at sea, the ISM code require each navigation company to implement and maintain its own Safety Management System (SMS). Thus, this becomes not only the condition to take part in the international traffic but also a compulsory condition to insure the ship (starting with July 1998).

The Safety Management System, which as a result of the evolutions in the international maritime world, becomes compulsory for the entire world sea fleet, stands for the national dimension of the ISM code, this being the most important dimension, the system efficiency and results depend on.

The ISM code is considered by the literature as the norm document having the heaviest impact on the world commercial fleet. It is an international standard for the operation and management of ship safety and pollution prevention (ISM, 2005).

The main objective of this code has been the increase in ship safety and keeps the marine environment uncontaminated. The ISM code is a unitary set of rules and requirements applicable to both ships and navigation/shipping companies, starting from the pre-requisite that the most important modality of preventing maritime accidents and sea pollution by ships is to design, manufacture, equip and maintain vessels and further having them operated by properly trained crew, in compliance with the international conventions and standards about maritime safety and prevention of marine pollution (ISM, 2005).

Applying the ISM code is expected to encourage the development of a true culture for shipping safety. The success factors for developing such a safety culture may include confidence, values and conviction. The motivation of the Safety Management System is to keep ship in the international maritime traffic under safety and environment protection conditions, reducing the number of accidents, damages and disasters. Its general objectives are the ship safety, life and work conditions on board and prevention of the

contamination of the sea where the ship is operating (Iordanoaia, 2006).

A model of Safety Management System is given in Fig. 2. The Safety Management System makes specific provisions for suitable steps likely to ensure that the company, due to its organisation capabilities, be able to cope any time with the dangers, accidents and emergency situations which might occur.

3. Results and discussion

Highlighting the main causes and sub-causes that affect ship operation safety at sea revealed the need for implementing a Safety Management System in each shipping company.

The SMS proposed model (Fig. 2) provides for the major stages of its implementation for the purpose of obtaining the safety management Certificate for each ship and the Certificate of conformity of the shipping company.

They are the proof that both the ship and the company meet the requirements of the ISM code issued in 1993.

The stages provided are: evaluation of the existing state of the company in terms of ISM code, establishing a Safety Management System implementation program, and the certification audit as per ISM code.

The company objectives with respect to safety management and pollution prevention as defined by ISM code are to be found in the company's SMS (ISM, 1993).

They are the followings: assuring safe practices in ship operation and a danger-free working environment, establishing safety measures against the identified risks, permanent improving of the on shore and on board staff competences as regards the safety management, including staff training for emergency cases.

In order to achieve these objectives, the shipping company establishes whether it applies and maintains a safety and marine pollution prevention policy. This policy shows how objectives are out into practice at all organization levels on shore and onboard equally.

To guarantee safety operation of each vessel and to make the proper link between shipping company and the staff on board, the company appoint one or more persons on-shore which have direct access to the highest management level. Among their responsibilities is the surveying the ship operation, pollution safety and prevention, assign the suitable resources and their related support on shore.

A good safety and pollution prevention management both off- and on- shore implies that the operational responsibility is the ship captain's but the overall responsibility asks for a deeper commitment of the on-shore management.

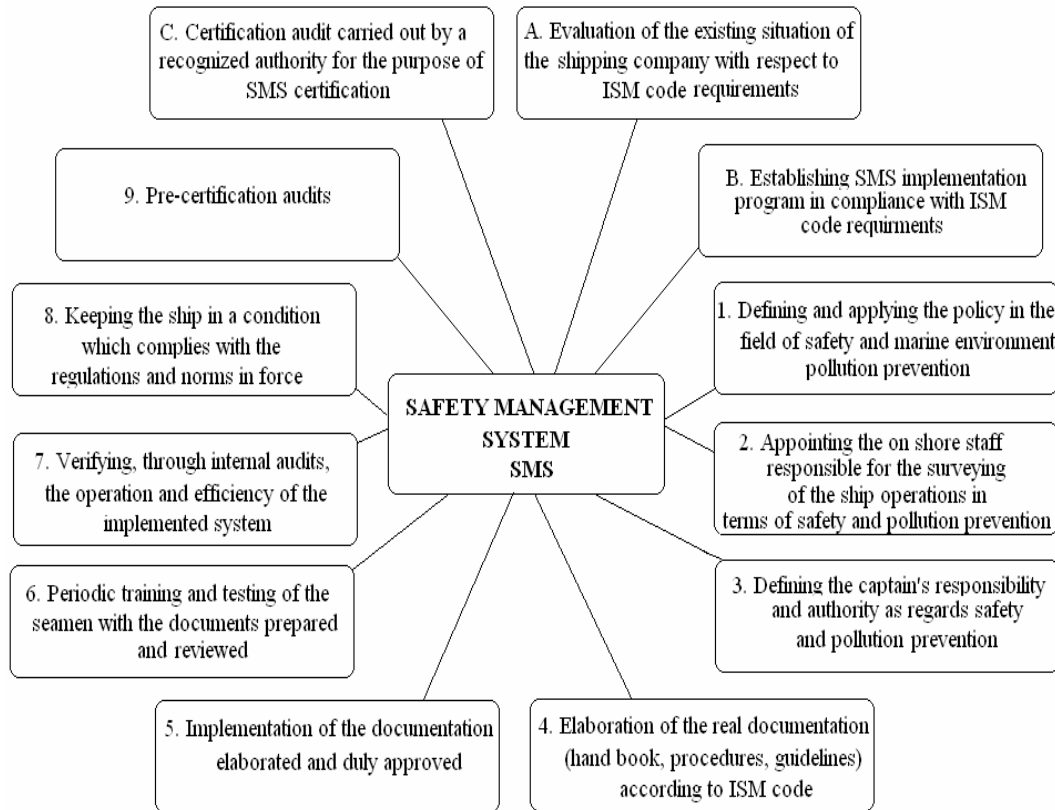


Fig.2. Safety Management System

The company clearly defines the captain's responsibility as regards: implementing the policy, motivating the crew, making up the orders and guidelines very clear, checking the compliance with the specific exigencies, analysing the safety Management system and informing about lack of compliance with the on-shore management. Within the system the supreme authority belongs to the ship's captain since it is up to him to take decisions on safety and pollution prevention.

Within the System, the company establishes a set of procedures for: training the staff for the system implementation, making the schedules and instructions for the major operations on board, identify and describe the emergency situations and measures to take, identify the equipment and installations whose sudden damage may create dangerous situations. The system provides for specific measures to increase reliability of such equipment.

The procedures included in the Safety Management System must ensure that potentially dangerous accidents are reported to the company, as they are investigated so as to improve ship safety and pollution prevention (Willingale, 1998).

The company performs internal audits to check if the activities related to safety and pollution prevention are in compliance with the implemented system, making periodical evaluations of its efficiency.

The safety management certificate is issued to a ship after the initial verification of the compliance with the ISM code requirements. This includes verification if the company conformity document is applicable to the specific type of ship and the implemented system is in accordance with the ISM code and is properly applied (ANR, 2005).

4. Conclusions

The cause-effect analysis as regards the causes and sub causes that determine the human errors accompanied by accidents and marine disasters resulting in casualties and sea contamination has shown that such causes may be eliminated by introducing a SMS in the shipping companies.

The safety Management system means a structured and documented unit which enables the implementation of the company policy of safety and marine pollution prevention. It should ensure that compulsory rules and regulations are strictly observed, along with the applicable codes, standards recommended by the organization, administration, classification societies and marine organizations.

The fundamental condition of a good safety management is the highest commitment. In the issues of safety and pollution prevention the final result is

determined by the commitment, competence, attitude and motivation of individuals at all levels.

The Safety Management System provides for adequate measures so as to ensure that the company organization is able to face, any time, the accident dangers and emergency situations its ship may found itself into.

Implementation of such a system is a condition to maintain each ship in the international traffic circuit.

References

- Alexiu E., Alexiu J., (2002), *On the ship safety and marine and air pollution prevention management*, Alma Edition, Galati, 27-215.
- ANR, (2005), The certification rules of ANR, (in Romanian), Regulation certification of Romanian Naval Authority, Romania
- Bauchet P., (1992), *Le transport maritime*, Économique Press, Paris.
- Bătrânca Gh., (2004), *International Maritime Commerce*, (in Romanian), vol. I, Arvin Press, Bucharest.
- Branch A.E., (1996), *Elements of Shipping*, Chapman & Hall, London.
- Iordanoaia F., (2003), The modern shipping company, *Sci. Maritime Annals University*, 4, 54-57.
- Iordanoaia F., (2006), *New management for maritime companies*, International Scientific Conference, Marine Science Forum, vol.1, Varna, Bulgaria, 43.
- IMO, (1994), International Safety Management, Code IMO, issued by International Management Organization, by resolution A. 739 (18), London
- ISM, (1993), International Safety Management Code, issued by International Marine Organization, by resolution A. 741 (18), London.
- ISM, (2002), International Safety Management Code, issued by International Marine Organization, by resolution M.S.C. 104, London.
- ISM, (2005), Code and revised guidelines on implementation of ISM Code, issued by International Marine Organization, by resolution A 863 (20), London.
- MARPOL 73/78, (1997), International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto, Published by the International Maritime Organization 4 Albert Embankment, London SE1 7SR, 3-23.
- MEPC, (1999), Identification, Weathering and Biodegradation of Oil in the Marine Environment, 43rd session of Marine Environment Protection Committee, London
- SOLAS, (1974), International Convention for the Safety of Life at Sea adopted by the International Conference on Safety of Life at Sea by the International Maritime Organization (IMO), London.
- Voicu M., Veriotti M., (2000), International marine conventions, vol. I, II, III, (in Romanian), ExPonto Press, Constanța, Romania.
- Willingale M., (1998), *Ship Management*, Business of Shipping Series Edition, third edition, London, 297-314