



## Application of The Ism Code On Passenger Ships and Impact on The Loss of Human Lives at Sea Over The Past 35 Years

J.A. González<sup>1,\*</sup>, F. Padrón<sup>1</sup>, A. Dionis<sup>1</sup>, J.I. Gómez<sup>1</sup>, M.C. Adrián<sup>1</sup>, J.M. Calvilla<sup>2</sup>

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### ABSTRACT

On March 6, 1987, the RO-RO ship Herald of Free Enterprise sailed from the Belgian port of Zeebrugge, with the bow door unlocked because of negligence on the part of the crew. After leaving the port, exactly 90 seconds, the water came in great amount in the hold for vehicles, causing the heel of the ship. In a few minutes, the ship is lying on its starboard side, causing the loss of 193 people. The official investigation showed that the management of the safety of their vessels by the shipping company had not been adapted, so that following this event and other high impact accidents in the maritime field, the International Maritime Organization through Resolution A.741 (18), approves the ISM Code on November 4, 1993, mandatory for all vessels with the entry into force of Chapter IX of SOLAS (International Safety Management Code) as it demonstrates that over 80% of accidents on vessels are due to human factors. We proceed to list a number of selected by the number of victims and high impact on public opinion accidents. This is therefore a preliminary work that will form the basis for further study. We want, by analyzing a few cases after the accident Herald of Free Enterprise, if the implementation of the ISM Code has achieved the goals that had initially set; mainly 'to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular, to the marine environment, and to property'. After this review, we can conclude if a change as important as the ISM code standard is necessary.

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### 1. Introduction

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code - ISM) has as its main objective the establishment by shipping a safety management systems of ships and pollution prevention. The code, adopted by the IMO after numerous accidents on passenger ships with great media impact on the number of victims, is in Chapter IX of SOLAS Convention (International Convention for the Safety of Life at Sea); resulting mandatory for all member states of the IMO. Specifically Regulation 2 of Chapter IX indicates that this code it's applicable into:

1. passenger ships, including passenger high speed vessels, no later than July 1, 1998;
2. oil tankers, chemical tankers, gas carriers, bulk carriers and cargo ships high speed of gross tonnage above 500, no later than July 1, 1998; and
3. other cargo ships and mobile offshore drilling units of gross tonnage above 500 GT, no later than July 1, 2002.

The starting point for the development of the ISM Code was the 'Herald of Free Enterprise' ship sinking. The official investigation concludes that 'immediate cause of the accident was that the bow door remained wide open, allowing the great in-rush of water as the vessel increased speed, while the assistant boatswain directly responsible for closing it lay asleep in his cabin Unless the assistant boatswain's negligence was simply the last in a long string of actions that laid the groundwork for a major accident' (Sheen, 1987). Six years after that tragedy, the ISM code is approved. The code and rules associated with

<sup>1</sup>Departamento de Ingeniería Agraria, Náutica, Civil y Marítima. UD Ingeniería Marítima. Grupo I+D CONSEMAR. Universidad de La Laguna.

<sup>2</sup>Grupo I+D CONSEMAR. Universidad de La Laguna.

\*Corresponding author: J.A. González. E-mail Address: [jagonal@ull.edu.es](mailto:jagonal@ull.edu.es)

it should enter into force on 1 July 1998 in the first phase and July 1, 2002 in its second phase, as mentioned above. However, as we shall see, this accident was not a unique case, and have continued accidents of this nature.

The main objective of the ISM Code, it is to create an international standard covering the management of the safety of the ship and the prevention of pollution and its effects on the environment. The application of the code by the company must meet minimum requirements, for example: provide for safe practices in all operations to be performed by the ship and in the workplace; take precautions against various risks, continuous improvement of training of the crew on board and ashore on security management, proceeding against emergency situations, with potential effects on the safety of the ship and the environment. To this end, the rules must be respected mandatory, as well as guidelines, standards and recommendations from the IMO and other organizations involved as public administrations, classification societies and many other organizations of the sector.

The ISM code is structured in two parts. Part A, it is mandatory and organized in 12 articles (IMO Res. ):

1. General.
2. Principles of Safety and Environmental Protection. (On-board and ashore).
3. Responsibility and Authority of the Company.
4. Appointees to ensure the implementation and operation of IS; Code.
5. Responsibility and Authority of the Captain.
6. Resources and Personnel, with particular reference to the proper training of the crew, for a correct application of the Code, as set out in the Management System Security (SGS)
7. Development of plans for shipboard operations, with special attention to the most important operations on board.
8. Emergency preparation, with exercises and practices for effective preparation before emergency situations.
9. Reports and analysis, implementing tools to keep duly informed the company.
10. Maintenance of the ship and equipment in accordance with existing regulations.
11. Documentation, with proper processing of data related to SGS.
12. Verification of the company, review and evaluation, verifying the correct application of SGS.

Part B of the Code, is a guide of recommendations for proper development of the STCW Convention and Watchkeeping for Seafarers or STCW.

Maritime recent accidents with loss of human lives, caused by recklessness and negligence by members of the crew as Captain Schettino, responsible for the sinking of the Costa Concordia cruise (2012) and its behavior against accident, similar to the Korean ship Sewol's captain (2014), Lee Jun-seok abandoned to their fate, passengers and crew members, make the ISM code has great importance today, after being amended in

2000, 2004, 2005, 2008 and 2013. In fact, a study by the National Transportation Safety Board concluded that almost 80% of accidents in the maritime sector is due to the human factor and mismanagement in shipping companies (Ugarte Miguel, C; 2013). It is expected that its application of the legislation should have a significant impact on increasing safety and reduce the risk of loss of human lives on sea.

## 2. Methods

Our work aims to be the starting point for a deeper study of the situation worldwide. We seek to make a first approach to the state of the question, seen from the point of view of a person who has nothing to do with the maritime sector. For this reason we makes a study of maritime accidents involving loss of life occurred in international shipping and considering only the number of deaths, the navigation area and only passenger ships. There are several previous studies about the causes in various parts of the world, although generally and not specifically on passenger ships. For this study we have been used data provided by the IMO-GISIS database: Marine Casualties and Incidents of the International Maritime Organization, where such accidents are collected. In this work, we will stick only to the total number of victims, without distinguishing between crew and passengers. To do this, of the 127 incidents involving passenger fatalities in the period 1993-2015 and the 1127 incidents with members of the crew died in the period 1993-2015, we will make a selection of those most relevant accidents (for public opinion and number of victims) in the last 25 years and the previous decade, prior to the implementation of the ISM code. Then, from the GISIS database, we extract 21 accidents with more than 25 contrasted deceased as a first approximation and listed in the following table:

Table 1: List of Ships. Source: GISIS Database - IMO.

Ship	Year	Deceased	Navigation Zone
M/V Tampomas II	1981	580	Indian Ocean - Java Sea
S/S Admiral Nakhimov	1986	423	Black Sea
Herald of Free Enterprise	1987	193	English Channel
M/V Doña Paz	1987	4341	Indian Ocean - Philippines
M/V Salem Express	1991	470	Red Sea - Egypt
Moby Prince	1991	140	Mediterranean Sea
M/S Jan Heweliusz	1993	54	Baltic Sea
M/V Neptune	1993	1215	Caribbean Sea
Seohae Ferry	1993	292	South Korea
M/S Estonia	1994	852	Baltic Sea
M/V Bukoba	1996	800	Victoria Lake - Tanzania
M/S Express Samina	2000	82	Aegean Sea
M/V Le Joola	2002	1863	Senegal
M/V - Nazreen I	2003	780	Indian Ocean - Bangladesh
Al-Salam Boccaccio 98	2006	1000	Red Sea - Egypt
M/V Princess of the Stars	2008	1000	Indian Ocean - Philippines
M/V Bulgaria	2011	122	Volga River
M/S Costa Concordia	2012	32	Mediterranean Sea
M/V Karama	2012	78	Indian Ocean - Zanzibar
M/V Rabaul Queen	2012	183	New Guinea
Sewol	2014	304	South Korea

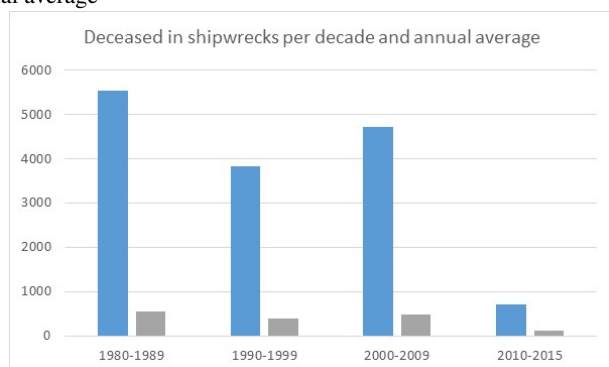
We will see how accidents and their victims are distributed in different periods and analysis shall be based on the areas of

navigation, number of accidents and density navigation, evaluating some of the causes that caused such death toll. We do not intend to conduct a thorough analysis of the issue, but to expose a series of data that tell us simply as the issue is evolving.

### 3. Results And Discussion

Based on selected ships to our study, we collect a series of graphs to see how various parameters have evolved over recent decades. In Table 1, we find a list of victims killed in accidents referenced ships, while Figure 1, we can see the number of accidents occurred in the same decades for the selected sample.

Figure 1: Number of deaths in accidents passenger per decade and annual average

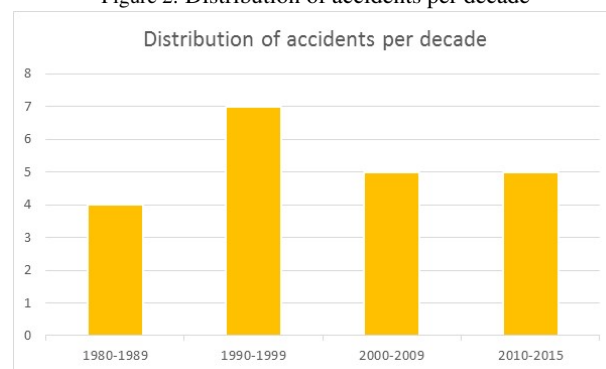


Source: I+D Consemar

In the 80s, the victims are a very large number (over 5000) compared to the number of accidents caused. It was from the number of deaths in this decade when proceeding with the implementation of the ISM Code. The following decade, while the number of accidents increases, the number of deaths decreased; however we consider the decade from 1990 to 1999 as a time of transition, since compulsory implementation of the code, it has a first date in 1998 and finally must be fully operational in 2002. However, we can see an increase in the number of deaths in accidents at sea significantly, falling short by little the decade that would lead to the development and implementation of the ISM Code. According to N. K. Mansell, in his thesis 'Flag State Responsibility: Historical Development and Contemporary Issues' (Mansell, J.; 2009), for the decade from 1990 to 1999, the number of lost ships over 100 GT, are 2562, with an annual average of more than 250 vessels. Their numbers, taking into account all these accidents are approximately 6300 deaths, while each other in just 7 accidents, we account the 60% of the total victims. From 2000 to 2007 he refers 5255 deceased compared to 4727 in our study (90% in 6 accidents where we reach also 2008). Data, which we consider alarming, since the ISM code was to be fully operational and yet far exceed the data occurred in the decade that would lead to the taking of these measures.

Since 2010, we have only recorded accidents until 2015, with 5 major accidents and high media repercussion, especially for being in areas such as Europe and Korea where the performance of the captains and other crew members show that there is an important underlying problem. However, as we can see

Figure 2: Distribution of accidents per decade

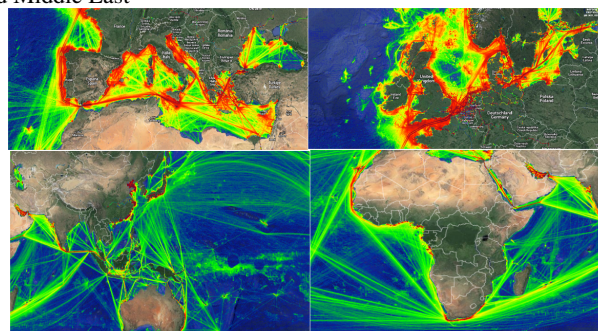


Source: I+D Consemar

the number of dead itself has been reduced drastically, which entails a substantial improvement over the past three decades.

Below we have collected four graphics (Figure 3), provided by the application Marinetraffic.com, with the density of navigation in some of the areas where there have been more accidents, Mediterranean, Northern Europe, Oceania and Africa, Indonesia and the Middle East. We analyze the traffic intensity (high red and decreases towards green), compared with areas where as many shipwrecks occur and therefore is also compared with the victims that take place in each of these areas.

Figure 3: Density of maritime traffic from AIS, in areas (A) Mediterranean (B) Baltic and North Sea, (C) Indian Ocean, (D) African Coast and Middle East

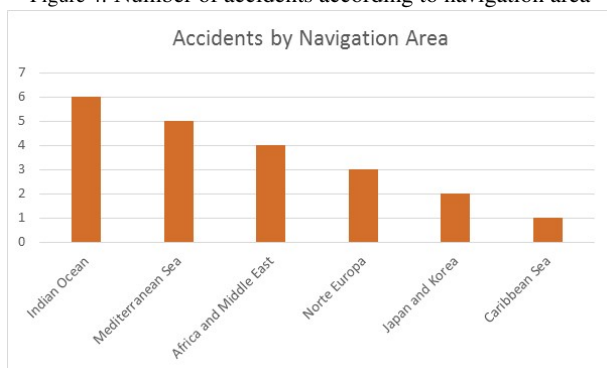


Source: www.marinetraffic.com

As we can see, one would expect greater number of maritime accidents in the areas of navigation in the Mediterranean and the Baltic and North Sea. However this areas are in the first and fourth position respectively, which verifies that the Mediterranean with a greater maritime traffic density has a greater risk of accident. The Indian Ocean and the African coast are situated a short distance behind, but traffic density is lower than Mediterranean Sea, while it is true that the passages in those areas usually have longer distance and time, exceed the distance between the multitude of islands that form Indonesia for example. We can also find that the incidence of accidents in the Caribbean zone is minimal (Figure 4)

In the figure below, and from above, we can compare the number of fatalities by area, which is interesting, the Mediterranean area had the highest incidence of accidents during the

Figure 4: Number of accidents according to navigation area

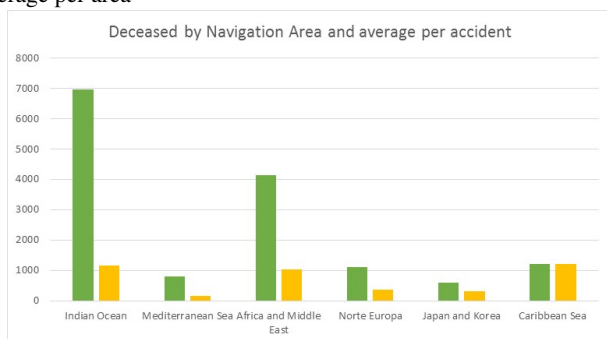


Source: I+D Consemar

period under study, but the death toll is almost the least of the areas analyzed.

As we can see the number in the Indian Ocean and African coast it is very large compared to other navigation areas. If we analyze accidents that more victims have caused in the areas mentioned, we found that many of these deaths could have been avoided, since in most cases is substandard vessels with serious deficiencies for navigation and although the signatory countries of the Paris Memorandum of Understanding (Paris MOU) or Port State Control, try to avoid operating in their waters into the mentioned areas, the conditions imposed by this or other regulations are not taken into consideration in the areas mentioned, some examples are the TAMPOMAS II (1981), a fire occurs on board that cannot be controlled and security measures are insufficient, failing to meet the provisions of the regulations, the MV DOÑA PAZ (1987) tripling the allowed passage and sinks after colliding with an oil tanker, the MV BUKOBA (1996), duplicating the amount of allowed passage, like the vessel JOOLA LE (2002) that quadrupling the allowed passage, among others.

Figure 5: Number of victims per navigation area in the last 35 years and average per area



Source: I+D Consemar

As we can see, a greater number of accidents does not have to involve a greater number of victims, as we can see in the figure above (Figure 5). So that the Mediterranean area has less dead even the Baltic and North Sea, and compared to the area of the Indian and African coast and Caribbean Sea with an average near 1000 deceased per accident, much higher than the average in other areas, which may be indicative of significant

infringements in the regulations of IMO.

#### 4. Conclusions

Many of these ships, conducting cruises cabotage, in countries and areas of navigation where legislation does abdicate its functions on maritime safety and also the response of the IMO, perhaps should be more forceful toward these nations and thus transfer them to unscrupulous operators when developing the business. But this is not new, in 1987 after the sinking of the *Herald of Free Enterprise*, was predicted by the eminent researcher Juan Zamora Terres, on flags of convenience and complacency of those flag states (Zamora Terres, J; 2000)

Unscrupulousness by shipping companies, together with permissive administrations is an ideal breeding ground for tragedies such as those collected at work, where many times it is impossible to know the total number of victims.

The enforcement seems to be reserved for the few countries concerned about it, and in recent years, the crews of convenience occupy important positions in many shipping companies, with training and preparation more than questionable, but nevertheless prevails lower cost thereof.

Southeast Asian countries, Indonesia and many parts of Africa, also receive passengers belonging to the local population, a significant number of foreign tourists traveling on boats that sometimes can barely keep him or afloat or are taken to limit their conditions safety at high risk for the lives of passengers on each cruise that shipping company performs.

The application of the rules, may be linked to the reduction in recent years of accidents and the number of victims, however it is known that the enforcement does not reach desirable levels in certain areas of navigation, of great importance the amount of passage that move.

The involvement of government is essential to it, so that IMO should act firmly against those nations that violate the requirements of the different safety standards; although it is a difficult task.

From 2010 a significant decrease of the deceased is seen in passenger ship accidents, but if we extrapolate the data from these first 5 years, at the end of the decade we can meet about twice dead; still achieving a considerable reduction in the number of deaths compared to the previous decade; however no longer a mere assumption, because as we see in our work, one or two accidents can cause the numbers to increase significantly.

It is essential therefore, to examine the implementation of the ISM code globally, in conjunction with inspections of administrations and classification societies, so as to prevent operation to those carriers that endanger the lives of their passengers and as in some cases proven that their negligence is repeated in succession.

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