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# Accidentability as change factor in safety policies of cruises and passenger ships

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*ABSTRACT*

From the professional point of view, we cannot conceive our society without the existence of a regulation that is responsible for regulating the behavior of people. Companies are not oblivious to this fact and in the field that concerns us, no shipping company can obviate compliance with regulations or regulations that directly affect them. The maritime sector, and within it the one referred to cruises and passenger ships, is one of the most regulated worldwide; Organizations such as the International Maritime Organization (IMO), the European Maritime Safety Agency (EMSA) and the rest of public entities, develop and ensure compliance of the safety regulations on board these ships. On more than one occasion, we wonder how in such a regulated sector, such as the maritime one, there are still important and recent accidents such as those of Costa Concordia (2012) or Sewol (2014). In addition, studies shows that 80% of this accident rate is mainly due to the human factor. Unfortunately and as we want to make clear in this work, the promulgation of safety standards or updating them, rarely in the maritime sector is done with foresight and normally this occurs after the accident has occurred. Through this work, we want to review the most relevant accidents that have clearly promoted the promulgation or updating of important regulations and rules in order to maintain the safety of human life at sea; having spatial consideration on cruise ships, ferries, line ships or passenger ships in general throughout recent history.



## 1. Introduction.

The beginning of any emergency is usually a catastrophe caused by an unforeseen event of a negative nature that manifests itself on board as an exceptional situation for passengers.

A reduced crew must face extreme emergencies in a coordinated manner, with the daily resources available to them and with the submission of the stipulated duty for which they have been properly trained through quasi-real drills and with the purpose of improving the training of These professionals of the environment, although it is also obvious to think that under optimal conditions one is less prone to committing errors and that in real emergency situations the frequent result is a total collapse, mainly caused by fatigue accumulated from overwork and human behavior.

A ship is an itinerant work center in which its crews generally belong to third countries in which an indiscriminate recognition of the title and other training certificates that are required by SOLAS 1974 are carried out, and that they agree to work for a lower salary. The reduction of the crews is a fact, despite having established an official procedure to determine the minimum security endowment by means of the subsequent consent by the Maritime Administration and the obtaining of the IMO Certificate of Minimum Security Endowment, which gives rise to aboard the multiplicity of functions, to serve with the same efficiency, in the same proportion in which their rest is reduced,

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reducing attention in the performance of their work and will have an impact on maritime and navigation safety.

There are multiple actions for the crew, and also for passengers after the Costa Concordia incident in 2012, which must be applied and developed in writing in the Emergency Intervention and Contingency Plan, Specific Procedures, Ship Safety Plan, and Table of obligations on board and other documentation on board. The most notable emergency situations on board a ship are abandonment, stranding, boarding, man overboard, and operations with special rescue teams.

## 2. Background.

### *2.1. Investigation of maritime accidents.*

The investigation of accidents and marine accidents is essential. On the one hand, it allows us to know what motivated it and to differentiate between the different factors that led to it, and to what extent each one could be decisive.

From our point of view, a series of important factors can be distinguished that can occur in a marine accident; First of all, we have the environment factor, in itself, the sea is a hostile environment, the ship is at the mercy of the elements and although it is something that we can foresee, we cannot control. The second factor is the ship itself; a device that stays afloat and moves through the waters and that we can explain in a simple way through a basic knowledge of physics. So far so good, but it is much more, modern ships are real industries, with a multitude of mechanical, electrical, electronic, hydraulic components, etc. that can fail and can cause a safety chain problem, which endangers the same vessel. The third factor, which from our point of view and that of many other authors is one of the most influential, is the human factor. The work on board is different and a multitude of studies show this; consequently the decision making that people on board must make is also different, where any mistake can be vital. If we unite the human factor of passengers, we can find several thousand people, in a small space, in a hostile environment and where the safest means of survival, which is the boat, can become the opposite in a matter of minutes.

It is important for each accident, accident, shipwreck, etc... to study to what extent it is conditioned by these or other factors (we have restricted the human factor to crew and passage, but we must not forget the decisions made on land, often without the information and analysis of the issue of the people on board, and as it has been demonstrated on occasions guided by other interests that normally conflict with the safeguarding of people on board); in order to collect and analyze the information that allows us to avoid or, failing that, minimize the effects of similar situations in the future. We must remember that, as a general rule, the modifications to the regulations are usually given as a result of the investigation of the claims and after knowing the factors that have determined that the situation was out of control; that is, the rules will be changed if an accident or mishap requires it, and more quickly if the media coverage has been such that public opinion demands measures in this regard.

But the investigation of claims in the maritime field cannot be done in any way. The IMO, as we have said, is made up of 172 states and the way in which the investigation should be carried out must be agreed, especially since ships of different flag states and people of multiple nationalities may be involved in the same accident.

To solve this, the United Nations Convention on the Law of the Sea, to be held in 1982, would be held in the town of Montego Bay, Jamaica. In article 94 of this convention, "Duties of the flag state", which we reproduce below (Organización de las Naciones Unidas (ONU), 1982):

*Article 94. Duties of the flag State*

*Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over the ships that fly its flag.*

*2. In particular, every State:*

*a) It will maintain a register of ships that includes the names and characteristics of those flying its flag, with the exception of those ships that, due to their small size, are excluded from generally accepted international regulations; Y*

*b) It will exercise its jurisdiction in accordance with its internal law over all ships that fly its flag and over the captain, officers and crew, regarding administrative, technical and social issues related to the ship.*

*3. Each State shall take, in relation to ships flying its flag, the necessary measures to guarantee safety at sea with regard to, among other things, the following*

*a) The construction, equipment and navigability of ships;*

*b) The manning of the ships, the working conditions and the training of the 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 will include those that are necessary to ensure:*

*a) Each vessel, prior to and after registration at the appropriate intervals, be examined by a qualified ship inspector and carry on board appropriate charts, nautical publications, and navigation equipment and instruments for the safety of your browsing;*

*b) That each ship is in charge of a captain and duly qualified officers, particularly with regard to seafaring experience, navigation, communications and naval machinery, and that the competence and the number of the crew are appropriate for the type, size, machinery and equipment of the ship;*

*c) That the captain, the officers and, where appropriate, the crew fully know and comply with the applicable international regulations that refer to the safety of life at sea, the prevention of collisions, the prevention, reduction and control of marine pollution and the maintenance of radio communications.*

*5. In taking the measures referred to in paragraphs 3 and 4, every State shall act in accordance with generally accepted international regulations, procedures and practices, and shall do what is necessary to ensure its observance.*

*6. Any State that has reasonable grounds to believe that appropriate jurisdiction and control over a ship has not been exercised may communicate the facts to the flag State. Upon receiving such communication, the flag State will investigate*

*the case and, if appropriate, will take all necessary measures to correct the situation.*

*7. Every State shall cause an investigation to be carried out by or before a duly qualified person or persons in relation to any maritime accident or any incident of navigation on the high seas in which a ship flying its flag has been implicated and in which they have lost to life or seriously injured nationals of another State or serious damage has been caused to ships or facilities of another State or to the marine environment. The flag State and the other State shall cooperate in carrying out any investigation that it may carry out in relation to said maritime accident or navigation incident.*

The seventh section urges the States, categorically, to proceed to the investigation by competent persons or organizations, of any maritime accident or incident of navigation that occurs on the high seas (we assume that each state assumes that, in the respective waters under the supervision of the state, said investigation will be made without the need to specify it); and in the course of which a ship that flies its flag is involved. Although it expressly takes into consideration that it will be investigated whenever the event involves or goes against the interests of another state; but assumes that, if the affected are of the same nationality of the wrecked ship, will the investigation also be carried out?; Or will it be a decision of the state itself to carry it out? The implications for the safety of human life this could have would not be negligible.

We have already mentioned in the previous chapter the most relevant conventions of the International Maritime Organization. In the case of the International Convention for the Safety of Human Life at Sea (SOLAS, 1974/1978), it also does not forget to dedicate part of it to the investigation of maritime accidents. If we go to Chapter I, Part C, Rule 21 establishes (Organización Marítima Internacional (OMI), 2009):

*Part C. Claims. Rule 21. Claims*

*a) Each Administration undertakes to investigate any incident suffered by any of its vessels subject to the provisions of this Agreement when it considers that the investigation may contribute to determining changes that should be introduced in these rules. **

*b) Each Contracting Government undertakes to provide the Organization with the pertinent information regarding the conclusions reached in these investigations. No report or recommendation of the Organization based on that information will reveal the identity or nationality of the ships affected, nor will they expressly or implicitly attribute any responsibility to any ship or person.*

As we can see, the administrations of the states that sign the agreement and are part of the IMO are tacitly obliged to carry out an investigation of the accidents of ships that fly their flag and are subject to the provisions of their own agreement, but adds that it will occur, provided that such research may result in modifications or changes in the rules of the agreement. It might seem that this provides a solution to the obligation that states must investigate accidents where their ships are involved, regardless of whether it affects a third party, however, he adds that it will be "any ship subject to the provisions of this Convention However, as we will see below, each of the SOLAS chapters sets out its scope; however, initially it is specified that ships that make international voyages, that is, depart from a port in one state and sail to another; but we will enter later in the analysis of this part of the regulations.

At the level of the European community, the large number of accidents that have occurred in its waters have promoted the development of multiple standards for this purpose. For example, Council Directive 1999/35 / EC (Council of the European Union, 2017), of April 29, 1999, regulates the regime of compulsory recognitions to guarantee the safety in the operation of regular services of ro-ro ferry services. and high-speed passenger ships, in such a way that said directive must be adopted by the member states, forcing them to adopt those provisions that allow them and other member states, with a significant interest, to participate, collaborate or carry out the investigation of maritime accidents and incidents, in which a ferry has been involved that allows the transport of ro-ro cargo or a high-speed boat.

The Directive establishes the program of inspections, surveys and verifications that will be carried out on the ship before its entry into service and afterwards, at the intervals established periodically, whenever there is a relevant change in circumstances. of exploitation.

What he is looking for is that the Maritime Administration of the State where the norm or host state applies, is in charge of the supervision and control of those shipping companies that are in charge of operating regular maritime transport services and that use corresponding ships. to the type of those mentioned in the standard, so that its operations are carried out with the conditions and guarantees of maximum security. In addition, it establishes how the cooperation between the Member States will be developed, with a view to investigating the marine accidents or incidents that may occur.

Finally, Directive 2009/18 / EC of April 23, 2009 (Council of the European Union, 2017), establishes the fundamental principles by which the investigations of accidents that may occur in the maritime transport sector shall be governed, where it is also established for the member states of the European Union, what are their obligations when proceeding in the investigation of maritime accidents.

The Directive specifies that the development of research must be carried out under the responsibility of a permanent and impartial research body, which has the necessary competencies for the proper development of the research and which has researchers with the appropriate qualification, in such a way that they are competent in those aspects related to marine claims and incidents. To ensure that the security investigation is carried out in an absolutely impartial manner, the investigation body must ensure that it is totally independent, both in its organization, in the legal structure, and in the decision-making process with respect to third parties that They could present a conflict of interest regarding the object or objects of the investigation, conditioning the development of their role in the process.

The way in which investigations should be carried out and how to proceed to carry out a correct analysis of maritime accidents, at an international level, is regulated by the Code for the Investigation of Claims and Maritime Events, which would

be approved by the Resolution A.849 (**??**) of the International Maritime Organization, on November 27, 1997.

The main objective of the Code (International Maritime Organization, IMO, 2017), is the promotion of a common framework for the investigation of marine accidents and events. At the same time, it seeks to promote collaboration in this matter between States, in such a way that determination is facilitated and expedited, as well as fostering collaboration between States to determine what factors contribute and give rise to these claims.

The Code defines, for the purposes of carrying out the investigation, a Maritime Loss, as that event, which has resulted in the following:

- *The death or serious injuries have occurred in any person, and that they had been caused by the operations of the ship, or that had been related to them.*
- *The loss of any of the people on board occurs, and that this was a consequence of the operations carried out by the ship or was related to them.*
- *The total loss, presumed loss or abandonment of the boat.*
- *That material material-type damage has occurred on the ship.*
- *Those episodes where the stranding (involuntary or not) or major damage to the boat would have occurred; or that it had been part of a boarding situation.*
- *All those serious material damages that have been caused by the operations of a ship or related to them.*
- *Damages of a serious nature produced to the environment (spills, leaks, etc...) that would have been the result of the damages produced by one or several vessels and that had their cause or were related to their operation.*

In addition, the Code also establishes a series of guidelines for the development of investigations of marine casualties, and which must be kept in mind when carrying out the investigation procedure. Among these guidelines, we can highlight the following:

- *It is amply justified that the best way to establish the circumstances and causes that have caused a maritime accident is always by conducting an impartial and thorough investigation, without conflicts of interest, either between states, shipping companies or companies, shipping companies. insurance and even the service users themselves (passengers or transport customers).*
- *Obtaining a complete and exhaustive analysis of a maritime accident or accident may only be possible through real collaboration between the States, organizations and actors with interests in them; especially Only through collaboration between States with significant interests can a complete analysis of maritime incidents be carried out.*
- *It is established that the degree of priority of investigations of marine accidents must be the same as those of criminal or other investigations in order to determine with certainty the scope of responsibility or fault on the part of those involved.*
- *It is vital that those who carry out investigative work on marine casualties have the greatest possible facilities in accessing pertinent safety information, in addition to the records of the inspections or surveys that the flag State may have, ship owners, shipping companies and classification societies. Unless there are other ongoing investigations, which could be harmed, there should be no impediment to access to all that information by the person or group of persons in charge of the investigation.*
- *It is crucial in any investigation to be carried out on an accident or maritime event that occurs, the effective and correct use of all the amount of data available about it, as well as the data stored in the so-called "black boxes", which in the Maritime scope are known as RDT (Voyage Data Recorders) or VDR (Voyage Data Recorder) and that the ship might have installed; being the State in charge of the investigation the one in charge of the organization of the reading of said devices.*
- *The person or persons in charge of the investigation into the marine accident, must be able to access without difficulty and be able to maintain fluid communication with government inspectors, officials of the coastguard or marine rescue service, operators of the marine traffic service, as well as the pilots or any other member of the maritime personnel dependent on the respective States.*
- *All research to be carried out must take into account the recommendations, instruments and standards published by the IMO or the ILO, especially those that refer to the human factor, in addition to any other recommendations or instruments approved by other organizations. international character and that could condition the investigation.*
- *It is known that the effect of the reports on the investigations will be greater if they are given adequate publicity, both to the shipping sector and to the general public, since the objective of informing and training to prevent similar accidents could occur.*

Code A.849 (20) would be amended a posteriori by Resolution A.884 (21), approved on November 25, 1999, incorporating in it a series of guidelines that are responsible for providing practical guidelines related to the systematic investigation of the human factor within these accidents and incidents. To this end, such guidelines seek to facilitate, as far as possible, the formulation of a clear analysis and effective preventive measures.

Although initially said Code was not mandatory, nor binding for Member States, at the 80th session held in May 2005, the IMO Maritime Safety Committee would be in charge of

supporting the mandatory recognition of the Code of Investigation of Claims under the new regulation XI-1/6 of the SOLAS Convention; as proposed by the 15th Subcommittee on Implementation by the Flag State (FSI).

That is why, through Resolution MSC.255 (84), the Code of international standards and recommended practices for the investigation of the safety aspects of accidents and maritime events, adopted by the Maritime Safety Committee at its 84th session, was approved. dated May 16, 2008 and is normally known as the Claims Investigation Code.

With the application of this Code, Member States are encouraged to apply a uniform methodology and approaches when carrying out investigations of accidents and maritime events, in such a way as to allow and promote more extensive investigations that serve to prevent future of other events, so that you can discover the factors that have caused them or allow other security risks to emerge; in such a way that afterwards such reports are presented to the IMO, thus allowing a wide distribution of information on security and protection measures, with the aim that all the actors in the international maritime sector can address and apply all those aspects. that are related to maritime safety. The code would enter into force on January 1, 2010, at the same time that the amendments to regulation XI-1/6 of the SOLAS Convention would come into force.

For its part, at the international level and as we have seen in previous paragraphs, the European Commission is another of the bodies that has shown the most time and concern for the investigation of accidents and maritime events. After the accident of the "Prestige" tanker (Rubio & González, 2007), a 243 meter long Liberian monohull tanker operated under the flag of the Bahamas, and its sinking on November 19, 2002 off the coast of Galicia, loaded with 77,000 tons of high-density fuel oil, which would cause one of the most important spills in the history of Spain and consequently one of the largest ecological disasters on record, the European Commission, no doubt also conditioned by popular clamor to take measures against this series of accidents and the claim of environmental, judicial and political responsibilities, would approve on March 11, 2009 a third package of legislative measures for the reinforcement of maritime security, called Package of measures "Erika III" (Prado, 2009).

Through the application of this new package of measures, the aim is to strengthen the European Community regulations on maritime safety and prevention of pollution of the marine environment, in order to preserve their integrity. To this end, the regulatory part is strengthened with regard to the regulation of ship inspection and the mechanisms and protocols that guarantee an optimal response in the event of an accident are reviewed, for which a common framework for investigation will be developed. of accidents. In addition to all this, regulations are introduced regarding the compensation of passengers who have suffered an accident and there is an emphasis on greater control and reinforcement of the liability regime that corresponds to shipping companies and shipowners.

In this way, the countries of the European Union will have one of the most extensive and advanced regulatory frameworks in the world for maritime transport.

Among the most relevant aspects that we can highlight of this package of legislative measures, we find:

- *When a ship is in difficulties and it must change its course or decisions regarding its operations must be made during an emergency situation, they must be made independently and without conflict of interest in the process.*
- *Any ship or vessel that makes a call in any European port will be inspected. Those vessels that are considered to pose a risk or have been designated as dangerous will be inspected more frequently and access to port areas may be prevented from those vessels that are proven to repeatedly violate the regulations.*
- *All those organizations that are in charge of the certification of the safety of ships, as well as the classification societies will be subject to audits and inspections by the states.*
- *The creation of a European maritime traffic control center will be created, to which all EU countries will be connected through SafeSeaNet (Maritime information exchange system implemented by Directive 2002/59 / EC of the European Parliament and of the Council, of June 27, regarding the establishment of a community system for monitoring and information on maritime traffic) (BOE., 2017).*
- *In the same way, all national maritime authorities will be subject to audits, in order to guarantee that compliance with international regulations is imposed on all ships that fly their flag.*
- *The pertinent guidelines will be published to carry out maritime accident investigations and that they be carried out in a similar way in the different States.*
- *There must be compulsory insurance that will be responsible for covering the damages that accidents may cause; In addition, the shipowners will be responsible for covering the damages caused or suffered by the passengers during an accident.*

Among the standards that are part of the "Erika III" package in the field of maritime safety and can be extended to the entire fleet, we can mention the following:

- *Directive 2009/15 / EC of the European Parliament and of the Council of 23 April 2009 on common rules and standards for ship inspection and survey organizations and for the corresponding activities of maritime administrations. (Since 06/17/2009).*
- *Directive 2009/16 / EC of the European Parliament and of the Council, of April 23, 2009, on the control of ships by the port State. (Since 06/17/2009).*
- *Directive 2009/20 / EC of the European Parliament and of the Council of April 23, 2009, relating to the insurance of ship owners for claims under maritime law. (Since 05/29/2009).*

- *Directive 2009/17 / EC of the European Parliament and of the Council of April 23, 2009, amending Directive 2002/59 / EC on the establishment of a community monitoring and information system on maritime traffic. (Since 05/31/2009)*
- *Directive 2009/18 / EC of the European Parliament and of the Council of 23 April 2009, establishing the fundamental principles governing the investigation of accidents in the maritime transport sector and amending Directives 1999/35 / Council EC and 2002/59 / EC of the European Parliament and of the Council. (Since 06/17/2009)*
- *Directive 2009/21 / EC of the European Parliament and of the Council, of April 23, 2009, on compliance with the obligations of the flag State. (Since 06/17/2009).*
- *Regulation on common rules and standards for ship inspection and survey organizations. (Since 06/18/2009).*
- *Regulations on the liability of sea passenger carriers in the event of an accident. (Since 05/29/2009 applicable to the Community of the Athens Convention from this date and, in any case, no later than December 31, 2012).*

Among the rules included in the previous list, belonging to the "Erika III" package, we find Directive 2009/18 / EC of the European Parliament and of the Council, of April 23, which establishes the fundamental principles that govern research of accidents in the maritime transport sector, published on May 28, 2009 in the Official Journal of the European Union, and which was to be adopted by the member countries before June 17, 2011.

Through the application of this directive, a harmonized framework is established at European level in the investigation of accidents, it is also intended to improve the way in which the different Member States exchange information on accidents, as well as the experience accumulated in investigations carried out cape; in order that all this information may be available to the rest of the members of the European Community, giving the widest possible dissemination to it in order to prevent similar accidents.

In addition, greater independence in the investigation is guaranteed, with respect to the Guardianship Administration and the States and organizations involved, making it faster for investigators to access the scene of the incident, the available evidence and indications, as well as the interviews with those involved or the flow of information with the parties is improved.

The Directive emphasizes that, except in exceptional cases, where parallel investigations are required; A single investigation will correspond to each maritime accident, which will be carried out by a Member State, having at all times the obligation to guarantee the legal protection of witnesses.

Through Regulation (EC) 1406/2002, the same year that the Prestige accident occurs, the European Maritime Safety Agency is created and regulated, which is in charge of working together with the Member States and the European Commission in order to develop common methodologies and protocols for the investigation of maritime accidents.

Within this same context, in Article 17 of Directive 2009/18 / EC, EMSA provides for the implementation of the European Marine Casualty Information Platform (EMCIP) and which according to the administration itself European maritime security will be a very important tool that will allow both the exchange of information and the processing of data collected by data from investigations related to maritime accidents and incidents. For this, the Member States in charge of the investigations, through the local authorities appointed for this purpose, will supply that information to the Platform, so that it is possible to obtain, group and analyze all the information provided, under a common perspective.

Mainly what is pursued with the development and use of said Platform, at least as regards the European Union, is to allow EMSA, to provide objective, reliable and comparable information both to the European Commission and to the Member States on maritime security. At the national level, it will facilitate the preparation of statistics and any other need for data analysis by the Member States in the field of accident investigation, as well as, in the future, allow compliance with the notification obligations of the accident reports. investigation by Member States to IMO.

## 3. Discussion.

The case study or case analysis has been an instrument or research method that has its origin in medicine and psychology (Becker, 1974), and which has subsequently been used in other disciplines by a variety of authors. In the areas of social sciences, it continues to be used as a qualitative evaluation method. In our case, the International Maritime Organization itself recognizes this, through regulations for the investigation of maritime events and accidents, which extends to all member states.

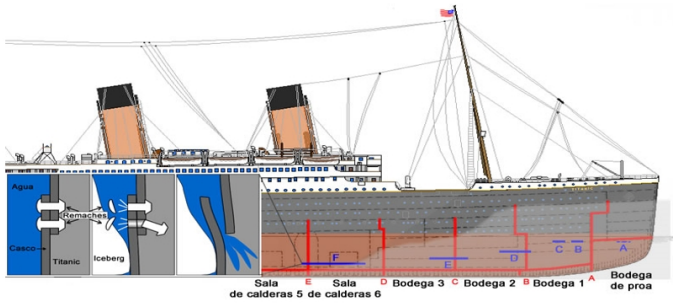
Below, we echo some examples that we can consider "basic" accidents and the subsequent changes in regulations that they have entailed.

### *3.1. Titanic (1912)*

On April 14, 1912, at 11:40 p.m. the largest and most luxurious ocean liner built to date collided with an iceberg during its journey through the North Atlantic, just 300 miles off the coast of Newfoundland, with 2,223 passengers and 885 crew. on board, with a balance of 1,512 deceased and 706 survivors, after their sinking at 2:20 in the morning.

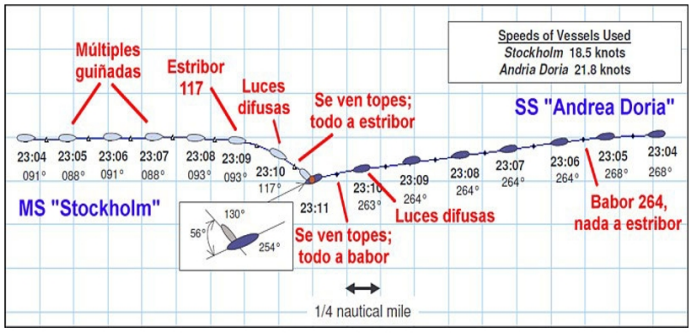
Undoubtedly, the sinking of the Titanic is one of the tragedies that marked the marine sector and from this, a series of regulations began to be made to improve maritime safety. With this accident they were clear that the ships had to have a better construction, equipment, and operability of the ships. And from this tragic accident is when they began to issue rules to solve it.

Figure 1: Hypothesis about the breakage of the hull and the entry of water into the compartments.




Source: static.naukas.com.

Figure 2: Collision between Andrea Doria and Stockholm.




Source: grijalvo.com.

After this accident, the famous "SOLAS" (International Convention for the safety of human life at sea) was created, which was made for the prevention of human life in maritime acts.

The 1929 conference was also held with some regulations.

In 1948 a convention was held, which would be the third version of SOLAS, applying to a large number of ships. In February of that same year, IMO (International Maritime Organization) was created to promote cooperation between states and the transport industry to improve maritime safety and avoid pollution at sea.

In 1960 a convention was held that would be the fourth version of SOLAS where they decide to regulate in the field of radiocommunications and a wide range of measures designed to improve safety in the maritime field.

In 1974 it is the last update of the Solas that includes the tacit acceptance procedure, establishing that an amendment will enter into force on a certain date.

In short, the Titanic tragedy led to the creation in 1914 of SOLAS for the safety of human life at sea and to improve maritime safety.

Also from this accident, an icebergs patrol was created under the authority of the US Coast Guard. Its objective is to control icebergs in the Northwest Atlantic so that no ship has problems with them and guarantee their safety. Since this was created, there have been no deaths in any accident with the same characteristics as the Titanic.

### *3.2. Andrea Doria (1956)*

On July 25, 1956, around 23:00, the Andrea Doria would board the ship, by another ocean liner, the Swedish-flag Stockholm, sinking definitively the first the following day around 10:09; very close to the coast of Nantucket, Massachusetts, when he was heading to the port of New York with 1134 passengers and 572 crew members on board. The balance of deaths in the accident would be 46 passengers from Andrea Doria, 5 crew from Stockholm and two passengers who died of a heart attack during the rescue.

The sinking of the SS Andrea Doria had great repercussions in maritime legislation, although not of immediate effect. So much so that I led to the creation of a new regulation for boarding: the RIPA. The International Regulations for Preventing Collisions at Sea, or RIPA, was established by the International Maritime Organization (IMO) in 1972, although it did not enter into force until July 1977. Rule 14 of said regulation makes clear how to act in the face of the return situation encountered of two ships.

### *3.3. Herald of Free Enterprise (1987)*

The MS Herald of Free Enterprise was a Roll-On / Roll-Off (RO-RO) ferry that capsized moments after leaving the Belgian port of Zeebrugge in the late evening of March 6, 1987 causing the deaths of 193 passengers and crew. When the ship left the port with the bow gate open, the sea immediately flooded the cargo decks and within minutes the ship was lying on its side a few meters from its departure from the dock in shallow water. The immediate cause of the sinking was shown to be due to negligence on the part of sailor Mark Stanley, who was sleeping in his cabin when he should have been closing the bow gate. In addition, the official investigation revealed many other failures and deficiencies on the part of supervisors and generally a significant lack of communication within the ferry company P&O European Ferries.

Figure 3: Image of the semi-sunken ship.

Source: news.bbcimg.co.uk.

Safety improvements on RORO ships. All ships are built under the supervision of the maritime authorities and classification societies, according to standards dictated by the States,

but in accordance with international conventions, particularly those relating to cargo lines and the safety of human life in the sea. The passenger ship must abide by the rules of these conventions, including the possible flooding of part of the ships within limits that allow adequate stability to withstand critical damage. Asymmetric flooding should be kept to a minimum and never exceed 15 degrees. The Herald of Free Enterprise far exceeded those limits for suspected, but not yet definitive reasons, with the tragic consequences known.

### *3.4. Estonia (1994)*

The Estonia, a passenger and ro-ro ship, sank in the Baltic Sea as it made the journey from Tallinn to Stockholm. On September 28, 1994, Estonia lost its defective helm, when sailing in the midst of a storm. The accident resulted in the loss of 852 lives and the ship lying about eighty meters below the Baltic Sea. The media impact of the accident still resonates today and the consequences derived from it on the regulations on ships of these characteristics are in full force.

Figure 4: Estonia with the bow helm raised.

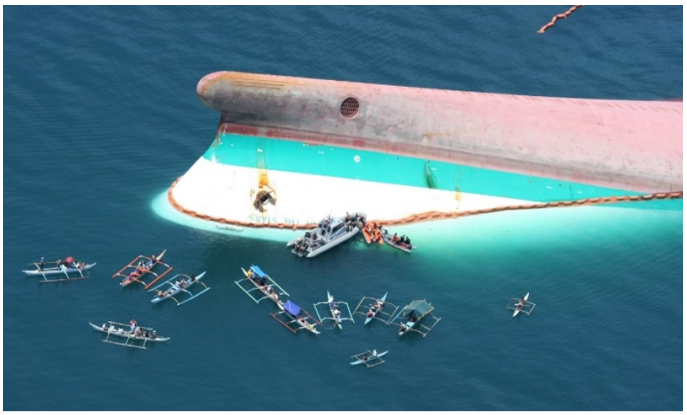

Source: fondear.org.

There was a before and after the sinking of Estonia in terms of regulations, at the time of the sinking the current SOLAS 90 regulation that would then be improved in principle in one that would be stricter in that applied to passenger and ro-ro ships this The standard called the Stockholm Treaty was in principle between eight countries in northern Europe, but the EU and the IMO extended it to the countries of the southern EC, although it took several years due to the differences between countries in this matter, currently It is common to all of Europe, although compliance is not controlled in all countries equally.

### *3.5. Princess of the Stars (2008)*

The Princess of the Stars, the flagship of the Sulpicio Lines fleet, was a 23,824-ton Philippine passenger ferry. On June 20, 2008, he set sail from the port of Manila for the city of Cebu. Typhoon "Fengshen" (also referred to by PAGASA as "Frank") had made landfall on the island of Samar, but the Princess of Stars was allowed to sail because the ferry was large enough to stay afloat. On June 21, 2008, the ship suffered a machine failure just 3 kilometers from the coast, drifting and being dragged by Typhoon Fengshen to Sibuyan Island. The ferry was carrying about 862 people when it sank off the island in central Philippines, with only 43 survivors recovered.

Figure 5: Native boats, helping in the rescue of bodies.



Source: : news.bbc.co.uk.

This accident would result in important regulatory changes such as:

SOLAS amendment 2008: adopted on December 4, 2008.

- Chapter II-1: Construction-structure, subdivision and stability, machinery installations and electrical installations.
- Chapter II-2: Construction-prevention, detection and extinction of fires.
- Chapter VI: Freight transportation.
- Chapter VII: Transport of dangerous goods.
- IDS 2008: adopted on December 4, 2008. General requirements applicable to lifeboats

## Conclusions

Accidents happen and will continue to happen, and as we have seen, the regulations are only capable of reaching where people leave you. Let us remember that, in most maritime accidents, it has been shown that they are due to the human factor. The rest of the factors have been controlled, applying regulations and improving safety, but as we saw, accidents that depend directly on the professional on board are difficult to eradicate, although we must differentiate between lack of seamanship and negligence.

It is almost impossible to eliminate the "human factor" in accidents that occur in the maritime sector, although it is possible to work on it, with adequate training in values for future professionals.

The training proposed by the IMO through the STCW Convention is technically very successful, but there is a lack of specific training dealing with aspects that have to do with life on board and with the conditions of the profession to be performed, precisely, training aimed at reducing the incidence of the "human factor" in accidents.

Unfortunately and as we want to make clear in this work, the promulgation of safety standards or updating them, rarely in the maritime sector is done with foresight and normally this occurs after the accident has occurred.

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