Maritime safety culture as a condition for sustainable shipping

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Abstract

This paper addresses the importance of the development of maritime safety culture, in terms of sustainable shipping through continuous improvement of the safety management system (SMS) that enables a shipping company's personnel to effectively implement the company's safety and environmental policy. The main aim of the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code – ISM Code), which was adopted by the International Maritime Organization (IMO) and became mandatory, by virtue of its entry into force on the 1st of July 1998, in SOLAS Chapter IX on the Management for Safe Operation of Ships, is to provide an international standard for the safe management and operation of ships as well as pollution prevention. Thus, compliance with the ISM Code and its effective enforcement is necessary to ensure adequate standards of safety and pollution prevention. The purpose of this paper is to show that the internationally unified legal measures that have been developed under the IMO in the ISM Code are an instrumental consequence of maritime safety values, and allow them to be achieved in practice. The result of this research is the justification of the thesis concerning the need to create a safety culture as a condition for sustainable shipping, including the safe operation of ships in the environment.

Introduction

From a global perspective, international maritime transport is a significant component of the world's economic system (UNCTAD, 2018). Crucially, it is closely linked to the concept of sustainable shipping. In 2013, sustainable development was the leading subject of the discussion undertaken by the International Maritime Organization (IMO). As part of the work carried out under its auspices, the priorities of a Sustainable Maritime Transportation System (SMTS) were adopted at that time (IMO, 2013). Thus currently and continuously, these priorities are very well matched with the international sustainable shipping initiatives that aim to draw attention to environmental, social and economic issues (United Nations, 2012; 2015; 2017). The IMO is consistently following the path of sustainable development; therefore the term "Sustainable shipping for a sustainable planet" has been selected as the World Maritime theme for 2020. The IMO found that this will provide an opportunity to raise awareness of the United Nations' Sustainable Development Goals (United Nations, 2019). The IMO presents a clear vision of the future in which the shipping industry, with the support of the IMO regulatory framework, has already started to transition towards a sustainable future. This vision is focused on the further development of measures to mitigate greenhouse gas emissions, reduce the sulphur content of the fuel oil that ships burn, implement the Ballast Water Management Convention, protect the polar regions, reduce marine litter, improve the efficiency of shipping through electronic exchange of information, meet the challenges of the digitization of shipping and boost the participation of women in the maritime community.

Sustainable development is closely linked to fundamental values, such as the broadly understood maritime safety and security. For many years, the IMO has been developing international standards,

procedures and recommended practices that are used to create a maritime safety culture. The condition for achieving sustainable shipping is the realization of the value of a maritime safety culture through the practical application of legal instruments and their continuous improvement. Legal measures developed under the IMO are, in this respect, an instrumental consequence of maritime safety values, allowing them to be achieved in practice. Achieving sustainable shipping is not only an objective, but is above all a dynamic process in which many different entities are involved, both public and private. It therefore requires a high level of compliance and enforcement of the internationally agreed maritime safety standards, procedures and recommended practices; in particular regarding management of the safe operation of ships (Pyć, 2011). The maritime safety culture is ultimately meant to create added value for the SMTS by promoting maritime safety.

Towards sustainable shipping

The International Maritime Organization has identified key priorities that are relevant to the development of SMTS, namely: safety culture and environmental stewardship; education and training in the maritime professions, as well as support for seafarers; energy efficiency and ship-port interfaces; energy supplies for ships; new technologies and innovations; maritime security; maritime traffic support and advisory systems; technical co-operation; finance, liability and insurance mechanisms and ocean governance. By setting priorities for SMTS and developing the standards and procedures that are required to achieve it, the IMO contributes to the global achievements of the Rio+20 Conference (IMO, 2013).

In order to conduct global trade in a safe, reliable and efficient manner, maritime transport requires a global legal framework, which is currently included in the IMO conventions that cover most aspects of international shipping. The IMO has regulated almost all of the aspects of international shipping in more than fifty international agreements that are currently in force (including conventions such as SOLAS, MARPOL and STCW) and supplemented by many codes and hundreds of guidelines that relate to ship operation; from commencement of construction to decommissioning and scrapping. The IMO promotes maritime safety and security, increasing energy efficiency and conserving resources, as well as reducing marine pollution. In order to meet these challenges, every entity engaged in the SMTS

should act responsibly, and apply the best available practices, from a ship's design stage to the end of her use and subsequent recycling.

Thus, effective operation and maintenance of SMTS requires the development of a rigorous safety culture and transparent rules for environmental management. Two specific objectives have been distinguished in this respect: The first assumes that achieving SMTS requires the development of a safety culture that is supported by global standards and their stringent enforcement; these standards should guarantee equal opportunities. The second relates to minimizing the negative impact of maritime transport on the environment. Environmental ship management should be reflected in the development and implementation of global standards for the prevention, reduction and control of pollution (Pyć, 2014).

The concept of sustainable shipping has also been presented by the European Maritime Safety Agency as follows: "Sustainable Shipping is a holistic management concept for sustainable development, applied to the shipping sector, incorporating environmental and social responsibility. Sustainability includes three main pillars: environment, society and the economy, and the development of sustainable shipping is the result of the strengthening of these three pillars" (EMSA, 2019).

Maritime safety – the first priority

Maritime safety can be defined as a state in which the risk of a marine casualty that could cause harm to a person or damage to either the environment or property is kept to an acceptable level. Descriptively, maritime safety is a state that characterizes the ability to withstand a threat (in shipping – a marine casualty or incident; in the marine environment – an ecological disaster). Maritime safety can therefore be referred to as attainable freedom from threats to a ship, its crew and passengers (shipping) and the sea, as well as coastal areas (environment).

In legal terms, maritime safety is subject to normative regulation. Under international law, legal norms, intended to ensure maritime safety through their implementation by States, have been developed for over a hundred years, undoubtedly since the Titanic's accident. At present, legal standards aimed at ensuring and improving the state of maritime safety are so extensive and detailed that it can be assumed that they form the international legal system of maritime safety. In the international forum in the early 1990s, the IMO, recognizing the need for appropriate organization and management of safe

ship operation and prevention of marine pollution, developed the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management (ISM) Code), which primarily promotes the safety management system and plays a particularly important role in this system.

Certainly, maritime safety is not only a state or the subject of the internationally accepted legal system, but is also a value that can most simply be described as reasonable freedom from danger. Consequently, maritime safety, seen as a value, is the corner stone of maritime safety culture. Assuming that it is possible to effectively manage the safe operation of ships, it should be done by making the values more realistic. The starting point may therefore be the recognition of real values as an essential element of the proper functioning of the organization, i.e. a shipping company. According to the ISM Code, a "company" means the owner of a ship or any other organization or person such as the manager, or the bareboat charterer, who has assumed the responsibility for the operation of the ship from the shipowner and who, on assuming such responsibility, has agreed to take over all the duties and responsibilities imposed by the Code.

Maritime safety is a desirable state of balance in which the model of managing human activities in the marine environment, that has been introduced, is aimed at preventing any risks that may arise. The purpose of normative regulations, including safety standards and procedures, as well as recommended practices, is to carry out effective management within the limits of acceptable risk. Maritime safety should be based on well-designed procedures for managing the safe operation of ships and preventing pollution. The natural question that arises is "it is possible to effectively manage the safe operation of ships based on the values that contribute to maritime safety culture?"

Maritime safety culture – renaissance of values

At the end of the 1980s, Lord Justice Sir Barry Sheen (Wreck Commissioner), when explaining the causes of the marine accident suffered by the roll on/roll off passenger and freight ferry, the Herald of Free Enterprise, stated that the shipping company that operated the vessel was infected with the "disease of sloppiness" at all levels of management. In his report, Justice Sheen pointed out the errors made by the Master, the Chief Officer and the assistant bosun, but otherwise he emphasized the cardinal

negligence in safety management on the part of the shipping company. The Herald of Free Enterprise left the Belgian port of Zeebrugge on the 6th of March 1987 with an open bow at high speed (the practice of hasty departure from the port, accepted by the shipping company, was a violation of the safety procedures) and with a greater than normal draft at the bow, caused by a change in the usual ballasting. There were probably 459 people onboard the ferry at the time of the accident, and 193 of them lost their lives. The investigation demonstrated neglect of the safe operation of the ship and errors in management, as well as establishing that "the Board of Directors did not appreciate their responsibility for the safe management of their ships. (...) The directors did not have any proper comprehension of what their duties were. There appears to have been a lack of thought about the way in which the HERALD ought to have been organized for the Dover/Zeebrugge run. All concerned in management, from the members of the Board of Directors down to the junior superintendents, were guilty of fault in that all must be regarded as sharing responsibility for the failure of management. From top to bottom, the body corporate was infected with the disease of sloppiness. (...). The failure on the part of the shore management to give proper and clear directions was a contributory cause of the disaster." (Report of Court, 1987).

In 1986, one year before the Herald of Free Enterprise capsized, the Department of Transport (UK) issued the Merchant Shipping Notice No. M. 1188 entitled "Good Ship Management" which included the recommendation that referred to the fundamentally relevant issues: "The efficient and safe operation of ships requires the exercise of good management both at sea and ashore (...). The overall responsibility of the shipping company requires the need for close involvement by management ashore. To this end it is recommended that every company operating ships should designate a person ashore with responsibility for monitoring the technical and safety aspects of the operation of its ships and for providing appropriate shore based back-up (...). Stress is placed upon the importance of providing the Master with clear instructions to him and his officers. The instructions should include adequate Standing Orders. There should be close co-operation and regular and effective communication in both directions between ship and shore." (Report of Court 1987).

The formal investigation that was carried out by Justice Sheen into the capsize of the Herald of Free Enterprise showed that regulating the management of the safe operation of ships could no longer be

delayed. The investigation concluded that the station instructions issued by the shipping company did not take into account the existing realities and common practices. This accident, and the conclusions resulting from the investigation of its causes and circumstances, confirmed that it was necessary to introduce an international legal instrument, the use of which would minimize errors in managing the safe operation of ships. Therefore, the relevant work in this regard was undertaken at IMO.

As mentioned earlier, the ISM Code was adopted by the IMO in 1993 (IMO, 1993) and has been amended several times since then (MSC, 2000; 2004; 2005; 2008; 2013). The ISM Code became mandatory by virtue of its entry into force, in July 1998, of the 1994 amendments to the International Convention for the Safety of Life at Sea (SOLAS) which introduced a new chapter IX on "Management for the Safe Operation of Ships". In 1995, the IMO Assembly adopted the Guidelines on the implementation of the International Safety Management (ISM) Code by Administrations (IMO, 1995a). The new Revised Guidelines on the implementation of the International Safety Management (ISM) Code by Administrations were adopted in December 2017 (IMO, 2018). The Revised Guidelines of 2017, like the 1995 Guidelines that preceded them, stated in the introduction that "the application of the ISM Code should support and encourage the development of a safety culture in shipping", and moreover, that "success factors for the development of a culture, that promotes safety and environmental protection are, inter alia, commitment, values, beliefs, and clarity of the safety management system". It is also worth referring to the resolution on safety culture in and around passenger ships that was adopted in 1995, which recommends governments and international organizations to start work with the aim of establishing a safety culture in and around passenger ships that sail under their flag, addressing all persons working professionally in or in relation to such ships, irrespective of whether or not their work is covered by the relevant instruments developed by the IMO (IMO, 1995b).

The ISM Code provides an international standard for the safe management and operation of ships and for pollution prevention, as well as constituting a system of self-regulation for safe ship operation including occupational safety and health on board. The doctrine emphasizes that the ISM Code was also derived from the voluntary Code of Good Management Practice in Safe Ship Operation published in 1982 by the International Chamber of Shipping and the International Shipping Federation, which advocated a "culture of self-regulation of safety" (Anderson, 2015; Oltedal & Lützhöft, 2018).

The strength of the measures in the ISM Code is its mandatory implementation and enforcement. The ISM Code goes beyond the voluntary measures and applies to all shipping companies and to each ship operated by the companies, as well as requiring procedures to ensure: safety and environmental protection policy; safety of shipboard operations; identification, assessment and management of risk; reports and analysis of non-conformities, accidents and hazardous occurrences, maintenance of the ship and equipment, documentation, as well as a company verification, review and evaluation (Vella, 2016).

The underlying philosophy in the ISM Code supports the development of a safety culture in shipping companies (Anderson, 2015). For the purposes of this paper it was assumed that maritime safety culture is a system of values and good practices of ship management and ship operation, as well as a commitment to personnel, to ensure that the risks related to shipping are mitigated to the greatest degree possible. Although a universal definition of maritime safety culture has not been formulated, an attempt to explain the meaning of the concept of safety culture has been successfully undertaken in other areas. The Advisory Committee on the Safety of Nuclear Installations (ACSNI) set up a study group in 1987 to prepare a report on the human factor in nuclear risk. The ACSNI Study Group has defined safety culture as: "(...) the product of individual and group values, attitudes, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety programs. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventative measures" (ACSNI, 1993).

The mechanism for managing the safe operation of ships and preventing pollution in the ISM Code is identified by legal instruments and procedures addressing both shipping companies and the administration of the State which is party to the SOLAS Convention. It should be emphasized that the fact that mandatory measures in the field of managing the safe operation of ships have come into practice at all is the result of the implementation and enforcement of the ISM Code. Proper implementation of the ISM Code should result in a maritime safety culture.

The idea of a maritime safety culture resulted in a lot of comments among shipping companies.

However, regardless of their overtones, the clear view prevails that the application of the ISM Code has changed the approach to ship management (Łuczy-wek, 2018). In addition to shipping companies' value management, there is a general trend toward management by values. In both cases, the central value is maritime safety, which can be attributed to the primary value trait. Undoubtedly, the view expressed in the doctrine, that it is a culture "in which safety becomes a daily concern, rather than just a factor to be taken into account after something has happened" should be considered to have been justified and confirmed by practice (Boisson, 2016).

Although no code of values for maritime safety culture has been developed so far, this does not mean that shipping, as a commercial activity carried out by shipping companies, is devoid of a value-based foundation. From a practical point of view, both from the perspective of ship crews, i.e. seafarers, and ship managers, as well as administration (i.e. Port State Control, Flag State Control), maritime safety culture values have much in common with good maritime practice, which has evolved over the centuries and the importance of which cannot be overestimated (Ek, Runefors & Borell, 2014).

The key issue is also awareness that the relationships that connect people who work in a shipping company and for a shipping company (seafarers) are associated with maritime safety; therefore it seems natural to perceive the management of the safe operation of ships as a practical path towards achieving sustainable shipping. When taking care to ensure the safety of ships and their crews as well as the cargo and passengers, a kind of unity between the personnel who are employed in the shipping company's office and the crews of the seagoing vessels they operate is important.

The value of maritime safety can be considered in terms of economic efficiency; in shipping, this approach is nothing new. The profit made by a shipping company when they operate a ship is primarily determined by her safety. The operated ship must be seaworthy and cargoworthy, which means that she must comply with many standards under international conventions and domestic law. While in the field of the proper operation of a ship, safety as a factual state does not raise major reservations; the issue of safety as the central value of maritime safety culture may entail difficulties in its practical perception. In functional terms, in the everyday practice of a shipping company maritime safety culture is based on: communication, commitment and common sense. These practical and real-words safety values

are part of the safety management system (SMS). In essence, it is the role of SMS to translate values into the language of a specific behavior and the way employees perform their duties on board a ship. Through its manuals, SMS presents a practice based values approach.

International standard for safe management and operation of ships

The international standards for managing the safe operation of ships have developed over the past thirty years, and they have acquired a practical dimension. The fact that maritime safety standards and procedures were developed internationally was determined by the necessity of introducing management instruments that would minimize the risk of maritime accidents throughout the world. However, about 80 percent of maritime accidents are caused by human factors; it should be added that human factors also include errors and negligence committed by the shipping companies in managing the safe operation of the ship. Most accidents are a result of a breach of the basic safety rules, but usually the casualty is a combination of many causes. Analyses of marine accidents have confirmed the inadequate application of the procedures in practice, certain "weaknesses" in ship management, as well as the lack of appropriate training and low awareness of their importance. The ISM Code has established safety management objectives which are: to provide for safe practices in ship operation and a safe working environment; to establish safeguards against all identified risks; to continuously improve the safety management skills of personnel, including preparing for emergencies (Oltedal, 2011).

Participation in management requires the cooperation of many people (Lappalainen, 2008, p. 46–47; Lappalainen & Salmi, 2009, p. 38). In simplified terms, it can be stated that management is a "team game". Maritime safety culture is a function of a team play – a management game. It is participation in management, a type of qualitative participation that depends on the skills, abilities and commitment of seafarers – in other words it is based on crew competences, which include, in particular, real commitment and which cannot be reduced to only certified qualifications and experience (Teperi et al., 2019; Arslan et al., 2016).

The SMS is basically a useful instrument that is aimed at the continuous improvement of the ability to manage the safe operation of a ship by the personnel who are employed in shipping. The SMS allows

the shipping company to properly and safely manage its ships at sea from the shore. This can be called a "living system", which implies the instructions and procedures are constantly being updated by the company (Pyć, 2013). The shipping company's instructions (also included in the manuals) cover all aspects of ship operation and provide shore-based support, and demonstrate how ship operation should be safely managed. The SMS applies to all conventional ships; it is subject to review, audit and reporting. It is also designed to be a structured and documented system that enables the employees to effectively implement the safety and environmental protection policy of the company.

The idea of a safety management system is that each crew member is responsible for the safe operation of the ship, as well as environmental protection. Moreover, one of the important elements of managing the safe operation of the ship is the readiness to take action in emergency situations. For this purpose, the company should establish procedures for identifying, describing and acting on potential emergency situations on board. The SMS should contain measures that ensure the crew has the ability to respond to danger.

The requirement for a company to have a safety management system available on its ships in the form of written procedures is to ensure that all the crew have undergone appropriate training and are familiar with the procedures for the safe operation of the ship, which must be applied as required by the company. In general, the procedures do not allow for flexibility in how they are carried out.

Conclusions

Sustainable shipping is a very broad concept, which in functional term consists of three practical requirements: no casualties, no pollution and delivering their service on time. From the mid-1980s to the mid-1990s many marine accidents and incidents occurred that were caused by human factors; mainly including human error in the management of the safe operation of a ship. The investigation of the Herald of Free Enterprise accident demonstrated, first and foremost, the shipping company's weakness in ship management. In 1989, the IMO adopted guidelines for the management of the safe operation of ships and pollution prevention. The guidelines served as the basis for a modern concept of managing the safe operation of ships; this was later developed by the ISM Code. Most marine casualties or incidents are the result of violations of basic safety standards and procedures (failure to comply with the law); marine

casualties or incidents are indicative of many causes (lack of effective control); analyses of marine casualties and incidents have confirmed the inadequacy of the application of such procedures in practice (weakness of management); failure to provide appropriate training and a lack of awareness of their importance (education and culture of maritime safety).

The adoption of the International Management Code for the Safe Operation of Ships and Pollution Prevention has prompted research aimed at maritime safety culture. The ISM Code promotes the maritime safety culture, although it does not expressly use the term "safety culture". The philosophy of the ISM Code is based on continuous improvement. Investigating the causes and circumstances of various threats to safety, which may find marine accidents or incidents that were not only caused by identifiable errors, but also near misses and non-conformities, is an integral element of the process of continuous improvement of the Safety Management System. The International Maritime Organization has recognized that "learning" based on the analysis and assessment of these types of threats helps to improve safety management systems.

Complying with international standards and responsible management of the safe operation of ships is a part of the maritime safety culture. It would be rather difficult to find sufficient arguments to authoritatively conclude that shipping companies are now operating on a model of management by values; this tendency is visible, but it is not yet the paradigm. However, if we assume that this will be the case in the future, maritime safety is still the justification to claim the significance and leading role of management by values.

It would then be necessary to create a unified model that is based on the coherence of values with maritime safety in a multifunctional approach – consistency of values with the safety function in managing the safe operation of ships. Although no special code for a maritime safety culture or collection of values for this culture has been developed, the ISM Code and IMO guidelines successfully fill the gap in this respect.

The concept of continuous improvement is based on the assumption that achieving the goal of building and implementing an effective safety management system requires treating it as a never-ending process in which all non-conformities are constantly reported and corrected in order to remove them, as well as preventing any possible negative effects that they could cause in the future. The effectiveness of the system depends on a safety culture that is based

on a mutual trust between the company (shipowner) and the master and the crew as well as the staff ashore. Its components are: commitment (work energy), common sense (resulting interdependence in all types of work) and good communication (crew-crew/crew-passengers/crew-shore based staff).

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