Positive Perception in Maritime Safety

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Abstract

In this article are published the results of an international study on safety culture tools in shipping, undergone in 2020. The research objective is to propose a Safety Culture Assessment Fast Tool (SCAFT) used to identify preliminary basic premises of safety culture existence within shipping companies. Research methodology used to identify most appropriate questions for SCAFT consist in a comparative analysis between the introduction of safety culture concept by the International Nuclear Safety Advisory Group (INSAG) from the International Atomic Energy Agency (IAEA) and the later use of safety culture within the particular sector of shipping. SCAFT consists in a number of 4 questions focusing on two distinct perspectives: individuals (seafarers) commitment to the safety culture and effectiveness of communication of their safety concerns, and, respectively, leaders' understanding on the necessity of education and motivation of seafarers and assuming leadership's full responsibility when dealing with safety incidents. The advantage of using SCAFT consist in the simplicity and ease to use and the relevance for any company from the shipping sector. The limitation of the tool is referring to the lack of deep systemic analysis, necessary for a complex assessment for the safety culture, as well as restrictive access to the informational field for observers outside the analyzed entity.

**Key words:** safety culture, ship, threats, risks, collision
J.E.L. classification: J28, M14, M54, R41

1. Introduction

There is no common definition of the safety culture concept, nor a standard way for assessing the construct (Cole, Stevens-Adams, Wenner, 2013, p.3). However, safety culture represents a key aspect of switching perspectives related to maritime safety, from the 'must to obey' perspective to 'competitive advantage'.

According to a recent 2020 report on state of maritime safety, „the average fatality rate per working hour in shipping is still significantly higher than in land-based industries" and only six types of accidents account for 99% of the fatalities, out of which, the most important are: grounding and collision, fire and explosion, beside hull or machinery damage, contact, founder and less common, war loss or hostilities. These accidents are managed through existing regulations and safety-management systems. However, „major operational accidents occur because of failure of safety barriers rather than unknown threats" (Blake, Nastali and Nadkarni, 2020, 3). The report presents relevant updated statistics regarding to safety incidents, as the ones in Figure 1, emphasizing critical indicators of fatalities with the purpose of making awareness on the importance of safety in Shipping.

Figure no. 1. Incidents by casualty type during 2015-2019
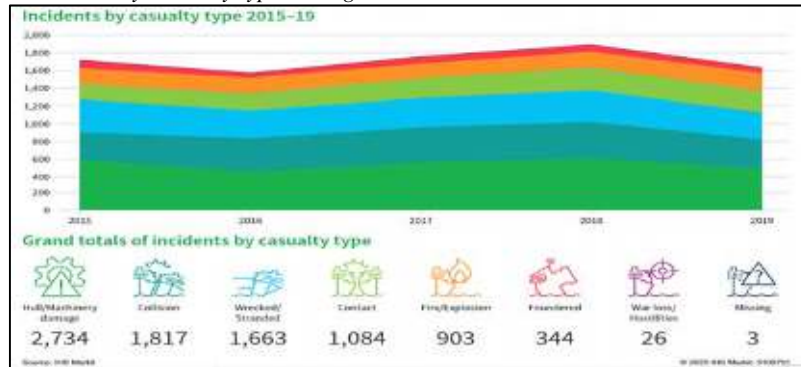
Source: Blake, Nastali and Nadkarni, 2020, p. 9

Another graphics emphasizing the impact of safety in shipping is shown in the Figure 2 below. We conclude from the figure that safety issues are affecting individuals globally, no matter their nationality.

Figure no. 2. Flags of seafarers killed or missing during 2015-2019
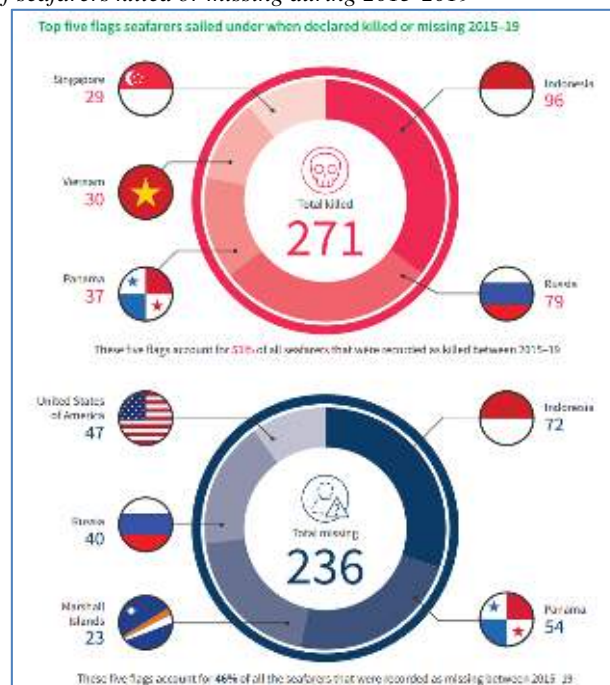
Source: (Blake, Nastali and Nadkarni, 2020, p. 22)

Shipping accidents should be avoided through a risk-based approach to safety. Presence and manifestation of safety culture within the ship and shore dimensions of the shipping company plays a key role in limiting the occurrence of safety incidents.

2. Literature review

The concepts of "safety culture" and "safety climate" are mandatory to be understood in the context of managing a risk-based approach to safety. The "safety culture" concept was first proposed as a term and an explanatory factor in an accident investigation by the International Atomic Energy Agency (IAEA) International Nuclear Safety Advisory Group (INSAG) following the Chernobyl accident that occurred on April 26, 1986 (Hanzu, 2014, p.7). The term was introduced by INSAG in two reports. The first, *INSAG's Summary Report on the Post-Accident*

Review Meeting on the Chernobyl Accident, was published by the IAEA as Safety Series No.75-INSAG-l in 1986. Further the use of the concept was expanded, in *Basic Safety Principles for Nuclear Power Plants, Safety Series No.75-INSAG-3*, issued in 1988. Since the publication of the two reports, the term Safety Culture coined by the INSAG has been increasingly used, not only in connection with nuclear plant safety only, but also in other domains and sectors.

 INSAG definition of Safety Culture was: "Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance. (INSAG, 1991, p.1) The definition relates to the personal attitudes and the management style found at the basis of the organization's structure, regarding the requirement to consider safety issues in an appropriate manner.

"Safety culture is best viewed as a dynamic, multi-faceted overall system composed of individual, engineered and organizational models" (Cole et al, 2013, p. 3) and represents „long-term attitudes, beliefs and the stable ways in which people behave,", while „safety climate represents a snapshot of the current state of these factors" at any particular time (Flin et al., 2000). Below in Table no. 1. are included several relevant definitions for the „safety climate" concept.

Table no. 1. Definitions of „safety climate" concept

Reference	Definition of Safety Climate
Zohar (1980)	A summary of molar perceptions that employees share about their work environment.
Glennon (1982a, b)	Employees' perceptions of the many characteristics of their organization that have a direct impact upon their behavior to reduce or eliminate danger and, safety climate is a special kind of organizational climate.
Brown and Holmes (1986)	A set of perception of beliefs held by an individual and/or group about a particular entity.
Dedobbeleer and Beland (1991)	Molar perceptions people have of their work setting.
Cooper and Philips (1994)	Safety climate is concerned with the shared perceptions and beliefs that workers hold regarding safety in their work place.
Niskanen (1994)	Safety climate refers to a set of attributes that can be perceived about particular work organizations and which may be induced by the policies and practices that those organizations impose upon their workers and supervisors.
Coyle et al. (1995)	The objective measurement of attitudes and perceptions toward occupational health and safety issues.
Cabrera et al. (1997)	The shared perceptions of organizational members about their work environment and, more precisely, about their organizational safety policies.
Williamson et al. (1997)	Safety climate is a summary concept describing the safety ethic in an organization or workplace which is reflected in employees' beliefs about safety.

Source: (Cole et al, 2013, p.19)

3. Research methodology

In our study we have proposed to develop a Safety Culture Assessment Tool applied in the particular field of shipping. Research methodology consist in using a comparative approach model for the atomic energy fundamental concept of Safety Culture, in the case of identifying essential components of safety culture in shipping. Such components are further used in synthesizing the fundamental principles of the concept necessary for suggesting a minimum assessment tool for the

identification of safety culture fundamentals within a shipping institution, on shore or on board.

Concretely, the assessment tool that we proposed to be used in shipping was generated through a synthesis process of the concept suggested by the International Nuclear Safety Advisory Group (INSAG) of experts from the International Atomic Energy Agency (IAEA). In our study, we have applied key concepts from the content of INSAG Report (INSAG, 1991) to the case of shipping and maritime safety.

4. Findings

As suggested by the INSAG, Safety Culture has two major components, as represented in Figure 2. The first component would be the framework with the overall organizing policy which, in the shipping sector, is assimilated to the international regulatory (ISM, SOLAS, MARPOL etc.) as well as to the internal regulatory, comprising several departmental policies and the leadership vision, goals and action. The second component of the Maritime Safety Culture would be the response of the individual (seafarer, crew) committed with responsibility to the company's or the institution's framework.

Figure no. 2. Major components of Safety Culture
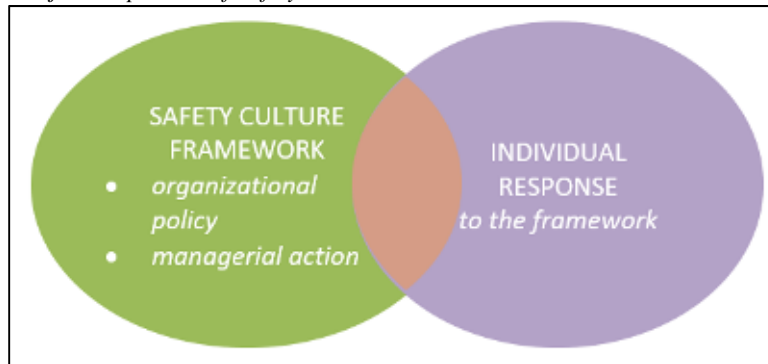
Source: Authors' study, adapted from (INSAG, 1991, 2)

In the figure above is suggested the necessity of correlation between the organizational level of the company and the individual response. Such clear correlation, complementary, is needed for proper implementation of the Safety Culture, both on shore and on-board vessel. If there are no clear procedures for building a trustful climate of safety on shore, definitely such situation will be reflected in a lack of safety improvements on board ship. Even if drills and safety procedures are delivered according to the schedule, such exercises and training is expected to be delivered mechanically, with no positive perception of safety and no enjoyment of participation for the exercise improvement.

In order to reach positive perception of the individual for maritime safety, and to generate and stimulate the development of the Safety Culture, as proposed by the INSAG for the atomic energy, but applied in the case of the shipping domain, both the company on shore and the crew must comply with the same level of high responsibility towards safety. In the maritime sector, the implications of Safety Culture definition, as proposed by the INSAG, are briefly detailed in Table 2, below:

Table no. 2 Implications of Safety Culture INSAG's definition applied to Safety Culture in maritime

Principles emerging from INSAG's definition of Safety Culture	Maritime implications and comments
1. sound procedures and good practices are not fully adequate if merely practiced mechanically	Participatory involvement will enhance the level of awareness during safety procedures and drills
2. all duties important to safety are to be carried out correctly	Procedures, briefings and check lists are to be respected accordingly, allowing continuous improvement
3. all duties important to safety are to be carried with alertness	The main key performance indicator is the action duration (drill timing), but other KPIs can be proposed and assessed, depending the case
4. all duties important to safety are to be carried due thought and full knowledge	Safety regulatory framework must be known and understood by all crew
5. sound judgement	Substance of Safety Culture remains rationale thinking, critical judgement and analytical competences
6. accountability	Drills should be assumed and provided with fully commitment

Source: adapted by authors from (INSAG, 1991, 1-2)

Based on the INSAG universal features of safety culture (INSAG, 1999, p.6) there are the following sets of requirements for establishing a Safety Culture within the shipping company and onboard vessel: requirements at policy level at the onshore company, requirements on managers and response of individuals. At the level of the shipping company, implementation of the safety culture as institutional framework fundamental is represented in Figure 3, below:

Figure no. 3. Safety Culture requirements at policy level
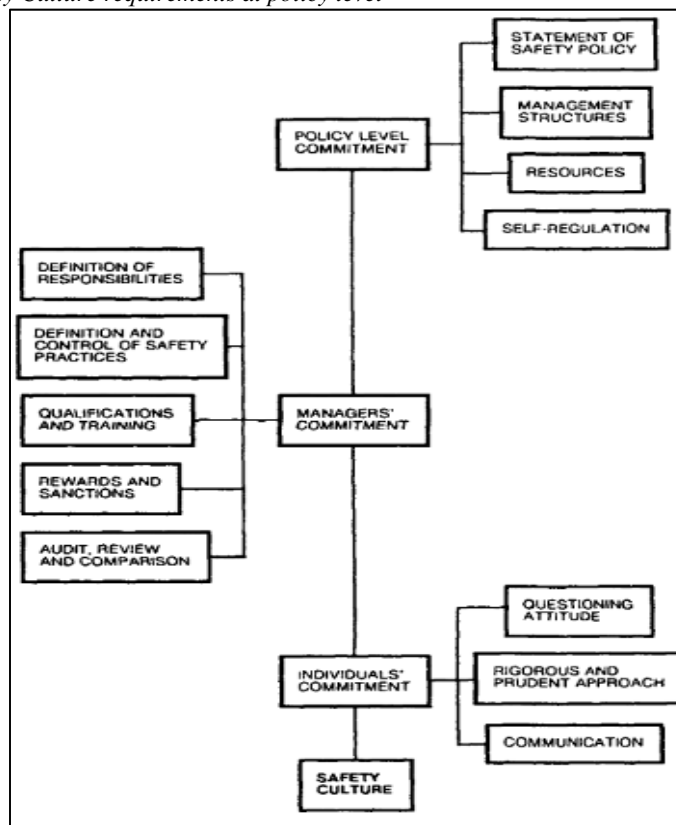
Source: (INSAG, 1991, 6)

The shipping company has to encourage crew (at both executive and operational level) to suggest new safety initiatives. Such participative attitude leads to seafarers enjoying a high level of safety and generating a personal pride in dealing with important tasks in a professional manner, as inspired from the recommendation of ISAG for the individuals, "developing a questioning attitude, a rigorous and prudent approach, and necessary communication" (INSAG, 1999, 14).

In addition, for an effective understanding and implementation of the Safety Culture concept, we have considered in our study a list of guidelines and suggestions for conducting effective security drills, that can also be applied to safety drills, according to a research report delivered in 2013 by Constanta Maritime University for the International Association of Maritime Universities (IAMU), (Arsenie, 2013, 187-188). Suggestions were reviewed and included in Table 3 below.

Table no. 3 Guidelines for organizing safety drills

Nr. crt.	Guidelines for the safety drill	Details of the guideline
1	To be as realistic	• scenario should be the most realistic; • training crew has to be placed in a normal situation for the simulation stress; • A trained person must be aware of the individual's responsibility for the safety of the protected object/persons; • awareness of safety as important part of any crew member.
2	Training should be spontaneous	• is not providing binding participants in the training to know in advance that they will participate in it, but is obligatory always practice to be declared; • is not providing binding workouts are always held at the same time (day or night, in bad hydro weather conditions - fog, heavy rain) or in the same place (on piers, anchoring, underway);
3	Training should be primarily practical:	• 90% practical work; • crew work to practical use of security equipment, the actions in the implementation of safety procedures, etc.; • focus primary on care, as well night and day.
4	Training must be progressive complexity	• build sustainable practical skills starting „from the simple to the complex", „Step by Step"; • skills must meet certain performance standards (e.g., time), but never include running; • increased complexity should be provided through the use of increasingly difficult scenarios for implementation; • Scenarios can be more interesting and instructive when they make typical real life „turns".
5	Training must build capacity for teamwork as:	• building effective teams, ensures adequate response to safety risks; • teamwork significantly increases efficiency and prevents loss of life; • crew members must be prepared for substitution by injury; • teamwork is required in implementing safety procedures;
6	Training should be positive:	• not be used as punishment (or harassment, intimidation or difficult people and their work); • have fun, build a sense of safety • people should feel confident with those who would rely on in case of an emergency

Source: adapted from Arsenie, P., 2013, p.187

Further, we have synthetized the list of questions suggested by the INSAG for the Safety Culture in the energy domain (INSAG, 1999, 13-14, 22-30), and we have selected the most relevant 4 questions that should provide enough details regarding the presence of a safety culture within the shipping business.

We are following propose the following 4-questions Safety Culture Assessment Fast Tool as quick tool necessary to identify the safety culture in the maritime workplace.

The first two questions, applying to seafarers, have the aim to uncover two essential, key aspects motivating the individual to become aware and committed and responsible to the Safety Culture framework. First question will identify seafarers' level of awareness, the understanding of safety procedures role and the level of commitment to such procedures. The second questions have the aim to track and assess the efficiency of the communication flow between seafarer and leader, as well as the aim to identify and make awareness on other for key aspects of Safety Culture: the safety concerns of the individuals.

The last 2 questions from the Safety Culture Assessment Fast Tool (SCAFT) are applying to leaders on shore at the shipping company headquarters, as well as to master, chief engineer, officers, designated Safety officer on board etc. These questions are referring to education and learning necessities as key factors for motivation and awareness of seafarers on the importance of the safety culture in shipping, and, in the last question, the focus is placed on highlighting the need to establish and assume responsibility of the safety outcomes at the highest decisional level.

As described above, the Safety Culture Assessment Fast Tool consist in the following 4 questions:

1. Seafarers believe safety drills and procedures are necessary and important?
2. Seafarers can freely communicate their safety concerns with their manager/leader?
3. Leaders invest in educating and motivating seafarers about safety goals?
4. Leaders take full responsibility when safety incidents occur?

The tool was sent to local shipping companies for pilot testing and is currently in process of validation. The tool is further used in expanding the study on Safety Culture, aiming in identifying ways of enhancing positive perception in maritime safety through participative approach during safety drills.

The advantage of using SCAFT consist in the simplicity and ease to use and the relevance for any company from the shipping sector. The limitation of the tool includes the lack of deep systemic analysis, necessary for a complex assessment for the safety culture, as well as restrictive access to the informational field for observers outside the analyzed entity.

5. Conclusions

In essential domains supporting world societal processed, as energy and transport, safety is a number one aspect that must be taken into consideration for the proper, effective and non-harmful function of the sector. In this paper was presented a Safety Culture Assessment Fast Tool for the shipping sector, with 4 questions, for the purpose of identifying the presence of Safety Culture basic principles within shipping companies onshore and on-board ship. The good functionality and implementation of Safety Culture is possible through the correlation of the regulatory from the organizational level of the company and the individual response. Such correlation should be clear and complementary. If there are no clear procedures for building a trustful climate of safety on shore, the situation will be reflected in a lack of safety improvements on board vessel.

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