# EFFECTIVE IMPLEMENTATION OF SAFETY MANAGEMENT SYSTEM (SMS): AN OVERVIEW OF THE ROLE OF THE HUMAN ELEMENT

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***Abstract.*** The human element is an expression commonly used in the context of the maritime industry. The human element is a complex multidimensional issue that plays a most vital role in enhancing maritime safety, security and marine environmental protection. It embraces the integral spectrum of human performance of ships' crews, shore-based personnel, organizational bodies and others. All should cooperate to address human element issues. It is recognized that the quantification of the human element in general and its role can influence the methods of upgrading safety management systems. For Maritime Education and Training (MET), the issue should be how to provide the human element with the proficiency and competence necessary to accomplish the set MET objectives. To achieve satisfactory standards for safety management, it is very important to promote safety culture through providing specialized training during the academic stage. The excellence of MET rests on the substantial intention and designation of the quality and efficiency of the human element. Thus, these two crucial elements of MET should be the target of any sound educational system. From the perspective of Safety Management System (SMS), the crucial factor is the successful implementation of the said system, which depends on the selection of the proper human elements to occupy positions affecting performance. When a safety management system is thus oriented, it becomes a living working system. This paper addresses the relation between successful implementation of SMS and the selection of the personnel who are in charge of implementing this system.

## 1. INTRODUCTION

The history of shipping industry has taught us that maritime safety is a plural amenability and it is furthermore complicated and of great significance. It makes obligatory a contribution from all people involved in the maritime community such as master and crew, the maritime authorities, ship-owners, classification societies, and any other party within that community.

The ultimate success of improving maritime safety depends on the dedication and proficiency of a whole range of people who make a contribution to the implementation of IMO standards.

Accordingly, maritime safety becomes an integral and significant part of cooperative concern, one which requires running and methodic jealous (stinginess) by the corporate management.

Eventually, the final responsibilities should lie with the ship operators, and with the managers and ship staff that they employ. Actually, it is the crew and the seafarers who can make the most important contribution to introducing maritime safety and safety culture within the shipping industry.

## 2. THE MARITIME INDUSTRY AND SHIPPING COMPANIES

The shipping industry is one that economists prefer to think of as capital intensive due to the tremendous costs of the developed equipment used.

The provision of skilled and experienced personnel for the maritime context to cope with the growing requirements of the global industry has been the most difficult and imposing matter that owners encounter in every shipping center.

It has been observed in the field of the shipping industry that the technical innovation develops very quickly. The principle of the shipping industry is to develop the quality of seafarers in order to face the future demands of the shipping industry and maritime safety.

In fact, the progress of the shipping industry and the related issues has been affected by the improvement of MET; marine officers have been trying to accommodate the developments in industry demands.

The maritime industry is truly a global market. All shipping companies employ people coming from many countries with different backgrounds in MET and various cultures, which will generally affect safety culture.

There are IMO instruments with clearly marked obligations for shipping companies and shipowners (ISM & STCW are meaningful).

The shipping industry has to reach out to every sector of the community if it is to attract the best people to purse a maritime career.

The companies must employ the right people onboard and in the office and make sure that all of them know what their duties are, receive instructions on how to carry out their duties and get trained when and if necessary.

Experience from within the shipping industry has shown that a company may make use of any development in safety awareness and safety management skills of personnel.

## 3. THE HUMAN ELEMENT IN THE SHIPPING INDUSTRY

The principal factor of maritime safety is the human element and the term "human element" is normally associated with those at the lower end of the shipping hierarchy- the crew members, port operators and so on; it should be extended to cover every one involved and it should be professed that shipping safety is not as good as it should be because of manners at the top rather than in efficiency at the bottom.

Focus on the human element should be the primary prevention measure. Nationally and internationally, flag states should emphasize the human element in implementing the ISM Code and the revised STCW95.

It has been declared that the overwhelming majority of accidents at sea is caused by the so-called "human element" of ship operation, whether as a consequence of bad seafaring or poor management ashore. It has become clear that the human element, including the individual, the organization and total system, has to be taken into account in improving safety of ship operation.

The crew remains the most vital element to the safe and efficient operation of any ship despite the advancement of technology. They are also in focus when it comes to training and updating, certification and watchkeeping as well as safety culture.

Because we frequently take this factor, we tend to attribute accidents to the errors of the individual responsible for the operation of the ship. It is however a reality that the majority of the accidents are caused by an unfortunate integration of human and organizational errors.

The main fact is that the act of a human element plays some part in substantially every accident, involving those where construction or equipment failure may be the immediate cause.

Human error, a complex matter, may include inadvertence; equivocal; pilot-master relationships; low or indigent physical fitness; low eyesight; immoderate fatigue; immoderate alcohol use; immoderate personnel turnover; high level of estimated risk; improper lights and marks; misuse of radar; uncertain use of sound signals; inadequacies of the rules of the road, etc.

Human error can be classified into 3 major categories with the same approximation of the STCW Code 95 amendments. The 1st category is operational, i.e., based on human error. The 2nd category is management of human error and the 3rd category is the combination of the first and the second, which might cause a considerable accident or disaster by triggering chain events.

We know that there is scarcely a technical solution that the human element is unable to evade, ignore, fail to maintain, or break. The risks associated with human error will continue with the resulting loss of life, injury and pollution. The economic losses assignable to human factors have been shown to be significant.

A USCG analysis of human error falls into five categories as follows:

- Management: Faulty legislation and standard inadequate communications and coordination.
- Operator status: Inattention and fatigue.
- Working Environment: Poor equipment design and hazardous natural environment.
- Knowledge: Inadequate general technical knowledge and inadequate knowledge of ship board operation.
- Decision making: Poor judgment and inadequate information.

## 4. INTERNATIONAL SAFETY MANAGEMENT (ISM) CODE

It is generally recognizing that the ISM Code is a key instrument that fortifies and enhances safety culture within shipping industry.

The ISM Code is basically concerned with system errors as regards the organization and the individual. Recognizing that people subsist the inherent element in the management of safety, it could give rise to an important change of culture in the industry. The philosophy behind the code is to eliminate as far as possible confusions about responsibilities, the flow of information and communication, and to set clear procedures for action in case of an emergency.

The essence of the ISM Code can be summarized in two statements: "the cornerstone of a perfect Safety Management System (SMS) is the obligation from the top" and that "in matters of safety and pollution prevention it is the obligation, competence, attitudes and motivation of individuals at the levels that determine the end conclusion".

Given the fact that an estimated 65 – 80 % of marine casualties are caused by human error, improvement in communication and training among ship personnel is needed. The ISM Code, with its global standards focuses owners' attention on planning and training measures to avoid problems before they happen and mitigate the damage when things go wrong. The code states that not only must procedures and measure be in place to support safety and prevent accidents, but there must be a full commitment to these measures by top level management.

The ISM Code states that its purpose is to provide an international standard for the safe management and operation of ships and for pollution prevention. The ISM Code triangle is as follows:

- Top management: The objectives of the code are to ensure safety at sea, prevent human injury or loss of life, and avoid damage to the environment, in particular to the marine environment, and to property.
- Shore personnel: Safety management objective of the company should, *inter alia*:
  - provide for safe practices in ship operation and a safe working environment;
  - establish safeguards against all identified risks; and
  - continuously improve safety management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection.
- Ship personnel: The ISM Code requires that SMS should ensure:

1) compliance with mandatory roles and regulations;
2) that applicable codes, guidelines and standards recommended by the organization, administration, C.S and maritime industry organizations are taken into account. (ISM Code).

The ISM Code particularly addresses the company, which should ensure that the master is:

1. Properly qualified;
2. Fully cognizant with the company's safety management system;
3. Donated the de-rigueur support to achieve his duties safety.

The company is also responsible for ensuring that the ship is manned with qualified, certified and medically fit seafarers in accordance with national and international requirement.

Every person in the shipping company can benefit from the furtherance of safe practices in ship operation. Diminished damage, developed safety perception greater professionalism and developed moral are apt to bring authentic cost saving and better efficiency.

## 5. SAFETY MANAGEMENT SYSTEM (SMS)

The SMS is the cornerstone of the ISM Code. It needs safety and environmental protection policy, determined levels of authority, clear lines of communication between shipboard and shore-side personnel, and contingency propensity and accession procedures. The code animates the regular improvement of safety management skills in the shipping industry and provides a link among the company and the seafarers onboard its ships.

The ISM Code establishes 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 safety-management skills of personnel, including preparing for emergencies.

The SMS consecutively should include a number of operative requirements:

– A safety and environmental protection policy;
– Instructions and procedures to ensure safety and environmental protection.

Defined levels of authority and lines of communication between and amongst shore and ship born personnel:

– Procedures for reporting accidents, etc;
– Procedure for responding to emergencies;
– Procedure for internal audits and management review.

A SMS is improved and conserved by people (human element). It is important to check the responsibilities and function (authority) of the different persons (human element) embodied in the system, and the lines of communication between persons influenced by it. Once assigned and documented, the tasks and activities related to the safety and environmental protection, both ashore and onboard ships, are the infrastructure of a SMS.

Safety Management System (SMS) requires a company to document its management measures to assert those conditions, activities and tasks, both ashore and onboard ships, affecting safety and environmental protection, are controlled, achieved and checked in conformity with legislative and company demands.

A structured safety management system empowers a company to focus on the cementation of safe practices in ship operations and contingency readiness and preparation.

The commitment and involvement of high level management and the demand to involve representatives from personnel on board and ashore have been recognized as key factors in the establishment and implementation of a SMS.

Hopefully, ship-owners and operators should see continuously the benefits of the SMS and commit to the ISM Code early, improving their implementation process. If adequately administrated, the SMS will enhance safety at sea, minimize the incidence of human injuries, limit unscheduled vessel delay, and reduce environmental results assignable to marine casualties.

Finally, safety management system (SMS) can become an attitude when it is harmonious and founded on the cultural tradition of its setting.

## 6. MARITIME EDUCATION AND TRAINING (MET)

Maritime education can be known as a series of interdependent operations such as teaching, learning, researching and using resources, including human element material and information than perform harmoniously to carry out appointed educational objectives.

In the 21st century, we are observe some dramatic changes in the proficiency and know-how needed by seafarers: advanced computer competence, and a considerable interdepartmental flexibility.

Training is one of the significant fields in day-to-day shipping operations and business. It is also closely related to the career improvement of seafarers. Training facilitation is thus likely to have an effect on the obligation of the seafarers' competitiveness and performance of the value chain.

Training and furtherance is the primal expedient in preparing the human resources for the group climate of developed organization.

One of the most important of IMO's technical cooperation objectives is to support developing countries' human capital through training, education and other means of knowledge transfer.

IMO has emphasized the importance of high crew standards and adopted recommendations calling upon governments to ensure that the MET of master, officers, and seamen is kept up-to-date and in line with modern technological developments in this field.

It is generally agreed that the revised STCW will in the long run result in seafarers being better trained, in their certification becoming more reliable and in watch keeping procedures being improved. But will these improvements be sufficient to cut down the accidents rate? Will they do so in time? And what else should be done.

Improved training and crew standards are at the core of the STCW Convention.

The significant task of those supplying the training should be highlighted. Trainers should be highly qualified, and stimulated and provided with a proper work environment and suitable compensation.

Accordingly, crew training must be developed and the standards of the individuals involved in shipping, onshore as well as sea, should be improved.

Maritime training institutes should do all they can to ensure that their students adopt the concept of safety culture.

The world Maritime University in Malmo, Sweden, as a center of excellence for maritime education and training should develop the highest practicable standards in all maritime affairs and provide a mechanism for international exchange and transfer of knowledge and application.

Maritime institutes involved in MET business have a responsibility to hand over efficacy courses that meet the individual and the shipping industry's needs. The organizational authorities have a burden to ensure that this is so. But how do we ensure that this is so worldwide? It is a role for some international or global body such as IAMU, IMO and WMU.

## 7. SEAFARERS

The shipping industry remains a stimulating, hiring and fulfilling vocation: a vocation that can employ people almost anywhere. Seafaring is not only a favorable and worthwhile vocation choice in itself, it is also a permit to a vast diversity of related jobs ashore for which experience at sea will make one notably qualified. Indeed, many dedicated professional seafarers are now managers, dispersed throughout the shipping industry, after serving their early years at sea.

There are many groups involved in improving safety at sea, including IMO itself , member governments, ship owners, insurers and C.S., but of all those involved, non has a greater interest than the seafarers because for if something goes wrong, they are the only ones who risk losing their lives.

The role of human element resources management is no longer only to assert that the seafarer posses the required skills and knowledge as well as to setup the environment in which staff can learn, contribute and perform.

Every management in a shipping company should have sea crew and shore staff able to treat the different aspects of the business of the company as individuals and, more significantly, as a team.

The seafarers as worthwhile human resources are not only directly inclusive in maritime industry because of their working on board, but also are making participations as ashore employers, which could be considerable for some shipping companies. With the implication of seafarers, the capability of the shipping company could be further scrutinized.

But more than that, it has been made clear that the seafarer is one of the most important elements in the shipping companies business. He should be competent but also be trained regularly with refresher courses to update his knowledge and preserve and develop his standard of competency which is the principal step for any safety programme. If we approve this notification, the ISM Code certification is more than just certificate of compliance; it is an intellect of best management practices for the entire human element in a company.

## 8. SAFETY CULTURE

To firm up the safety culture concept in the sea crew, to cultivate in individual seafarers the initiative to learn, to follow the procedures and to work safety, the development of safety culture is crucial. Safety culture is the cure for human error.

By concentrating on the human element generally, IMO is invigorating the link between management ashore and functioning afloat to enhance a safety culture.

The safety culture of an organization is the product of individual and group attitudes, perceptions, aptitudes, competences and qualifications. It is definite that a safety culture needs the functional cooperation between management and the workforce. Safer shipping needs a safety culture.

Where the ISM Code had been embraced as a positive step towards affection through a safety culture, substantial positive feasibility were manifest, and ISM Code conformity could be made easier through a lessening in the administrative process.

In its pursuit of a safety culture at sea, IMO focused attention on safety and the human factor in the maritime industry and developed the STCW convention.

Effective improvement of safety culture extends with obligations, values, and beliefs. Communication and demonstration of obligation, values and beliefs should start from management.

## 9. IMPLEMENTATION

The objective of ISM Code is to ensure compliance with all mandatory rules and regulations by addressing organizational structures, responsibilities and procedures. The will to implement these objectives affects safe operation and emergency preparedness. Successful implementation leads to the desired safety culture provided there is adequate commitment from the owner/operator!

A vital factor in the successful implementation of a SMS is the selection of the right personnel to fill positions influencing its performance.

Experience from transportation and shipping industries prove that the implementation of safety management System (SMS) avail business. Shipping companies focusing on safety management experience that they reduce casualties.

Worldwide regular implementation of SMS (Rules and Regulations) is of high importance. Developing enforcement by flag states and classification societies, and augmenting port state control will improve quality and safety in shipping industries.

Consideration of the "human element" by all players will lead eventually to more cost-effective solution with lasting influences.

Regular checks and audits should be held by the company to ensure that the SMS is being complied with and the system itself should be reviewed periodically.

Perceiving that too many shipping accidents as well as incidents are assignable to human factors, the full implementation of the revised STCW and the ISM Code are apparently significant. The national and international exertion should go some worthwhile way towards providing the level playing field that good ship owners wish to see and eliminate the inequitable competitive advantage currently enjoyed by the operators of substandard shipping.

## 10. CAUSE OF MARINE ACCIDENTS

Although the improvements in maritime safety are measurable and demonstrable, accidents still occur, and it should be clear that the cause why accidents continue to occur is because some people somewhere did not take the convenient initiative to avoid a problem, or did something wrong. So, lack of knowledge or inadequate application of the basic rules of the road are the major contributory factors in maritime accidents.

So, any earnest effort to improve maritime safety and prevent maritime pollution must concentrate on the elimination of human error because accidents do not happen but are caused, and most of them are caused by human element.

The question is why highly skilled and well-trained professional seafarers make mistakes. We should find an answer to this paradox. The main reasons for accidents may be boor judgment, complacency, disregard of basic seamanship and inexperience.

A list of the causes which affect how seafarers work and contribute to accidents includes alcohol abuse, inadequate technical knowledge or language skills, fatigue, low morals and injury, together with staffing levels, work environment and company management.

It is rare that a single item causes an accident or incident. Commonly overall chain of items and/or acts are embodied. The human part can go back to the design of the system or portion of equipment or ship, to the construction, to the effective fabricating process, to installations, etc.

The key factors effecting ship safety are the ship, the organization or ship company, human element, operations and the manner all of these factors are actuated. The majority of marine accidents are the result

of a chain of happenings correlated to the ship, the organization and management or ship companies, and personnel and their qualifications.

## 11. THE CONVENTIONS RELATED TO THE HUMAN ELEMENT

The two measures that are at the hart of IMO's commitment to addressing the human element in shipping and awfully directly designed to affect the culture and process aboard ship and within shipping companies are:

First: The revised Convention on Standard of Training, Certification and Watch-keeping for seafarers (STCW).

Second: The International Safety Management Code.

The two conventions provide a set of practices and a safety system which will enhance its continued success for the future of shipping industry.

The core of the STCW convention depends on basic MET. The level of skill and proficiency needed to perform any given task comes first and foremost.

The same can be said of the ISM Code, although this deals with management structure and responsibilities. The ISM Code addresses the responsibilities of the people that are at the heart of IMO's commitment to addressing the human element in shipping.

With the adoption of the ISM Code and the International Convention on Standards of Training, Certification and Watch Keeping for Seafarers "STCW 78", as amended in 1995, IMO has highlighted the dominant role played by the human element and management in safety at sea and environment protection.

The essence of the ISM code is its distinct focus on the human element. In the vast majority of cases, accidents happen because somebody, somewhere along the line, did not take the proper action to avoid a problem or did something wrong, whether through laziness, ignorance, fatigue, negligence or stress.

So, two important statutory measures have been adopted: the ISM Code and STCW Convention.

The ISM Code requires operators to establish a defined Safety Management System (SMS) and acquire certifications to that effect.

The revised STCW Convention puts in place enhanced training and watch keeping requirements which will continuously lead to a more skilled and flexible labour force.

The revised convention will provide the framework to ensure that they are appropriately trained and possess the skills to do the job properly.

The Code outlines the responsibility and authority of the master of the ship. It states that the SMS should make it clear that the master has overriding authority and responsibility to make decisions. The code deals with other seagoing personnel and emphasizes the importance of training.

The revised STCW Convention has highlighted the importance of the qualification of shipboard personnel and the importance of MET for such personnel.

The revised STCW Convention is a very important instrument to deal with the influence of the human element and accidents.

What are the characteristics of the ISM Code and the revised STCW Convention? The key features of the STCW Convention are that it adopts that human element are of crucial significant in any institution, and that training and education are vital to improve the skills and competencies of the human element and, through that process, instill a safety culture in all fields of their business. The strength of the said convention is that it is founded on the improvement and demonstration of competence in all of the main

safety-related areas of work on board. The ISM Code sustains the STCW perspective in setting assurance upon frequently developing the safety management skills of personnel ashore and afloat, and personnel being adequately qualified and certificated. The introduction of competence-based training and assessment has strengthened the steps towards a safety culture and has led to an important strengthening of conjunctions between the training suppliers and the shipping companies and their staff, all moving towards the objectives and standards explicating (disclosing) in the conventions.

The ISM certification prescribes vessel management and environmental policies, emergency response procedures, accidents and non-conformity reporting procedures and operation procedures and maintenance manuals.

The STCW certification focuses on "human factors" including verification that vessel watch standers have enough rest, basic language ability and basic safety training and that the crew is competent.

The challenge for ISM and STCW is to guarantee that the human element and safety and quality system programs become institutionalized as we go ahead.

## 12. CONCLUSION

Effective implementation of the STCW convention and the ISM Code through proper MET will promote seafarers and the practical safety of ships.

Safety at all times in the shipping industry requires continuous commitment of directors, managers, supervisors and all the people engaged in the company's activities.

Companies are required to establish and implement a policy for achieving these objectives, and every company is required to designate a person or persons ashore having direct access to the highest level of management.

Companies are required to prepare plans and instructions for key shipboard operations and to make preparations for dealing with any emergencies which might arise. The importance of maintenance is stressed and companies are required to ensure that regular inspections are held and corrective measures taken where necessary.

IAMU, as a non-governmental organization "NGO" in IMO should actively share in the issues such as maritime safety, environmental protection, maritime education and training and it can make structural suggestions and recommendations.

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