

CREW RESOURCE MANAGEMENT IN ERA OF TECHNOLOGY – ENHANCING MARITIME TRANSPORT SAFETY AND SEAWORTHINESS OF VESSELS

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ABSTRACT

This article describes the research conducted by the writer concerning the possibilities in enhancing the safety of ships and seaworthiness through risk management and marine insurance connected to new possibilities developed by research results achieved by solutions developed for Bridge Resource Management and Crew Resource Management. The article describes the basic solution in new Nordic Marine Insurance Plan 2013 for encouraging the ship owners to develop safety practices which can be accepted by the insurers as safety regulations in insurance policies to affect the risk management and to create safety practices which in turn increase safety on vessels and create cost efficiency through decreased insurance premiums when risk management on a ship or whole fleet is taken care of by using these modern safety practices which are made possible through effective use of modern technology and use of research models adjusted to practices on vessels.

Keywords: *Transport safety, Risk management, Seaworthiness, Unseaworthiness, Marine insurance, Crew Resource Management, Ship owner's liability, Bridge Resource Management.*

1. INTRODUCTION TO UNSEAWORTHINESS PROBLEMACY IN GENERAL

All vessels which leave port are made seaworthy as ascertained by the captain before the common perils for ship and cargo will be encountered. Seaworthiness of ships is a basic concept in Maritime law and in Law of Marine Insurance.

The concept of seaworthiness itself is related to a great deal of laws and provisions - given both by private and governmental organisations. The concept is also often used in universal language without specified meaning. In this article unseaworthiness is considered as a term and phenomenon related firstly to maritime transportation and ship owner's liability and secondly to marine insurance.

The meaning of the seaworthiness concept is relevant when we consider liability issues between ship owners and cargo owners. As the law stands today in most jurisdictions – the vessel has to be seaworthy when the vessel leaves port. If the vessel later will be considered unseaworthy at the time of departure, the ship owner will usually be considered liable in relation to the cargo owners if there will be a causal link between the loss of cargo and the unseaworthiness of the vessel.

In the law of marine insurance, most maritime jurisdictions follow the same pattern using Seaworthiness/unseaworthiness evaluation as a basic rule to protect the insurer. The Nordic countries use safety regulations for the same purpose. Since the beginning of 2013 the unseaworthiness rule has been abolished from the clauses in all Nordic countries. This increases the use and meaning of safety regulations for the insurer, who is able to deny the insurance cover for ships when the owners are in breach of the safety regulations specified in insurance policies.

Seaworthiness/Unseaworthiness is still the core of the insurance conditions and insurance policies in other

jurisdictions than in the Nordic jurisdictions. The regulation in Nordic countries can benefit the owners in several respects as the development of new safety practices through technology can more easily be directly connected to the safety culture of the ship or fleet and benefit the owners through risk evaluation when the premiums are adjusted to meet the real risk evaluation.

The concept of unseaworthiness is usually not defined in the provisions concerning the question. In all jurisdictions seaworthiness seems to be a relative term that must be evaluated according to the circumstances in question; the ship, trading area, time of the year, quality of the cargo etc.

The concept contains usually not only the physical condition of the vessel but also other aspects of the ship, like sufficient manning, skills and certification of the crew, defects in stowage, documentation etc.

Requirements are also different for vessels in port from vessels at sea. In some jurisdictions the concept is used without any qualification at all and in some jurisdictions unseaworthiness –provisions include more detailed guidelines as to what constitutes unseaworthiness.

2. MASTER'S LIABILITY FOR SAFETY AND SEAWORTHINESS OF VESSELS

2.1 Introduction

In the world we are living now the primary responsibility of the master is to ensure compliance with various laws that apply to the vessel and crew - Was it national law or international law - both in the country of the vessels flag or the law of the country the vessel is visiting.

At first sight one could imagine that all masters should also have at least a master degree in international law before they accept this demanding post. But they do

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not, and if some of them have, they will be hired by the London market - as we have seen to happen. The other important master's responsibility is to ensure that company policies and procedures are followed.

Modern legislative trends are increasing the responsibilities placed not only on shore side administrators and managers but also shipboard personnel, especially the master. For example environmental laws carry with them not only civil penalties, but the potential for personal criminal liability as well.

The legislative atmosphere surrounding maritime transportation has been affected primarily by a few major accidents during the last decades. The laws affecting maritime activities are enacted largely as a response to catastrophes of one sort or another, or as a reaction to international pressures and trends. The last trends and pressures have especially and unfortunately been seen also as criminalisation of seafarers.

Masters should become familiar with the legal responsibilities of the position. Unlike in earlier days they have new problems like work-hour rules, reduced manning, automation, flow of personal documents, additionally required logs and recording documents number of which keeps increasing year by year etc. etc.

All this workload for the masters should be taken into consideration when the safety of ships is to be guaranteed. New technical procedures should be made to ensure the safe prosecution of the voyage and to help the masters in ensuring the safety on board.

When a master accepts the command of a vessel, he agrees to act honestly and to do the best of his ability to protect the interests of the company. He looks after the safety of the vessel, cargo, passengers, and crew at all times and he also has a legal and moral duty to protect the environment. The master acts as a direct representative of the company and sometimes also as a representative of the charterer and is responsible for all damage and accidents that happen on board. The master is responsible for all persons on board whether their presence is authorised or not. His work to ensure the safety should be made easier by technological means so that they make the safety procedures easier to be controlled by him.

2.2 Development of Seaworthiness requirement

The concept of seaworthiness was born in 17th century England when insurers and charterer's needed a concept for evaluation of the conditions of the vessel they were going to insure or charter. Shipping registries and classification societies were needed for supervision of the requirements when the ships became larger and more technical entities.

Although seaworthiness was at first the concern of charterers and insurers, many other interests were soon involved and interested in seaworthiness of a ship. Authorities after all the others, which have been mentioned above, became last interested in the issue. Seaworthiness has been foremost an issue attached to

shipping business before last decades when safety at sea has become increasingly important.

2.3 Technical seaworthiness of a vessel

The requirement of technical seaworthiness means first and foremost vessels hull, machinery and all equipment connected to these and which are closely related to the use of a vessel. Modern vessels are practically loaded with technical instruments, which can be enumerated in under this requirement; steering gear, hatches, pipelines, fire fighting systems etc.

Although ship owners are also responsible for keeping the ship seaworthy, it is expressly stated that the master has a duty to ensure that all these technical seaworthiness requirements are fulfilled before the ship sets off on a voyage. The master accepts this responsibility by signing in ships log that the vessel has been made seaworthy before the voyage each time the ship leaves port.

2.4 Seaworthiness for a voyage

The ship has to be manned and equipped for the intended voyage and the master is responsible for taking into account all possible needs for intended voyage plus possible changes of route ordered by ship owner or charterer. The ship has to carry along necessary charts and other navigational aids, medicine, bunkers, provision and documentation.

To compare the two requirements - technical seaworthiness and seaworthiness for a voyage - we could imagine a house with walls, roof and things that are fixed in the house to symbolize the technical seaworthiness of a vessel. Living in the house is not possible without all movable objects which make living in it possible for at least for a certain period of time which in turn symbolises equipping the ship for a certain voyage. The master is responsible for the cleanliness, sanitation, and good condition of the living quarters on the vessel. He also has to ensure that no unauthorized personnel are permitted aboard when the vessel leaves port.

2.5 Cargoworthiness

The ship is expected to arrive at port of destination unharmed with its cargo. The ship has to be considered cargo worthy already before loading to make this possible. Cargo holds must be cleaned after previous cargo in a way that is expected by the new cargo. The master has to be aware of the required measures expected by the new cargo.

On the other hand the charterer will not be willing to pay for unnecessary delay caused by unnecessary cleaning or other measures which were not necessary for his cargo. All cargoes cannot be accepted at the same time and certain cargoes make the ship unseaworthy for transporting the others (for example IMDG -cargo).

3. RESEARCH AND TECHNICAL SOLUTIONS TO ENHANCE THE SAFETY AND SEAWORTHINESS OF VESSELS

3.1 Introduction

Seaworthiness must nowadays be evaluated in very different circumstances than traditionally. In the era of technology a seaworthy ship needs to be technically and electronically in order before leaving port and be equipped and manned in a way that it stays that way also during the voyage. Crew must be able to cope with the situations which might arise at the bridge.

The shipowner must have means to cope with the different requirements which are posed for the crew by the officials which control the seaworthiness of the ship and the skills and certificates /validity of the training of the crew.

The work at the bridge must also be arranged that way that the ship shall be manoeuvred in a way that stays seaworthy and the crew at the bridge doesn't lose concentration because of unnecessary occupancies or routines which make the crew lose concentration at the precise moment when the best endeavours would be needed.

Ship with wrong routines or unnecessary people at bridge can lead to a disaster which could be avoided by strict obedience of safety procedures in critical points of the voyage on a well-planned route. Different scientific models are analysed which can be used in this respect in order to guarantee a seaworthy vessel throughout the voyage.

Another aspect relating to technical possibilities for avoiding classical unseaworthiness problems are development and planning of electronic crew certificate management systems and spare part management systems which efficiently guarantee, if they are well used, that the requirement for safety can be met.

Satakunta University of Applied Sciences has for years encouraged the teachers and researchers into both theoretical studies and research connected with more practical examples to be performed with the students in relation to seaworthiness problems in relating to human behaviour and technical avoidance of such problems.

3.2 Cruise ship safety and cybernetic model for BRM

Research concerning Cruise ship safety has been done for years but the last research project has been well timed as it was started before and finished after the Costa Concordia incident – and the core of the project was to analyse the safety from the angle of the workload and activities on bridge. The greatest remarks during the study made by Master of Marine Technology student, Master Mariner *Risto Sipilä*, were made on the human behavior.

Sipilä pointed out that the natural features of human-being are not included to the training of the officers and seldom considered on board.

The implementation of new was found difficult. The attitude and working habits of the captains and the officers were strongly rooted and build, not only during the test use of the Cybernetic tool, an environment,

where the alterations, possible improvements and the experimentation of them, or even independent thinking were rejected.

Sipilä's research pointed out that the crucial role of the captain has huge effect on the projects like his study. As the captain is responsible of the safety on board and to implement the bridge team management to meet his criteria, he is usually the only person able to bring new ideas into force. This was acknowledged by the company as well.

Bridge operation related documents on safety management system state that the captain is responsible to plan and establish proper manning by creating watch plan and giving the required orders to instruct the officers accordingly. The responsibility is clearly noticeable but this kind of arrangement creates other difficulties. In the companies where the crew members shift between two or more vessels it is typical that the working methods shift with the persons. This hinders the formation of standards as the colleagues are constantly changing.

The captain as responsible person changes the whole bridge procedures according to his opinion. This creates every time difficulties to the colleagues who have to learn the new way of working in the middle of their contracts.

If the company doesn't create the procedures with the captains, who agree to implement the procedures on board, in the fleet there will be as many bridge management systems as there are captains. Implementing new systems and working procedures, especially when they deal with significant changes, must be introduced and brought into force from the higher level of management to enhance maritime safety - considers *Sipilä* in his research outcome.

Sipilä points out that this kind of implementation of working procedures would as well solve the confusions with the descriptions of required actions. When the company acknowledges the captain to be responsible to implement "proper manning on the bridge" they actually cover their own back and make the captain partly guilty of accidents.

This is a remarkable point in the cases when the captain is not fully capable to deal with the resources. After an accident the bridge management will be noted not to be in order, which shows that the captain hasn't fulfilled his duties. This leads to more complex difficulties. The totalitarian system, where the leaders command the underlings without interaction hasn't worked, and will not work on board either.

Sipilä highlights in his research that the safety standards of the work on the bridge during the navigation must be taken into account constantly; also when the idea of the double watch system is considered to be worth implementing, it is not appropriate to wait until it's completed. Beforehand, and when implementing big changes, the safety attitudes are the most remarkable factor to improve or hamper the standards.

The attitudes are impossible to transfer – they are everybody's own based on the qualities and knowledge of the person. These own opinions, and the actions based on them, will affect the ones of surrounding people and

influence their ideologies. The positive changes are about to increase and create culture, which uses the best possible methods to improve the safety standards: the human beings.

The research to be completed in SAMK is to find out the connections between liabilities of the owners in relation to seaworthiness of the vessels when the owners can be anticipated – or even shown – to accept the unsatisfactory procedures or safety culture on bridge. The relation of ISM code to new safety practices on maritime safety research shall also be under consideration in the near future.

In the future when seaworthiness will be evaluated constantly during the voyage also from the liability point of view - when the Rotterdam Rules will be effected by maritime nations - the question on causality and liability of the owners will be even more interesting.

3.3. Resource management and communication in a shipping company – some considerations

Resource management systems are often as many as shipping companies even though some standard systems have been developed. There are electronic systems which are tailored for companies on the basis of some basic solution and there are solutions that are tailored directly for a company on the basis of company's own needs – and then there are companies which do not have any electronic systems in place at all.

The research which was made at the SAMK by Master of Maritime Management student, Master Mariner *Mona Zilliacus* during the last calendar year pointed out interesting considerations on the needs of such systems especially in relation to companies where demands for changing crews very often between different kinds of vessels.

The side effect of the research was to take into consideration the fact that there is a severe risk in such circumstances that the crew management misses the requirements if there is no proper system in place and the vessels sail with an unseaworthy manning as a consequence of a missing certificate and the crew does not have necessary knowledge on the demands of the vessel.

The outcome of the research was that there is a specific need for a workable and tailored program especially when the mobility between vessels is significant especially in situations with tug owners where only a part of the vessels are continuously manned.

Also this research has been promoting new research project concerning the relations of the procedures created by shipping companies in relation to the owner's knowledge and liability for safety and seaworthiness of vessels in general.

Universities of Applied Sciences take care of the research which applies the results into practice.

In Master of Maritime Management program this basic idea is used in a way that these two are combined as research projects by Senior Lecturers or research fellows working on their Doctoral thesis and the students

(Captains with bachelor degree + minimum of three years working experience at sea) working on their Masters thesis. They both benefit each others.

The findings that can be made on the basis of the analysis of the two recent Master theses will be more closely analysed in further work.

Especially Nordic Marine insurance

4. CONCLUSIONS

The continuous research project concerning seaworthiness of vessels and promoting safety at sea aspects to enhancing safety thorough insurance conditions has been conducted in SAMK for years. The idea of the Finnish educational system is twofold: the basic research should be made at the conditions (Nordic Marine Insurance Plan 2013) make it possible for the shipping companies to promote better safety cultures in shipping companies and to affect at the same time on the level of their own insurance premiums when the risks though technological solutions connected to ensurance of human behavior are created and put into place - and made safety regulations as detailed insurance conditions in the policy.

Universities and the The basic idea is simple to sell for the ship owners – The technical solutions and investments on workable models for BRM that promote safety, need investments when they are created and put into place, but the investments can be saved within a year or couple of years when the insurance premiums can be negotiated to take into consideration the new safety culture of the vessel or the whole fleet.

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