

## PROBABILITY MODEL OF SAFETY AT SEA

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**Abstract:** *Research shows that ususally Master is the main guilty, if any catastrophe arrises. Obviously, it is not truth. In realising the transport task many other participants take part. A principel relative model is formulated. It is accepted the errors are ocasional and equally distributed. It is demonstarated Master is burden wrongly.*

**Keywords:** *disasters, captain, relative model.*

Nowadays, at least half of the citizens of the European Union (EU) live along the coasts on less than 50 km of the sea coastline. As a matter of fact, the sea aquatorium that is under the jurisdiction of the European governments exceeds in size the land territory. That is why safety of life at sea and environmental protection issues are with first priority. The marine industry of the countries gives approximately 40% of European gross domestic product. More than 40% of the world merchant fleet that implements the greater part of foreign trade and almost half of the domestic trade by means of the internal water ways belongs to Europe as well. Despite the increasing necessity of an integrated interdependent approach towards defining the marine policies and the appropriate approaches for their implementation, there are certain signs that up to now the activities in the marine sector bear a separate development which is not sufficiently interrelated. This paper is intended to stress the community's understanding about balanced model of safety at sea.

Looking for manners how to improve safety of live at sea we would like to offer a model, based on the theory of relativeness, that includes three parts: fundament, superstructure and sea-going staff (Shipmaster and crew). The fundament has two levels: external (working environment) and internal. These terms are contingent. More precise terms could be found.

1. The **external level** consists of the working environment, where the vessels of international shipping operate. It includes: navigational and weather conditions + local authority and services, who monitor and assist shipping (e.g., Search and Rescue, VTS, Waterway and buoyage system maintenance, Agency, Pilotage, Medical, Insurance, Border, Customs, Supply, Ecological, Port authorities, Maritime administration, Shipper, Forwarder etc.).

2. The **internal level** consists of: the ship owner, the operator, the insurers, the registers, the shipbuilders/ship-repairers, the flag administration, etc.

The factors of both groups form the so-called Coastal authorities and services group (CAS). On the other side is the Shipmaster together with the crew. There are various philosophies to express the safety model. Two of them are:

(1) .....Safety = F [External + Internal + Shipmaster]

(2) .....Safety = F [(External + Internal) + Shipmaster]

(3) .....Total risk = Sum of errors = Safety = 100% = 1

Equation (1) shows that all players are together – „in one boat”, instead of (2), where the Shipmaster is some separately. Our supposition is that reality belongs to the second expression. Of course, the true is somewhere in between.

Now we shall consider only the working environment and the processes taking place there, as compared to the safety index. The proposed approach allows focusing our attention to the base, i.e., the Coastal authorities and services, because the safety depends mainly on their actions. We strongly believe that it would contribute to the development of more serious analyses amongst participants in the rest of the levels.

Following such thinking, it could be accepted that:

a) Main participants in the maritime transport task are: Crew (Master), Pilots, Agents, State authorities (Customs, Medical, Immigration, etc.), Port authorities (Stevedores), Harbor master, Vessel Traffic Services, Cargo services (Forwarders). Let's say they are 10.

b) By nature, errors are: flagrant/gross, systematic and random, caused respectively by – human, equipment and all the rest. Predominant are the random errors, where they are accumulated in squaring.

(4) .....Total risk = Sum of participants' errors = Safety = 1

If equally distributed:

(5) .....  $\sum e_i = \sqrt{e_1^2 + \dots + e_n^2} = \sqrt{0.1_1^2 + \dots + 0.1_{10}^2} = 1$

Then in accordance with (2):

(6) .....Safety = 0.9 + 0,1 = 1 = 100%

That means safety depends 90% of shore-based staff and 10% of Master/crew i.e., besides **his** errors, Master is loaded with all participants' errors as well! This equation shows that the main part of errors belongs to the other participants of the transport process. Master is forced to suffer the all-participants' errors!

As it is well known, every component of the operational chain is a potential and real carrier of errors. It is quite evident that the more participants there are, the more errors happen. Unfortunately, in many of the cases the inaccuracies of the coastal participants become evident when the Master and crew find themselves at sea in heavier conditions. Obviously, the working conditions at sea are more complicated than those ashore. So, it is quite natural that the decision taken by the Master could be not the best one and could be followed by certain mistakes. This is one of the reasons the guilt to be transferred to the ship. We should say that this meaning is accepted over the world, as shipping is one of the most important branches of the maritime industry.

One of the final objectives is to further inform the maritime community. Moreover, the common knowledge that the Shipmaster is guilty for everything has to be forced out of peoples' mind.

### **Main stages of the operational process**

As mentioned before the Master and coastal participants are the two main parts of shipping. Let us briefly explain some of the weak points of the working environment that closely relate to the safety of the crew, ship, cargo and environment. In this case the inaccuracy of the CAS directly reflect on board.

Some of the most important tasks that should be solved by the crew of a merchant vessel in international trade are:

- navigational (the voyage between two points to be performed in an optimal way, i.e. safely and economically);
- work with the coast authorities and services;
- operational (loading/discharging must be safe and within optimal time limits, complying with the international and national requirements and good maritime practice).

This report does not pretend for have analyzed the processes in details. Stages and tasks of greater importance are subject to consideration. Following our brief description it could be concluded that the Master is the only person who takes the responsibility for all the omissions made by shorebased representatives. There are a lot of proves about that. No doubt that good ship operation and maintenance first of all depends on the competence of the coastal specialists. Therefore, in order to properly fulfil their duties they must have sufficient sea-going practice. We would like to remind to those who are not sure about our statement that for a long time world shipping has suffered for competant sea-going staff. Normally, a part of this manpower takes shoarbased vacancies. So it is evidant that specialists who are employed for shoare branches of shipping are not experienced enough. It is well known that the Master has the power on board. However, in practice, the last word does not belong to him. Actually he has to execute commands given from shoare. Therefore, managing vessels, coastal professionals transfer their competence and incompetence on board.

### **Conclusions and Recommendations**

This report was not planned to analise processes in details. Only some main stages and tasks have been observed.

#### **1. Conclusions**

Despite any actions taken to assure safer shipping and cleaner oceans at sea numerous heavy disasters took place around world, accompanied by loss of human lives, serious unfavourable consequences upon environment and damages, according to „Total loss” category. This is a clear sign for the necessity of undertaking immediate specific actions on international and national level for a detailed investigation of the state of the working environment and the main factors that influence the safety of shipping;

Maritime services demonstrate actions that comply with the international and national maritime legislation and good maritime practice. But, if we have a deeper look into this matter, we shall see that there are a number of weaknesses of these same services that they transfer towards the ship administration only, respectively to the Master. The application of such methods does not do any good to nobody, having in mind that the number of people willing to work at sea constantly decreases. From the practical point of view, there is nothing new there. All this is well known. Probably, there is enough regulative base. Then, how to improve our activities so that much more knowledge and experience to be put in operation?

## **2. Recommendations**

Burgas Free University to cooperate with the other national and/or international appropriate academia, maritime NGOs and respective national structures to work together for:

- Analysing the actual state of the search and rescue systems of the Black Sea countries, as shipping is international and its employees – seafarers have the right to be saved anywhere, if any cases arise;
- Organising regular annual events on different topics in the maritime law matter on the Honor of prof. Yankov, who is DOCTOR HONORIS CAUSA of the University.



This paper is dedicated to Prof. Alexander Yankov and his 100<sup>th</sup> Anniversary since he was born on 22.06.1924 in Burgas, Bulgaria and past away on 17.10.2019 г. In Sofia.

No words to explain my gratitude to him for our professional cooperation on maritime field, integrated maritime culture and practical support to organise numerous national and events with international attendance to raise Bulgarian maritime culture and our commitment to fundamental IMO motto: Safer Shipping–Cleaner Oceans. My obligation is to announce that prof. Yankov formulated:

**Safer Shipping–Cleaner Oceans–Competat Crew!**

A lot was published about life and achievements of Prof. Yankov. He was a Bulgarian prominent jurist, a successful diplomat and a brilliant scholar. Some of his main positions in his long and very distinguished career in international law were: former member of the UN International Law Commission (1977-1996) and its Chair in 1984; Bulgaria’s Ambassador to the United Kingdom (1972-1976) and Permanent Representative to the United Nations in New York (1976-80); Professor Yankov was also a Member of the Permanent Court of Arbitration (PCA, 1971-88), and Judge of the International Tribunal for the Law of the Sea (ITLOS, 1996-2011); He was President of ILA in 2012, hosting the very successful biannual conference in Sofia, Bulgaria Professor of International Law at the University of Sofia (Bulgaria) since 1973, Member of the Bulgarian Academy of Sciences since 1981, etc. Much more might be found in [www.legal.un.org/yankov\\_tribute](http://www.legal.un.org/yankov_tribute) (Obituary: Professor Alexander Yankov Shinya Murase, 3 September 2020; Alexander Yankov Statement in the ILC by Michael Wood (September 2020); Commemorating Alexander Yankov (1924-2019) Statement by Nilufer Oral (September 2020); TRIBUTE TO ALEXANDER YANKOV Juan José Ruda Santolaria (September 2020); Tribute to Alexander Yankov by Pavel Šturma).

For first I met Prof. Yankov indirectly, nearly 55 years ago, listening to the radio that he would work about maritime problems on very high international level. During that time my dreams were to study in maritime school and go to sea. Surprisingly, this dream came true. Later, we met really in 1990s, when with some colleagues from Varna, we offered Mr. William O’Neil - Secretary-General of IMO to be invited in Bulgaria and Bulgarian

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Maritime Training Centre to apply for recognition as affiliate of World Maritime University in Malmo, Sweden. Next decades, until the Autumn of 2018 were marked with many maritime events with Prof. Yankov and his full cordial support. Here you will see only a few of them.



*19.10.2018, Bulgarian Chamber of Shipping awarded Prof. Yankov with Special Award for Rise to Eminence of Maritime Bulgaria. (Ph. BCS, L to R: Autor, Prof. Yankov and Capt. B. Bogdanov-Chairman BCS bestows the prize)*



*2014, Prof. Yankov during his 90<sup>th</sup> Anniversary given to him as a matter of honor*

*The special badge „Master Foreign Going”*



*16.09.1994, Bulgarian Maritime Training Centre, Varna:*

*Prof. Yankov visited the Centre in order to be made familiar with its simulators, programmes and organisation of the „First IMO seminar for Black Sea countries about SAR and GMDSS”.*

