

## HUMAN ERROR-THE MAIN FACTOR IN MARINE ACCIDENTS

Raluca APOSTOL-MATES<sup>1</sup>  
Alina BARBU<sup>2</sup>

<sup>1</sup>Junior Lecturer Ph.D. "Mircea cel Batran" Naval Academy, Constanta

<sup>2</sup>Senior Lecturer, Ph.D. Constanta Maritime University

**Abstract:** *Modern ships are equipped with technologically advanced systems that are presumably infallible. Marine accidents still occur, and the number of casualties is alarmingly high. Not even the state of the art systems used to improve the new ships' operation have reduced the number of incidents and accidents at sea. The main factor that induces the present situation is the human factor. Not being a machine, a human cannot be programmed to follow the perfect path in every situation. Moreover, taking into consideration the variety of elements able to interfere with human work onboard the ship, it is practically impossible to have a rule or regulation for each state that can occur. The present paper highlights the importance of human error in the maritime field and underlines problems related to the maritime crew.*

**Key Words:** *marine accidents, human factor, communication, inter-cultural*

### Introduction

Nowadays, it is stated that over 90% of the world's cargo is transported by merchant ships. Taking in consideration that also a significant number of military ships are deployed all over the oceans and seas, we can say that oceans have become quite 'crowdy.'

If we look into some facts, numbers, and examples, we can say that humans and their decisions on sea are the roots of the majority of sea accidents:

- A Dutch study of 100 marine casualties found that human error contributed to 96 of the 100 accidents.
- Human error costs the maritime industry \$541 million per year, according to the United Kingdom Protection and Indemnity (UK P&I) Club.
- Human error contributes to 84–88% of tanker accidents.
- Human error contributes to 79% of towing vessel groundings.
- Over 80% of marine accidents are caused or influenced by human and organization factors
- Human error contributes to 89–96% of ship collisions.

### Human factor-the weakest link.

To eliminate errors made by humans, some steps have been taken. In the beginning, there was the concept of adapting people to technology, idea that developed into a segregation between assignments suitable for humans and technical tasks for machines. As a result, an interface that connected the human with the technology was given the utmost importance. Consequently,

systems became more complex and capable of multi-tasking, while humans, being considered prone to fail, were given simpler tasks. No matter how many, how high performing automated systems modern ships operate on, those systems are still related to humans, even in a very low degree: for example to respond to an alarm. Reality shows that the majority of ships still have nonautomated systems that require human intervention for operation and maintenance, situations when humans interact with equipment and machineries, but also with other humans. The numbers show that even trained, capable, and experienced sailors could make mistakes. Therefore, people operating equipment and machineries onboard ships are considered the weakest link and back-up systems are provided to minimize or even eliminate the human errors.

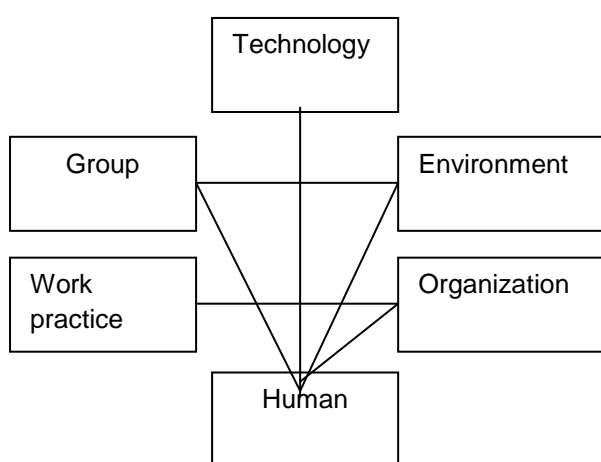
### Types of breakdowns leading to accidents

The Romans had a saying: 'errare humanum est'. 'Why are we making mistakes?' is a difficult question to be answered by psychologists; the others should focus on what are the factors leading us to make mistakes and how to prevent them from happening. Making a mistake is not that important if it does not corroborate with another mistake made by another person from the crew or with a lack of reaction of the others involved. When mistakes come one after another, and they find favorable conditions, they usually develop into accidents. This error chain could be roughly defined as 'a sum of mistakes.'

As for the language aspect, the recent amendments to SOLAS require a common working language. They come as a completion of SMNV adopted by IMO in 1977 and SMCP in 2001. Even under the international regulations regarding the use of Maritime English in all

communications regarding the ship, accidents happen when a breakdown occurs in the socio-technical network. The breakdowns can be due to:

- poor design of equipment (human-technology),
- dissonance between work practice and written procedures (work practice-organization),
- crew stress caused by company pressures (human-organization),
- poor communication between crewmembers (human-group)
- fatigue caused by vibrations and noise (human-group-work environment)



The causes of the accidents that can occur are classified, based on the type of breakdown causing it, into:

- Problems related to multicultural crews: e.g. **Bunga Teratai Satu** accident, the **Sally Maersk** death, the **Scandinavian Star** accident
- Problems related to communication failure due to different cultural background between crew and pilot: e.g. the **Bright Field** accident
- Problems related to mis-communication among crew members and passengers on passenger’s vessels: e.g. the **Skagerak** accident, the **Scandinavian Star** accident
- Problems related to the usage of different languages with respect on external communication, VHF communication with other vessels: e.g. the **Royal Majesty** accident

#### **Bunga Teratai Satu**

On 2 November 2000, the Malaysian flag container ship Bunga Teratai Satu, bound for Sydney, struck the north end of The Great Barrier

Reef at 07:23, at a speed of over 20 knots on a heading of 120°.

The accident occurred when the change in heading from 120° to 164° at 07:00 was not made by the Pakistani Mate on watch at the time.

Investigations revealed that the Pakistani Mate and his wife, who was onboard, were preoccupied with private phone calls, between 06:45 and 07:15, and the AB on watch had been waiting for an “alter course” command, although he knew that they were off-course.

The investigators of the accident noted that there was a strict hierarchy between the Pakistani senior officers and the junior officers and crew who were Malaysian, Indonesian and Myanmar. Although the AB knew that something was wrong, his culture impeded him to question the decision of a superior officer.

#### **Sally Maersk**

In June 2000, on M/V Sally Maersk, during a voyage from Hong Kong to Long Beach, a Polish repairman accused back pain and fever. Due to poor English language skills, he asked his colleague, another repairman from Poland, to perform as his interpreter during the medical consultation with the chief officer.

The sick repairman had an injury in his back few days ago. His colleague was aware about this and assumed that the pain was caused by the injury. Because the sick repairman had a back injury a few days ago, his colleague assumed that the pain was a result of that injury.

Even though the sick repairman explained that he had pain and he was also febrile, the information about fever was underestimated and never translated, and the chief officer retained that the problem was the pain most likely caused by the injury.

The chief officer established mild pain killers as the most suitable treatment.

The Polish repairman visited his sick mate in the following two days.

Although the sick repairman complained about his general state and the rising fever, his colleague did not realize the gravity of the situation.

During the last visit he paid to the sick repairman, he seemed asleep and his colleague left him without even talking to him.

Later that day the sick repairman was found dead in his bunk. The cause of death was pneumonia.

#### **Scandinavian Star**

The ferry Scandinavian Star cremated completely during a voyage from Norway to Denmark on the night of 7 April 1990. A third of the passengers onboard and crewmembers died in the fire (a total of 159 casualties), and the accident was considered amongst the worst passenger ferry tragedies that happened in European waters.

Investigators found out that passengers identified problems related to crew-passenger communication and even crew-crew communication due to poor English language skills. The captain complained about this problem of the Portuguese speaking crew in a fax to the ship owner before the accident.

A large part of the Portuguese crew members did not speak or understand English, Norwegian or Danish, had little knowledge about the ship, and were unfamiliar with practicing a fire drill. Only a few crew members asserted the situation correctly with the accident and put on breathing masks prior entering the smoke-filled corridors.

#### **Bright Field**

MV Bright Field was a bulk cargo ship involved in a collision with the Riverwalk Marketplace shopping complex in New Orleans, Louisiana. The accident happened on December 14, 1996, after the cargo ship lost engine power due to a poorly maintained oil filter.

The crew of the Bright Field was entirely Chinese, and the Pilot onboard was American.

According to Chinese culture, the word "no" is a very impolite word. It is, therefore, the cultural practice of Chinese crews to always answer "yes", even if the situation would require a "no". moreover, if the person they answer to is a superior officer, a pilot, a member of port authority, the answer is always "yes", even if they are cognizant of the fact that the proper answer would be "no".

Because the pilot could not understand the communication between the bridge and the engine room, which was held in Chinese, he lacked important information. He was unaware of the engine problems from the bridge/engine communication in Chinese, and he, therefore, underwent information deprivation.

The balance of the incident denoted 66 injured people.

#### **Skagerak**

The ferry Skagerak sank in 1966 on her regular route between Norway and Denmark. The accident occurred because of meteorological conditions. It ended up in no injured or dead because of the discipline of the crew and the concentrated effort of the vessels and helicopters involved in the search and rescue operation.

### **CONCLUSIONS**

The 1995 amendment of the STCW (International Convention on Standards of Training, Certification, and Watch keeping for Seafarers) introduced specific requirements for English Language Certification:

*“Under the STCW Convention, all officers in charge of a watch (navigational or engineering) must have a good command of spoken and written English. Senior officers with functions at a managerial level must also speak and write English since this is a requirement at the previous level of responsibility. Ratings forming part of a navigational watch are required to be able to comply with helm orders issued in English. Crew members assisting passengers during emergency situations should be able to communicate safety-related issues in English or in the language spoken by the passengers and other personnel on board.*

The mustering of the passengers was done in an unusual way, not by the means of loudspeakers, but by a crew member who knocked on each and every cabin door and impelled the passengers to don their lifejackets and present to the mustering stations as quickly as possible. The communication was done in Norwegian or Danish, as the majority of the passengers were native speakers of one of those languages. Only a couple of French speaking passengers did not figure out the instructions given and expected that the crewmember announced the arrival. They got dressed carefully and made ready for the arrival. When they went to the passenger area, they found the other passengers dressed in pajamas and lifejackets.

The problems with the communication between the crew and the passengers could have had fatal consequences.

#### **Royal Majesty**

On June 10, 1995, the cruise ship MS Royal Majesty grounded on Rose and Crown Shoal about 10 miles east of Nantucket Island, Massachusetts. The discrepancy between the grounding point and the point the watch officers considered accurate for the ship was of about 17 miles.

The M/V Royal Majesty was off route due to a navigation equipment fault. No one from the crew was aware of this flaw due to false indications given by the navigation equipment.

At a certain point, the crews on board a group of Portuguese fishing boats tried to warn M/V Royal Majesty that she was heading into danger and called her on channel 16.

Because the calling was made for a vessel in a certain position, and the crew on board M/V Royal Majesty was positive that the ship was in another position, the crew on M/V Royal Majesty did not answer to the call.

What drew the attention to the investigators was the fact that the call was made in English, but it did not indicate any danger. Only the ship to ship communication within the group of Portuguese fishing vessels did indeed indicate danger. Unfortunately for M/V Royal Majesty crew, this communication was in Portuguese and was not understood.

*In these days of multi-national and multi-lingual crews, the importance of sharing a common language cannot be underestimated. It will not only improve safety and operational efficiency but will also make life on board easier and more pleasant.”*

The cases presented above are the perfect illustration of the fact that human factor is the main one responsible for marine accidents and that among other causes, the most frequent that leads to accidents is the language barrier. It is clear that English must become the second language for people onboard vessels to eliminate the problem of multiculturalism in onboard communications.

#### **BIBLIOGRAPHY**

- [1] <http://www.marineinsight.com/marine-safety/the-relation-between-human-error-and-marine-industry/>
- [2] <http://www.profilschager.com/page109855.html>
- [3] <http://www.jmr.unican.es/index.php/jmr/article/view/32/30>
- [4] <http://www.sailingtoday.co.uk/uncategorized/human-errors-account-for-most-maritime-accidents/>
- [5] [www.aast.edu/pheed/.../pdf\\_retreive.php?](http://www.aast.edu/pheed/.../pdf_retreive.php?)
- [6] Just Waiting to Happen... The Work of the UK P & I Club, The International Maritime Human Element Bulletin, No. 1, October 2003, pp. 3–4. Published by the Nautical Institute, 202 Lambeth Road, London, U.K.
- [7] [www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA458863](http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA458863)