

HUMAN ERRORS AND NON-TECHNICAL SKILLS

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1. INTRODUCTION:

Today there is a general consensus among maritime stakeholders that human error is the most dominant contributing factor in causing accidents.

It is also widely accepted that human error is a general term which covers a variety of unsafe acts, omissions, behaviors and unsafe conditions or a combination of these. A quick review of P&I clubs reports and bulletins shows that this general term accounts for more than half of the claims and accidents. The term human error indicates that the individual should have acted in a different manner. Experts in maritime field agree on three basic points:

- 1. Everyone commits errors.*
- 2. Human error is generally the result of circumstances beyond the control of those committing the errors.*
- 3. Systems or processes that depend on perfect human performance are inherently flawed.*

It is also agreed that there are numerous reasons for an individual to make errors. These may include:

- Communication failure
- Lack of effective training
- Memory lapse
- Inattention
- Poorly designed equipment
- Exhaustion, fatigue
- Ignorance
- Noisy working conditions
- Other personal and environmental factors

The above list is not exhaustive and most of them are not related to individual's technical skills and knowledge.

Professor Michael Barnett in his article "*Non-technical Skills: The vital ingredients in Maritime technology*" ,2006 stated that; *the majority of accidents and incidents are not caused by technical problems but by the failure of the crew to respond appropriately to the situation.* He also pointed out that other safety critical industries have already taken positive measures for improving non-technical skills; The aviation industry is a good example. Most researches claim

that maritime accidents are due to inappropriate response of crew to the situation and not because of technical problems.

The aim of this paper is to review the non-technical skills on board merchant ships and whether they have been given sufficient value by regulating bodies.

In order to reach this aim the following steps have been taken;

- ❖ Review non-technical skills of flight crew
- ❖ Identify non-technical skills on board ships
- ❖ Identify related regulations in maritime field
- ❖ Evaluate the adequacy and efficiency of these regulations
- ❖ Conclusion

The aviation industry has been chosen mainly because of two reasons; firstly, like maritime industry it is very safety critical and secondly the aviation industry can be considered as one of the leading industries in this context.

2. NON-TECHNICAL SKILLS OF FLIGHT CREW:

There are different definitions for non-technical skills, some would state that it is in fact; How an individual responds and acts when confronted with expected and unexpected problems. According to Oxford aviation academy it is:

“The use and co-ordination of all the skills, knowledge, experience and resources available to the ships’ team, to accomplish or achieve the established goals of safety and efficiency of the passage”

In aviation industry it is widely accepted that the errors are caused not by technical problems but due to the following elements;

- ❖ Preoccupation with minor technical problems
- ❖ Failure to delegate tasks and assign responsibilities
- ❖ Failure to set priorities
- ❖ Inadequate monitoring
- ❖ Failure to use available data
- ❖ Failure to communicate intent and plans
- ❖ Failure to detect and challenge deviations from standard operating procedures.

The aviation industry has recognized four groups of non-technical skills;

- 1- Leadership & Management
- 2- Team Work And Cooperation
- 3- Problem Solving And Decision Making

4- Situation Awareness

This has been developed from a tool designed for aviation industry (McCulloch et al, 2008)

Flin et al, 1998 in their research subdivided the four categories in to two categories; social skills (Cooperation, Leadership And Management) and cognitive skills (Situation Awareness, Decision Making) they also stated that social skills are mostly in communication form and are visible skills whereas cognitive skills are in the mind of pilots which can not be seen directly. What can be seen is the behavior of pilots which are the results of these cognitive skills. They then concluded that both of these categories contribute heavily on flight safety.

The quality of Leadership relies on strong will, confidence and assertiveness. It also demands planning and coordination as positive skills. A successful manager should be able to manage the time and maintain standards. A proper leader should be able to solve conflicts efficiently and successfully.

Coordination and team work relies on supporting teammates and creation of open and efficient communication. These are in fact interpersonal skills. A leader must provide an atmosphere which encourages group communication. (Flin et al, 1998)

However, decision making is the process of reaching a decision based on adequate judgments. Decision making relies on problem identification, recognition of solutions and options, assessing all solutions and options, understanding risks involved and finally reaching the best decision.

This can not be done unless the individual obtains the quality of situation awareness. Situation awareness means being able to look at the situation from different angles. It also means to be able to visualize and conceptualize a reasonable time in the future of the task which is being done currently.

3. NON-TECHNICAL SKILLS ON BOARD SHIPS:

Unfortunately there are no clear guidelines for identifying non-technical skills on board and how they should be assessed in maritime industry. The author designed a simple questionnaire to identify non-technical skills from seafarers' point of view. The questionnaire was completed by the author himself during several interviews with the respondents. The interview was done individually and there was no obligation for taking part. 21 out of 35 took part willingly. The interviewees were:

- ❖ Chief officers
- ❖ Holding class 2 certificate for ships with GT 3000 and above/ unlimited voyages
- ❖ They have completed class 1 course, but not yet appeared for final exams
- ❖ They also have done ARPA Management and Bridge Team Management courses recently
- ❖ They have:
 - Total average sea- service as deck officer; 62 months
 - Average sea service as chief officer; 12 months
 - Average age; 33 years

The author used nearly an hour to brief the respondent about safety, its importance to the industry and the role of ISM code in creating safety culture among seafarers. Neither non-technical skills nor the main purpose of the interview were mentioned directly during this briefing session. The following scenario was the topic which was discussed with the interviewees during the interview:

A task is to be done on board your ship.

It is to be done by several teams.

Only one team works at a time.

You are in charge of one of these teams.

Think about it and apart from your technical skills and knowledge try to list important elements which are very influential in your success.

It is up to you to define success.

Many interesting points have been raised during the course of interviews by the interviewees but the following non-technical skills were strongly emphasized on as the most influential factors in successful completion of the task:

- ❖ Management, Leadership, Stress management, Organizing skills, Time management, Planning and preparing, Ability to use authority (Leadership And Management)
- ❖ Inter-team communication, Ability to criticize, Ability to receive criticism, interpersonal communication, listening, team work, transferring information Supporting others in critical situations (Team work and Cooperation)
- ❖ Ability to recognize priorities, Ability to carry out multi-task, problem solving ability (Problem Solving/ Decision Making)
- ❖ Ability to look at the task from different angles, Ability to identify potential hazards, Envisage and Conception, Anticipation of future problems (Situation Monitoring)

Many of the above mentioned elements are common among different categories. A very good example is "Ability to look at the task from different angles", it can be placed under Management And Leadership, Problem Solving Ability And Situation Monitoring.

The result of this limited survey confirmed that the flight crew non-technical skills are applicable for merchant ships crew members.

The ensuing issues are appealing;

-Almost everybody believed communication was a very important factor but almost 25% did not believe in "listening" as a necessary skill for the team leader. They actually thought that the leader does not need to listen to his teammates for better leadership.

-About 30% were of the opinion that persons with high safety conscious do not facilitate a task.

-75% stated that team leader should discuss the work plan with the teammates.

-20% did not accept that personal conflicts between teammates could adversely affect the task.

-More than 15% did not consider time as a critical component of the task. They valued safety in an exaggerating way.

-90% believed monitoring the task provides an important contribution to effective team performance.

-10% claimed that it is impossible to train an individual to be a better communicator.

-20% did not like to work with persons who ask questions about the information provided by the team leader.

-10% did not share the opinion of having standard method of handing over the task to the next team is an important element.

-Almost everybody accepted that teams that do not communicate efficiently increase their risk of committing errors.

4. REGULATIONS, THEIR ADEQUACY AND EFFICACY:

A detailed review of STCW code (Seafarer' Training, Certification and Watch keeping) section A-II/2 indicates the Mandatory minimum requirements for certification of Masters and Chief Mates on ships of 500 gross tonnage or more. The standard of competence has been defined for Masters and Chief Mates in this section. This section is taken as a sample and the interpretation can spread to other sections of the code.

Paragraph 1 states that; any candidate for certification is required to demonstrate the competence that he/she is able to undertake duties and responsibilities listed in column 1 at management level.

Paragraph 4 requires the level of the knowledge to be sufficient to serve as Master or Chief Mate.

Paragraph 5 requires theoretical knowledge, understanding and proficiency under different sections in column 2 of the table.

And paragraph 7 requires evidence showing the candidates has achieved standard competence according to columns 3 & 4 (Demonstrating Competence And Evaluating Competence)

Table A-II/2 has four columns:

The first column specifies the competence required, the second one defines knowledge, understanding and proficiency, the third column describes different methods for demonstrating the competence and finally the forth column distinguishes the criteria for assessing competence.

The author has chosen "***Search And Rescue***" from column 1 which is a safety critical issue and involves high degree of management, leadership, communication, team work, coordination, stress management and visualization skills. Although the corresponding column 2 requires a thorough knowledge and ability to apply procedures mentioned in MERSAR manual but the corresponding columns 3 and 4 do not require any of the above mentioned non-technical skills.

Nothing has been defined as the knowledge and proficiency in column 2 in relation to non-technical skills, nothing has been described for methods of demonstrating competence and finally the criteria for evaluation is only whether the plan is in accordance with international guidelines and standards. Unfortunately the poor candidate is not required to demonstrate anything but an

amalgam of theoretical knowledge being done practically in simulator courses or using approved laboratory equipment training.

Going through the code again one can see that the code in its most practical parts normally describes three methods for demonstrating competence;

- 1- approved in-service experience
- 2- approved simulator training, where appropriate
- 3- approved laboratory equipment training

It is evident that the possibility for an apprentice to be involved practically in search and rescue operation during his/her on board training is a tiny one and even if the candidate experiences such an extraordinary operation there will be no reason why he should obtain the essential non-technical skills. Therefore he/she should gain and demonstrate this proficiency in either simulator training or laboratory equipment training.

Fortunately when it comes to passengers and emergency situations part A chapter V paragraph 5 of STCW requires the Masters, Chief Mates, Chief Engineers, 2nd Engineers and all those having responsibility for the safety of passengers to complete courses in crisis management and human behavior. This is in deed the only mandatory requirement for behavior training which can be seen as closest to non-technical skills.

IMO's approach: A resolution adopted by IMO in 1997 elucidates the Organization's approach in this issue. It admits that human element is a *multidimensional and complex issue and encourages the development of non-regulatory solutions*. The IMO believes that regulatory approach creates a culture of compliance which is far from a safety culture. IMO recognizes 3 types of shipping companies; first those which not only comply with the regulations but take additional steps toward safer shipping, then those which just comply with the requirements but for them safety is not a priority and finally those that do not comply and run substandard ships. It then concludes that; unfortunately adoption and enforcement of regulations do not turn non-compliers in to compliers.

On world maritime day in 2002 the Organization released a statement emphasizing on the importance of safety culture. Once again it states that the creation of a safety culture is the most effective solution to this problem. In other words IMO acknowledges the necessity of harmonization in implementation of existing global regulations.

5. CONCLUSION:

Undoubtedly with current regulations (STCW code) a candidate may pass different examinations and become a Master without having any of the essential non-technical skills. s/he may eventually work as a maritime lecturer, teaching deck cadets and officers how to respond and react in an emergency like search and rescue operation. The author tries to be very brief:

- ❖ The IMO has no plan in taking steps for the development and adopting new regulations concerning non-technical skills.
- ❖ Considering the maritime accident statistics and the role of human element, adopting and enforcing new regulations in this area is inevitable.
- ❖ Human beings respond and react in a similar manner in safety critical situations, therefore we can conclude that managing an error in aviation industry is quite similar to the one in maritime industry.
- ❖ The four major non-technical skill categories are extendable to maritime field.
- ❖ In general seafarers have positive attitude toward non-technical skills.
- ❖ Most of the participant in the interview strongly believe that training is very useful for enhancement of non-technical skills such as communication.