

## **SHIPPING ACCIDENTS – HUMAN ERROR OR HUMAN BEHAVIOR, MET PROSPECTIVE**

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**Abstract.** Every global industry is striving for safe working environment. Same is the case with the maritime industry, specifically ships in ports and at sea. Shipping accidents have a huge impact on environment and economy, in addition to loss of precious seafarer's lives. Main focus of all stakeholders, whether it is IMO, technology or MET institutes, is accident prevention. However, despite all best efforts, accidents do still occur, damaging environment, loss of lives and property. Investigations conducted worldwide into shipping accidents reveal that human element is a major contributing factor [1]. MET institutes are responsible for comprehensive seafarers training but unluckily more importance is given to professional training, with less emphasis on human behavioral sciences. Although, there are few courses on personal safety, social responsibility, multilingual and multicultural working environment, however, human behavior is a neglected part in the curriculum in majority of the MET institutes. Personality traits and human behavior have a very strong impact on the professional life of any individual. Around 1.5 million seafarers [2] are working around the globe on board ships. The majority of the seafarers are from developing countries, where a culture of safety and safe working environment is not given much emphasis. We are aware that extensive research is in progress on unmanned ships, to prevent accidents due to human error. This may have great advantages as far as safety is concerned, however hundreds of thousands of seafarers will lose their jobs, resulting in the economy of many countries depending on seafarer's remittances being jeopardized. There is no doubt that it is very difficult to change personality traits [3], behavior, old traditional and unsafe working practices of different nationalities, because most of the seafarers belong to underdeveloped / developing countries, where safety has least importance. Shipping industry cannot alleviate multinational and

multicultural crewing. The only remaining viable solution is to train seafarers with the highest attitude towards safety and change their behavior towards unsafe practices, to ensure human error is eliminated. In such circumstances, responsibility of MET institutes increases manifold. In this paper, hundreds of shipping accidents, unsafe practices and unsafe working culture of different countries, behavioral science, human attitude towards safety issues, the impact of local safety culture on seafarer's personalities and the role of MET institutes has been discussed. This paper also proposes to develop an IMO model course "Human Behavior and Safety Culture"

**Key Words:** Shipping Accidents, Human Error, Human Behavior, MET Institutes, Seafarers, Safety Culture

**Introduction:** Every global industry is striving for safe working environment. Same is the case with the maritime industry, specifically ships in ports and at sea. Shipping accidents have a huge impact on environment and economy, in addition to loss of precious seafarer's lives. Focus of all stakeholders, whether it is IMO, technology or MET institutes, is accident prevention. However, despite all best efforts, accidents do still occur, damaging environment, loss of lives and property. Investigations conducted worldwide into shipping accidents reveal that human error is a major contributing factor [1]. MET institutes are responsible for comprehensive seafarers training but unluckily more importance is given to professional training, with less emphasis on human behavioral sciences. Although, there are few courses on personal safety, social responsibility, multilingual and multicultural working environment, however, human behavior is a neglected part in the curriculum in majority of the MET institutes. Personality traits and human behavior have a very strong impact on the professional life of any individual. Around 1.5 million seafarers [2] are working around the globe on board ships. The majority of the seafarers are from developing countries, where a culture of safety and safe working environment is not given much emphasis. We are aware that extensive research is in progress on unmanned ships, to prevent accidents due to human error. This may have great advantages as far as safety is concerned, however hundreds of thousands of seafarers will lose their jobs, resulting in the economy of many countries depending on seafarer's remittances being jeopardized. There is no doubt that it is very difficult to change personality traits [3], behavior, old traditional and unsafe working practices of different

nationalities, because most of the seafarers belong to underdeveloped / developing countries, where safety has least importance

**Shipping Accidents:** While we use any mode of transport, chances of accidents are bound to happen. Like road and air accidents, maritime accidents also occur in the vast oceanic area because thousands of ships sailing, millions of fishermen out at sea for fishing, oil exploration is at its peak, warships are patrolling across the oceans. That is why; these accidents have very severe impact on the environment, economy, human and marine life. If we look at the number of shipping accidents during 2017, it reaches to about 114 till September [4]. It is very alarming situation that no day without major or minor accident. Experts have categorized following types of marine accidents according to the severity:

- Offshore oil rigs
- Oil/Gas and chemical tankers accidents
- General cargo and container ship accidents
- Accidents in shipyard, docks and port areas
- Tug boats and barges mishaps
- Fishing vessels mishaps

The outcome of such accidents is explosions, heavy fire and oil spill especially offshore oil rigs, oil and chemical tankers, Grounding, Sinking, Collision, Capsize, Cargo shift, Loss of human life, damage to the property and environment.

Looking at the report by Canadian Transport Safety Board, in 2016, 304 marine accidents were reported to the TSB, up from the 2015 total of 248, up from the 2011-2015 average of 282. Over the past 10 years, 83% of marine accidents were shipping accidents, while the remaining were on board ships. [5]

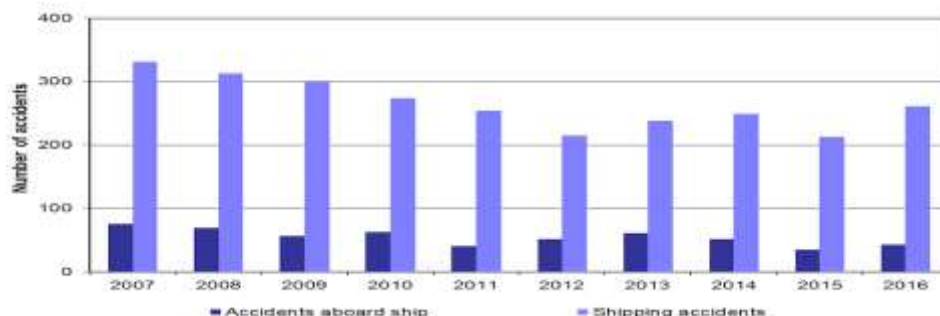


Fig- 1 Accidents aboard ship and shipping accidents, 2007-2016



Fig -2 IMO Casualties Incidents and live lost data

Although IMO casualties and incident data base [6] shows decline in shipping accidents and individual casualties but it still needs lot of efforts to reduce shipping accidents

### **Major Known Causes of such Accidents**

- a. Severe weather conditions/ natural disasters
- b. Machinery failure
- c. Human error

**Human Error and Marine Industry:** This paper focuses on human error particularly human behavior involving safety culture. “the causes that top the list like collision, fire, explosions, tanker accidents etc. are all results of human errors in one way or the other” [7]. Different studies of marine accidents have shown amazing results that in most of the cases (almost 96%), the root cause was human error with classic examples of Torrey Canyon and Titanic. Although technology in shipping industry has gone tremendously sophisticated but human involvement to use this technology is unavoidable factor unless the industry opts for unmanned ships. Very minor human error has led to sinking of a ship like not ringing emergency alarm. “Human Error contribution to shipping accidents, 84-88% of tanker accidents, 79% toeing vessel, 89-96% grounding, 75% collisions and 75% of fires and explosions attributes towards human error” [8]. According to a presentation by Clamber University of Technology, Gothenberg Sweden in 2013 “human error” is one of the biggest contributing factors for maritime accidents [9]. “A study conducted by Dutch authorities of 100 marine casualties revealed that 96 accidents out of 100 occurred involving human error” [10]. This factor costs maritime industry \$550 million/year, as per UK P&I Club. A study of 6091 major accident claims (i.e., over \$100,000) of commercial ships, over a period of 15 years by UK P & I Club, revealed that 62% of the claims were due to human error [11]. Ashok

Mahapatra, Dy. Director, Maritime Training and Human Element Section, Maritime Safety Division, IMO underscored the fact that “80 per cent of the accidents occurring at sea was the result of human errors” [12]

**Following are the major contributor in the human error.**

- a. Overworked and fatigue
- b. Disorientation of crew members
- c. Wrong decisions based on insufficient information
- d. Crews over confidence
- e. Miscommunication (internal and external)
- f. Insufficient knowledge and training
- g. Under manning and Multilingual and multicultural crewing
- h. Wrong management decisions
- i. Poor bridge team work
- j. Lack of emergency drills
- k. Unhealthy and unsafe working environment
- l. Poor maintenance
- m. Company management pressure because of too much commercialism and competition
- n. Negligence because of poor safety culture background**

**Human Error or Human Behavior?** Most of the studies show that “Human Error” is the major contributor of marine accidents. There is no doubt in that but a very important part is neglected and that is human negligence due to human behavior reflecting safety culture of his background, maritime training institute and overall community safety culture. Personality traits and human behavior have a very strong impact on the professional life of any individual. Around 1.6 million seafarers are working around the globe on board ships. Most of the seafarers are from developing countries, where safety culture and safe working environment is not given high priority. There is no doubt that it is very difficult to change personality traits [3], behavior, old traditional and unsafe working practices of different nationalities, because most of the seafarers belong to underdeveloped / developing countries, where safety has least importance. Very recent example of negligence, grounding of General cargo ATLANTIC south of Oskarshamn, eastern Sweden, Baltic Sea on 23 Sep 2017. Investigations revealed that Master and Officer of the Watch,

(crew Russian and Filipino Nationalities) were heavily drunk. They did not change course and sailed straight ahead until grounded.

**Seafarers Supplying Countries:** Since ages, people had been travelling and trading through the sea. Seafarers always exited wither on wood logs or on ULCCs. In today’s global economy, shipping is the most vital source of good’s transportation. Clothes we wear and food we eat is transported through sea by ships and ship without seafarers are meaningless. It will not be wrong to admit that they are the major driving force for the global economy and without it world would halt. Seafarers working on merchant ships are estimated to 1,647,500 of which 774,000 are officers and 873,500 are ratings. China, Philippines, Indonesia, Russian Federation and Ukraine are the five largest seafarers supplying countries. [13]

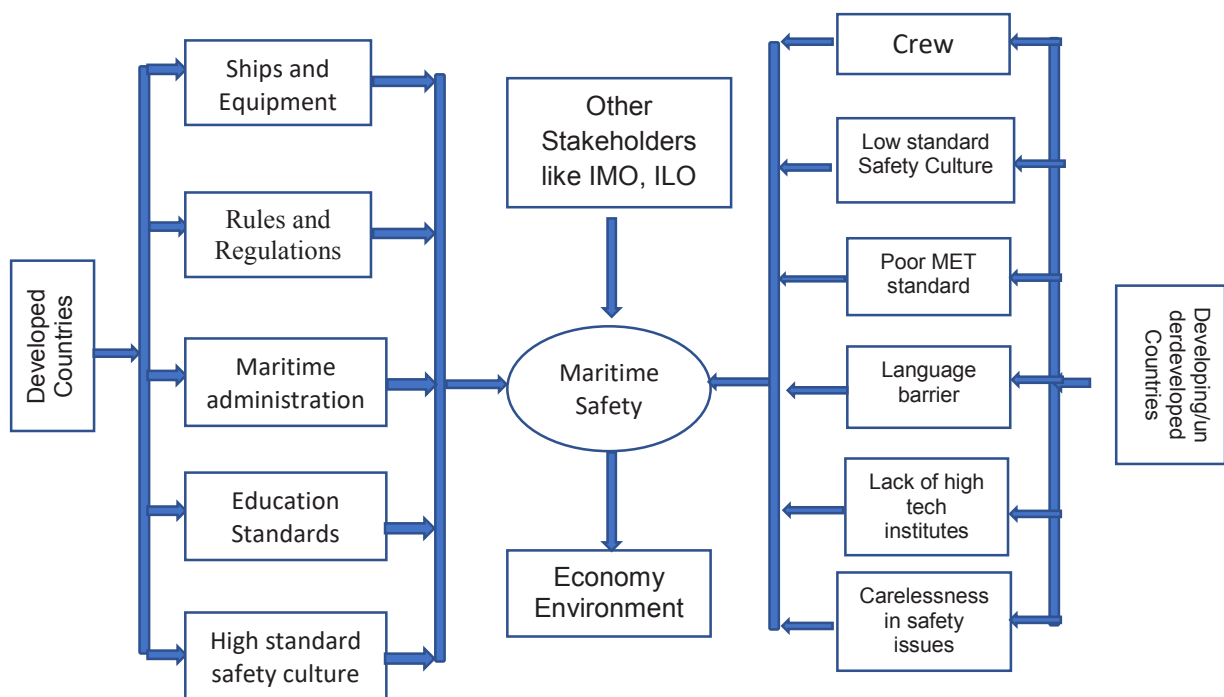


Fig- 3 maritime safety and stakeholders (c)

The gray area in shipping industry is that ships are constructed in highly developed countries like Japan and Korea, fitted with very high-tech equipment’s and seafarers are produced in underdeveloped countries where seafarer’s training is not adequate even though some developed countries help MET institutes but absence of basic safety culture inculcated in them since childhood is big hurdle. “Shipping is one of the safest transport means, yet thousands of accidents occur and majority of these involve human error. The main issues which can influence the potential for human error are education, training and working conditions. EU registered ships are often

crewed by seafarers who are not from EU member states. This fact needs to be considered when determining the best ways ensuring that the crew members on board EU registered ships are appropriately educated and trained “[14]. EMSA is one of the example inspecting and visiting underdeveloped countries to make sure the compliance of STCW. It has visited more than 80 countries, covering more than 90% of seafarers operating in EU waters, as well as all others operating on EU registered ships around the world” [15]. This situation can best be described by the following diagram.

**Human Behavior and Safety Culture:** Most of the developing countries spend very low budget to promote safety culture because of budget deficit. Same is carried away in the population and becomes a habit and behavior. On the other hand, developed countries spend lot of money to promote safety culture in the society. If we make a comparison between developed and developing countries about safety culture, we find that Sweden has one of the world’s lowest traffic-related fatality rates. This is achieved through education, public service and public awareness, starting from childhood. On the other hand, Saudi Arabia has population of 30 million with 17 deaths per day on roads because safety is not taken very seriously by the public despite lot of government efforts. You can see a driver with baby in his lap while driving during heavy traffic, on highways and rush hours indicating the safety culture. For example, only in Jeddah city with 400000 people, for 8 hours, speed and safety cameras on road take almost 10000 snapshots of traffic violation.

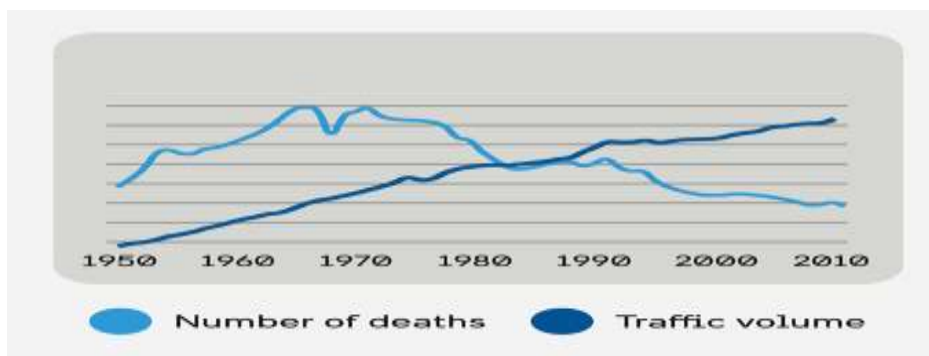


Fig -4 Sweden road safety achievements

This issue in underdeveloped countries is much worst like Philippine, Vietnam, Pakistan, India, Bangladesh and so on. One Swedish company lost a very big contract because it refused to cut in budget allocated for safety installations. So many inventions were made to ensure safety of people. On the contrary, following few pictures can depict the situation of safety culture in the underdeveloped and developing countries from where most of the seafarers are supplied.



In Japan railway, there are about 19 safety checks before train reaching to a railway platform. Intercity buses in Japan, surprisingly driver checks tire after every 18 to 20 kilometers whereas in Pakistan or India, driver will come to know about the tire condition after it has busted.



These pictures show that how safety has been taken so seriously. School curriculums are not designed to teach children and young students about safety culture and safe practices. These children carry the same throughout their life and practice the same unsafe methods unintentionally on-board ships because of their personality traits.

Human Behavior and Personality Trait: Personality traits and human behavior have a very strong impact on the professional life of any individual. Previously the idea was conceived that personality traits, habits and social behavior cannot change but now the psychologists have found



out that personality traits can be changed by providing continues and rigorous training. Here comes the role of MET institutes. Most of the MET institutes are conducting IMO Model courses, undergraduate and post graduate programs but a specific human behavior course on behavioral sciences subject is not taught neither it is part of GP -rating.

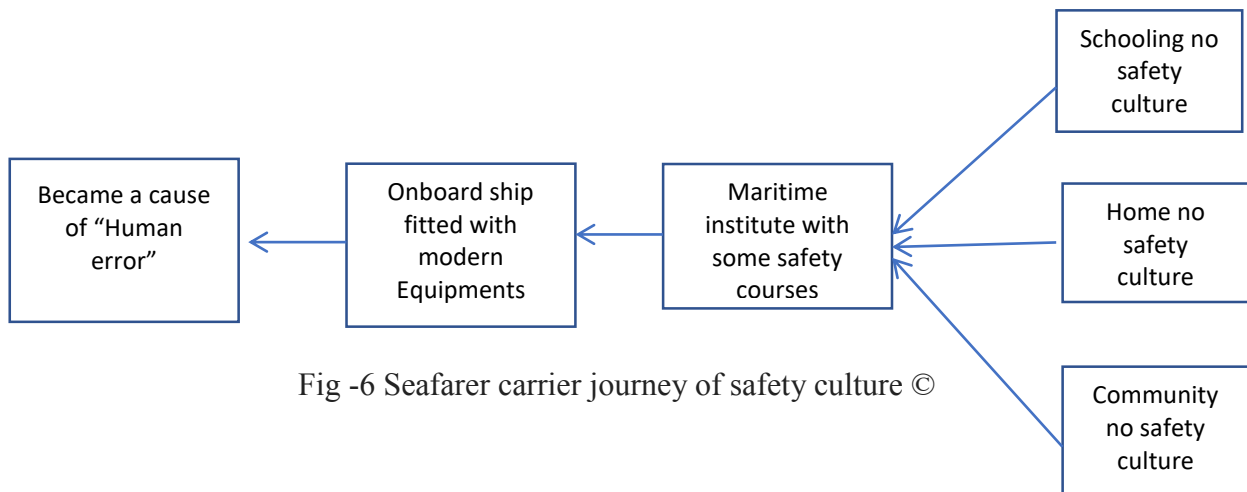


Fig -6 Seafarer carrier journey of safety culture ©

**Role of MET Institutes:** A survey was conducted. 12 MET institutes from different countries were sent a questionnaire to ascertain whether they are conducting such courses or not to alleviate safety culture in the seafarers. Following questions were asked:

- a. Do students have any idea about safety culture?
- b. Local people adhere to safety culture?
- c. Does government spending enough money to promote on safety culture?
- d. Do people follow crude methods to deal with safety issues
- e. Is Human behavioral science and safety culture course in the curriculum?
- f. Is this part of B.Sc. Program?
- g. Do you think such course needed?
- h. Will this improve safety culture?
- i. Can this be helpful to reduce accidents?
- j. Do you think personality traits contribute towards safety culture?
- k. Should it be an IMO Model course?

Reply to the questionnaire indicates that people are not much aware of safety culture and they are not adhere to it. Crude methods are used to deal with safety issues. MET institutes believe that students educational background does not carry valuable knowledge of safety culture. Institutes,

though conduct short mandatory course like PSSR but that is not sufficient to bring students at par with developed countries as for safety culture is concerned. MET institutes strongly supported the need to have behavioral science as part of curriculum as well as an IMO model course on the subject. Countries providing majority of seafarers should put more funds to improve safety culture and remove notion of using old traditional crude methods to deal with safety issues specially on-board ships.

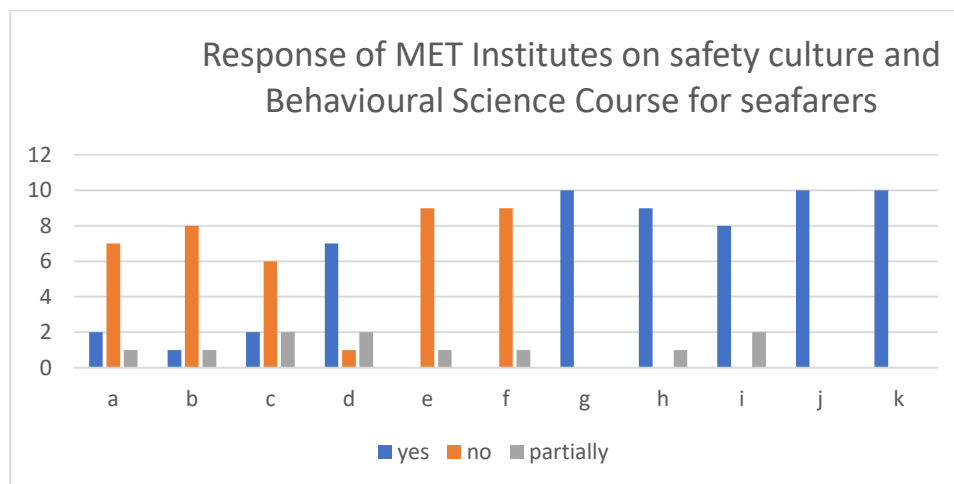


Fig -7 Survey analysis

If MET institute did not realize their responsibility to train people in safety culture and inculcate safety behavior and as personality trait, it will be difficult to reduce shipping accidents. The practice of blaming “human error” should be cribbed and seafarers should be made realized that human negligence is the most dangerous act on board ships to put life of other seafarers and ship in danger. If this is not improved, we all know that

We are aware that extensive research is in progress on unmanned ships, to prevent accidents due to human error. This may have great advantages as far as safety is concerned, however hundreds of thousands of seafarers will lose their jobs, resulting in the economy of many countries depending on seafarer’s remittances being jeopardized

**Conclusion:** Human survival is impossible without shipping and ships cannot be operated without seafarers. Mostly seafarers are from developing countries where safety culture has been given least importance. As number of ships and size of ship increasing, chances are for accidents, and “vision zero” can only be achieved through comprehensive training. MET Institutes needs to take up the issue of human behavior during different situations and circumstances, especially

during emergencies. Developing countries safety culture will improve with development and education but MET institutes needs to tailor some course to cater for personality traits and change poor habits in safety matters.

### **Recommendations:**

1. MET institutes should make “Human Behavioral Science and safety culture” as part of the curriculum
2. IMO Model course be prepared and implemented along with other safety courses.
3. Shipping companies may introduce such courses and drills on board ships to minimize human negligence
4. Investigation of shipping accidents should point out negligence on the part of the crew instead labeling the accidents just as “human error”

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