Evaluating the Role of Human at Marine Incidents in Iranian Shipping Companies

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Abstract
Historically, marine incidents have been an inseparable part of shipping. Majority of all recorded marine accidents are generally attributed to human error or associated with human error. Many individuals and organizations in the maritime field use risk management techniques to minimize the effect of human error. The main focus is to enhance safety and reduce human error through motivation, education and training, system design, rules and regulations. It has always been recognized that the best way of improving safety at sea is by developing international regulations that are followed by all shipping nations. Adopting proper regulations will definitely decrease the human error and thus maritime accidents.

This paper aims at evaluating the role of human at marine incidents in Iranian shipping lines. Achieving this purpose, IRISL, NITC, BOSCO, Valifajr, and Iran-o-Hend are selected as case studies.

Keywords: Maritime Incident, Human Error, Shipping, Shipping Line

1. Introduction
A large number of maritime accidents and incidents involve some form of human error [1]. As reported by Port and Maritime Organization (PMO) of Iran, marine accidents were identified to be the cause of death of more than 5000 people in this decade. Studies show that for each serious accident in the maritime domain, or in any other domain, there are a larger number of incidents, a larger number of near misses, and many more safety-critical events and unsafe acts [2]. Pomeroy and Tomlinson [3] stated that many of the failures are actually the result of errors (i.e. latent failures) that have been designed and constructed into highly complex systems especially system integration and interfacing.

As in the aviation and other transportation modes, human error is at the root of most preventable casualties in the maritime field and around 70 to 90 percent of transportation crashes are, directly or indirectly, the result of human error [4]. Human errors depend upon the internal factors related to the operators’ characteristics and differences such as skill, experience, task familiarity, etc. and the external factors to the operators such as equipment design and installation, task complexity, work environment, organizational factors and operating procedures. A proper balance between the capability of the human operator and the difficulty of the task would decrease the likelihood of human error [5]. Figure 1 represents the most common human errors occur in transportation.

Fig.1 Human error categorization in transportation [4]

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Celik and Cebi [6] proposed an analytical human factors analysis in order to identify the role of human errors in shipping accidents based on the fuzzy analytical hierarchy process. Sanders and McCormick [7] defined human error as an inappropriate or undesirable human decision or behavior that reduces or has potential for reducing system effectiveness, safety or performance.

When we use the term safety, it will encompass:

- Safety and health of persons
- Safety of vessel
- Environmental aspects

Hetherington et al. [8] reviewed the literature on safety in three key areas; common themes of accidents, the influence of human error, and interventions to make shipping safer.

The control of safety in shipping is complex for a number of reasons [2]:

- International, regional and national laws and regulations
- Control is exercised by a number of agencies
- Control affects the various life-cycles of the vessel

Safety is regulated on the basis of different legal sources, the key ones of which are the following:

- International laws and regulations
- National laws and regulations
- Case law
- National territorial zones
- International Maritime Organization (IMO) conventions and regulations
- Classification construction rules
- Port state control guidelines

In addition, there are number of other organizations and agents that affect safety. The main ones are listed below:

- Flag and Port State Control
- Classification Societies
- Insurance companies
- Charterer, cargo owner

Lack of enough information on evaluating the role of human on marine disaster in Iranian shipping lines motivates this study. This main objective of this research is evaluating the main human error causes of marine incidents in the main Iranian shipping lines.

This paper follows with a brief introduction on safety related IMO conventions, and also International organizations. After that, the main Iranian shipping lines are case studied and the main causes of human error within them are highlighted.

2. International Maritime Organization

Shipping industry is one of the key branches of international business cycle. If each nation publishes its own safety legislation, serious conflicts with the national laws will occur. Maritime safety is an integral part of IMO’s responsibilities. IMO is acting on setting internationally approved baseline standards for its members in order to prevent diversity in terms of practicing the codes, rules, and regulations [9]. Followings are some of the international conventions and treaties engaged with maritime safety which adopted by this organization:

- Safety of Life at Sea (SOLAS) Convention, 1974
- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978
- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)
- Convention on the International Regulations for Preventing Collisions at Sea (CORLEG), 1972
- The Maritime Code (MC)

2.1. Effectiveness of IMO in Improving the Safety at Sea

One of the main objectives of adopting a new convention, in the field of maritime safety, is decreasing some sort of human error. Generally speaking, all mentioned conventions cover one or more type of human error. Table 1 represents the relationship between the conventions adopted by the IMO and human errors. Decreasing the human error definitely causes an increase in the level of maritime safety.
Table 1 Relationship between IMO conventions and human error

<table>
<thead>
<tr>
<th>Design Error</th>
<th>Maintenance Error</th>
<th>Operator Error</th>
<th>Inspection Error</th>
<th>Fabrication Error</th>
<th>Handling Error</th>
<th>Contributory Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLAS MARPOL CORLEG</td>
<td>MARPOL SOLAS</td>
<td>SOLAS ILLC STCW MARPOL ISM CORLEG</td>
<td>MC UNCLOS</td>
<td>MC</td>
<td>STCW ISM CORLEG</td>
<td>CORLEG ILLC</td>
</tr>
</tbody>
</table>

3. Flag State Control

As mentioned before, the set of internationally accepted safety rules and regulations are not enforced by the IMO but by the Flag States. The national maritime administration, e.g. PMO, is acting as Flag State on behalf of the country in question. When a government accepts an IMO convention it agrees to make it part of its own national law and to enforce it similar any other law.

3.1. The Seaworthiness Act

Each country has to give a legal basis for exercising this role as Flag State. The law regulates shipping activity in relation to the public sphere and also defines the role of the national maritime administration [2]. This law should cover the following items:

- Safety control activity in general
- The competence of the Maritime Directorate
- Investigation of accidents
- Inspection and detention
- Certificates
- Safety and occupational health-related activities onboard
- Equipment standard
- Cargo condition and safety
- Manning and working hours
- Control of passenger vessels
- Responsibility of master and ship owner

Basically, the law applies to vessels with greater than 50 tones gross register tonnage, but the administration may decide that other vessels also have to be built in accordance with the rules under the law.

4. Marine Incidents in Iranian Shipping Lines

Human error is an inseparable part of marine incident all around the world. Indeed, majority of marine incidents are directly related to human error. Like its global scale, human error is one of the main causes of marine incident in Iranian territories.

Gathering the necessary data of analysis, face to face interview coupled with the published reports (2008 to date) of Search and Rescue (SAR) committee of PMO are used as data collection method. Figures 2 to 6 represent the main causes of marine incident in the main Iranian shipping line.
As shown in figure 2, crew negligence is the main root of incident in National Iranian Tanker Company (NITC). Poor training and inadequate tools are at the second level of importance.

As same as the NITC, crew negligence and poor training are the main causes of accident in Islamic Republic of Iran Shipping Line (IRISL).
Fig. 4 Causes of defects in Iran-o-Hend

As illustrated in figure 4, crew negligence is the main cause of defects in Iran-o-Hend shipping line. The second main root causes are belong to over confidence and poor judgment leading to wrong action.

Fig. 5 Causes of defects in Valfajr
For Valfajr shipping line, crew negligence, poor training, and working improper condition are the main causes of marine incident, respectively, as shown in figure 5.

As illustrated from figure 6, crew negligence and poor training are the main causes of incident in Bonyad Shipping Line (BOSCO), respectively.

6. Conclusion and Discussion
The success of the future international maritime cooperation among the nations strictly depends on the extent to which regulations affect the maritime safety. Since most of the maritime disasters are reported to have a nature of humans’ faults, considering the factors affecting human error, either ashore and aboard, is of great importance.

In terms of shipping, as shown in figure 7, the main deficiency reported is the problem of negligence. Poor training, fatigue, inadequate tools, and lack of skill and experience are other factors in the category of human errors.
This study which was carried out by self data collection and analysis of SAR’s data, focused on conventions and regulations, marine administrations and societies dealing with human errors in maritime fields and studied the role of human error in marine incidents in the main Iranian shipping companies.

Unfortunately, there is no accurate data base for marine incident reports in Iran. Indeed, there is no accurate and update data on marine accidents of unclassified and fishery vessels. Based on the reports of SAR committee of PMO, these vessels are usually engaged with problems such as machinery failure, fire, flooding, hull rupture which can be the result of poor control and inadequate regulations on them. In addition, according to lots of medical helps, crew injuries, and man over board disasters reported annually all around the world on these vessels, their crew should act under adequate regulations categorized in the mentioned operator error level.

Improving the level of safety in maritime trade and decreasing maritime disasters, followings should be considered:

- Since there are usually many reports on marine disasters on unclassified vessels, Port State Controls and Classification Societies should control them more careful than ocean-going vessels.
- There should be annual training programs for seafarers under safety conventions, in particular the new amendments of the STCW, SOLAS, and MARPOL.
- Oil and fuel leakage in engine rooms is the main root of fire, especially in small vessels. Thus fire fighting appliances should control regularly by both the port state control and classification society.

References


