

# Analysis of Ship Accidents in Turkey from 2005 to 2015

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**Abstract**—Ship accidents may often cause fatalities and injuries. Reduction of accidents that may occur during vessel navigation will mitigate these deaths and injuries. To do this, first of all, it is necessary to determine what these accidents are and what caused the crash. At this point, it is very significant to achieve and evaluate the marine accident statistics. In this study, ship accidents that occurred from 2005 to 2015 were discussed and categorized. In this way, type of accidents occurring at sea and ship types involving in these accidents were tried to present.

**Keywords**— Ship accident, accident statistics, collision, capsizing, grounding.

## I. INTRODUCTION

Shipping industry has implemented a number of measures aimed at improving its safety level [1] (Chauvin et al., 2013). With these measures, the accident rate has reduced recently. Maritime traffic accidents have been rather rare events [2]. However, ship-induced accidents cause many material and human damages every year. The effects of accidents vary from minor injuries to fatalities and from insignificant damage to very severe damage [3]. These accidents often include grounding, collision, hitting, capsizing and various hazardous incidents and so on. These accidents and hazardous incidents may also lead to death, injuries and environmental damages such as sea pollution. In particular, the leakage resulting from the collision and hitting events of the ships carrying liquid cargo is causing serious pollution at sea. This pollution is endangering the lives of sea creatures on the spot.

Determining of the reasons causing ship-originated accidents and sea events is extremely significant. Identification of sources of accidents and presenting them in meaningful way will help prevent future accidents.

In this study, accidents and hazardous incidents which occurred in Turkish territorial waters from 2005 to 2015 were investigated. These accidents were analyzed and the factors that cause accidents have been demonstrated on a regular basis. However, accident statistics were presented according to the types of ships. In this way, it is thought that this study will be a step in order to mitigate the accidents which the ships are involved.

In literature, there are many studies presenting the statistics of accidents. Reference [4] performed a review on accidents concerning fishing ships from 1992 to 1999 and presented some statistical data. Reference [5] analyzed 10-year tanker accidents between 1997-2007 years. Reference [6] investigated the collision risk of ships in Finland Gulf by describing the last 10- year accident statistics. Reference [7] studied the fatal occupational accidents in Danish vessels between 1989-2005 years and analyzed 114 fatalities and investigated the reason of these fatal accidents. Reference [8] presented the reasons of the occupational accidents in fishing sector in Portugal according to ages and experience level of the fishermen by analyzing 73 accidents. Reference [9] analyzed the ship fatal accidents from 1919 to 2005 and categorized the fatal accidents according to shipping disasters and personal accidents. Reference [10] also performed a study comparing fatal accident rates of the fishing sector with the other British occupations and industries and also analyzed the causes of the fatal fishing accidents by considering the accidents which were occurred from 1996 to 2005. Reference [11] present the detailed results of the accidents of large oil tankers taking place between 1978 and 2003 and categorized the accident according to major accidents. Reference [12] took the release of packaged and containerized goods into consideration and analyzed the accidents of dangerous good releases between 1998 and 2008. Reference [13] analyzed the accidents which were occurred in Arctic Region from 1993 to 2011 and applied Fuzzy Fault Tree Analysis (FFTA). Reference [14] investigated the collision and grounding accidents of the oil tankers occurred between from 1998 and 2010 and performed the risk assessment by using fault tree analysis (FTA).

## II. METHOD

In this study, the accidents occurred in Turkish territorial waters from 2005 to 2015 were taken into consideration. In the first phase of the study, the statistics showing the accidents in Turkey were achieved and in the second phase, these statistical data were evaluated by investigating one by one.

## III. DISCUSSION

Table 1 shows the accidents occurred in Turkish territorial waters between 2005-2015 years. Accordingly, a total of 39 different types of accidents took place in Turkey between the related years. However, between the years 2005-2015, a total of 54 accidents and hazardous incidents occurred in Turkish territorial waters. Referring to Table 1, most occurring marine accident type is “collision event due to incorrect maneuver” that 7 times took place. Thus, collision event resulting from incorrect maneuver has been the most common type of ship accident.

TABLE I. ACCIDENT DEFINITIONS

Accident Definitions	Ship Types involved in accident	
	Number of Accidents	Ship Types involved in accident
Medical evacuation event due to breathing difficulties	1	Oil Tanker
Hit event depending on the machine failure	2	Passenger Ship Passenger Ship
Drift event depending on the machine failure	1	Ferry
Capsizing event due to water uptake	3	Commercial Yacht Passenger Ship Agency Boat
Fire incident due to machine failure	1	Dry Cargo Ship
Sea event due to water uptake	2	Commercial Yacht Dry Cargo Ship
Capsizing event depending on incorrect maneuver	1	Tug
Drift event during iron scanning	1	Dry Cargo ship
Machine failure event	1	Ro-Ro
Hit event due to excessive speed	1	Ferry
Aground event due to an unknown cause	3	Bulk Carrier Container Ship Container Ship
Collision event due to incorrect maneuver	7	Dry Cargo Ship/ Dry Cargo Ship Dry Cargo Ship/ Dry Cargo Ship Ferry/General Cargo Ship Inflatable Boat/ Inflatable Boat Bulk Carrier/ Ferry Bulk Carrier/ Ferry Ro-Ro/ Ferry
Grounding event due to rudder locked	1	Ferry
Collision event depending on an unknown cause	1	Oil Tanker/ Oil Tanker
Capsizing event due to weather conditions	2	Fishing Ship Fishing Ship
Collision event during iron scanning	1	General Cargo Ship/ General Cargo Ship
Demand for assistance depending on death event	1	Bulk Carrier
Collision event during replacing iron location	1	General Cargo Ship/ Dry Cargo Ship
Boat damage during the incorrect maneuver	1	Container Ship
Capsizing event as a result of fire on board	1	Ferry
Grounding event due to drizzling	1	Dry Cargo Ship
Hazardous incident due to drizzling	1	Ferry
Hit event due to incorrect maneuver	2	Bulk Carrier Bulk Carrier
Collision event due to drizzling	1	Oil Tanker/ Passenger Ship
Sinking event due to weather conditions	1	Small Craft
Marine pollution occurring as a result of personnel fault	1	Dry Cargo Ship/Oil Tanker
Hazardous incident due to an unknown cause	1	Passenger Ship
Hazardous incident due to weather conditions	1	Passenger Ship
Capsizing event as a result of load shift	1	Dry Cargo Ship

Accident Definitions	Ship Types involved in accident	
	Number of Accidents	Ship Types involved in accident
Falling of personnel into ship hold due to an unknown cause	1	Dry Cargo Ship
Grounding event due to machine failure	1	Ro-Ro
Impact of equipment to personnel as a result of personnel fault	1	General Cargo Ship
Grounding event due to weather conditions	1	Search and Rescue Ship Dry Cargo Ship Dry Cargo Ship
Breaking of the rope due to an unknown reason	1	Dry Cargo Ship/ Tug
Fire event due to smoking	1	General Cargo Ship
Falling overboard of automobile due to incorrect maneuver	1	Ferry
Explosion event on board due to personnel fault	1	Chemical Tanker
Falling overboard of personnel due to imprudence	1	Dry Cargo Ship

Referring again to Table 1, the reasons of type of collision accident are based on incorrect maneuver (number of 7), unknown cause (number of 1), iron scanning (number of 1), replacing iron location (number of 1) and drizzling event (number of 1). So, a total of 11 collision accidents occurred between 2005-2015 years. Figure 1 depicts collision-originated accidents and their numbers.

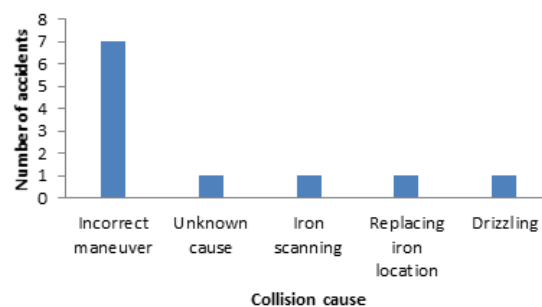


Fig. 1. Collision-related accidents

Figure 2 presents the causes of type of hitting accident. Accordingly, number of 2 machine failures, 1 excessive speed and 2 incorrect maneuvers occurred. So, a total of 5 hitting accidents took place between the said periods. Figure 3 shows the number of capsizing accident and also the capsizing reasons. There have been 8 capsizing accidents consisting of water uptake (3 times), incorrect maneuver (once), weather conditions (2 times), fire on board (once) and load shift (once). Besides, the number of grounding accidents and the accident causes are given in Figure 4. As can be seen from Figure 4, grounding accidents consist of 3 unknown causes, 1 rudder locked, 1 drizzling, 1 machine failure and 3 weather conditions. So, there have been 9 grounding accidents in Turkish territorial waters from 2005 to 2015.

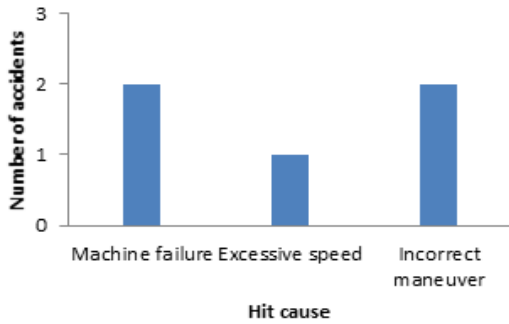


Fig. 2. Hit-related accidents

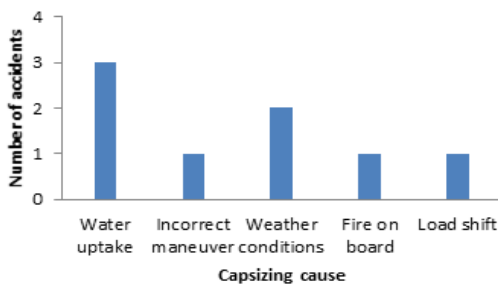


Fig. 3. Capsizing-related accidents

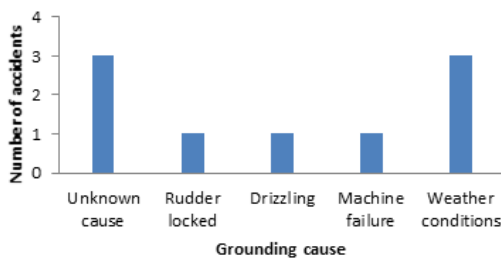


Fig. 4. Grounding-related accidents

Apart from the accidents mentioned above, a number of hazardous incidents occurred between the periods 2005-2015. As can be seen from Figure 5, a total of 5 hazardous incidents occurred. These hazardous incidents consist of 2 water uptake, 1 drizzling, 1 unknown cause and 1 weather condition.

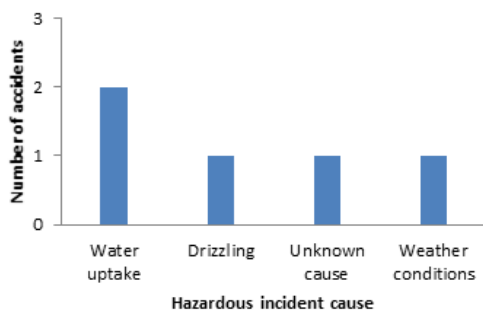


Fig. 5. Hazardous incident-related accidents

Between 2005-2015 years, total 67 vessels were involved in the accidents mentioned above. Figure 6 presents the number of accidents that the ships were involved. Accordingly, the ship type involved in the most accident numerically is dry cargo ship. Dry cargo ship was involved in 16 accidents totally. The second ship type involved in accident in number is ferry.

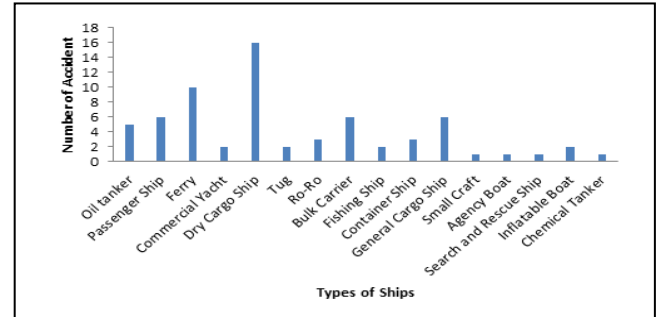


Fig. 6. Ship types involved in accidents and hazardous incidents

#### IV. CONCLUSIONS

In this study, between the years 2005-2015, the ship accidents occurred in Turkish territorial waters and hazardous incidents were statistically examined and the resulting data was presented in Section 3. Accordingly, it was determined that the vessel type involving in the most accidents is dry cargo ship. Besides, when looking at the main accident causes, collision was found to be the most common type of accident. The biggest reason of collision is incorrect maneuver. However, grounding ranks second in terms of incidence frequency. The biggest reasons of grounding are weather conditions and unknown causes. Capsizing ranks third in terms of incidence frequency. Water uptake is the biggest reason causing capsizing.

Considering all of the accidents, marine accidents and hazardous incidents generally result from incorrect maneuver, weather conditions, machine failures, water uptake, unknown causes and drizzling. Therefore, in order to mitigate these accidents, the factors causing these accidents must be reduced. In this way, the accidents are able to be minimized. In mitigating the accidents, firstly, incorrect maneuvers should be emphasized. Mitigation of incorrect maneuvers depends on the navigation experience and talent of ship master. So, it is necessary to take some measures in reducing incorrect maneuvers. On the other hand, the navigation under rigors of the weather should be avoided. If the navigation must be performed under rigors of the weather, the navigation should be ensured safely. Besides, timely maintenance and repair of machines and availability of the staff on board who have ability to solve problems with immediate intervention are required. To avoid getting water in vessels, it is significant to take some measures. Hull plates, in particular, should be checked regularly and the plates to be changed should be replaced. Together with these measures, vessel accidents and hazardous incidents are expected to be reduced.

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