

ANALYSIS OF ACCIDENTS IN ISTANBUL STRAIT

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ABSTRACT

Istanbul Strait is one of the most important routes of oil transportation, as it connects the Black Sea and the Mediterranean. It has most busy and dangerous traffic after the Malaka Strait. Istanbul Strait is open for international sea traffic and the number of crossing ships is 3 times more than Suez Canal, 4 times than Panama Canal and 2 times than Kiel Canal. It can be easily realize that; with increasing of the international trade volume of Black Sea countries, opening of the Danube-Rhine and Danube-Main inland waterways and enlarging the Strait hinterland, number of Strait users will be increase. Hence, the number of ships, especially oil tankers carrying the Khazar oils to Europe, will be increase.

There have been large accidents occurred beside the mega city Istanbul, where more than thirteen million people inhabit. The ship accident in the Strait can be a terrible disaster, which will directly affect the city life. Recently, it was happened many accidents in Istanbul Strait and as a result it caused death of peoples, lost of ships and sea pollution. Increasing of the busy local and international sea traffic, especially tankers which carry dangerous cargo, threat the Istanbul Strait. An accident happened in Istanbul Strait will be cause serious results on the surrounding area, and it will affect all countries which utilize from the Strait.

In this paper will be explained about definition and classification of accidents happened in Istanbul Strait since 1985 and investigate reasons of them. Particular accidents causing risk for life, goods, navigation and environmental safety and oil pollution are reviewed and consequently from accidents encountered in Istanbul Strait will be created a database. And finally, it will be analyzed which factors are more responsible for accidents and also which factors are important to find solution immediately.

Keywords: Istanbul Strait, ship accident, classification

1. INTRODUCTION: IMPORTANCE OF THE ISTANBUL STRAIT

Istanbul Strait is one of the most important and risky routes of oil transportation, as it connects the Black Sea and the Mediterranean. In 2007 there are 56.606 vessel with totally 484.867.696 Gross tones, passed through to strait, 26.685 of them used pilot help, 31.826 of them passed strait as transit vessel, 3.653 of them bigger than 200 meters, 54.468 of them bigger than 500 Gross tones, 10.054 of them tanker vessel (Marine Ministry Database). Istanbul Strait is open for international sea traffic and the number of crossing ships traffic is 3 times more than Suez Canal, 4 times than Panama Canal and 2 times than Kiel Canal. In one study it has been described that; there are 6 accidents occur at every 1 million miles passage. This ratio is two times of Suez Canal. It can be easily realize that; with increasing of the international trade volume of Black Sea countries, opening of the Danube-Rhine and Danube-Main inland waterways and enlarging the Strait hinterland, number of Strait users will be increase. Hence, the number of ships, especially oil tankers carrying the Khazar oils to Europe, will be increase. (Ece, 2005)

Nearly 15 million people lives in Istanbul. And in the strait there's big amount of people visiting both sides of the strait. Transporting of the people gives very crowded local traffic in the strait. There are several transport services in the strait; passenger vessels, ferryboats, fast catamaran passenger vessels of the IDO, passenger boats of TURYOL and DENTUR. All of these vessels have voyages nearly 1500 times a day. (Turkish Straits Marine Safety, 2000)

2. Main Geographic & Physical Properties of the Istanbul Strait

2.1 Traffic Regime of the Strait

In the strait for arrangement of vessel traffic, “left course traffic regime” used between 1934-1982, from 1982 to today “right course traffic regime” used, and also from 1994 “traffic partition regime” using to obtain safety of live, marine pollution and progress. (Marine Ministry Database)

2.2. Main Dimensions and Route Properties

Main geographical property for strait, it's the most narrow and bending passage way in the world. Average length of the passage is 17 nautical mile. Every ship must change its route at least twelve times, when passing through to the strait. Some of these turning points are more difficult to the others; for example Kandilli-Aşıyan turning point with 45 degree turning angle and 700 meters width, and Yeniköy turning point with 80 degree turning angle with very fast flow. The average depth of the strait is between 30-60 meters and the deepest point is 110 meters so for the vessels depth is not a risk factor. (Ece, 2005)

2.3. Flow Characteristics of the Strait

Flow through the strait is one of the important events for the passage of the vessel. Flow on the upper part of the strait opposite for the lower part of the strait. The average speed of the north flow is 0,5-1,5 miles and in normal conditions maximum 3 miles, but when the rains effect the rivers connected to black sea, and also if the north winds are increased then the flow speed can reach to 7 miles speed.(Yurtören, 2004) This flow characteristic is one of the important risk factor for the strait. Up to day there a lot of accidents happen because high flow speed. Top speeds of the vessels in strait limited to 10 miles according to ground. So the vessel must fix its speed according to flow speed but this can be problem for the big ships when the flow speed high. Because this means their rudder will take less water flow and this will disturb the efficiency of the rudder. Also for the vessels with the bigger length and depths, higher flow speed effect the vessel when its turning in the strait, the flow can effect different at the bow to the aft according to speed and turning angle, this effect maneuverability of the vessel badly. According to this satiation to avoid some risks; when the upper edge flow passes to 4 miles some restriction apply on the vessels speed, type, and size. But this limitation is very restricted and it can't solve the accident risk according to flow problem of the strait.

2.4. Weather Conditions

Fog, snow and heavy rain can reduce the visibility range of the strait and voyage safety. We know that most of the accidents happened in this weather conditions, when the visibility range below half mile. But of course these time schedule is not very ordinary. (Ece, 2005) According to 1998 “Boğazlar Tüzüğü” voyage of the vessels in these weather conditions restricted. If the visibility range decreases to two miles and below, all vessels must use their radar transponder. If the visibility range decrease to one mile and below; traffic of the strait will carry on from one side only, also with hazardous cargo carrying vessels and deep drafted vessels will not permit to pass the strait. At the end if the visibility range decreases to half miles and below the passage of all vessels will be forbidden.

3. HUMAN EFFECTS ON ACCIDENTS

When we look at the sea accidents in the strait most of them occur by human fault, same for all over the world. Human faults sometimes combine with other factors, and effect to decrease these risk factors effects on incidents. When giving wrong decision to the events occurs in the same time, may be a reason for accidents. Nautical equipments data and experiments always used for describing for the speed and the route of the vessel. Decisions made with union of these events. But some times when describing the data like speed, depth, route and position of the other vessels may be wrong, and this can be also reason for the accident. This gives indefiniteness to the reasons of the events, to describe as human fault factor or machine failure factor.

Main items for human fault factor to the accident can be described below;

- panic and shock
- fear and anxiety
- drug and alcohol dependence
- insomnia and tiredness
- seasickness
- visual and idea confuse
- knowledge, ability and communication deficiency

- inattentiveness
- unconcern
- wrong information
- unnecessary risk taking tendency (Poyraz, 1998)

It's impossible to prevent all human fault factors, but there must be a target for decreasing to minimize the faults. IMO advises that; improvements for the working conditions will decrease the human faults in the marine transportation.

4. MAJOR ACCIDENTS LIVED IN ISTANBUL STRAIT

There are a lot of accidents happened in the strait till today. Some of them especially tankers also give very big environmental disaster. The important ones listed below (Marine Ministry Database);

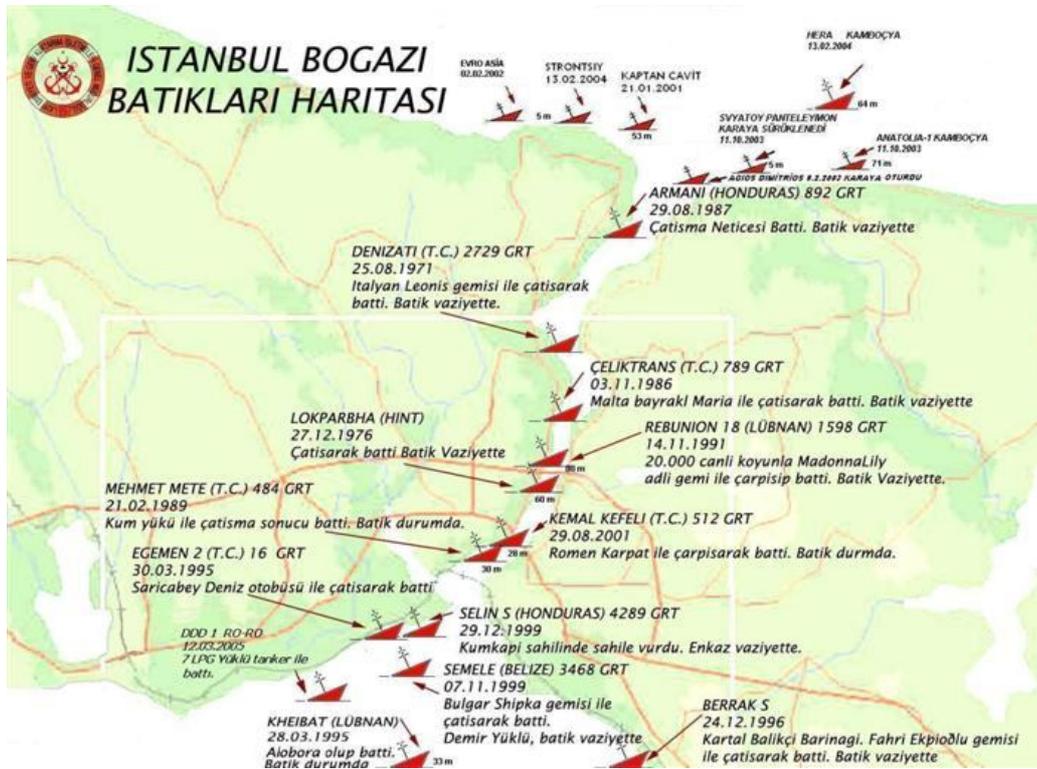


Figure 1: Ship Accidents in Istanbul Strait

- In 14 October 1960 Greece flag M/T World Harmony and Yugoslavian flag M/T Peter Zoranic collided. 20 of crew also captains of the vessel died in this disaster. The collision caused environmental pollution and oil fire that can not stop in few weeks.
- Two soviet ships M/T Lutsk & M/T Cransky Oktiabr collided at 1 March 1966. Thousands of oil polluted the strait. Kadıköy port and one passenger ship located at there burned.
- 1 year old, 147631 DWT oil tanker M/T Independenta collided with Greece flag cargo vessel M/V Evriyalı at 15 October 1979 near to Haydarpaşa. M/T Independenta was carrying 94600 tones of oil. After collision all cargo spilled to the sea with fire. This accident is the biggest oil pollution accident all over the world. Effect of fire can be feel from the living houses, also glasses of Haydarpaşa station melted with this fire. 43 seamen died in this accident.
- At 1990 Iraq flag M/T Jambur and Chinese flag M/V Datton Shang crashed because of wrong route in the strait at Büyükada area. One cargo tank of M/T Jambur damaged in this accident. 2600 tones of oil spilled to the sea and very big pollution became. After this collision Jambur grounded.

- At 13 Mart 1994 Cyprus flag two ship M/V Shipbroker and M/T Nassia crashed. Totally 29 seamen died in this accident. 20000 tones oil spilled to the sea. Ships burned totally. To stop the fire on Nassia vessel towed to the Black Sea. All living houses near the strait lived the danger of tanker fire.
- At 29 December 1999 river tanker Volgoneft-248 located in the anchorage area of Strait strait in Marmara sea close to Istanbul. Because of age & condition of the vessel and bad weather. Cracked and divided in to two parts, 1578 tones of fuel oil spilled in to the sea. Cleaning works continued for three years but %31 of pollution was not cleaned from the nature.

5. STATISTICAL COMPILATION OF THE ACCIDENTS LIVED IN ISTANBUL STRAIT

In 2003 there is one good event happened in the strait. The VTS system started to observe and organize the traffic on the strait. This is very important for avoid most of the accidents in the strait. Because when we looked the accidents mostly happened according to human factors. So we divided two periods accidents happened from 1985 till today, to see effect of VTS system on accidents. On this point of view we will give the numbers between 1985 to 2003 before VTS as first period and numbers between 2004 to 2008, after VTS system started as second period.

5.1. Accident Numbers According To Flags

“Boğazlar tüzüğü” gives big advice to take pilot when passing the strait, but according to Montrö agreement there can not any restriction for passing without taken pilot on deck. %85 of the accidents occurs in the vessels that have no pilot on deck in the strait. But against all advices for taking pilot, ratio is very low in the vessel only nearly %45. Turkey have lowest number (only %1) for taking pilot on deck, (Marine Traffic Regularity Presidency Database) this is very interesting because Turkish vessels must be model for this safety factor. Also when we looked on accidents statistics according to flags Turkey is the first country with accident numbers. Most of this accidents occurred with internal voyage vessels but, this can be also gives idea for need of taking pilot in the Strait.

When we look accidents in statistics ratio of the Turkey decreased from %50.7 to % 41.8 from the total between two periods. But with the increase of the traffic in the strait, Turkey’s and other countries accidents numbers per year increased. For example for Turkey accident ratio drop to %41.8 from %50.7 but per year increased to 34 accidents per year in 2004-2008 periods. For the other countries we can easily say that accident numbers going very highly nearly two times in 2004-2008 periods.

Table 1: Accidents According to Vessels Flags (Marine Ministry Database)

ACCIDENTS ACCORDING TO VESSELS FLAGS							
Accidents Happened Between 1985-2003				Accidents Happened Between 2004-2008			
Flag	Accident Number	Ratio	Accident per Year	Flag	Accident Number	Ratio	Accident per Year
Turkey	427	50.7%	22.5	Turkey	170	41.8%	34.0
Russia	79	9.4%	4.2	Panama	25	6.1%	5.0
Malta	36	4.3%	1.9	Cyprus	24	5.9%	4.8
Ukraine	29	3.4%	1.5	Cambodia	24	5.9%	4.8
Romania	26	3.1%	1.4	Malta	17	4.2%	3.4
Honduras	24	2.8%	1.3	Georgia	15	3.7%	3.0
Cambodia	22	2.6%	1.2	Russia	15	3.7%	3
Panama	20	2.4%	1.1	Ukraine	13	3.2%	2.6
Greece	17	2.0%	0.9	North Korea	11	2.7%	2.2
Syria	14	1.7%	0.7	Liberia	10	2.5%	2
Lebanon	13	1.5%	0.7	St.Vincent	9	2.2%	1.8
Bulgaria	12	1.4%	0.6	Slovakia	6	1.5%	1.2
Cyprus	12	1.4%	0.6	Antigua/Barbuda	5	1.2%	1
Italy	9	1.1%	0.5	Belize	5	1.2%	1

Egypt	9	1.1%	0.5	Comoros	5	1.2%	1
St. Vincent	9	1.1%	0.5	Marshall Islands	5	1.2%	1
Liberia	7	0.8%	0.4	St. Kitts-Nevis	4	1.0%	0.8
Bahamas	6	0.7%	0.3	Bolivia	3	0.7%	0.6
Belize	5	0.6%	0.3	Italy	3	0.7%	0.6
Azerbaijan	4	0.5%	0.2	Lebanon	3	0.7%	0.6

5.2 Accident Numbers According To Accident Types

We can easily see the effect of the VTS system on the accident types. Collision and grounding type accidents decreased in second period. The VTS system always checks the route of the vessel, to avoid collision and grounding dangers. We can say that this system working with this aim. Ratio of both hazards decreased in second period. The accident per year numbers not changed so much but we must take attention on the increase of the traffic in second period very highly.

Table 2: Accidents According to Accident Types (Marine Ministry Database)

ACCIDENTS ACCORDING TO ACCIDENT TYPES							
Accidents Happened Between 1985-2003				Accidents Happened Between 2004-2008			
Accident Type	Accident Number	Ratio	Accident per Year	Accident Type	Accident Number	Ratio	Accident per Year
Collision	256	35.4%	13.5	Collision	72	27.3%	14.4
Grounding	211	29.1%	11.1	Grounding	45	17.0%	9.0
Fire	104	14.4%	5.5	Fire	40	15.2%	8.0
Capsizing	49	6.8%	2.6	Capsizing	33	12.5%	6.6
Catma	38	5.2%	2.0	Çatma	29	11.0%	5.8
Others	27	3.7%	1.4	Contact	26	9.8%	5.2
Contact	20	2.8%	1.1	Help Request	12	4.5%	2.4
Help Request	19	2.6%	1.0	Others	7	2.7%	1.4
Total	724		38.1	Total	264		52.8

5.3. Relationship between Accidents with Death and Accident Types

Also when we look for fire hazards we can see that it's increased as accidents per year, this is the important hazard for the strait; because in the past years strait lived big fires that affected the life in the Istanbul. So there must be some new studies on fire fighting methods in the strait, new fire fighting boats, new stations etc. to interference very fast to this type of accidents. Also when we look at the deaths in the sea fire item takes second places with % 19 ratios. So it's important for live saving on sea also.

Table 3: Relationship between Accidents (Marine Ministry Database)

RELATIONSHIP BETWEEN ACCIDENTS WITH DEATH and ACCIDENT TYPES years between 2001 – 2008			
Accident Type	Number	Number of Death	Ratio
Capsizing	13	53	36%
Fire	7	8	19%
Others	6	6	17%
Help Request	3	3	8%
Collision	3	6	8%
Çatma	2	2	6%
Grounding	1	1	3%
Lost	1	1	3%
TOTAL			36

5.2. Accident Numbers According To Ship Types

Its very ordinary to see ship types of General Cargo and Tankers, that biggest accident numbers on types. Traffic characteristic of the strait is mostly cargo and tanker for international passage and, passenger transportation internal ways in the strait. When we look on the statistics biggest ratio for ship types is General Cargo Vessels, the second one is tankers, which is carrying hazardous cargoes for pollution and population. The second point of view on statistics vessels which is carrying passengers, totally %4.1 of all accidents occurred by passenger vessels, which must find a solution for this ratio for safety of life at sea.

Table 4: Accidents according to Ship Types (Marine Ministry Database)

ACCIDENTS ACCORDING TO SHIP TYPES							
Accidents Happened Between 1985-2003				Accidents Happened Between 2004-2008			
Ship Types	Number	Ratio	Accidents per year	Ship Types	Number	Ratio	Accidents per year
General Cargo Vessel	351	45.2%	18.5	General Cargo Vessel	151	19.4%	30.2
Tanker	116	14.9%	6.1	Tanker	35	4.5%	7.0
Bulk Carrier	73	9.4%	3.8	Passenger Vessel	20	2.6%	4.0
Passenger Vessel	56	7.2%	2.9	Fishing Vessel	19	2.4%	3.8
Passenger Boat	45	5.8%	2.4	Bulk Carrier	16	2.1%	3.2
Yacht	33	4.2%	1.7	Container Vessel	13	1.7%	2.6
Other Vessels	33	4.2%	1.7	Ro-Ro vessel	9	1.2%	1.8
Fishing Vessel	24	3.1%	1.3	Yacht	8	1.0%	1.6
Ferry Boat	13	1.7%	0.7	Fast Catamaran Passenger Vessel	5	0.6%	1.0
Fast Catamaran Passenger Vessel	12	1.5%	0.6	Tug Boat	5	0.6%	1.0
Ro-Ro vessel	8	1.0%	0.4	Other Vessels	4	0.5%	0.8
Container Vessel	7	0.9%	0.4	Ferry Boat	4	0.5%	0.8
Tug Boat	6	0.8%	0.3	Passenger Boat	3	0.4%	0.6
	777		40.9		292		58.4

6. CONCLUSION

For own safety of pollution and population of Istanbul, firstly Turkey must have own safety politics, for Turkish fleet. When we look for the numbers of accidents Turkish fleet always have the first place, so Turkey must prepare our own safety policy for our fleet and lives. Also it can easily see that Turkish fleet don't using

pilot (only %1 of Turkish fleet using pilot service) for passage. Turkish fleet must be encouraged for taking pilot service; this will decrease the Turkish fleet accidents like collision, grounding etc.

For passenger carriage in the strait when we look for accidents regions we can find result according to Maritime Ministry; “In the strait most of the accidents occur on first region; (between Harem and Ortaköy) (%35,4), than in second reigon; (between Ortaköy and Anadolu Castle) (%27,6) and thirth reigon; (between Anadolu Castle and Sarıyer) (%16,9), and at least accidents occur on forth region (Rumeli Feneri , İstanbul Boğazı Karadeniz Girişi) (%7,6).” This can be very simple identified, when we look the traffic in the first region this is like a crossroads, between sirkeci- kadıköy, üsküdar- beşiktaş, and international transportation on the strait. All passenger vessels must be renovated for nautical equipments, for communication between vessels, and VTS systems. (Marine Traffic Regularity Presidency Database)

It can easily see that VTS gives chance for safety transportation of the vessels. Activity of this system must increase and must become widespread for all sizes of vessels.

Fire hazard is the one of the biggest threat for the strait. Effective fire fighting boats must arrange for all areas of the strait.

Additional safety solutions and precautions prepared for passenger carriage of the Istanbul in marine way. Tunnel passage can be declared as a good progress for this item, when it’s finished.

For all vessels nautical equipments, reporting systems, pilotage and escorting systems must be checked regularly for all sizes of vessels, and if it’s necessary it must be renovated. Also supervising of naval traffic and alternative ways to carry dangerous goods must be done to increase the sea accidents in strait. There must be a system for event inspections after accidents, and reporting of events of accidents, to describe risky points and reasons of accidents in strait.

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Nazmi BAYAR was born in 1977 at Aydın. He got Naval Arch. & Marine Engineering degree in 1999 & Msc degree in 2003. He is going on his PhD study at same department. He has his own Engineering & Shipping Bureau trading in Tuzla.

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