

## Some issues relating to sea accidents, reasons, and solutions

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**Abstract:** Maritime is an industry that has made great contributions to the economy of a country and it also contributes to the protection of the sovereignty of the sea and islands. Therefore, many countries around the world are taking care of developing and protecting the marine economy as the nation's main economy and Singapore is a good example. Vietnam is a country with great potential in marine economic development but with the exploitation of the potential advantages from the marine economy for high economic efficiency, maritime operations are always hidden accident, incalculable danger. Each year, there are many sea accidents that brings damage both of people and property. The accidents from many difficult reasons but the most popular reason begin from people. Therefor, the solution was needed to limited to the maximum the sea accidents not only Vietnam but also countries on the word.

**Keywords:** sea accidents, solution, maritime industry

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### I. INTRODUCTION

With 3,000 km of coastline and many convenient ports is a strong point for the Vietnam Maritime industry to develop. However, in the past years, the situation of marine accidents caused by collisions or incidents related to ships damaged, sunk, polluted the environment and caused relatively deadly consequences. Finding causes and proposing measures to prevent sea accidents is a scientific and practical job.

According to the Vietnam Maritime Administration, the situation of maritime accidents in 2017 and 2018 is still very complicated. In 2017, Vietnam had 17 maritime accidents in which 2018 had 15 accidents. Most of the causes of accidents are due to human factors. In addition, there are some other reasons such as transporting goods, big waves, high winds, currents impacting on the ship's rope system that can cause the ship's rope to be broken, the ship moves out of position. It can lead to collisions. These accidents will affect the marine economy and marine environment of Vietnam as well as the world. Therefore, the study to provide solutions to ensure maritime safety is an essential task and it will meet the demand for marine economic development that Vietnam has set out.

### II. THE REASONS FOR MARINE ACCIDENTS

#### A. Objective reasons

##### 1) Because of narrow channels

When controlling the ship in narrow channels – this is water area has greatly affect the resistance of the ship, changing the conditions of the journey compared to when the ship travels deep water. Therefore, when the ship enters shallow and shallow water areas, it will lead to a situation in the narrow channel, when the ship moves to the curve, the centrifugal force will affect the ship and change the tendency to push ships to the shoreline causes ships to run aground. This is quite a common cause because most ports in Vietnam are shallow water ports.

In addition, it can be said that navigation buoys in the navigation channel are drifting, confusing the flow position, so that the ship may be stranded in the channel. Or when going near the shore with great speed, it will arise the phenomenon of the shore sucking the stern to the shore, pushing the bow to the channel ...



Figure 1. Petro Pacific 1 ship aground in BinhThuansea in 2012

**2) Because control of ship enter and leave the wharf**

Another objective cause that could also cause a maritime accident is the control of ship entering and leaving the wharf. This is a complicated process and very easy to cause accidents. Collision accidents can occur due to the influence of changing conditions such as wind, tornadoes or unusually heavy rain. Sea currents and currents will increase the level of drift especially when the speed of ships decreases.

Meteorological and hydrological conditions such as abnormal earthquakes, tides, wind storms have many dangerous factors when navigating in that area that people cannot fully grasp, leading to judgment and wrong handling deviation caused marine accidents.

**3) Because of incorrect maritime instruction**

This can be said to be a serious cause of maritime accidents. Letting navigational instructions be inaccurate, charts too old, not updated regularly, lack of information. There are no maritime indications on board the upcoming operating area of the ship; Information obtained from maritime guidelines has been used inaccurately, asynchronously, sources of information.

**4) Because of natural disasters**

When the ship anchors at the wharf or anchor area, the scene elements such as big waves, high winds, currents can also directly affect the ligament system, making it easy to move away from the position leading to drifting, wear dry, bump. Some examples include earthquakes, volcanoes or lightning strikes, the dangers of nature that many people have not accurately predicted. Or because of the irregular currents and tides, the regional topography has many factors that people do not fully grasp, leading to a deviation in judgment, judging situations, causing danger to the ship. There are also predefined natural hazards that still cause serious accidents like storms.



Figure 2. Stormed cargo ship hit the rock muzzle in QuyNhon

### **5) Owners ship are not responsible**

Another reason is that collisions where indirect causes are due to the subjective error of the shipowner or the ship operator who has not fully performed their responsibilities, the shipowner does not know about maritime rules such as Consequently, the lights are opened and the lamp placement is wrong, so other ships are unaware. Or the contracting for crew members to manage the ship itself should lead to the technical condition of the ship does not guarantee according to regulations, the exploitation of wrong routes ...

In fact, there have been maritime accidents that indirectly caused by the shipowner or the ship operator has not fully performed their responsibilities, entrusted the crew members to fulfill all safety requirements. of ships. Some ship owners have handed over to seafarers the self-management and exploitation of ships, leading to the unsecured technical conditions of the ship; actual crew on board is not the same as the number of registered crew members, is not suitable for professional ability with the type of ship; exploiting wrong-operated ships with prescribed or over-operating areas according to decentralization.

Crew members violating the regulations on functions have not been strictly handled by ship owners; The ship owners have not yet implemented the report on the correct handling of procedures and have not yet learned from the experience of maritime accidents for their units to apply appropriate preventive measures seriously.

### **B. Subjective causes from the operator**

#### **1) Because training from many different sources, the level and judgment and handling of situations will be different.**

The professional capacity of officers has not met the working position to undertake - The train driver himself has not fully grasped the information and characteristics of the ship he is controlling. The duty officer is irresponsible to learn all the features, operations and specials that are the limitations of the equipment on the cockpit as well as how the device is being placed in relation to the safety of the ship.

#### **2) The awareness of observing international conventions is not high**

Conscious of the observance of laws and regulations of international conventions of officers and crews who have not yet fulfilled their responsibilities and obligations in the process of ship navigation, subjective, industrious and inexperienced in the sea, very embarrassed when encountering difficult and complicated situations that did not have appropriate measures; When processing, there is no homogeneous coordination leading to the implementation of ineffective orders and handling of incomplete and definitive situations. Do not maintain the realm, leading to no detection of ships encountered at a distance large enough to be able to handle avoidance effectively; do not use velocities in accordance with actual conditions, especially in narrow channel areas, many obstacles, large vessels density; when boats have been found nearby but do not properly assess the risk of collision, lead to negligence and neglect the necessary activities to move away from each other.

#### **3) Because of subjectivity, lack of concentration and dependence on equipment**

Moreover, the long journey through the ocean also affects health, making the mentality stressed, tired and lack of concentration for the crew while working. Or the subjective issues directly related to the health of the crew when operating the train such as oversleeping, drunkenness, poor eyesight ....have led to forgetting to adjust the route and forget it. Turn on the navigation warning system on the ship.

In addition, marine equipment in the cockpit is increasingly modern, communication methods are more and more diversified, many officers are too dependent on equipment but forget the goods skills. Classic marine with high reliability.

## **III. SOLUTIONS TO PREVENT AND REDUCE MARINE ACCIDENTS**

### **A. Have a clear and strict trip plan**

The movement of ships from port to port is a combination of both onshore personnel and crew on board. One of the most important parts of maritime operations is the trip plan that must be undertaken by a maritime officer on board.

A trip plan must be comprehensive from the port to the port, developed and used by the ship's driver to determine the most favorable route, to identify potential problems and dangers during the trip, and participate in implementing cockpit management to ensure the ship is on a safe route. The route plan includes a full description of the cruise route that is prepared by experienced officer. This is done to ensure that the ship follows the required route to the destination port.

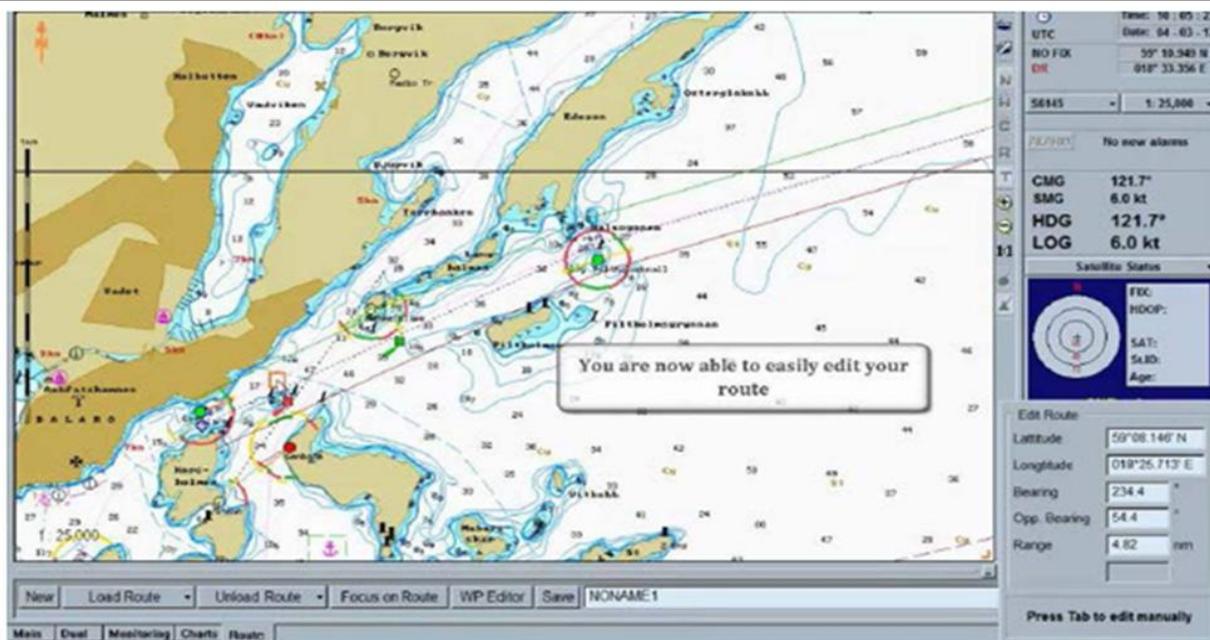


Figure 3. Planning a trip on ECDIS

A ship trip plan involves 4 basic steps / stages below:

- + Evaluation
- + Planning
- + Execute
- + Monitoring

Each stage when planning a route has its own importance and is especially important to carry out one of those phases, being careful and fully updated to ensure a safe journey.

In the beginning, the initial assessment is conducted throughout the journey. A basic plan is available, there will be modifications and changes according to the different details obtained from the chart, male navigator, Weather routing chart ... these processes are conducted through the beating. price and each stage of the plan.

In the next two stages, such as implementation and monitoring, the plan is used as a guide, and the itinerary is carried out taking into account the various factors, both observation and prediction.

### B. Regularly determine the position of the ship on the chart

Try to do a good job in locating the ship, if conditions permit it to proceed to locate the location continuously for certain periods of time. The purpose of continuous positioning is to regularly check whether the vessel has deviated from the intended path and what is the cause of the deviation. Based on the actual route of the train (connecting the train location points) to check if the ship is entering the obstacle course. Based on the exact location of the train to calculate the actual speed and expected time of the train to reach the next important position. Usually, when running at the coast, every 30 minutes the journey is located once. When the train enters the island area complicatedly, it is necessary to locate more and more quickly, the captain must identify the vessel at least 4 hours / 1 time.



Figure 4. Determine the location of ships and obstacles through the AIS automatic recognition system

When the cruise ship, it is necessary to appoint a watchman to observe 24 hours, ensuring 360degree angle fan surface, especially the fan surface in front of the bow. In complicated maritime conditions, it is advisable to use the means of observation on the ship including: eyes, headphones and technical means such as Radar, GPS, depth gauge ... to be able to identify obstacles soon. danger.

**C. Complying with international rules for collision prevention (COLREG 72)**

Strictly comply with the International Code of Collision Prevention (COLREG-72). Even if all plans are outlined in the chart, any online officer must strictly abide by the COLREG-72 International Rules for Crashing and Prevention of Marine Vessels to ensure the voyage. Be safe. The ship must be constantly in a proper, continuous and effective manner, the cockpit organization works in a disciplined, scientific and effective manner. After completing the trip, the Captain needs to hold an exchange meeting, learn from the experience of making the trip. Frankly analyze the weaknesses to withdraw the repair experience for the next journey.

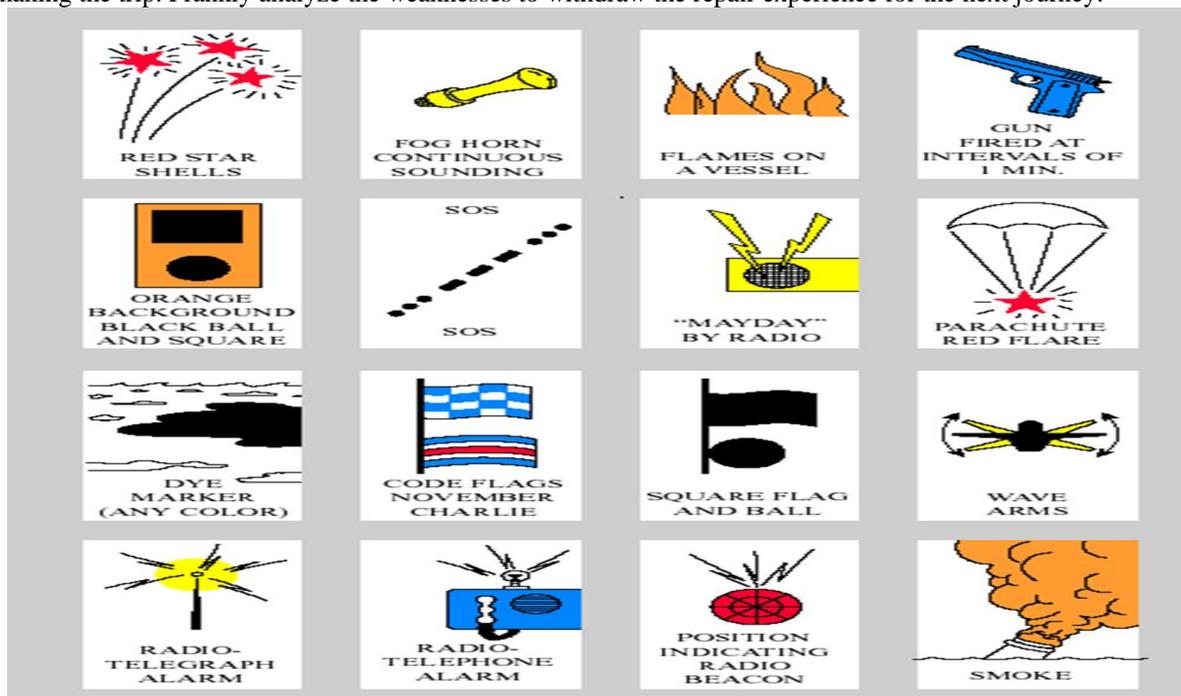


Figure 5. Signals when ships need support under COLREG – 72

**D. Enhance communication, education and capacity building for crew members**

Implement well the coordination mechanism with specialized forces to strengthen inspection and patrol activities to improve traffic safety and order on maritime routes; supervising and supervising the anchorage and landing of small vehicles; strictly handle violations according to law provisions and study for channeling small vessels in the sections of fairways, thus creating the utmost favorable conditions for maritime navigation of big ships.

Strengthen propaganda and dissemination of maritime law, international treaties that Vietnam has signed or acceded to, step by step improve the sense of safety compliance, maritime security and marine environmental protection of the Shipowners and crew.

Upgrade infrastructure and equipment for specialized maritime management in units ...

**IV. THE EQUIPMENT TO HELP SHIP SAFELY**

**A. Marine radar**

Most of the causes of fishing vessels collided on the sea are due to increasing density of vessels circulating on the sea, increasing the number of fishing vessels, and a longer period of seagoing vessels. While the majority of fishing vessels lack radar to detect obstacles, prevent collisions. Especially at night when the foresight is limited, in the conditions of fog, rain or thunderstorms ... the risk of crashing is very large because boats do not see each other.

Under international regulations, large cargo ships have marine radar equipment and collision avoidance equipment. However, when cargo ships enter Vietnamese waters, because fishing vessels are often made of wood shells, radar reflections are very poor, some small ships have lower height than the wave so radar of cargo ships is difficult to detect. warning. Besides, some fishing boats do not have improper signal lights or signals, during the night, many foggy sky ships cannot detect remotely with the naked eye. Fishing vessels become "invisible" and easily lead to crashing at sea.

To minimize accidents at sea, fishing vessels need to use marine radar to detect targets during the night and in bad weather, to ensure safety for ships and people at sea. Marine radar is a device that uses radio waves to detect obstacles, helping fishermen determine the direction of the surrounding targets and adjusting the direction accordingly.

In addition, marine radar mounted on fishing vessels can also be used in fishing nets by fishermen. With a range of up to 32-72 knots, the radar can detect and display buoys that hold nets on the screen, making it easier for fishermen to detect unknown ships and monitor and manage their gold nets, term the grid status is lost or broken due to collision with other ships.



Figure 6. Marine radar

**B. AIS equipment**

AIS (Automatically Identification System) is a maritime assistance communication system, which allows ships to exchange information about location, direction, and speed identification with each other or exchange with shore stations. This information helps the vehicles when they avoid collision with each other, in

addition to exchanging information such as help with incidents, weather information ... When combining AIS with a device other communications, AIS is also applied in emergencies, rescue and rescue at sea.

AIS operates on the VHF maritime band to identify information between waterway vehicles equipped with AIS and external objects within VHF coverage. AIS allows waterway facilities to actively share their information with vehicles operating in the neighborhood, VTS stations - Base Transceiver Station and maritime administration.

The function of AIS equipment are:

- Display on the screen the AIS device combined with ENC electronic chart helps boats locate and navigate accurately in all weather conditions.
- Provide seafarers with detailed information about maritime signs (signaling name, exact location of signaling, information on sea conditions in signaling, ...) in a direct way. continuous, continuous.
- Helping managers quickly detect position deviations and some other characteristics of floating signals.
- Allowing the setting up of false signals for nautical signals that are not allowed to install AIS signals and false signals in conditions that do not allow the establishment of real signals.
- Ability to store a great amount of information about the maritime operation of ships in the area and can display again when requested (ship name, MMSI identification number, speed and direction of travel , starting point, next destination, type of goods transported, listing and extracting crew, cruise ship, ...), connecting to VTS system to serve the management of ports and Search and Rescue.
- Connect to the Internet to share information on maritime safety between relevant national and international authorities.

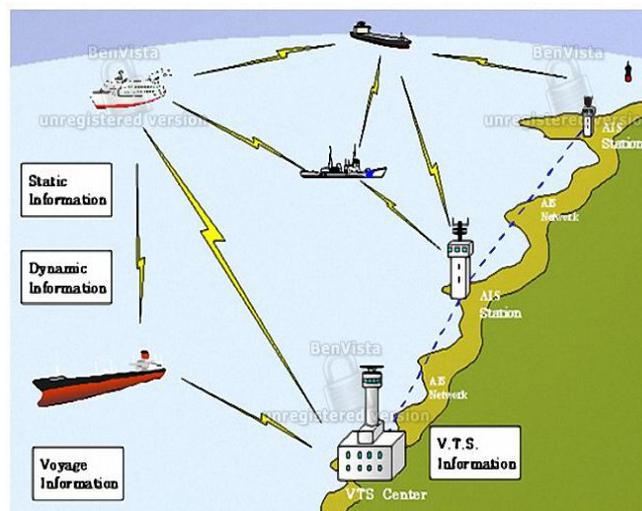


Figure 7. Operating principle of AIS device

## V. CONCLUSION

Crash in the maritime accident is difficult to avoid completely. Because of this, strict compliance with the International Code for Collision Prevention (COLREG-72) is essential for marine vessels. On the other hand, regular monitoring of weather reports, dangerous weather warnings, maritime safety warning messages will help a lot for boats to have a safe journey at sea.

In addition, it is necessary to improve the capacity of the contingent of officers and crew members on the ship, and at the same time regularly organize training and updating for the contingent of officers and crew; arranging personnel according to professional ability; always improve and update the program and content of teaching and training of crew members, ensuring that the students and officers of the crew after graduation have sufficient professional qualifications, maritime style, and foreign skills. language and health. In addition, it is necessary to improve the professional qualifications of teaching staff and enhance facilities for teaching at maritime training schools. Finally, improving the infrastructure to serve the sea as the access channel to the port, towage ships, and pilots. In this way, it is possible to minimize the situation of marine accidents which are happening in a complicated way like today.

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