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Analysis The Incident of MV. CMA CGM EIFFEL Touching The Seabed That Cause the Ship's Grounding At Port of Alexandria

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Abstract*— MV. CMA CGM EIFFEL is a container cargo ship owned by CMA CGM with a capacity of 4404 TEU, which often sails to the Trans Misr Terminal at the Port of Alexandria, it is an important port in the Mediterranean region. On December 17 2023, this ship experienced an incident with its aft touching the seabed while proceeding to the berth. This research employs qualitative methodologies, utilizing data collection techniques that include documentation analysis, direct observation, and comprehensive literature reviews. To analyze the incident, a fishbone diagram was employed to systematically identify the root causes, categorizing them into four primary factors: material, machine, methods, and man. Through the data analyze authors found several factors contributing to the incident including malfunctioning material and failure of bridge team management. Master took immediate action and by Pilot advice to kick engine ahead and cast off the forward tug to help pushing the vessel from the aft. Emergency response also taken to make sure the condition if any critical damage but luckily all found satisfactory and no damage. This research not only to find the root causes of the incident but also emphasize the importance of implementing preventive measures to prevent similar occurrences in the future and to overcome relate problems.

Keywords *— touching seabed, grounding, incident, cause, action, overcome.*

I. INTRODUCTION

Sea transportation is a necessity and an alternative in world trade, therefore safe and comfortable shipping is very much needed. Shipping safety is one of the absolute factors that must be met so that the ship can operate properly. Where if all shipping safety requirements are met then the entire crew can work optimally.

However, ships as floating structures that move a lot with propulsion at varying speeds across various shipping areas within a certain period of time will experience various problems which can be caused by various factors including natural factors such as wind, currents, weather, as well as ship factors. These include engine failure, lack of seafarers' skills in controlling the ship and also other factors such as heavy shipping traffic, lack of port facilities and infrastructure. These factors can cause shipping disruptions for ships.

Disruption to shipping for ships causes delays in ships getting to the port of destination. This disturbance can cause an emergency on board the ship so that the crew must work harder to deal with the emergency quickly so as not to cause a crisis situation on the ship. What is meant by an emergency according to (Capt. Agus Hadi Purwantono, 2018:01) is a situation outside the normal conditions that occurs on board a ship that is detrimental to the ship and has a tendency to endanger the safety of human life, property and the environment where the ship is located which must be resolved as soon as possible so as not to cause a crisis situation on the ship. One of these disturbances is the ship running aground.

The consequences that can occur due to a ship running aground are detrimental both in terms of materials and the environment and can also cause loss of life. Therefore, the condition of a ship running aground must be preventable, this dangerous situation can be reduced or not even occur if we do it according to good and correct procedures, of course it must also be supported by sufficient sources of knowledge so that we know every risk that can occur from each dangerous situation on the ship and how to overcome it. Previously, research related to the above was carried out by Novi Setiyoko (2017) on the MT. MARTHA OPTION and Ryandhika Fathan Ramadhan (2020) on the MV. NYK JOANNA.

MV. CMA CGM EIFFEL is a container carrying cargo ship owned by the CMA CGM company with a container carrying capacity of 4404 TEU. The shipping lane at the Port of Alexandria is one of the shipping lanes usually passed by MV ships. CMA CGM EIFFEL headed to Trans Misr Terminal to unload containers. The Port of Alexandria is one of the most important ports in the Mediterranean region, with a heavy and varied ship traffic. As one of the main trade routes in this region, this port serves various types of ships of various sizes and types. The navigation flow in the Port of Alexandria's narrow waters and unpredictable changes in

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water conditions add to the complexity of navigating this port. There are many

possibilities for ships passing through the waters of the Port of Alexandria to run aground if they do not comply with the rules when entering or leaving the port. Like what happened on the MV. CMA CGM EIFFEL At that time the ship's stern touched the seabed while carrying out berthing operations at the Port of Alexandria which resulted in the ship running aground.

This research is based on the results of observations at the stern of the MV ship. CMA CGM EIIFEL hits the seabed at the Port of Alexandria, Egypt. The incident occurred when the ship was maneuvering to enter the port on 17th December 2023. The ship was moving into the waters of the Port of Alexandria with a forward draft of 10.50 m, aft draft of 13.50 m.

The primary objectives of this research are:

1. To make a scientific contribution to the study of nautical science, especially the branch of ship maneuvering when proceeding into the port.
2. To increase awareness when sailing into the Port to be done properly and safely so that a good navigation process can be achieved

This research is expected to broaden the knowledge of prospective officers or cadets who wish to work and serve as officers on vessels equipped with deck cranes, to understand the forms of supervision, maintenance, and also problem-solving related to hoisting and luffing wire deck cranes, and to serve as reading material in the STIP library. The results of this research are expected to serve as a reference for sailors who will work on similar ships and can be used as input for the companies operating such vessels.

II. Literature Review

A. Navigation

Navigation is a process of directing the path or movement of a vehicle from one place to another safely. These vehicles can be passenger ships, commercial ships, submarines, airplanes or spacecraft. Navigation comes from the word navigation which is taken from Italian and Greek which means sailing (ship) or flying (airship) from one place to another safely and securely.

Another definition of navigation is the art of bringing ships from one place to another efficiently. Shipping navigation also means shipping safety. In order to keep a ship safe and efficient when sailing from the port of departure to the port of destination, sufficient experience in maneuvering or driving the ship is required.

Martopo (2019) said that navigation is an activity that includes everything related to shipping navigation aids, pilotage, shipping telecommunications, hydrography, channels and crossings, ship frame handling, salvage and underwater work for the benefit of shipping safety.

Based on the information above, it can be concluded that navigation is very important to assist the navigator in the navigation process when traveling carrying cargo from the ship's departure point to the arrival point, whether at sea, land or air so that the cargo carried is in a safe condition.

B. Port Card

In SOLAS (Safety of Life at Sea) Chapter V Regulation 34 paragraph 1, it is said that before continuing the voyage, the captain must ensure that the voyage has been planned using nautical charts and publications that are appropriate for the area to which he is going, taking into account the guidelines and recommendations developed. by the organization. In paragraph 2 it is also said that shipping plans must consider all relevant shipping route creation systems.

A port card is a document used on a ship to obtain information regarding the port you are going to. This document contains information about port facilities, current updates on government regulations, and special instructions regarding entry and exit from the Port. The Port Card includes information about port security, restricted zones and emergency procedures. The data on the Port Card takes information from various sources such as the destination port authority and also takes publications related to shipping routes such as the book "Guide to Port Entry" and Sailing directions which are recognized by international organizations such as IMO (International Maritime Organization). In the book SOLAS (Safety of Life at Sea) Chapter V Regulation 27, it is stated that maps and nautical publications, sailing directions, lists of lights, notices to mariners, tide tables and all other marine publications are required for shipping. In the book "Guide to Port Entry" (2024:6) it is stated that all information is recognized and will be very useful, this guide will remain of high value for users and will always be updated.

C. Grounding

According to Capt. Agus Hadi Purwantono (2018:4) running aground is an emergency situation caused by the hull touching or hitting the surface of the seabed, either intentionally or unintentionally, which can endanger the safety of human life, property and the environment. A ship running aground generally begins with signs such as the propeller spinning feeling heavy, the chimney emitting black smoke, the ship feeling vibrating and the ship's speed changing downwards until it stops suddenly. When the ship experiences a sudden stop, the officer on duty quickly checks the position of the ship and compares the sea depth with the ship's draft so that it can be concluded whether the ship has run aground or not. The position of the ship when it runs aground really depends on the condition of the seabed, if the seabed is mud, the chances of the ship experiencing a leak are low, but if the seabed is coral, it will cause serious damage and the possibility of leaks is high, of course there will be a danger of sinking if water enters the ship and can't be overcome.

Types of Grounding According to Capt. Agus Hadi Purwantomo (2009:57) in the book "Teknik pengendalian dan olah gerak kapal" aground are divided into 2, namely:

1.Beached

The definition of beached is a ship that is intentionally grounded. Usually carried out when the ship experiences a leak and damage to the pumps or the pump cannot meet the average speed of pumping water as a result of a leak in the ship and usually the ship is easy to refloat.

2.Stranded

In contrast to beached, a ship that runs aground accidentally, for example due to negligence or negligence of the watch officer in carrying out his duties while on guard duty on the bridge, is called stranded. Usualy ships

are difficult to refloat. When beached, the grounding point is generally at the bow of the ship, and when stranded, it is possible that the ship's grounding point is unexpected, which can occur at the bow, stern or middle of the ship.

D. Sea bottom

According to Kamus Besar Bahasa Indonesia (KBBI), the bottom is the lowest part, the lowest layer, the land beneath the water. According to the Big Indonesian Dictionary (KBBI) the sea is a large and extensive collection of salt water that inundates and divides land into continents or islands. Catherine Banet (2020:44) says in a book entitled "The Law of Seabed" the definition of the seabed is the top part of the earth in the seas and oceans. So it can be concluded that the seabed is the lowest part of sea water above the earth's surface.

E. Ship's Maneuvering

According to " Preliminary Study of Ship Maneuvering Prediction of Container Ship" (2020:01) ships maneuveringis defined as the inherent capability of a vessel to turn its path based on the hydrodynamics principles. The maneuvering performance becomes important to the safety of navigation when a ship operate. Ship maneuvering is one of important parts in the area of ship performance. Many researchers are competing to find ways to solve maneuver problems in both testing and numerical approaches. International Towing Tank Conference (ITTC) has proposed the standard of ship maneuvers for sea trials such turning circle, zig-zag maneuver, pull-out maneuver, spiral maneuver, reverse spiral, maneuver and stopping trial.

F. *Echosounder*

In the book SOLAS (Safety of Life at Sea) Chapter V Regulation 19, it is stated that all ships with a gross tonnage of 300 or more must be equipped with a sea depth echo detector. Echosounder is an electronic navigation tool using an echo system installed on the bottom of a ship which functions to measure the depth of waters. In its application, echosounder uses an instrument that can produce sound waves, which is called a transducer.Echo sounder function as following below :

1) As a tool used to measure the depth of sea water.
2) As Seabed Mapping (Seabed Mapping).
3) To determine cables and pipelines for underwater.
4) To search for sunken and abandoned ships on the seabed.

III. METODHOLOGY

Research methods are the ways to discover, develop, and test the truths of the principles of a natural phenomenon, society, or humanity based on the relevant scientific discipline in a scientific manner. Essentially, research methods are scientific approaches used to find data in research for specific purposes and uses with the methods that will be employed.

Based on the explanation above, the important role of research methodology can be understood as providing an overview of the results from all studies and research obtained during the researcher's practical experience at sea on the ship, by explaining what and how the research was conducted in the preparation of this thesis. The author will also explain in detail about the time and place during the research, as well as the methods used in the research that has been conducted. Thus, in this chapter, the author aims to provide a better understanding of the research process conducted by the author, with the hope that readers can comprehend the research results obtained very well.

A. Time and Place of Research

1. Time of Research

In obtaining detailed data and information, the writer acquired it during the research conducted while on board the MV. CMA CGM EIFFEL, specifically from of July, 2023 until February 2024.

2. Place of Research

The research was conducted on board the MV. CMA CGM EIFFEL, owned by a shipping company from France, namely CMA CGM with its subsidiary CMA CGM International Shipping Company, which is located at Pte. Ltd 9 North Buona Vista Drive, #14-01 The Metropolis, Tower 1, Singapore 138588.

B. Research Design

The research method used is a qualitative descriptive method and a cause and effect approach, which is one of the research methods used to describe and explain social or cultural phenomena in detail and in depth through data collection in the form of text, images and direct observation. Qualitative descriptive research aims to understand and describe social or cultural phenomena in a broader and more complex context. This is achieved through data analysis from field findings and the use of measuring tools such as theories related to the problem under study.

According to Lexy J. Moleong (2020: 213) "Qualitative descriptive research analyzes individual behavior and written or spoken words.". According to Anas Sudijono (2023: 17) "The causal approach referred to as "Introduction to Educational Statistics" is used to test hypotheses which show whether or not there is a relationship between two or more variables. This relationship can be causal, that is, the relationship between two interconnected variables."

C. Data Collecting Methods

Complete, objective, and accountable data and information must be researched and presented as a depiction and understanding that can assist in the preparation of this thesis. This writing requires assistance in the form of data analysis to formulate the material issues in order to achieve good writing results.In this regard, the author collected data using the following techniques:

1. Observation

What is meant by observation is the research conducted by directly visiting the location being studied and seeing firsthand what is present in the field. In other words, data collection through direct observation involves gathering data using one's own eyes, which can be assisted by a camera as additional evidence for the research, all of which has been systematically planned and is intended for research purposes.

2. Literature Study

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Collecting data and information from various literatures or other sources that are closely related to the understanding of ship's navigation and manoevering as well as how to practice it on board a ship with the theories found in books related to the issues to be discussed, so that the extent of its application on the ship can be determined.

3. Documentation

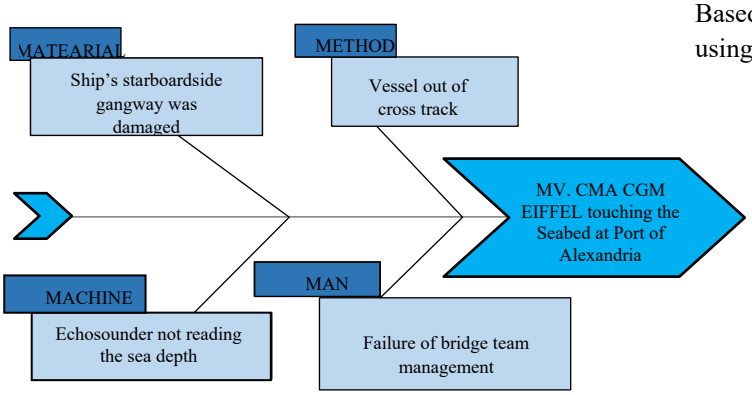
Documentation is a data collection technique that involves gathering and recording all data or information related to the issues connected to the discussion in qualitative research. According to Sugiyono (2016:240), he defines documentation studies as follows: "Documents are records of past events. Documents can take the form of writings, images, or monumental works by an individual. Written documents, for example, include diaries, life histories, biographies, and policy regulations".

D. Data Analysis

According to Sugiyono (2010: 335) data analysis techniques are the process of searching for data, systematically compiling data obtained from interviews, field notes and documentation, by organizing data into categories, breaking it down into units, synthesizing, compiling into a pattern of choosing what is important and what will be studied, and making conclusions so that they are easily understood by oneself and others.

The analytical technique used to analyze the data in this thesis is to use root cause analysis, namely collecting data obtained during research and then collecting it and then presenting it and describing it according to the circumstances and conditions at that time and based on observations by looking at existing data. The data collection referred to is obtaining relevant, accurate data and identifying existing data related to the skills of the crew on board the ship. Meanwhile, data analysis is intended to manage and identify existing data.

The method used to analyze the data in this thesis is the fishbone analysis method which describes and makes decisions based on all events that occur on the MV. CMA CGM EIFFEL.It is hoped that this will make it easier for readers to understand the content of the research presented by the author.



IV. Findings and Discussion

A. Findings

1. Data Description

On December 17, 2023, MV. CMA CGM EIFFEL is carrying out maneuvers to enter the channel at the Port of Alexandria to dock at the Trans Misr Terminal port. The ship enters the channel assisted by 3 pilots, where pilot on duty is still on training and the other 2 pilots assisting and observing the pilot on duty. Two tugboats made fast at the starboard bow and starboard quarter aft. At that time the ship sailed with a forward draft of 10.50 m and an aft draft of 13.50 m. The docking process is carried out by the ship making a 180° turn to the right, then the ship move astern and will be assisted by the tugboat to get closer to the jetty and the ship will dock on port side alongside. At 03:36 local time, while the ship was moving astern, the ship lost speed and the Master suspected that the ship had run aground. When the incident happened, the Master immediately ordered the Chief Officer as the officer on duty to record the position and call the engine control room to inform of the suspicion that the ship's stern had run aground. During the incident, the pilot gave the command for the engine to kick ahead and ordered the tugboat that made fast at the starboard bow to release the mooring rope and then move the starboard position quarter aft to help push the ship at the back which was thought to be touching the seabed. The ship also managed to change position and dock at the Trans Misr Terminal.

2. Data Analysis

In this research, researchers obtained data by conducting observations, literature studies, interviews and by carrying out documentation related to the problem being studied. Researchers used qualitative research methods with a descriptive data approach and used fishbone data analysis techniques to explain the factors that caused the MV. CMA CGM EIFFEL touch the seabed at the Port of Alexandria. Based on the data description, data analysis was carried out using fishbone analysis mode with the following results:

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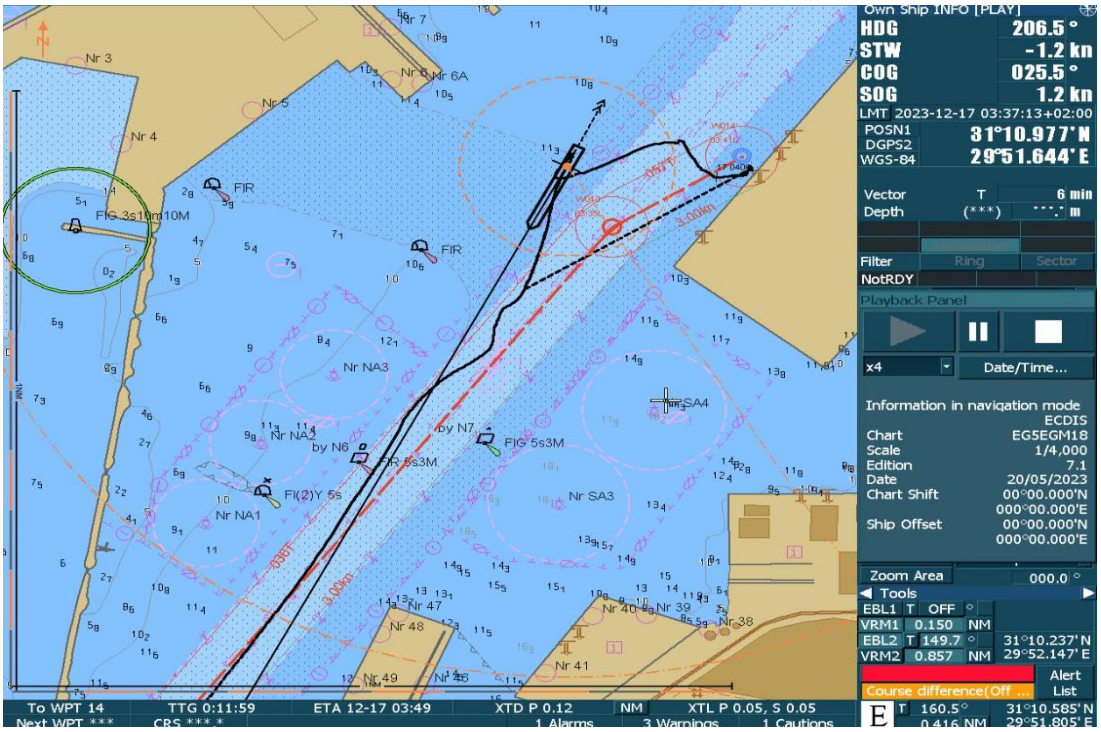
Based on the data description above, an analysis is conducted to identify the root causes of each issue present, as follows:

a. Ship's starboardside gangway was damaged (Material)

In the Alexandria Port Card it is stated that the ship's berthing position o Trans Misr Terminal is Starboardside Alongside, but this cannot be done because the starboardside gangway on the MV.CMA CGM EIFFEL is damaged. This causes the ship"s need change the way for berthing by swinging the bow to starboard and make a 180° turn so that the ship will move astern and the tugs will assist to push the ship near to the jetty end up with port side alongside.

b. Vessel out of cross track limit (Method)

Due to the change of the way for berthing when the ship move astern, the ship out of the cross track limit. The depth of the sea water outside the cross track limit is lower than the ship draft, as we can see on the picture below the dept outside the cross track limit is 11 meter and the ship's draft is 10.5 meters on forward and 13,5 meters on aft . Due to this matter it cause the ships aft touching the bottom of the seabed and grounded.



c. Echosounder not reading the sea depth (Machine)

The reason why the Echosounder does not show data is because the sensor on the transducer which is located under the ship is disturbed by the rotating motion of the propeller which produces bubbles which make the receiver sensor on the transducer not receive the echo properly, especially when in shallow water there can be additional interference from the surface like sand, mud it caused more disturbance for the echoes.

d. Failure of bridge team management (Man)

Bridge team management is the application of work methods with reliable and consistent standards that can only be maintained if navigation is based on good principles and is strengthened by the application of each individual. In this case, it means that every individual who is serving as a bridge team makes the best possible use of available resources, both human and material to achieve shipping success. Accidents are by nature unpredictable but accidents at sea are rarely the result of a single event, they are almost always the result of a series of non-serious incidents at the culmination of a chain of errors. In accordance with the results of the agreement at the International Safety Conference (INTASAFCON III) held in Norway, it was agreed that two main factors were the main causes of collisions and grounding, namely first, weakness in bridge organization, in this case all information must be provided clearly, such as preparation before leaving harbor, passage plan, all navigation and communication equipment checked and tested, master and pilot information exchange. This is also supported by the condition of the pilot on duty is still on training that currently evaluating his training by assisting the MV.CMA CGM EIFFEL for berthing.

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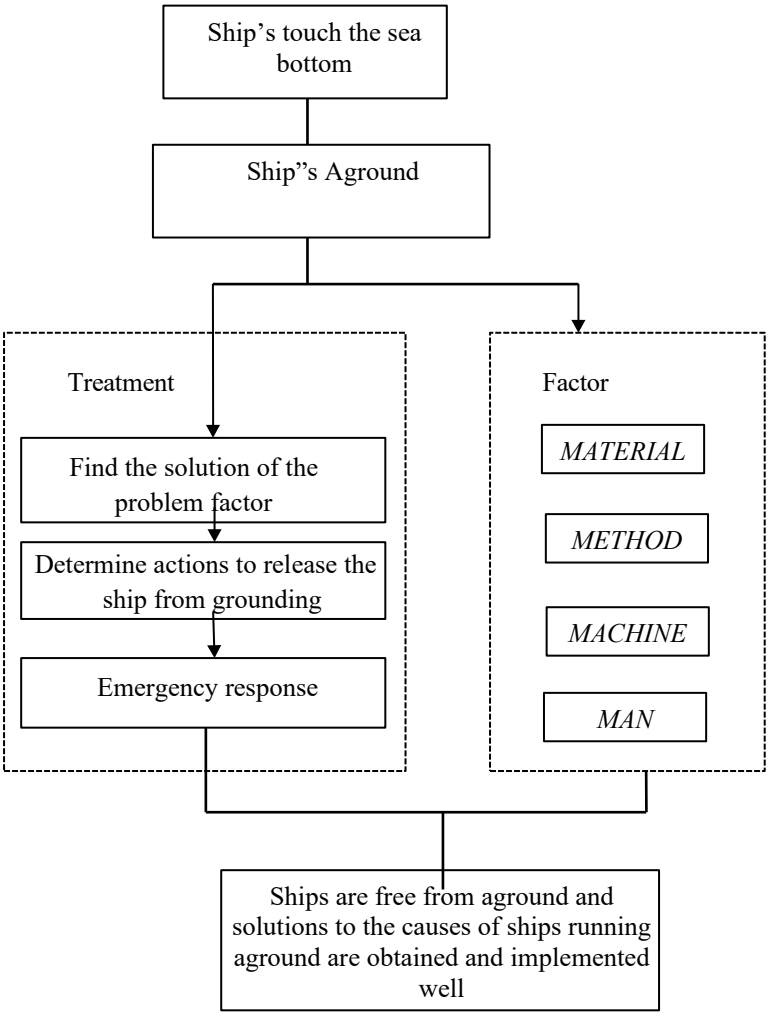
B. Discussion



From the main map above the main focus of this researcj it to analyze the problem factor**,** Find the solution of the problem factor, determine actions to release the ship from grounding and doing mergency response so that Ships are free from aground and solutions to the causes of ships running aground are obtained and implemented well.

1. Solutions for the Problem factor

a) MATERIAL
It is best for the consult and coordinate with the port and also the company regarding the actual condition of the ship before the ship sails into the port of destination. Due to its condition that ship's cannot comply with the regulation if the condition allowed by consideration for safety the ship must skip this port.

b) METHOD
Implement regular training on maneuvering in confined waters, emphasizing the importance of understanding drafts and water depths.

c) MACHINE
This problem can be overcome by reducing the speed of the ship when doing menuever especially in shallow water conditions

d) MAN
Conduct thorough pre-departure briefings that include the entire bridge team to discuss the passage plan and any potential challenges and establish protocols for information exchange between the master and pilot, ensuring clarity on responsibilities and navigation plans.

2. Actions to release the ship from grounding

When Master noticed that ship lost speed and stop and the Master suspected that the ship had run aground Master immediately ordered the

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Chief Officer as the officer on duty to record the position and call the engine control room to inform of the suspicion that the ship's aft had run aground. During the incident master kick engine from deadslow ahead, slow ahead until half ahead and the pilot gave the ordered the tugboat that made fast at the starboard bow to release the mooring rope and then move the aft position to help push the ship at the aft. Finally the ship began to move slowly and release from grounding.

3. Emergency response

The Master and officers on duty must take immediate action when the ship runs aground in accordance with the regulations that have which is divide by 4 step action :

a) Immediate Action

1) Stopped Engine
2) Sounded General Alarm
3) Inform All Crew
4) Vessel's Position and time
5) Logging events
6) Switch on Deck lights

b) Secondary Actions

1) Pressed 'Save' button on the VDR
2) Clossed All Watertight doors
3) Check Tanks, void spaces, cargo holds condition
4) Check Sea surface for any signs of pollution
5) Send GMDSS communications

c) Follow up actions

1) Notify Emergency line
2) Maintained Communications with relevant Shore-Based supporting departments

d) After the event

1) Statement of Facts
2) Incident/Accident report
3) Damage Report &/or Defect Report

V. CONCLUSION

A. Conclution

From the analysis the author found several interrelated factors contributing to the incident. The key conclusions from the investigation are as follows:

1. **Material Damage**:
   The damaged starboard gangway necessitated an unconventional berthing maneuver, forcing the ship to swing its bow to starboard and ultimately berth port side alongside. This highlights the critical importance of maintaining equipment in operational condition to comply with established berthing protocols.
2. **Methodological Errors**
   The deviation from the planned berthing path resulted in the vessel exceeding its cross track limit, which led to grounding. This underscores the need for precise navigation practices, particularly when altering berthing methods.
3. **Machine Malfunction**
   The echosounder's failure to accurately read sea depth due to interference from the propeller and shallow water conditions contributed to the grounding incident. This points to the necessity of ensuring that navigational equipment is functioning correctly and is shielded from environmental disturbances.
4. **Human Factors**
   A failure in bridge team management was evident, particularly in communication and preparation. The presence of an inexperienced pilot further exacerbated the situation, emphasizing the need for structured training and effective information exchange among the bridge team.

B. Recommendation

By addressing these root causes with targeted solutions, the risk of similar incidents occurring in the future can be significantly reduced, ensuring safer and more efficient maritime operations.

a) **Material**
   Regular inspections and maintenance of all critical equipment, especially the gangway, should be prioritized. Consultations with port authorities before arrival should be conducted to assess the ship's condition and ensure compliance with safety regulations.

b) **Method**
   Implementing regular training programs focused on navigation in confined waters will help crew members better understand ship drafts and water depths, reducing the likelihood of similar issues in the future.

c) **Machine**
   Reducing the vessel's speed during maneuvers in shallow waters can help mitigate the risk of grounding. This should be part of standard operational protocols.

d) **Man**
   Enhancing pre-departure briefings to include all bridge team members will foster a better understanding of the passage plan and potential challenges. Establishing clear communication protocols will enhance teamwork and decision-making processes.

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