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Effects Of Human Error On Marine Safety: Case Study

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ABSTRACT
The maritime shipping industry is considered as one of the huge and high-risk industries. There is a big concern toward reducing the associate risk of this industry and improving the maritime safety. There are many parameters contributing into improving maritime safety and reducing the risks of accidents. The majority of these parameters are concerned with improving the design of ship's hull and systems; utilizing advanced technologically equipment and machineries; and implementing legislations to ensure safe ship operation. Human is one of these parameters, which can be considered as the pivot parameter of maritime safety. It is the only life parameter, which interact and control the majority of other parameters. Therefore, ship safety is highly affected by human actions and the majority of maritime accidents are consequences of human error. The occurrence of marine accidents and increase of casualty's number instead of vast improvement in the ship's design, using of advanced technologically equipment and implementing of strict maritime safety regulations and legislation is an obvious example for the effect of Human error. In this paper, a detailed step-to-step events evaluation technique of a collision case study is used to investigate human error factors participated as main causes of the accident. This is through analyzing the collision happened between Oil Tanker "Kiafan" and Bulk Carrier "Unison Star" in Chittagong - Bangladesh (24 July 2017).
Keywords - Human Error, Maritime Safety, Ship Accidents

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I. INTRODUCTION

Marine transport represents the vital mean in transporting people and cargo across the world. More than 90% of the world's cargo is transported by merchant ships. Maritime safety is one of the imperatives of the maritime industry. In general, ship accidents are classified according to their causes into [1]:

- Accidents caused by unintentional human error.
- Accidents caused intentionally by human.
- Accidents due to technical failures.
- Accidents due to poor weather (wind, waves, lightning, etc.).

Efforts are presented in improving ship safety and reducing the risk of accidents through issuing and implementing legislation and regulations, improving ship hull design and systems and utilization of advanced technology. These lead to improving maritime transport safety and participate reducing the overall maritime accidents.

Despite great breakthroughs in marine industry technology and safety regulations, the marine industry experienced serious accidents and still suffering from accidents and increasing number of causalities. This concern is clearly reported by the International Maritime Organization (IMO) that with effective design practices, standards and associated management systems the maritime safety remains a concern.

The main reason behind this concern is because the focus of shipping industry in improving maritime safety has been mainly focused in improving ship structure and the reliability of ship operating systems with less attention to the main factor of safety, which is the human element, where and as indicated in Fig. (1), the maritime system is a people system and human errors figure prominently in casualty situations [2].

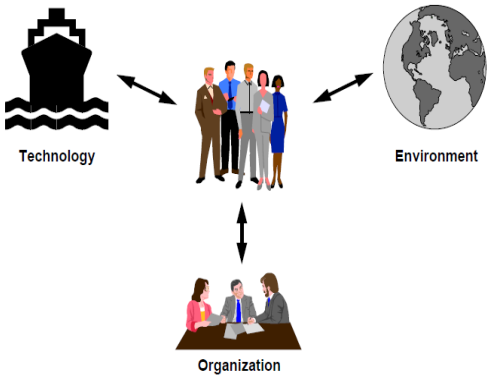

Figure 1: The Maritime System Is A People System [2]

Facts, numbers, and cases prove that humans and their decisions on sea are the roots of the majority of sea accidents:

- A Dutch study of 100 marine casualties found that human error contributed to 96 of the 100 accidents.
- Human error costs the maritime industry $541 million per year, according to the United Kingdom Protection and Indemnity (UK P&I) Club.
- Human error contributes to 84–88% of tanker accidents.
- Human error contributes to 79% of towing vessel groundings.
- Over 80% of marine accidents are caused or influenced by human and organization factors.
- Human error contributes to 89–96% of ship collisions.

1.1 Definition of Human Error

The terms human error defined as referring to the cause of an accident, which happened because of people, an individual or organization, as opposed to because of a technical fault [3].

Human error is a general term which covers a variety of unsafe acts, omissions, behaviors and unsafe conditions or a combination of these in which the individual should have had acted in a different manner [4].

1.2 Studying of Human Error

According to Hollnagel (1998), human error can only be observed indirectly by observation of human behavior. Accordingly, three parts are included in the definition of human error, which are:

- Evaluation of human behavior against performance standard or criterion.
- Event which results in a measurable performance shortfall, for an example, the expected level is not met by the acting agent.
- A degree of volition such that the actor has the opportunity to act in a way that will not be considered erroneous.

Therefore, the behavior must be initiated by and be a response to an event or a situation. Otherwise, it is meaningless to interpret the behavior as an error.

Senders & Moray (1991) defined human error because of behavior originated from psychological processes on different levels: perception, attention, memory, thinking, problem solving, decision making, evaluated against some performance standards, initiated by an event in a situation where it was possible to act in another way considered to be right in order not to cause an accident.

To conclude this part, human error cannot be studied directly, but it can be studied indirectly by studying human behavior.

1.3 Types of Human Errors

Human errors are categorized by action into:

- Unintended actions.
- Intended actions.

Unintended actions errors are the errors that happen accidentally and usually occur in tasks which are so frequently carried out that they become automatic. These errors are classified into slips and memory lapses errors. These errors are eliminated only by improving the design ensuring that components can only be fitted in the correct manner or allowing errors to be detected and corrected before any adverse consequences occur.

On the other hand, the Intended actions errors are classified into mistakes and violations categories. Mistakes are situations where, despite a genuine attempt to comply with procedures, an error of judgement leads to an inappropriate rule being applied or a step in a procedure being done out of sequence [3]. Therefore, this category contains the roles and knowledge based mistakes, which can be eliminated by improving the training, supervision and the quality of procedural documentation.

Violations are the non-compliance error that occurs when an individual or individuals deliberately contravene established and known rules [5]. Routines, exceptional and acts of sabotage are the main elements of the violations errors, which can be addressed by ensuring that crew do not perceive the benefits of non-compliance to be greater than any adverse consequences. [5].

The distinctions between the error types are presented in Fig. (2).

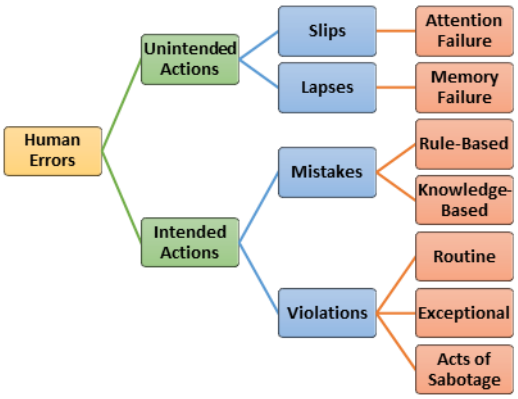

Figure 2: The distinctions between the error types [6]

1.4 Step-by-step approach for Analytical Investigation of Marine Accidents

A step-by-step approach is an effective method to describe events lead to accident or incident. A graphical presentation of the events starting from the time of the start event "t-start" to the time of accident "t-end" is usually conducted for this approach. The mechanism of this method bases on going back from the t-end to the t-start point and investigate about the status, performance and position of each actor.

Step-by-step method used to provide an overview of the circumstances in which an incident or event has occurred, which can help to understand exactly what has happened and investigate evidences from multiple sources or witnesses.

II. CASE STUDY: OIL TANKER AND CARGO SHIP COLLISION

2.1 Summary:

On July 24, 2017, at 11:09 am, the cargo ship "Unison Star" collided with Kuwaiti oil tanker "Kaifan", while Kaifan was in the Chittagong - Bangladesh anchorage area. The collision caused hull damage for both ships with no injuries and pollution.

In this case study, a Step-by-Step approach is used to sort events prior to ship collision is timely bases. Then a detailed analysis of each event taking into consideration identifying the followings:

- Individuals involved from each party and their job details
- Actions taken by each party
- Analysis of action taken into considering who gave the action and who performed the action.

Then the events are presented as a story of time based action to investigate the error and mistakes happened and the concerned evident for each of them.

2.2 Chittagong – Bangladesh Port:

The Port of Chittagong is the principal Port of the People's Republic of Bangladesh. It is situated on the right bank of the river Karnafuli at a distance of about nine nautical miles from the shore line of the Bay of Bengal. River Karnafuli rising in the Lushai Hill falls in the Bay of Bengal after taking a winding course of 120 nautical miles through the districts of Chittagong Hill Tracts and Chittagong.

Fig. (3), illustrates a descriptive map of Chittagong – Bangladesh Port [7].

Figure 3: Chittagong – Bangladesh Port [7]

Chittagong – Bangladesh Port has the followings general polices for ships to enter the port [7]:

- The maximum permissible draft for entering and leaving Chittagong Port is 9.50 m.
- The maximum permissible length for entering Chittagong Port is 190 m.
- The maximum permissible entry length for night navigation is 170 m.
- The maximum permissible draft for Main Jetty areas are:

- Jetty No.2 to Jetty No.4: up to 7.5 m
- Jetty No. 5 to Jetty No. 13: 8.55 m

2.2.1 Overview of Chittagong Outer Anchorage

Chittagong anchorage zone is very active and densely populated. Therefore, the anchorage presents many navigational challenges as vessels wait to berth or undertake cargo operations with lightering vessels.

Most collisions in the Chittagong anchorage result from maneuvering vessels failing to take account of the variability and strength of the tide and currents, leading to contact between anchored and embarking vessels. Therefore, ships masters should be cognizant of these conditions when entering and leaving the port [8]. Moreover, special concern should be taken to the weather and sea conditions.

Anchoring at Chittagong port need well skilled and knowledgeable crews familiar with port operating polices.

2.2.2 Operational Guidelines and Policies for Chittagong Outer Anchorage

The risk of collision at anchorages outside the port of Chittagong, Bangladesh, has recently increased mainly due to strong spring/flood/monsoon tides and silted shallows [8]. Anchorage in outside the Chittagong port is ship captain responsibility, therefore, Chittagong port

authority issued the following recommendations for master anchoring at Chittagong anchorage & entering harbor [9]:

1) Anchor at a safe distance from other vessels at anchor.
2) If the under keel clearance is less than two meters there is a possibility to the anchor to be dragged. This is more prominent during spring tides and during monsoons. The tide can be as strong as 6 to 7 knots. The chance of dragging anchor increased if the ship is lightering with other vessels alongside.
3) As a precaution use more chains, keep your engine standby all the times and keep the nos. of lighter vessel alongside to minimum.
4) Keep a good anti-theft lookout and employ watchmen onboard.
5) Ship Master must note that strong tidal condition prevail at outer anchorage and utmost care must be taken while maneuvering anchoring or heaving up anchors.
6) Crossing of bow at close range shall never be attempted.
7) All vessels within Port Limit shall strictly comply with existing Port Rules.
8) Ship Masters approaching Chittagong Road are advised not to attempt to cross the bow of vessels at anchor/underway to avoid drifting on them resulting probable collision in view of the prevailing strong current at outer anchorage. However, if it is inevitable to cross, Ship Master may do so with caution by giving wider berth to the vessels at anchor/underway considering the minimum velocity of the current being 6 Knots and other marine factors.
9) Deep draught vessels lightering at Alpha anchorage shall shift to Bravo or Charlie when they attain required draughts to make room for safe anchoring of newly arrived deep draft vessels.
10) Vessel must have at least 16 rope for safe berthing. Tanker vessel having wire rope must have at least 4 polypropylene rope.
11) To facilitate smooth operation, at berth master of mother vessel must allow lighter tanker/fresh water barge to stay alongside as required by Harbor Master office.
12) Vessel should have at least 0.20 m by stern trim for channel navigation to get good steering effect.
13) While at anchor never keep any loose mooring Rope/gear on deck.
14) Ship Master must not anchor their vessels near theriverentrance"PROHIBITEDANCHORAGE".
15) Ship Master must maneuver with great care while embarking or disembarking Pilots.

2.3 Ships Data:

2.3.1 Kaifan Oil Tanker:

The details of Kiafan oil tanker are given in Table (1) and Kiafan's photo is illustrated in Fig. (4).

Table 1: Kiafan Oil Tanker main data

Ship's Name	Kaifan
IMO number	9656046
Ship's Type	Oil tanker
Date delivered	Jul 24, 2014
Flag:	Kuwait / Kuwait
Length over all	186 m
Beam	32 m
Depth	18.5 m

Figure 4: Kiafan Oil Tanker [10]

2.3.2 Unison Star Bulk Carrier:

The details of Unison Star Cargo ship are given in Table (2) and Unison Star's photo is illustrated in Fig. (5).

Table 2: Unison Star Cargo ship main data

Ship's Name	M/V UNISON STAR
IMO number	9579391
Ship's Type	Bulk carrier
Date delivered	2011
Flag:	Hong Kong SAR
Length over all	189 m
Beam	30 m
Depth	15 m

Figure 5: Unison Star Cargo ship [11]

2.4 Kuwait Oil Tankers Company "KOTC" Regulations and Policies

The regulations and policies of KOTC states that all KOTC's tankers have fully comply with the policies of the concerned port authorities for anchorage operation. This is include the selection of the anchorage area and the precautions, recommendations and instructions.

2.5 Collision Detailed Time Events:

- **23 July 2017 (10:00am):** KOTC'S Kiafan oil tanker arrived at Kotopia's - Bangladesh anchorage area to unload a shipment consists of gasoline oil and aviation fuel oil. Unloading operation scheduled to be in three stages, where Kiafan oil tanker will unload part of the shipment to small ship in each stage.
- **23 July 2017 (01:00pm):** KOTC'S Kiafan oil tanker anchored at Alfa birth - Chittagong – Bangladesh. As per the regulation of Chittagong – Bangladesh, the anchorage position is decided by the ship captain.
- **23 July 2017 (12:00pm):** successfully completed the first unloading operation of the shipment to small port tanker.
- **24 July 2017 (04:48am):** successfully completed the second unloading operation of the shipment to small port tanker.
- **24 July 2017:**

- **08:00am:** Kiafan's third officer started his shift accompanied by a qualified sailor who was on duty at the bridge. At this time, a bulk carrier ship "Blue Lotus" anchored with a distance of 4.6 Nutical Mile from Kiafan. At 09:00 am Kiafan's captain went to the bridge for daily office work and check. This is comply with the recommendation of the Chittagong Port Authority "CPA" to keep monitoring the ship all the time once it is in the anchorage area and register any observation.
- **10:49am:** Kiafan's bridge sailor observed that a ship "Unison Star bulk carrier" entered to the anchorage area for anchoring with a speed of 4.9 knots. Unison Star was approaching the Blue Lotus in a precarious situation. Therefore, Kiafan's bridge sailor informed both the ship captain and the third officer that the two ships Unison Star and Blue Lotus had been very close in a precarious situation, which had witnessed the rapprochement situation. Accordingly, Kiafan's third officer called Blue Lotus ship to raise their attention regarding to the situation. Kiafan's captain thought that it is not a dangerous situation as Unison Star has full control on the ship engine and are aware of the area and regulations, so there is no risk on Kiafan. Therefore, the action taken only to observe the rout of the Unison Star on the radar.

⇨ **Associate Human Error:**

- Unison Star entered the anchorage area with relatively high speed which is against CPA polices to enter in low speed and anchorage at safe distance from other vessels.
- Kiafan's Captain limited the risk which may affect the tanker based on general conclusions that ships working in this region are familiar and aware of the regulations and have the experience in entering such areas.

- **11:04am:** Kiafan's bridge sailor and third officer observed that Unison Star began to retreat away from the Blue Lotus mainly due to water current effect (4.1 knots) and began to swing sharply towards the starboard direction, where it highly affected by the current in the horizontal direction. The Unison Star was on a 322o course and was running at 5.5 knots and Kaifan direction was 166.3o and the sea current was 4.1 knots as indicated in Fig. (6).

⇨ **Associate Human Error:**

- Unison Star did not consider /estimate the high effect of water current in this area.

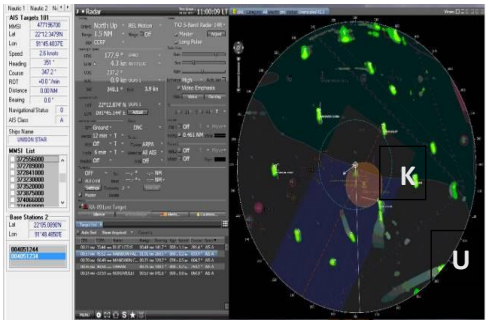

Figure 6: Radar Location of Kiafan's "K" and Unison Star "U" (24 July 2017: 11:05) [12]

- **11:06am:** Unison Star begun to drift towards the Kiafan. Accordingly, Kiafan third officer called Unison Star via radio call but no answer. The third officer informed the captain who informed the crew about the approaching of Unison Star carrier and tried to make call Unison Star using the maritime radio but no response received. Therefore, the captain called the port authority to inform them and report the situation.

⇨ **Associate Human Error:**

- Unison Star did not response to Kiafan calls in order to clarify its situation.

- **11:08am:** Kiafan's Captain contacted the Unison Star ship using maritime radio and requested them to operate their engine at full speed in the forward direction to avoid approaching collision situation. Unison Star responded by using their half the speed (medium speed), which caused Unison Star to move quickly towards the Kiafan. At this

situation, Kiafan third officer recommended to move back to avoid direct collision and accordingly Kiafan captain ordered to move back slowly, then increased the speed of the main engine to move half its power towards the rear after 30 seconds.

⇨ **Associate Human Error:**

- Unison Star response to Kiafan radio directions. This clarify that they were able to receive the calls but they did not answer. Moreover, they did not response to the requested action by Kiafan to avoid the collision.
- Kiafan Tanker: bad evaluation of the situation led to delay in taking actions toward moving the tanker in full speed to the rear direction. This clarify the effect of experience in dealing with such situations.

– **11:09am:** the Unison Star was approximately 1.0 nautical miles from the front of Kiafan tanker. Kiafan's captain realized that the collision was imminent, therefore he triggered the alarm and announced the possibility of collision. The collision happened at the left rear of the Unison and up to midway with the front of the Kiafan as indicated in Fig. (7).

⇨ **Associate Human Error:**

- Unison Star: loss of ship control due to lack of experience and violation of port authority polices, where it is clearly indicated that crossing of bow at close range shall never be attempted.

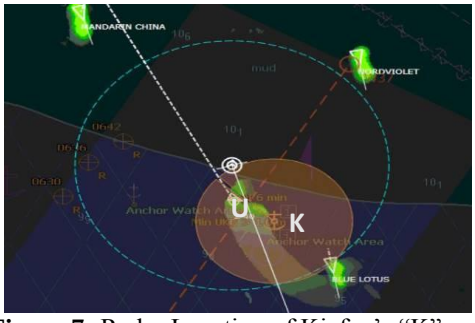

Figure 7: Radar Location of Kiafan's "K" and Unison Star "U" (24 July 2017: 11:10) [12]

2.6 Post-collision events:

- **11:11 am:** Unison Star continued to swing in the direction of the starboard. The Unison Star was at 138o and 1.5 knots, while the Kaifan was at 148o and 1.7 knots in the rear direction and continued to move back with full engine power.
- **11:12 am**: Unison Star stopped to swing to the starboard direction. At the same time, Kaifan's engine stopped working
- **11:14 am:** Unison Star was unable to separate from Kaifan and was not moving as Kaifan's anchor chain turned around Unison Star propeller
- **11:21 am:** Kaifan started to move backwards using half engine speed
- **11:23 am**: Kaifan stopped its engine as the rear of Unison Star was stuck on the port side of Kaifan.
- **11:26 am:** the Kaifan engine turned on its engine again to operate half the engine power towards the rear. Kaifan's captain tried to contact the Unison Star using the maritime radio but with no respond. Kiafan's captain was trying to move away from Unison Star to avoid any impact from the uncontrolled swing of Unison Star, which may increase the damage and affect the ship stability.
- **11:47 am**: Kiafan's moved forward with maximum capacity and keeping its steering wheel towards the far right. This caused Unison Star to come close to Kiafan from front port side and suspend to Kiafan. Then, it separated due to the forward movement of Kiafan and became far from Kiafan by a distance. Therefore, Kiafan reduced it speed to half of the full ahead speed. Unison Star confirmed no control on ship engine as they lost the propeller and they are no longer using the main engine. Therefore, Kiafan moved to another safe location (12:47).

⇨ **Associate Human Error:**

- Actions taken by both ships to be apart clearly show the lack of experience of both crews in dealing with emergency situations.

Fig. (8), shows a sketch diagram to the main collision time. The Figure illustrate the first possible collision between Unison Star and Blue Lotus, which not happened, and the collision events between Unison Star and Kiafan.

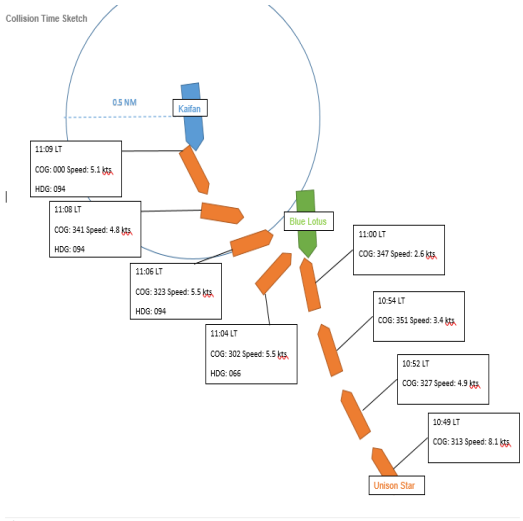

Figure 8: Illustration Sketch for Unison Star Collision Scenarios [12]

2.7 Consequences of Collision:

The collision caused hull damage for both ships with no injuries and pollution. Beside the hull damage, Unison Star lost the main propeller and extensive maintenance needed to the main propulsion system. The detailed report of the damages caused by the collision to Kiafan oil tanker indicates the followings [Ref. Report]:

- Structural Damages include:
  - Shell plates damage and members deformed at forward starboard side
  - Shell plates damage and members deformed at bulbous bow
  - Three tie guard rails deformed and broken, emergency embarkation light post damaged, windless compressor damaged at fore castle deck and forward at starboard side
  - Shell plates damage at wing tank starboard side
  - Shell plates damage at wing tank port side
  - Shell plates damage at wing tank port side
  - Ship side shell plates damage at pot quarter Webs, side longitudinal and transverse frame deformed at steering gear room at port side
  - Aft bulkhead, web frames and scupper pipe deformed at engine room internals of port side shell plate
- 12 shackles of port anchor chain lost to sea
- The location of collision damages to Kiafan at forward port and starboard sides are illustrated in Fig. (9).

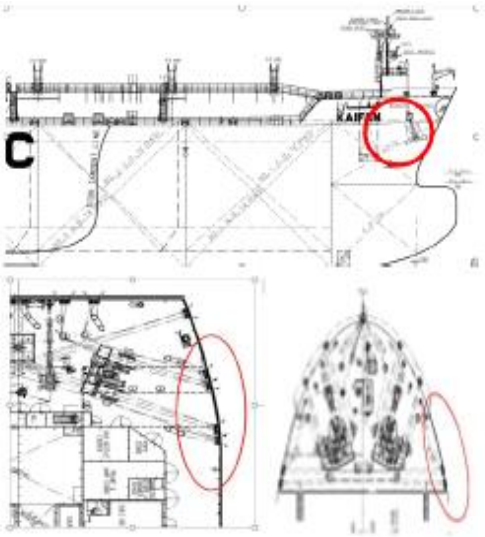

Figure 9: Locations of Kiafan's Hull Damages due to Collision [13]

III. INVESTIGATION OF HUMAN ERRORS AS MAIN CAUSES FOR THE CASE STUDY COLLISION

3.1 Kiafan's Crew information:

The followings facts need to be taken into consideration before conducting detailed investigation of the causes of the case study accident:

- **Crew data:**
  - Total number of crew: 32
  - Nationalities of Crew: 8 Nationalities, include: Kuwaiti, Indian, Egyptian, Bulgarian, Lebanese, Polish, Yemenite and Filipino
  - Language used on board the tanker is English

- **Kiafan's Captain:**
  - Age / Nationality: 39-year-old / Indian
  - Captain since 2015 with overall 44 months experience as captain. He assigned as Kiafan's Captain in 22 June 2017 (one month before the accident)

- **Kiafan's Third Officer:**
  - Age / Nationality:24-year-old / Kuwaiti
  - Joined KOTC since 2009
  - Joined Kiafan since April 2017 (two and a half months) and it was his first trip as navigation watch keeping officer

- **Kiafan's Bridge Sailor:**
  - Age / Nationality: 45 year-old / Filipino
  - Joined KOTC since April 2016
  - Joined Kiafan since April 2017

3.2 Accident – Human Error Investigation:

As per the illustrated events of the accident and the investigation report, the main cause of the accident was the completely loss of control on Unison Star to avoid colliding with a Blue Lotus ship, which caused drifting of Unison Star towards Kiafan oil tanker. However, the details of the accident clearly show the effect of human error in term of lack of experiences and knowledge in managing such situation from both ships, which highly affected by the short time window of the accident. Moreover, the dispersion and absence of control of the Chittagong port authority contributed as main factor for this accident. In line with the main Human Errors categories presented in Figure 2, the analysis of the case study collision show:

- **Unintended Actions** attended to collision. These errors represented by:
  - No situational awareness and dispersion in dealing with the situation for both ships.

- **Intended Actions** – Mistakes attended to collision. These mistakes are represented by:
  - The only way to avoid collision was using the ship identification system, which also interferes with the electronic mapping system. The radar provides early assessment of the position where collision can be avoidance. Kiafan's used as used radar system when Unison Star was about 2 nautical miles away. It was too late.

- No significant attempt to avoid collisions was taken by Kaifan's Captain when Unison Star was in close proximity to Blue Lotus. However, the action taken to move Kiafan backward was too late.
- Non-compliance of Unison Star with company and navigation procedures for approaching anchorage area.

- **Intended Actions** – Violations attended to collision. These errors represented by:
- Violation of Union Star to CPA polices regarding to the entrance of the anchorage area, high risk of tidal current speed in the anchorage area and crossing of bow at close range
- No response of Union Star to Kiafan radio calls.

3.3 Accident – KOTC Corrective Actions:

- In order to eliminate the human error and its effect in operation, KOTC "owner of Kiafan oil tanker" issued the followings corrective actions:
- Review the emergency response procedures for anchor operation and clarify all the possible emergency situation to crew
- Review and update the company senior officers assessment and upgrading system to have more focus in leadership and control competencies.
- Consider registering Kiafan captain in an effective leadership and management course
- Consider offering courses for crew management at emergency situations to ensure efficient utilization of crew
- Consider contracting with third party to unload KOTC charge from oil at Cotubidia port instead of anchorage area of Chittagong, which will reduce the risk during the unloading process, especially during seasonable wind times where the maximum impact of the current occurs.

IV. LESSONS LEARNT AND RECOMMENDATIONS

The followings are lessons learnt from the presented collision case study:

4.1 Shipping Companies:

As indicated from the profile of associate ship's crew profile, shipping companies should seriously consider the experience of the captain and crew when working is high risk areas. Captain should accompanied with expert crew when assigned to work in such area for the first time. This will:

- Reduce the risk of bad judgment
- Reduce personal judgment based on personal experience
- Familiarize the crew and assist in building the knowledge and experience of crew

Moreover, working is high risk areas need continuously review the emergency response procedures of these areas and ensure the awareness and knowledge of all the concerned crew. Training courses and well established emergency and operation guidelines for high risk areas will assist in reducing human errors.

4.2 Chittagong Anchorage Area / High Risk Navigation Areas:

As indicated, Chittagong anchorage zone is very active and densely populated. To reduce risk of collision specifically due to human error in such high risk areas, the followings are recommended:

- Bridge watch should be continuously maintained, and a vessel's position accurately monitored.
- Close monitoring of the position of the surrounding vessels
- Main engines should always be on standby
- Windlasses should be kept ready with available power to raise the anchor quickly at short notice.
- Anchor chains should not be over-extended, to avoid the swinging of the vessel over a greater-than-normal arc, increasing the risk of collision.

- Contact should be maintained with the Port Authority to view the latest advisories and updates regarding tide, current and wind conditions.

V. CONCLUSION

The collision case study shows that instead of the modern hull design, efficient ship systems and utilization of high technologically equipment, collision still can occur due to human error. Human error contributes to the vast majority of marine accidents and concerned casualties, making the prevention of human error of paramount importance to reduce the number of marine accidents and its severity.

There are many factors affecting the occurrence of Human errors. Most of these errors tend to occur as a result of technologies, working environments and organizational factors which do not sufficiently consider the abilities and limitations of the people who must interact with them. Therefore, human errors could be reduced significantly by taking more concern about improving quality of crew training and capabilities development programs, implementing regulations to control human error.

Shipping companies should consider having experts and knowledgeable crew members when working in high collision risk areas. Review of the operation and emergency polices and guideline of such areas are essential. Therefore, ship captain should ensure the awareness of the crew of these polices. Moreover, ships are advised to maintain

contact with port authorities to be updated regarding to the sea and weather conditions, to report any incidents and to get advised and recommendations once needed.

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