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Suggestions for Shipping Companies on Tackling the Deteriorating Natural Condition

by

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Abstract

The shipping industry, which is inherently subject to nature, has suffered from nature-related accidents more frequently in the past 15 years. The deteriorating natural conditions are threatening shipping reliability, leading to cargo loss, vessel damage, and the like. Therefore, we would like to look into how shipping companies should deal with the deteriorating natural conditions, helping them with shipping reliability in this paper. To answer the main question, we firstly review the literature to determine the deteriorating natural event to be focused on - storms as they are the most relevant to the shipping companies. With the literature, we also determine five measured dimensions and corresponding criteria that shipping companies should meet in storms to guarantee shipping reliability. With the criteria, we conclude that the ideal situation should meet all these criteria. Then we conduct case studies and interviews to build up the current situation, revolving around the criteria. Next, we carry out a gap analysis, finding different extents of gaps between the ideal and current situation regarding the criteria and the possible issues behind the gaps. With the possible issues identified, we provide the corresponding suggestions for shipping companies: (1) prioritizing the gaps with the highest severity; (2) cooperative R&D investments of leading shipping companies; (3) initiative inquiries about weather information at a fixed interval & recording the inquiries in logbooks; (4) investments in local weather infrastructure by leading shipping companies; (5) setting up an obligatory company rule of sending planned routes to head offices for approval; (6) launching aid programs; (7) involving at least two operational members in training for the specific voyage; (8) having a meeting with the last batch of the ship crew before departure; (9) specialized training for bad weather.

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Chapter 1. Introduction

1.1. Background

According to the World Meteorological Organization (WMO) (2021b), the global environment worsens year by year. The greenhouse gas concentration, the global temperature, and the sea level have all risen rapidly and reached a new record high from 2019 to 2021 (WMO, 2021b). Meanwhile, various types of natural disasters have increasingly occurred across the globe, for example, tropical cyclones, hurricanes, and flooding (Müller et al., 2020). It is reported that there have been 11,072 disasters in the past 50 years (1970 – 2019), accompanied by over two million deaths and economic losses of $3.6 trillion (WMO, 2021a). The overall pattern of natural disaster events in the past 50 years is increasing and will not be seasonal anymore (AGCS, 2021; WMO, 2021a).

For shipping companies, their shipping performance is affected by nature inherently. The nature-related accidents have continuously increased over the previous 15 years, resulting in cargo loss, container loss, vessel damage, and the like and accounting for over 30% of all vessel losses (Nautilusint, 2020). Especially in 2021 when the wind magnitude was unexpectedly fierce, the Central Union of Marine Underwriter (CEFOR) (2021) points out that the average claim fee due to heavy weather soared by over 100% to an unprecedented level of around $1,250,000.

The deteriorating natural conditions have been threatening shipping companies' reliability, stopping them from finishing shipments on time in full without damages. As Maritime Economics and Logistics students, our attention has also been drawn by this rapidly growing situation. This paper aims to provide recommendations on dealing with the deteriorating natural conditions for shipping companies worldwide, helping them with shipping reliability.

1.2. Main Question & Sub-questions

MQ: How should shipping companies deal with the deteriorating natural conditions to guarantee shipping reliability?

SQ 1: What natural conditions to focus on?

SQ 2: What is the ideal situation of shipping reliability in terms of the focused natural conditions?

SQ 3: What is the current situation of shipping reliability in terms of the focused natural conditions?

SQ 4: What are the gaps between the ideal and current situations of shipping reliability in terms of the focused natural conditions?

SQ 5: What can be the solutions to closing the gaps?

SQ 6: What are the strengths and weaknesses of the solutions?

1.3. Structure

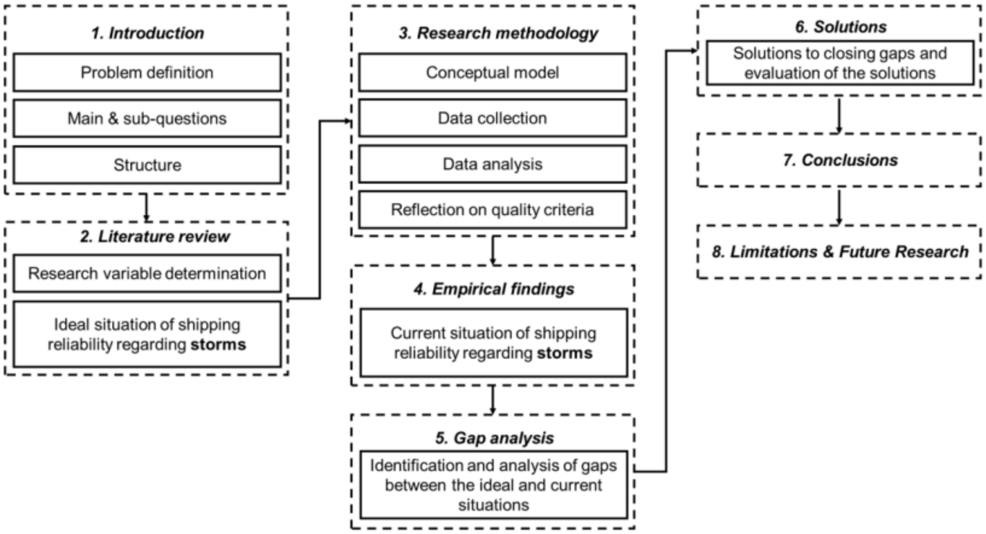


Figure 1: Research framework

As Figure 1 depicts, this paper is structured as follows:

Chapter 1 introduces the background of the paper topic to justify our topic selection and formulates sub-questions to answer the main questions.

Chapter 2 is a literature review responding to SQ 1 and SQ 2. We first define the keyword of our topic - shipping reliability in this chapter to ensure all the readers are on the same page. Then we identify factors affecting shipping reliability, proving the necessity of focusing our paper on natural conditions for shipping reliability. Next, we zoom further into specific natural events and select the one relevant to shipping reliability. The last point of this chapter is to set up the ideal situation of shipping reliability in terms of the focused natural event.

Chapter 3 shows how the research is designed, and the approaches applied to answer the sub-questions. One of the approaches is case studies, which are for studying the current situation, so we also determine and justify which cases to investigate in this chapter.

Chapter 4 is for SQ 3. It is the empirical findings of the current situation of shipping reliability in terms of the focused natural event.

Chapter 5 answers SQ 4. Here we identify and analyze the gaps between the ideal and actual situations.

Chapter 6 answers SQ5 and SQ6. Based on the gaps identified in Chapter 5, we come up with corresponding solutions to closing the gaps and also evaluate the solutions indicating what the shipping companies need to watch out for when they decide to implement such a solution.

Chapter 7 concludes this paper and answers the main question.

Chapter 8 points out some limitations in this paper and areas for further research.

Chapter 2. Literature Review

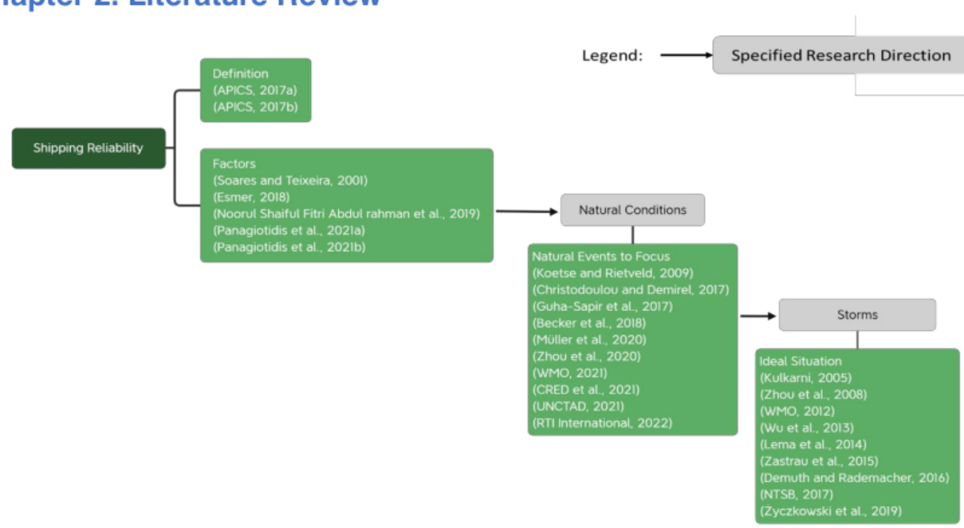


Figure 2: Literature relevance tree

The literature relevance tree is created in Figure 2. This literature review includes four parts. Section 2.1 is to define shipping reliability, ensuring that the readers have the same understanding as we do. Section 2.2 elaborates with theoretical support on why we would like to look into natural conditions in this paper. Section 2.3 aims to delimit this research further in terms of natural condition. Lastly, Section 2.4 sets up the ideal situation regarding focused natural condition – storms.

2.1. Definition of Shipping Reliability

The Supply Chain Operations Reference Model (SCOR) is a technique for assessing supply chain activities and performance (APICS, 2017b). The model measures the supply chain performance from five dimensions at a strategic level: reliability, responsiveness, agility, costs, and assets (APICS, 2017b). Shipping reliability in this paper follows the concept of reliability in this model, which can be defined as delivering correct goods on time, at the right place, and with the correct quantity and no damage (APICS, 2017b; APICS, 2017a).

2.2. Factors Affecting Shipping Reliability

In Soares and Teixeira's research (2001), they categorize four types of major risks in sea transportation during 1987 and 1997, which are fire and explosion, collision, stranding, and foundering. The first three risk types were mainly caused by human errors, while the foundering was due to technical issues (Soares and Teixeira, 2001). At that time, human errors were estimated to account for 80% of shipping accidents (Soares and Teixeira, 2001).

Coming to recent years, Esmer studies the factors influencing sea shipping. He had interviews with 24 experts in the shipping industry (Esmer, 2018). Half of the experts are ship operators, and the other half are terminal operators (Esmer, 2018). Esmer (2018) collects nine factors and ranks their importance from high to low according to the interviews: (1) cybersecurity threat, (2) industrial digitalization transformation, (3) climate change, (4) disruptive innovation, (5) political imbalances and policies, (6) evolution of business frameworks, (7) localization, (8) urbanization, and (9) aging. The overall result shows that cybersecurity threat, industrial digitalization transformation, and climate change are considered the most influential factors to sea shipping with importance weights of 24.1%, 22.3%, and 17.5%, respectively (Esmer, 2018). Nevertheless, there is a slight difference in the importance ranking of the top three factors, where the terminal operators attach more importance to climate change than ship operators (Esmer, 2018).

In another research studying factors causing delayed port operations at a Malaysian port, Sanusi et al. (2019) also conducted interviews with seven experts in the shipping industry. The researchers summarize a series of factors from the interviews. The top three factors are incompetent equipment, bad weather conditions, and safety issues with percentages of

26.6%, 26.2%, and 23.7%, respectively (Sanusi et al., 2019). It is noted that this article is port-related, but we consider it worthy of reference because shipping and port performance are connected closely.

Panagiotidis et al. (2021b) carried out quantitative research in 2021, analyzing the causes of 249 shipping accidents from 1983 to 2020. The accident causes are divided into five categories, namely collision (22.1%), fire and explosion (20.5%), stranding (16.5%), adverse weather (8.4%), and others (32.5%) (Panagiotidis et al., 2021b). Besides, the attached dataset of the research indicates that six accidents resulted from adverse weather from 1983 to 2005, whereas there were 15 weather-related accidents between 2005 and 2020 (Panagiotidis et al., 2021a).

The literature above has shown that, in the early years, human factors played a much more important role in sea transportation than natural conditions. In Soares and Teixeira's research, we cannot even find a trace of natural conditions. However, in recent years, natural conditions have started grabbing attention, no matter based on the subjective views of the experts or the data facts of the accidents. Especially the doubled accidents due to weather conditions speak the most straightforward. The weather forecasting technologies keep advancing, but the weather-related accidents increase tremendously, implying the natural conditions are worsening. Thus, natural conditions are worth being investigated.

2.3. Natural Events to Focus

Natural conditions deteriorate and present as natural disasters in many forms. This part is to determine specific natural disasters related to sea shipping to research.

In the Annual Disaster Statistical Review 2016, Guha-Sapir et al. (2017) present the natural disaster classification sourced from the International Disaster Database (EM-DAT) (Figure 3). In 2021, WMO reviewed EM-DAT. The natural disaster classification remained the same. Nevertheless, fog, glacial lake outburst, and wave action have been suppressed (WMO, 2021a).

Geophysical	Hydrological	Meteorological
• Earthquake • Mass movement • Volcano	• Flood • Landslide • Wave action	• Storm • Extreme temperature • Fog
Climatological	**Biological**	**Extra-terrestrial**
• Drought • Glacial lake outburst • Wildfire	• Animal accident • Epidemic • Insect infestation	• Impact • Space weather

Figure 3: Natural disaster classification (Guha-Sapir et al., 2017)

Guha-Sapir et al. (2017) indicate that in 2016, hydrological and meteorological disasters occurred the most, specifically, 164 floods and 83 storms. Three years later, Müller et al. (2020) confirmed again that hydrological and meteorological disasters played a major role in the past 20 years. In 2020, the occurrence of floods and storms even increased to 201 times and 127, respectively (CRED et al., 2021).

According to Zhou et al. (2020), ship behaviour is affected by wind and currents. Linked to the impact of wind and current on ship behaviour and considering the frequency of natural disasters, storms and floods are most likely to affect shipping reliability. Besides, the impact of wind can grow as the vessel size increases (Zhou et al., 2020). The phenomenon of increasing vessel size to achieve economies of scale can aggravate the impact of storms on shipping reliability (UNCTAD, 2021).

However, later literature shows that the impact of floods is concentrated in the coastal areas (Christodoulou and Demirel, 2017; Koetse and Rietveld, 2009). Storm surges will increase the sea level, leading to higher flooding risks at ports (RTI International, 2022). The higher flooding risks can deteriorate the risk of port damages and disruptions (RTI International, 2022). For example, the closure of Paranaguá Port due to flooding and landslides in 2008 and the damages to the UK ports between 2013 – 2014 due to winter floods (Becker et al., 2018). The floods affect shipping reliability via disrupted operations at ports. Considering that our paper is based on shipping companies' point of view while dealing with floods requires more effort to port infrastructure, planning, management, etc, on which shipping companies have limited influence, we have decided not to focus on floods. Unlike floods, storms can impact both port and shipping operations (RTI International, 2022). The latter allows shipping companies to take more actions for shipping reliability. Thus, we determine storms as the specific direction to research for shipping reliability.

2.4. Ideal Situation

Reaching 100% reliability is what shipping companies always strive for. However, instead of saying a number, we conceive the ideal situation by looking into the key elements that compose the optimal realibility in terms of storms.

In coping with storms, an inevitable topic is weather forecasting. WMO encourages the use of ensemble forecasting (WMO, 2012). The basic logic behind the model is that instead of relying on a single forecast, ensemble forecasting runs with slightly different inputs multiple times (WMO, 2012). The individual forecasts are ensemble members. Considering the deviation among the ensemble members and the proportion of the members that forecast an abnormal event, people can quantify the forecast uncertainty and predict the likelihood of the event (WMO, 2012).

Even after years, discussion about weather forecasting has never left away from studies about shipping, and the timeliness of data input is repeated all the time (Demuth and Rademacher, 2016; NTSB, 2017; Zastrau et al., 2015; Życzkowski et al., 2019). Zastrau et al. (2015) state that 40% of cargo delays mainly result from uncertainties in the weather forecasts of wind and waves. Besides forecasting itself, Demuth and Rademacher (2016) also stress the necessity of information coordination from the national level down to the operational level for forecasting in terms of IT systems, communication strategies, etc. Życzkowski et al. (2019) discuss weather forecasting from another angle, looking into the factors to be considered when choosing a specific weather service (see Table 1).

• Geographical scope
• Availability of relevant data for the considered region
• Access fee for data (where applicable)
• Resolution of data occurrence
• Forecasting duration and frequency
• Data format
• Data source
• Reputation and experience of the weather service

Table 1: Factors to be considered for weather service selection (Życzkowski et al., 2019)

The emphasis on weather forecasting is relevant to its impact on ship routing optimization for the avoidance of extreme weather (Wu et al., 2013). In addition to routing optimization, backup routes are also critical to maintaining the stability of the routing network, thereby improving the packet delivery ratio (Zhou, M. et al., 2008).

Besides weather forecasting and routing, Kulkarni (2005) points out the necessity of building up standardized operational procedures for ship crews to avoid or behave properly in typhoons. The research of Lema et al. has also shown that in 128 weather-related ship accidents, about 44% of them encountered unprofessional behaviour and a lack of training (Lema et al., 2014).

In the investigation into the sinking of SS El Faro, which directly sailed into the trajectory of Hurricane Joaquin, the National Transportation Safety Board (NTSB) (2017) has summarized a series of actions that the involved shipping company should take to deal with similar situation (see Table 2).

• Standardizing the procedures of tackling limitations and fuel levels of crucial machines on board for extreme weather
• Standardizing the procedures of using all closures on a ship
• Preparing contingency plans, checklists, and instructions on board
• Training personnel to be familiar with the instructions and follow the contingency plans
• Regular review safety management system
• External inspection of the compliance of the safety systems with the international codes
• Proper climatic monitoring equipment on board, e.g., barographs and anemometers
• Formalizing the process for weather routing, passage-planning assistance, and monitoring ship position
• Regular training for the deck crew to master the weather systems on board and fully understand the information provided
• Training senior personnel in damage response and operational process

Table 2: Actions to be taken (NTSB, 2017)

By reviewing the literature, we can categorize the measures contributing to the ideal situation of shipping reliability regarding storms into weather forecasting, routing, onboard procedure, personnel training, inspection, and climatic monitoring equipment. Among these measures, we have identified the most relevant ones to build up the ideal situation of shipping reliability regarding storms. Weather forecasting is the most frequently mentioned, which reflects its importance to shipping reliability. Routing is the second most frequently mentioned word and is highly relevant to weather forecasting. Nevertheless, these two elements mainly play a role in the pre-voyage phase. During a voyage, the monitoring equipment provides more real-time and imperceptible changes at sea. Also, clear instructions, standardized emergency procedures, and the ship crew's response to storms determine the extent of shipping reliability the ship can perform, so the onboard procedures and personnel training are crucial. Inspections are indispensable in any case, not only in the case of storms. Therefore, inspections are important but not as highly relevant to storms as the other measures discussed above. To conclude, an ideal situation of shipping reliability in terms of storms is set up as follows based on the literature:

- **Weather forecasting**: The most straightforward standard for weather forecasting is to be accurate and timely. Smooth information coordination among the involved forecasting parties and selecting a capable weather service agency may help acheve the standard.

- **Routing**: The shipping companies should be able to make the optimal route based on weather forecasting to avoid storms. Passage-planning assistance should be in place for the planner to have sufficient information to recognize the hazards in the voyage. Also, ship position monitoring is necessary to save time for rescue. Furthermore, when a ship gets warned of a storm, there should be backup routes. Nevertheless, for any routing operations we mentioned here, the shipping companies should make formal processes for them to ensure each ship gets equal security.

- **Onboard procedure:** To respond to storms without panic, clear instructions and standardized emergency procedures should be provided to reduce waste of time and material losses.

- **Personnel training**: Ideally, the training should cover all levels of personnel. The ship crew should be able to follow the instructions and the contingency plans, use the weather systems on board, and understand the weather information provided. Besides, the senior people should be clear about the operational processes.

- **Climatic monitoring equipment**: Equipment such as barographs and anemometers to assess the weather situation at sea is indispensable and should be installed properly on a ship.

We have also converted the text above into a checklist, which shows that the ideal situation should meet all the criteria in Table 3.

Measured dimensions	Specific criteria	Ideal situation
Weather forecasting	**Accurate**	Good
	Timely	Good
Routing	**Weather routing**	Good
	Passage-planning assistance	Good
	Ship position monitoring	Good
	Backup routing	Good
	Formalized routing processes	Good
Onboard procedures	**Clear instructions for emergencies**	Good
	Standardized emergency procedures	Good
Personnel training	**All levels of personnel included**	Good
	Capability of understanding of instructions and contingency plans	Good
	Capability of properly using weather systems onboard and weather information provided	Good
	Capability for senior personnel of understanding the operational processes	Good
Climate monitoring equipment	**Installation of climate monitoring equipment**	Good

Table 3: Ideal situation

Chapter 3. Methodology

3.1. Conceptual Model

Section 2.2 has proven that natural conditions can make an impact on shipping reliability, so natural conditions are the independent variable, and shipping reliability is the dependent variable. A mediating variable can explain the relationship between the independent variable. We choose storms as the mediating variable because they are the typical natural condition that can affect shipping reliability and that shipping companies can take action on, based on Section 2.3. Thus, we formulate the conceptual model as follows (Figure 4).

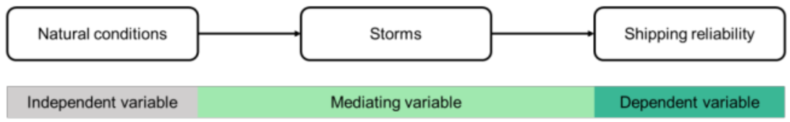


Figure 4: Conceptual model

3.2. Data Collection

We follow triangulation to collect data. Triangulation refers to applying multiple approaches and data sources to create a thorough understanding of facts (Carter et al., 2014). By sticking to triangulation, we can ensure the validity and reliability of this paper. To formulate a comprehensive picture of the current situation, we will do case studies. We have found six storm-relevant cases in the last ten years that are open to the public in International Maritime Organization (IMO) GISIS system (Table 4). We set the search duration as ten years to ensure the sufficiency of cases because the open reported cases for each year are limited. Also, a timeline of ten years allows us to see the evolution of shipping performance in storms, providing more dynamic insights. These cases occurred in Africa, Europe, and Asia, respectively, which means fewer geographical limitations on our paper. We will take the investigation reports in the GISIS system as our main source. Meanwhile, we plan to interview three professionals in the shipping industry to cross-check whether the information collected in the case studies is still up to date and whether we miss out on some important practical information. The identities of the three professionals can be ship masters and seafarers, depending on whom we can reach out to. Before starting the interviews, we will also provide the necessary information and our question list for the interviewees so that they have sufficient time to prepare their answers.

Year	Involved ship (IMO no.)
2018	MARINA (IMO 9369784)
2017	REAL (IMO 7130153)
2016	CITY (IMO 9281140)
2015	CEMFJORD (IMO 8403569)
2014	CAPE DURANGO (IMO 9449467)
2013	ALEKSEY KOSYGIN (IMO 9316127)

Table 4: Cases chosen (GISIS, n.d.)

3.3. Data Analysis

3.3.1. Case Studies

Based on Table 3, we develop an operationalization table (Table 5), focusing on the criteria regarding the five dimensions to analyze for the six cases.

Concept	Variable	Measured dimensions	Specific criteria	Indicator
Shipping reliability	Storms	Weather forecasting	Accurate	Green: good Red: problematic White: not applicable
			Timely	
		Routing	Weather routing	
			Passage-planning assistance	
			Ship position monitoring	
			Backup routing	
			Formalized routing processes	
		Onboard procedures	Clear instructions for emergencies	
			Standardized emergency procedures	
		Personnel training	All levels of personnel included	
			Capability of understanding of instructions and contingency plans	
			Capability of properly using weather systems onboard and weather information provided	
			Capability for senior personnel of understanding	

			the operational processes	
		Climate monitoring equipment	**Installation of climate monitoring equipment**	

Table 5: Operationalization table

3.3.2. Interviews

The interviews serve as a confirmation source for cross-checking whether the information collected in the case studies is still up to date and whether we miss out on some important practical information. In consideration of flexibility and orderliness, the interviews are semi-structured. We prepare a set of pre-determined questions and send them to the interviewees beforehand so that the interviewees can have sufficient time to prepare thoughtful answers. We have developed questions for the interviewees, as listed in Annex 1. As the interviews function as a cross-checking source for building up the current situation, we will conduct the interviews after studying the cases. The questions mainly revolve around the five measured dimensions: weather forecasting, routing, onboard procedures, personnel training, and climate monitoring equipment. Additionally, some questions about interviewees' roles in shipping, shipping terminology, and so on seem irrelevant to the five dimensions on the surface; however, in fact, they ensure that we do not miss out on practical shipping knowledge so that we can provide reasonable analysis and solutions at later stages.

3.4. Reflection on Quality Criteria

Validity: The literature review adopts 26 articles. Each module discussed in the literature has at least two articles to support it. The articles selected are the outcome of searching with keywords of the modules, which guarantees the relevance of the research variable determined and measures identified to the research topic. Besides, we provide an operationalization table indicating how we break down the research topic into specific criteria, which can prove the validity of this research. For desk research, we also apply keywords when searching. As to the field research, we make the interview questions based on the desk research on the cases for cross-checking, and the interviewees are all shipping professionals. With the triangulation and relevance to the paper ensured, this research is valid.

Reliability: This paper includes multiple information sources with AAOCC criteria considered. They are research journals, authoritative reports or documents, and interviews. In searching the secondary information, we apply Google Scholar, Elsevier, ResearchGate, WMO, GISIS, and so on. To guarantee the case size, we select six cases to study. One concern in this paper is the currency of the cases selected. Even though the selected cases are the most recent ones available on GISIS, the latest one was in 2018, so we will conduct interviews with three shipping professionals as the supplementary source to ensure that we get the up-to-date actual situation. Before the interviews, we will also send the interview questions to the interviewees so that they have sufficient time to prepare thoughtful answers. Additionally, we have a supervisor to review our work and confirm whether we are on the right track. Following the triangulation and the abovementioned steps, this research has high reliability.

Usability: The result of this paper will present in the form of recommendations. These recommendations aim to provide insights into dealing with the deteriorating natural conditions for shipping companies worldwide, helping them with shipping reliability. Over the entire research process, we apply plain and straightforward language to make our research understandable for readers.

Chapter 4. Empirical Findings

In this chapter, we start looking into the actual situation regarding storms by studying the six selected cases and conducting interviews.

4.1. Case Studies

4.1.1. Ship 1: Marina

(1) Event description: Marina is a cargo ship (JTSB, 2019). On September 30th, 2018, the vessel carried 12 crew members and was anchored in Yokohama, Keihin Port, Japan (JTSB, 2019). However, as Typhoon No. 24 approached, the ship tugged the anchor and was forced to sail northeast (JTSB, 2019). Finally, it collided with the seawall in Ogishima, Kawasaki area at around 01:47 (local time) on October 1st (JTSB, 2019). The ship got dents and some other damage to her starboard stern. So did the seawall (JTSB, 2019). No one got injured (JTSB, 2019).

- **Weather forecasting:** At 23:35 on September 29th, the Japan Meteorological Agency issued a typhoon alert for the northern area of Kanto. The warning was still in effect when the accident occurred (JTSB, 2019). Such a warning is announced when the Japan Meteorological Agency detects a phenomenon of the highest wind velocity due to a typhoon exceeding 64 knots or when the phenomenon is estimated to happen within 24 hours (JTSB, 2019). The data from the Yokohama Local Meteorological Observatory, which is located three nautical miles west of the anchorage, show that the wind began to strengthen at about 19:30 on September 30th (JTSB, 2019). The highest instantaneous wind velocity reached 35 m/s at about 00:00 on October 1st (JTSB, 2019). When the collision occurred, the near berth Toden-Ogishima LNG Berth detected that the wind was about 33 m/s (JTSB, 2019). The information on wind changes was updated every 30 minutes (JTSB, 2019). The Shallow-water Wave Model of the Japan Meteorological Agency estimated that at about 02:00 on October 1st, the wave height reached three to five meters lasting about six to seven seconds (JTSB, 2019).

- **Routing:** The vessel left from the Port of Chiba at about 16:30 on September 29th to avoid a typhoon (JTSB, 2019). At around 18:30, the vessel was anchored at Anchorage Y1 at the Port of Yokohama, Keihin (JTSB, 2019). However, as the typhoon approached, the ship drifted northeast, colliding at Ogishima, Kawasaki (JTSB, 2019). The trajectory of the ship is in Figure 5.

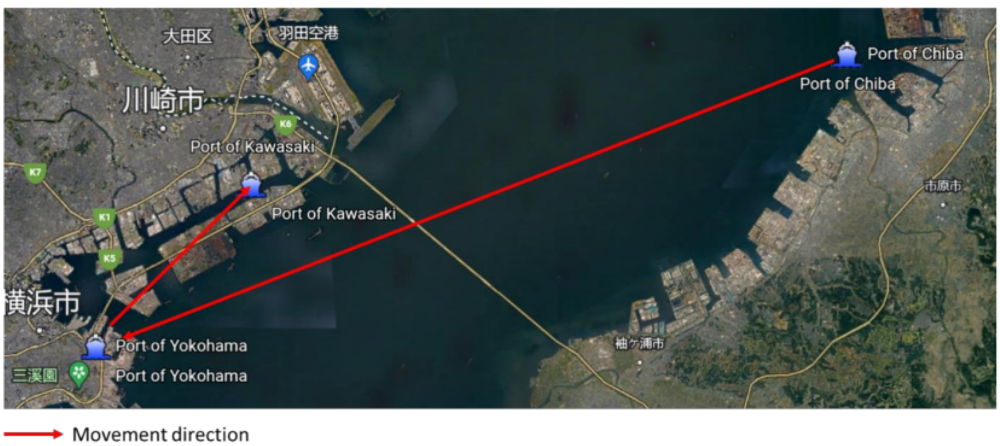


Figure 5: Trajectory of Marina (Google, n.d.)

- **Onboard procedures:** When Marina arrived at Anchorage Y1, Yokohama, at about 18:30 on September 29th, it pulled up with seven out of eight shackles[1] of the chain cable of the starboard anchor and began to ride at a single anchor (JTSB, 2019). At that moment, another two vessels were anchored about 280 meters east and 370

[1] "Shackle" is a unit for measuring the length of a cable chain. 1 shackle = 90 feet = 27 meters. (Dieselship, 2021)

meters west away from Marin, respectively (JTSB, 2019). As the wind strengthened, the master asked for an anchor watch in place from 19:00 on September 30th, and required setting the main engine on standby at 22:00 (JTSB, 2019). The main engine was in place at around 22:10 (JTSB, 2019). At 22:15, the radar showed that the other two vessels next to Marina began to tug their anchors (JTSB, 2019). Marina shook more strongly in the meantime, so the master used the main engine to prevent colliding with the other two vessels (JTSB, 2019). At about 23:00, the other two vessels dragged more violently. The master attempted to get the second anchor out to stop the anchor dragging, but he failed (JTSB, 2019). At 00:15 on October 1st, one of the other two vessels was getting closer to Marina, the master maneuvered the ship to avoid the approaching vessel, but in the meantime, Marina itself began dragging the anchor (JTSB, 2019). Even though the master operated the main engine to full, it still failed to prevent the dragging (JTSB, 2019). As a result, Marina drifted northeast and crashed into the seawall at about 01:47 on October 1st (JTSB, 2019). At 02:00, the ship got flooded and hit by a fierce wind (JTSB, 2019). The whole crew of the ship disembarked at 2:10 (JTSB, 2019).

- **Personnel training:** The ship was registered in Belize, which has specific regulations for the registered ships on safe manning, work hours, as well as drillings (IMMARBE, 1999; JTSB, 2019). The accident investigation of the Japan Transport Safety Board (JTSB) shows that the certificates of the crew were still valid (JTSB, 2019).

- **Climate monitoring equipment:** The accident investigation of the JTSB has stated nothing about the climate monitoring equipment onboard (JTSB, 2019).

(2) Evaluation

- **Weather forecasting:** We consider the accuracy of the weather forecasting in this accident is average. The weather agency indeed announced the typhoon warning in advance, providing the ship with some extra time to get ready for the typhoon. However, if the weather information was accurate, the ship would not have evacuated and been anchored at Yokohama as the typhoon could attack there. Therefore, the accuracy of the impact scope of the typhoon is in doubt. As to the timeliness, the typhoon warning was issued a full day earlier than the approaching of the typhoon, and the weather changes were updated every 30 minutes in between, so the ship should have sufficient time to prepare for the typhoon. The warning was timely.

- **Routing:** The area in Figure 5 belongs to the Greater Tokyo Area, which is visited by typhoons frequently. The distance between the Port of Chiba, where the ship evacuated from, and the Port of Yokohama, where it was anchored, is just 12 nautical miles (Ports, n.d.), whereas a typhoon in Japan can normally travel 64 to 86 nautical miles per hour (JMA, n.d.a). With such an evacuation route, we infer that the ship did not have a proper weather routing and backup route in advance. Also, during the evacuation, the ship probably did not get sufficient passage-planning assistance. Information about ship position monitoring and formalization of the routing process is not applicable in this case.

- **Onboard procedures:** Even though the master gave instructions and set the main engine on standby for the typhoon in advance, he underrated the strength of the wind – only used seven shackles, and the ship rode at a single anchor at the beginning, which was not sufficient to withstand the wind force. Such a fact implies that a standardized emergency procedure was not in place onboard. The actions were taken simply based on the master's experience and risk awareness at that moment.

- **Personnel training:** Considering the validation of the certificates, we infer that most of the training was in place. The only doubt is the training for properly using weather information provided. In light of the actions that the ship only evacuated 12 nautical miles away from the Port of Chiba and did not get adequately prepared for the typhoon, we can see the underestimation of the ship's crew to the power of the typhoon. Such underestimation indicates weak weather awareness. We attribute this weakness to a lack of training for properly using weather information provided.

- **Climate monitoring equipment:** No information is provided in the investigation report (JTSB, 2019), so it is not applicable in this case.

(3) Summary of the case

Case	Measured dimensions	Specific criteria	Indicator
Marina	Weather forecasting	Accurate	
		Timely	
	Routing	Weather routing	
		Passage-planning assistance	

		Ship position monitoring	
		Backup routing	
		Formalized routing processes	
	Onboard procedures	**Clear instructions for emergencies**	
		Standardized emergency procedures	
	Personnel training	**All levels of personnel included**	
		Capability of understanding of instructions and contingency plans	
		Capability of properly using weather systems onboard and weather information provided	
		Capability for senior personnel of understanding the operational processes	
	Climate monitoring equipment	**Installation of climate monitoring equipment**	

Table 6: Summary for Marina

4.1.2. Ship 2: Real

(1) Event description: When the cargo ship Real, with 19 seafarers onboard, docked at Public Berth No.1, Fushiki-Toyama Port, Japan, Typhoon No. 21 was approaching (JTSB, 2018). As a result, the mooring rope snapped (JTSB, 2018). The ship moved within the port. The ship tried to sail toward the outside of the port by using its engine but finally failed (JTSB, 2018). At about 00:15 on October 23rd, 2017, it was stranded on one side of the Toyama West Breakwater, opposite the berth bank (JTSB, 2018). Finally, the vessel was flooded and declared a complete loss, but no injury was involved (JTSB, 2018).

- **Weather forecasting:** As early as October 20th, the Tsunami and Typhoon Countermeasures Council of Uozu, Himi, and Fushiki-Toyama Ports (simplified as the Typhoon Countermeasures Council below) issued a warning at 16:00 (JTSB, 2018). When the ship docked at the berth, the ship master obtained weather information from a private weather service online (JTSB, 2018). At around 08:12 on October 22nd, the Toyama Local Meteorological Office announced two advisories on high winds and heavy seas (JTSB, 2018). At 09:00, the staff of the Japan Coast Guard communicated with the ship regarding the estimated route of the typhoon and preventative measures (JTSB, 2018). At noon, the Typhoon Countermeasures Council and the port captain of the Fushiki-Toyama Port announced a vigilance advisory (JTSB, 2018). Later, the Toyama Local Meteorological Office issued a storm caution at 13:48 (JTSB, 2018). In the evening, an evacuation advisory was announced by the Typhoon Countermeasures Council and the port captain of the Fushiki-Toyama Port at 18:00 (JTSB, 2018). At 18:32, the Toyama Local Meteorological Office gave a heavy seas warning (JTSB, 2018). It is noted that the two advisories from the port captain did not reach the ship or its agent (JTSB, 2018). Meanwhile, the ship's agent stated unaware of the warnings from the Typhoon Countermeasures Council, which should have arrived at the council members, including the agent (JTSB, 2018). Therefore, these warnings did not reach the ship.

- **Routing:** Given that the ship docked at the berth, the case does not include routing activities. Nevertheless, the ship had a GPS device for its movement to be traceable (JTSB, 2018).

- **Onboard procedures:** At 16:30 on October 20th, the ship docked at the berth. Roughly 200 tire wheels were loaded onto the ship at noon on October 21st (JTSB, 2018). Then the ship stayed at the berth waiting for Typhoon No. 21 to pass (JTSB, 2018). At 09:00 on October 22nd, the ship got warned of the typhoon and corresponding precautions from the staff of the Japan Coast Guard (JTSB, 2018). The ship started to prepare for the typhoon at 09:40 (JTSB, 2018). The preparations included attaching extra mooring ropes with different diameters to be against the force of the typhoon and increasing the number of crew for the mooring watch (JTSB, 2018). The ship master thought the strength of the typhoon would not go beyond what he experienced in the past. Thus, he only asked to add the usual number of mooring ropes (JTSB, 2018). These steps were done at 14:00. Meanwhile, the master believed that his previous experience would be sufficient to deal with this typhoon, so he applied a mooring approach that involved slacking all the mooring ropes and staying away from the side of the berth to create a distance from the berth (Figure 6) (JTSB, 2018). From 15:00, the ship started suffering heavy wind and waves (JTSB, 2018). At 22:38, one aft mooring rope snapped, prompting the master to call all the crew on deck and to begin setting the main engine (JTSB, 2018). Shortly after the breakage of the first rope, the second aft rope broke (JTSB, 2018). As the typhoon intensified, all four aft and five fore mooring ropes finally broke, and the ship started drifting within the port (JTSB, 2018). Around 23:36, the ship master asked the crew to drop the port anchor (the second anchor) and set the main engine to be full ahead (JTSB, 2018). However, the maneuvering was not successful. The ship went aground at 00:15 on October 23rd after drifting for a while (JTSB, 2018). As the hull got flooded, the master summoned the crew to the messroom and directed them to wear life vests by shipboard broadcast (JTSB, 2018). At 03:20, the ship master ordered all of the crew to leave the ship. Except for the chief engineer, the rest of the crew members evacuated from the ship to the land side. The Japan Coast Board employees came to rescue the chief engineer at 05:30 (JTSB, 2018). It is noteworthy that the ship did not take the initiative to acquire information about the typhoon from its agent throughout the whole process (JTSB, 2018).

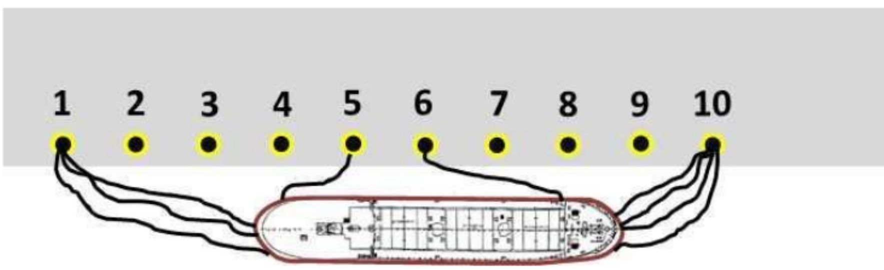


Figure 6: Mooring of the ship (JTSB, 2018)

- **Personnel training:** The ship master and the chief officer were certified under STCW I/10, and the certificates were still valid at the time of the accident (JTSB, 2018). At the same time, no misconduct of other crew members was reported in the investigation (JTSB, 2018).

- **Climate monitoring equipment:** To observe the state of the wind, an anemometer was installed onboard (JTSB, 2018).

(2) Evaluation

- **Weather forecasting:** Between October 20th and 22nd, the Typhoon Countermeasures Council, the Toyama Local Meteorological Office, and the Fushiki-Toyama Port all issued warnings of the heavy wind and waves and evacuation advisories. The consequence of the ship also proves that these institutions made accurate predictions of the weather situation and provided proper precautions. Even though the warning were issued three days earlier, continuously updated and the Japan Coast Guard staff specially came to the ship informing about the typhoon information, there was still a problem with the timely delivery of the weather information to the ship as the two advisories did not reach.

- **Routing:** According to the information above, a GPS device was installed onboard. The other criteria of routing are not applicable.

- **Onboard procedures:** The rescue of the chief engineer signifies that the ship master's evacuation order might not effectively get everyone onboard informed. A standardized emergency procedure might not be in place either. When confronted with a typhoon, an effective mooring approach can be attaching additional ropes and raising tension to distribute the load evenly through the ropes (JTSB, 2018). Meanwhile, it is necessary to use mooring ropes with the same specifications to prevent unevenness of the rope load (JTSB, 2018). The ideal placement of the ropes is in Figure 7. Apart from adding additional mooring ropes, the master performed the opposite as shown in Figure 6. The mooring ropes had different diameters and were slackly attached to improper locations. Besides, the ship master did not acquire up-to-date weather information while knowing a typhoon was coming. Such performance makes us doubt there was no standardized procedure guiding the ship master's decisions and behaviour in a typhoon.

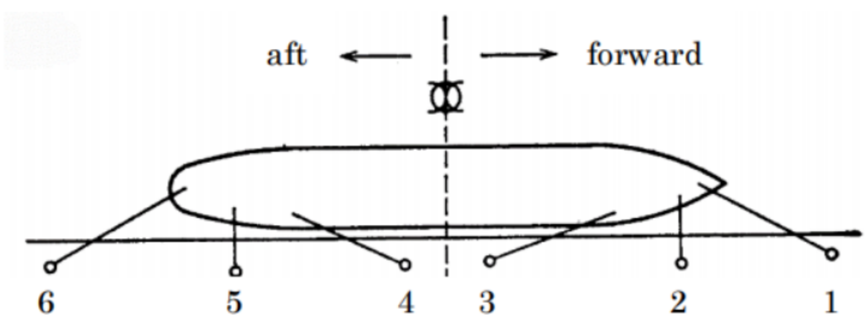


Figure 7: Ideal placement of the ropes (JTSB, 2018)

- **Personnel training:** Being certified under STCW[2] can prove to some extent that the ship master and the chief officer were properly trained for sailing. Nevertheless, the ship master's performance during the accident indicates his weak risk awareness of a typhoon, and he lacked experience in dealing with typhoons. His weak risk awareness

[2] "STCW" is the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers

reflected in staying in the port when he knew there would be a typhoon – he did not prepare an evacuation plan. Not setting the main engine on standby can also prove the master's weak vigilance over the typhoon. Additionally, the late evacuation of the chief engineer could result from the unclear instructions from the ship master, but might also be the result of the chief engineer lacking understanding of the instruction.

- **Climate monitoring equipment:** an anemometer was in place.

(3) Summary of the case

Case	Measured dimensions	Specific criteria	Indicator
Real	Weather forecasting	Accurate	
		Timely	
	Routing	Weather routing	
		Passage-planning assistance	
		Ship position monitoring	
		Backup routing	
		Formalized routing processes	
	Onboard procedures	Clear instructions for emergencies	
		Standardized emergency procedures	
	Personnel training	All levels of personnel included	
		Capability of understanding of instructions and contingency plans	
		Capability of properly using weather systems onboard and weather information provided	
		Capability for senior personnel of understanding the operational processes	
	Climate monitoring equipment	Installation of climate monitoring equipment	

Table 7: Summary for Real

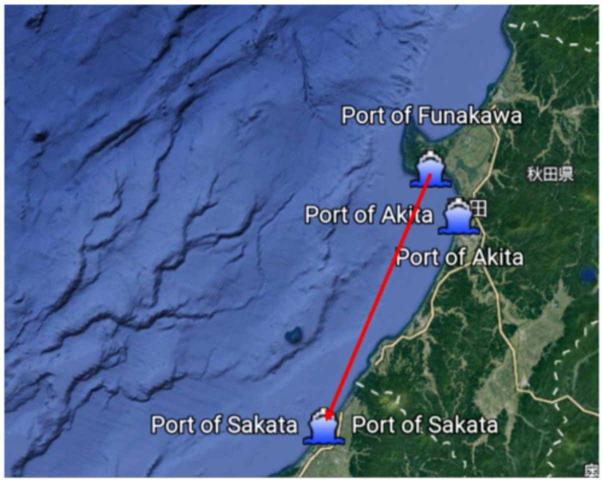
4.1.3. Ship 3: City

(1) Event description: The cargo ship City carrying 18 seafarers left from the Port of Funagawa, Akita, Japan, to the Port of Sakata, Yamagata, Japan, on January 9th, 2016. A strong wind with accelerated velocity approached the Port of Sakata when the ship sailed at a single anchor close to the port (JTSB, 2017). The ship tried to heave up the anchor but was pushed by pressure (JTSB, 2017). Then the ship got aground on a tetrapod nearby the port at 05:09 on January 10th (JTSB, 2017). As a result, City was inundated, which was a complete loss (JTSB, 2017). Nevertheless, no casualties occurred (JTSB, 2017).

- **Weather forecasting:** On January 9th, the Japan Meteorological Agency released a warning of the ocean wind at 05:35, which remained valid when the accident occurred (JTSB, 2017). At 06:07, an English ocean alert regarding the waters off Akita, including the Sakata area, was issued via NAVTEX[3] Otaru Station and was re-aired at 10:30 (JTSB, 2017). Another marine warning was aired at 12:02 and repeated at 14:30 (JTSB, 2017). The Japan Meteorological Agency made the analysis charts of the Asian Pacific surface available to the ship at 15:00 (JTSB, 2017). At 17:26, the 2nd Coast Guard Headquarters issued an ocean wind alert via Channel VHF[4] 16 and repeated it at 17:33, suggesting a maximum wind speed of 15m/s in the following 12 hours (JTSB, 2017). At around 18:10, NAVTEX Otaru Station broadcast the marine warning of the wind again. Later, the Japan Meteorological Agency released the coastal wave analysis charts to the ship at 21:00 (JTSB, 2017). NAVTEX Otaru Station repeated the marine warning at 22:30. Late at night, the 2nd Coast Guard Headquarters announced the ocean wind alert again at 23:41 on January 9th and 00:03 on January 10th, indicating that the maximum wind speed could reach up to 15m/s in the following six hours (JTSB, 2017). Following the warning of the 2nd Coast Guard Headquarters, NAVTEX Otaru Station aired the ocean warning at 00:05 and did the last warning at 02:30, according to the records (JTSB, 2017).

[3] "NAVTEX" is a device for receiving marine safety messages such as weather conditions, alerts, etc. (JTSB, 2017)
[4] "VHF" is radiotelephone. (JTSB, 2017)

- **Routing**: The ship departed from the Port of Funagawa at 13:40 on January 9th to the Port of Sakata (see Figure 8). A GPS indicator was also in place (JTSB, 2017).



Movement direction

Figure 8: Trajectory of City (Google, n.d.)

- **Onboard procedures:** The ship left the Port of Funagawa at 13:40 on January 9th, then was directed by an agent at the Port of Sakata to an anchorage at 01:30 on January 10th (JTSB, 2017). The anchorage was 35 meters deep (Dieselship, 2021). The normal standard is that the number of shackles of a cable chain should be about one-third of the anchorage depth or even longer (JTSB, 2017; Liu, 2019). Considering that the anchorage was near the shore, the master only veered out 6.5 shackles at this time to be able to hoist the anchor quickly if the weather deteriorated (JTSB, 2017). The master thought the weather would not escalate, so the watchkeeping system stayed the same as during the navigation (JTSB, 2017). From the time of anchoring to 03:00, the second officer kept an eye on the surroundings and weather conditions in the ship bridge. Meanwhile, the master asked the engine room to be ready to start the engine swiftly (JTSB, 2017). When anchored, the second engineer and two engine crew members came in position in the engine room. Then the chief engineer arranged an inspection and cleaning of the filter system of the fuel oil (JTSB, 2017). The second officer also validated the ship's position and established a guard ring on the radar (JTSB, 2017). At 03:00, the first officer came to the ship bridge taking over the watchkeeping. After the takeover, the first officer validated the wind conditions. Nevertheless, the wind blew stronger after short sleet between 03:10 and 03:15 (JTSB, 2017). At the same time, the 2nd Coast Guard Headquarters gave a call via VHF informing about the deteriorating wind conditions and warning to watch out for the ship moving and anchor dragging (JTSB, 2017). The first officer updated the master on this message at around 03:20. At this moment, the master recognized the ship was in danger and gradually got close to a breakwater, so he decided to keep the ship away from the shore and ordered to get the engine ready (JTSB, 2017). The engineers started working on the engine immediately. However, the ship received a strong wind pressure being pushed toward the shore when it began to hoist the anchor, although the master instructed full ahead (JTSB, 2017). The master thought that they must either go for a heaving-to[5] or switch the anchorage. However, the first officer reported that the wind got more violent, and the anemometer showed 20 – 25m/s (JTSB, 2017). The engine and the helm failed to manage this tricky situation, so the ship could not go for a heaving-to or switch to another anchorage. As the ship kept approaching the shore downwind in the direction of facing it (see Figure 9), the master instructed to stop the engine and drop the port anchor (second anchor) to prevent the flow pressure with three shackles of the chain (JTSB, 2017). However, these measures did not work. The ship finally collided with the tetrapod and was flooded with water shortly. The master summoned the crew to assemble via the intercom, asked people to put on the life vests, and sent a distress signal at 05:18 (JTSB, 2017). The ship started sinking at 05:36. The helicopters rescued all the crew by 09:52 (JTSB, 2017).

The investigation indicates that the ship received all the weather information mentioned above, but the master did not notice the marine warnings (JTSB, 2017). The analysis charts that the master received from the Japan Meteorological Agency did not alarm him either (JTSB, 2017).

[5] "Heaving-to" is a ship handling approach to dealing with storms. It turns the ship's bow to face windward so that the ship can stop. (JTSB, 2017)

Figure 9: Accident course of City (JTSB, 2017)

- **Personnel training:** The ship master and the chief officer had valid certificates under STCW I/10 at the time of the accident (JTSB, 2017). All the crew members also came in position timely on request of the master (JTSB, 2017). No misconduct was found, according to the investigation.

- **Climate monitoring equipment:** An anemometer was installed in the ship bridge (JTSB, 2017).

(2) Evaluation

- **Weather forecasting:** Comparing the forecasting (max. wind speed: 15m/s) with the actual detected wind speed by the anemometer (20 – 25m/s), we consider the forecasting inaccurate. According to the wind force scale of the Japan Meteorological Agency (n.d.b), a wind speed of 15m/s is a gale, while that of 20m/s has reached the storm level – there is a tremendous difference between them. As the ship received all the warnings one day earlier and the updates were aired repeatedly through NAVTEX and VHF, we assume there was no problem getting the information timely.

- **Routing:** The ship departed from the Port of Funagawa at 13:40 on January 9th. Before that, the wind warnings over the waters off Akita, including the Sakata area, had been announced four times on the same day. However, the ship still sailed to the Port of Sakata – 76 nautical miles away from the Port of Funagawa (Ports, n.d.). Despite the fact that the master did not notice all the warnings, the route planner should have done some research on the weather and potential risks on the route. Nevertheless, we do not see it in this case. Thus, we infer from City's routing that there was an absence of weather routing, passage-planning assistance, and backup routes for the ship. Such an absence may also signify that there was not a formalized routing process. Therefore, the quality of the routing plan was problematic. The only lucky thing is that a GPS was installed, which was helpful when the helicopters rescued the crew.

- **Onboard procedures:** Looking at the quick response of the crew members to the master's instructions, we consider that the instructions were all clear. However, the reaction of the master shows that he was lost in how to maneuver the ship in a storm as he instructed the crew to stop the engine finally, which could lead to the anchor dragging easily. Also, the second anchor was probably dropped too late, so this action was not effective at all. Furthermore, in consideration of the anchorage depth of 35m, the number of shackles for both anchors was not adequate. Especially in a storm, the number of shackles should be even more than usual (Liu, 2019). The limited number of shackles may cause the ship to have rare leeway to move when there is an emergency. Based on the overall performance, it was likely that no standardized emergency procedure was in place to indicate some necessary actions for the master and the crew.

- **Personnel training:** STCW is the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers. Being certified under STCW proves to some extent that the ship master and the chief officer were properly trained for sailing. However, with such frequent warnings delivered, the master still did not notice them. Besides, the master did not get alarmed with the analysis charts either, so we doubt his capability of analyzing weather information and risk awareness. Veering out a shorter cable chain means that the master did not conform to the relevant standard, so his knowledge of ship operations is also questionable.

- **Climate monitoring equipment:** an anemometer was in place.

(3) Summary of the case

Case	Measured dimensions	Specific criteria	Indicator
City	Weather forecasting	Accurate	
		Timely	
	Routing	Weather routing	
		Passage-planning assistance	

		Ship position monitoring	
		Backup routing	
		Formalized routing processes	
	Onboard procedures	**Clear instructions for emergencies**	
		Standardized emergency procedures	
	Personnel training	**All levels of personnel included**	
		Capability of understanding of instructions and contingency plans	
		Capability of properly using weather systems onboard and weather information provided	
		Capability for senior personnel of understanding the operational processes	
	Climate monitoring equipment	**Installation of climate monitoring equipment**	

Table 8: Summary for City

4.1.4. <u>Ship 4: Cemfjord</u>

(1) Event description: At 13:00 on December 30th, 2014, the cement carrier Cemfjord got fully loaded with cement at the Port of Aalborg, Rordal, Denmark, and headed for Runcorn, the UK, with eight crew members onboard (MAIB, 2016b). When the ship sailed in the direction of northern Scotland through the Pentland Firth at 07:44 on January 1st, 2015, the weather started deteriorating (GISIS, 2020; MAIB, 2016). As the storm got stronger, the ship capsized at 13:16 on January 2nd and submerged in the sea late on January 3rd (MAIB, 2016). None of the crew were found in this accident, so they presumably drowned (MAIB, 2016).

- **Weather forecasting:** The coastal prediction published by the UK Meteorological Office at 05:00 on January 1st, 2015, indicated that a strengthening low-pressure system would travel northeastward around the northwest of Scotland, accompanied by gales or serious gales to most places (MAIB, 2016). The forecast for 06:00 on January 2nd to 06:00 on January 3rd showed that the wind force could vary between moderate gale (Beaufort Level 7) and severe gale (Beaufort Level 9), even storm (Beaufort Level 10) across the area of Cape Wrath – Rattray Head with the Pentland Firth included (Hastings, n.d.; MAIB, 2016). The sea state in the north would be rough and heavy. At 05:00 on January 2nd, the UK Meteorological Office published the forecast for the next 24 hours (06:00, January 2nd – 06:00, January 3rd), warning that the badly unstable and squally conditions will continue for the next few days (MAIB, 2016). The forecast of the wind force and sea state for the area of Cape Wrath – Rattray Head, including Pentland Firth remained the same as the last day. Note that Cemfjord was capable of receiving this weather information via medium or very high frequency (VHF) radio, NAVTEX, and the Internet (MAIB, 2016).

After the accident, the UK Meteorological Office conducted a hindcast with its data modeling, presenting a series of low-pressure systems crossing the north of the UK with heavy winds at 12:00 on January 2nd (MAIB, 2016). The calculated wind speed for the accident place at 13:00 was 40 knots (between Beaufort Level 8 and 9) (Hastings, n.d.; MAIB, 2016). This calculation result was supported by the factual data of the Sandy Hill weather station on South Ronaldsay nearby the Pentland Firth (MAIB, 2016).

- **Routing:** The intended route of Cemfjord is to depart from the Port of Aalborg, Rordal, Denmark, through the Pentland Firth by crossing the North Sea to Runcorn, the UK (see Figure 10) (MAIB, 2016). The passage planning instructions in Cemfjord's Safety Management System echoed the IMO's need for a thorough, tiered approach to spotting and preventing navigational risks (MAIB, 2016). On Cemfjord, passage planning was the chief officer’s responsibility according to the instructions. There was a standardized passage planning procedure for the chief officer to follow (MAIB, 2016):
  a. *Information evaluation: the officer needs to evaluate all important information available for developing a passage plan. The information sources can be orders of the master/shipowner/charterer, marine radio announcements, records of past trips, regulations, and any nautical publications.*
  b. *Route establishment: This step includes distance calculations, route plotting on charts, discussions with the master on potential hazards, and determining margins that satisfy the trip requirements.*
  c. *Route determination: The officer will determine the final route to sail in this stage with important information explicitly marked on charts chosen for the trip.*

d. *Plan submission for approval: Lastly, the developed plan shall be submitted to the master for approval.*

When the officer planned the route, the master had responsibility for guaranteeing the important information, such as the nautical publications available onboard (MAIB, 2016). Meanwhile, the master needed to support the officer in planning routes by giving guidance and instructions (MAIB, 2016).

The accident investigation introduces that Cemfjord had all kinds of papers, maps, and external information sources available onboard to create a successful route strategy (MAIB, 2016). One of the information sources onboard was the Admiralty Sailing Directions, which especially warned of the severe sea conditions at times in the Pentland Firth (MAIB, 2016). Also, the master was experienced in traveling on the Rordal – Runcorn route. Additionally, the AIS[6] device was installed on the ship (MAIB, 2016).

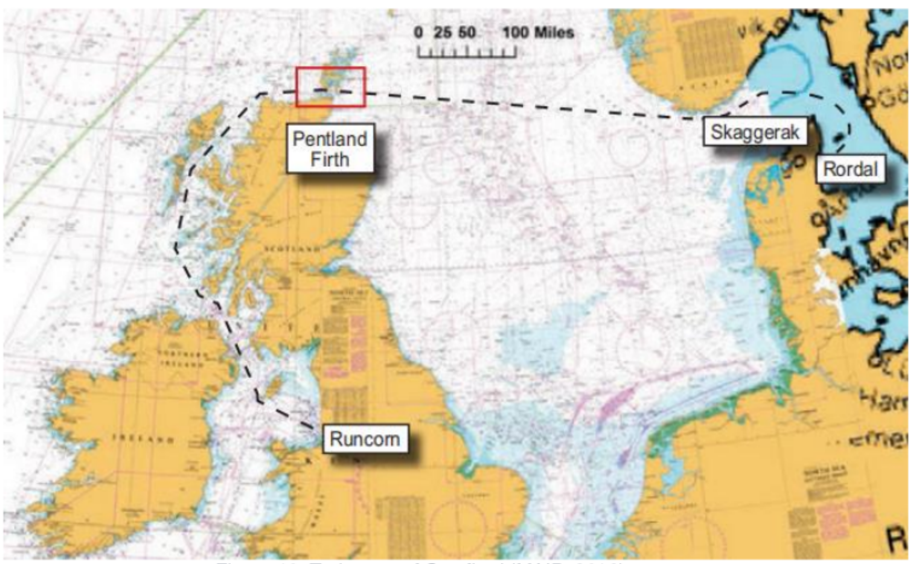


Figure 10: Trajectory of Cemfjord (MAIB, 2016)

[6] "AIS" stands for automatic identification system, which is used for information exchange between the ship and other ships with AIS equipped and port authorities. The exchanged information may involve position, ship identification, etc. (IMO, n.d.)

- **Onboard procedures:** At 13:00 on December 30th, 2014, when the ship departed with a full load, the master submitted a departure summary to the ship charterer, Aalborg Portland, as well as the ship managing company Brise Bereederungs GmbH (MAIB, 2016). The departure time was a few hours later than planned due to some loading issues. In the path of Rordal – Skagerrak – the North Sea, the ship's speed was 9.2 knots on average. In the morning of December 31st, the master submitted his daily report to the charterer, advising an expected arrival time in Liverpool of 14:00 on January 4th, 2015 (MAIB, 2016). As passing Skaggerak, the ship travelled across the North Sea directly towards the Pentland Firth. Then the ship encountered heavy seas and winds. After struggling with the severe weather for 24 hours, the master informed the charterer at 07:44 on January 1st that the ship would arrive two hours later than expected, namely 16:00 on January 4th (MAIB, 2016). At noon, the master reported to the ship managing company that the average ship speed for the past 24 hours was 6.8 knots. In the morning of January 2nd, the master updated the charterer on the new arrival time of 02:00 on January 5th (MAIB, 2016). The ship got closer to the Pentland Firth's eastern approaches at 10:52 on January 2nd. At this point, the master reported the ship and cargo information to the coastguard (MAIB, 2016). At 11:00, the master reported the speed of 5.8 knots, the updated arrival time, and the severe weather to the ship managing company. When the ship moved near the UK shoreline, the master, chief officer, and several crew members started calling or texting their families. The master might be the last one to contact his family, and it was 12:32 (MAIB, 2016). When the ship came into the Firth, it was sighted by a crew member of a ferry, Pentalina. The closest distance between the two ships took place at 12:48, at which Pentalina was only one nautical meter ahead of Cemfjord. Nevertheless, Cemfjord has turned perpendicular and wildly went into the violent waves at this moment (MAIB, 2016). The crew members did not even have time to send a distress signal. Around 13:15, Cemfjord's AIS communications completely stopped. Another ferry Hrossey noticed a floating object after 25 hours of the accident and reported this finding immediately to the Shetland Coastguard. The coastguard conducted searches and rescues but found none of the crew (MAIB, 2016).

It is noted that there were emergency procedures in place in fact, which was to abandon the ship when facing untenable weather (see Figure 11) (MAIB, 2016).

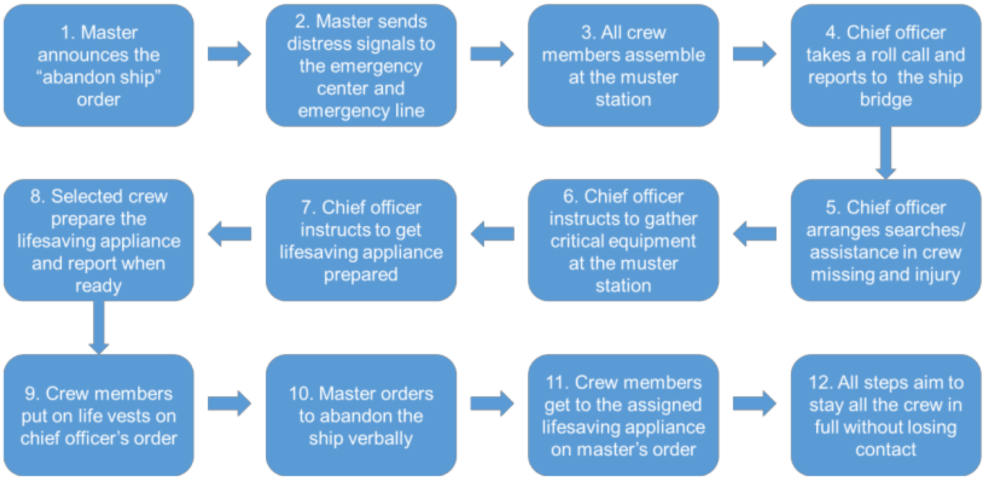


Figure 11: Steps of abandoning a ship (MAIB, 2016a)

- **Personnel training:** The master, chief officer, chief engineer, and the first able seaman all held an associated certificate of competency under STCW (MAIB, 2016). Apart from the master and the first able seaman, who had over seven years of experience on Cemfjord, the other six crew members joined the vessel in 2014 on their first contract (MAIB, 2016). There was no direct evidence showing the crew had emergency drills.

- **Climate monitoring equipment:** The accident investigation has stated nothing about the climate monitoring equipment onboard (MAIB, 2016).

(2) Evaluation

- **Weather forecasting:** The result of the 24-hour forecasting of the UK Meteorological Office was in line with the factual data from the Sandy Hills weather station, so we consider that the weather forecasts was accurate. Also, the ship had the capability of getting the weather information via VHF and NAVTEX, and the first warning was issued one day earlier. Therefore, we think there was no problem receiving the weather information in timely.

- **Routing:** The routing process was formalized. With all kinds of nautical information available on board, among which the Admiralty Sailing Directions particularly introduced the weather conditions in the Pentland Firth, the passage-planning assistance was also sufficient. And AIS was installed for position monitoring. However, the ship still went through the Firth, although the forecast had also warned, implying that the weather routing was not in place. Besides, the ship had chances to detour through the English Channel (Figure 12) or find a shelter after departing from Rordal (MAIB, 2016), but it seemed not preparing such a backup beforehand as the ship showed no intention to change a route at all in the severe weather.

- **Onboard procedures:** Based on the behaviour of the master prior to the accident, he did not give any instruction to the crew members about being on standby for an emergency procedure. Even though a standardized emergency procedure was there, the late reaction led to an irrevocable result where the changeful violent storm denied the crew the chance to send out a distress signal.

- **Personnel training:** Since four of the crew were just onboard in 2014, the sufficiency of training for them is doubtful. With the weather forecasting known, the master's insistence on the route through the Pentland Firth seemed not reasonable. Looking into the master's background, he was experienced, reputational, and hardworking, so we infer that the delay in departure has put some pressure on him. If the ship diverted through the English Channel (Figure 12), the voyage distance would be longer. Finding a shelter would also take extra time. Therefore, the arrival would be delayed further, which the master probably could not accept. Meanwhile, he might choose this risky route with a fluke mind as he had travelled the route many times before. The master's disregard for the weather threat warned by the forecast reflects his weak safety awareness.

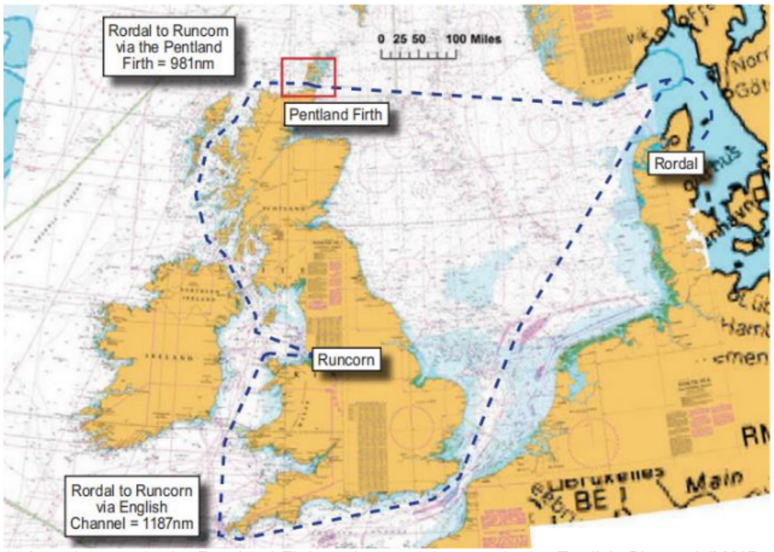


Figure 12: Actual route via the Pentland Firth and potential route via the English Channel (MAIB, 2016)

- **Climate monitoring equipment:** No relevant information is available, so this is not applicable.

(3) Summary of the case

Case	Measured dimensions	Specific criteria	Indicator
Cemfjord	Weather forecasting	Accurate	
		Timely	
	Routing	Weather routing	
		Passage-planning assistance	
		Ship position monitoring	
		Backup routing	
		Formalized routing processes	
	Onboard procedures	Clear instructions for emergencies	
		Standardized emergency procedures	
	Personnel training	All levels of personnel included	
		Capability of understanding of	

		instructions and contingency plans	
		Capability of properly using weather systems onboard and weather information provided	
		Capability for senior personnel of understanding the operational processes	
	Climate monitoring equipment	**Installation of climate monitoring equipment**	

Table 9: Summary for Cemfjord

4.1.5. Ship 5: Cape Durango

(1) Event description: Cape Durango, a chemical tanker, sailed from Kerteh, Malaysia via the Taiwan Strait to Ningbo, China, on September 14th, 2014 (GISIS, 2022; RMIMA, 2019). The expected arrival time was September 22nd, 2014. During the journey, the ship suffered the tropical storm, Fungwong, which had developed waves and swells in a north-to-northwest direction with Beaufort Level 6 to 7 (RMIMA, 2019). At 08:40 on September 20th, 2014, the pumpman was washed overboard by the heavy seas. A search-and-rescue operation was conducted, but the pumpman was not found (RMIMA, 2019).

- **Weather forecasting:** A forecast for the tropical storm Fungwong was issued at 08:00 on September 19th, 2014, indicating that the storm would strengthen when approaching the southern coastal area of Taiwan at an increasing wind speed from 45 knots (Beaufort Level 9: severe gale) at 20:00 on September 19th to 50 knots (Beaufort Level 10: storm) at 20:00 on September 20th (Hastings, n.d.; RMIMA, 2019). The wave height was predicted to reach five and a half meters (RMIMA, 2019). The storm was estimated to arrive south of Taiwan around 08:00 on September 20th and then travel north over the island on September 21st (RMIMA, 2019). The master monitored the storm state and was clear about the forecast trajectory of the storm (RMIMA, 2019).

  The factual data showed that on the night of September 19th, the ship received the winds at Beaufort Level 6 – 7 (i.e., strong breeze to moderate gale) together with heavy seas (RMIMA, 2019). At 05:46 on September 20th, the winds intensified to Beaufort Level 7, and the waves were five meters high (RMIMA, 2019).

- **Routing:** Figure 13 depicts the ship left from the Port of Kerteh (September 14th, 2014) through the Taiwan Strait to the Port of Ningbo (expected arrival time: September 22nd) (RMIMA, 2019). Even though the storm was gradually catching up to CAPE DURANGO, the ship's intended track across the Taiwan Strait was inside a semi-circle that could be navigated, so the ship kept on the intended route (RMIMA, 2019). The only change of the course occurred at 08:25 on September 20th, which turned the course from 026° to 045° (RMIMA, 2019). The alteration was done at 08:30 (RMIMA, 2019).

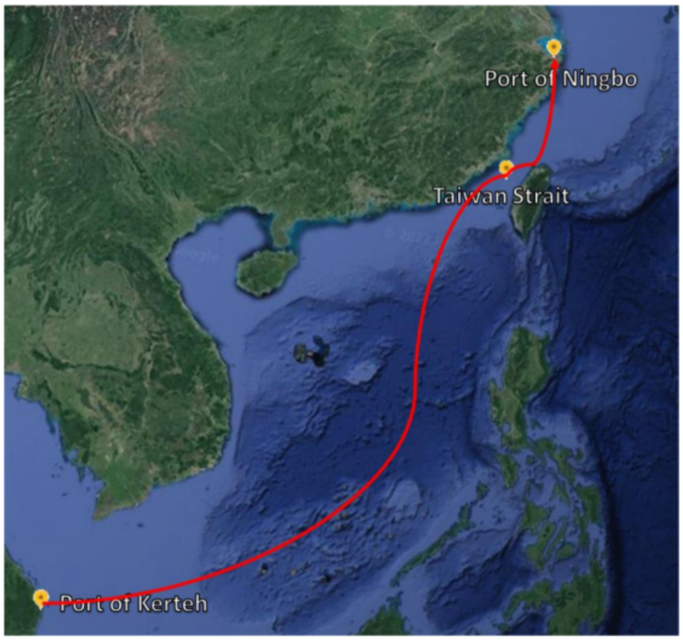


Figure 13: Trajectory of Cape Durango (Google, n.d.)

- **Onboard procedures:** The master was aware of the storm forecast issued at 08:00 on September 19th and kept an eye on the storm conditions during the voyage. On the night of the 19th, the ship received the heavy seas and winds of Fungwong (Beaufort Level 6 – 7) (RMIMA, 2019). At 05:46 on September 20th, when the storm escalated to Beaufort Level 7, the ship was sailing at six knots along a course of 026° (RMIMA, 2019). Around that time, the chief officer, who was also the officer of the watch, discovered that on the starboard side, the ladder of the life raft became loose from the deck lashings. The chief officer reported this situation to the master, and they decided to assign a four-person deck team to fix the ladder and check the forecastle (RMIMA, 2019). The team was composed of the chief officer, the pumpman, an able seaman, and an ordinary seaman. Before proceeding, they conducted a risk assessment[7] provided by the ship managing company for moving on deck in severe weather conditions (RMIMA, 2019). The assessment result showed that the risk level of each hazard was acceptable. The possibility of waves on deck was considered "extremely unlikely" (RMIMA, 2019). Around 07:58, the master asked to slow down by decreasing the engine revolutions per minute from 150 to 140 – this was also a risk control measure advised by the assessment. Then the master worked on administrative work for the arrival. The third officer took over the role of the officer of the watch at 08:00 (RMIMA, 2019). The wind force at that moment was still Beaufort Level 7. There were waves sweeping over the main deck and the forecastle. The deck team assembled in the mess room first. All four people put on protective equipment, such as life vests, and got a VHF radio for real-time contact (RMIMA, 2019). No lifelines were in place. The master finished the adjustment to the course to 045° at 8:30 (RMIMA, 2019).

At 08:35, the deck team went out on deck via the catwalk, which was four meters high from the main deck. On the way to the forecastle, the team noticed the portside ladder also broke free. At the forecastle, they found that the anchor chain lashings were separated (RMIMA, 2019). After getting permitted by the master, the team headed for the boatswain store via the deckhouse on the forecastle to inspect and fetch a lashing for the anchor chain. As the inspection and repair were finished, the master ordered the team to stay in the deckhouse till a tremendous surge was gone (RMIMA, 2019). As the master informed that the team could go, the pumpman went outside to check the windlass while the other three were still in the deckhouse. Once the pumpman confirmed that everything worked properly, he started heading back to the deckhouse (RMIMA, 2019). However, the door of the deck house was forced shut by a fierce wave coming over the forecastle from the port side. The pumpman was lastly seen by the ship bridge when being washed overboard (RMIMA, 2019).

At 08:45, the master took a Williamson turn[8] and pulled a MOB[9] alert. Then the ship transmitted a distress call via VHF and Digital Selective Calling at 08:54. Around 10:00, an assigned helicopter arrived for search and rescue (RMIMA, 2019). There were also

[7] The assessment identified a series of possible hazards followed by corresponding risk controls. The risk level for each hazard is calculated by multiplying the likelihood by the severity. Additionally, the assessment clarifies what actions the master shall take for different risk levels as well.
[8] "Williamson turn" is an approach to getting a ship back to a position it got through before. It is normally used for searching people overboard. (Marinersspeak, 2021)
[9] "MOB": man overboard (Marinersspeak, 2021)

another two merchant ships on spot for assistance. The entire search-and-rescue ceased at 19:21 due to the persistent severe weather (RMIMA, 2019).

- **Personnel training:** The master and the deck team all followed the STCW convention (RMIMA, 2019). All the crew had at least four years in shipping, but they only joined Cape Durango for a few months (longest: four months; shortest: three days) (RMIMA, 2019).

- **Climate monitoring equipment:** The accident investigation has stated nothing about the climate monitoring equipment onboard (RMIMA, 2019).

(2) Evaluation

- **Weather forecasting:** Based on the factual data (Beaufort Level 6 – 7; wave height: five meters), we consider the forecasting (Beaufort Level 9 – 10; wave height: five and a half meters) was moderately accurate. An overestimated result is better than an underestimation from a safety perspective. However, it still represents inaccuracy to some extent. Since the master was clear about the storm trajectory, the vessel was equipped with VHF, and the warning was issued 36 hours earlier, we presume the ship could receive weather conditions timely.

- **Routing:** The master knew the coming weather conditions in the Taiwan Strait, but he kept heading forward on the intended route. Despite the fact that the ship's track across the strait was in a semi-circle that the ship could sail, such weather routing was still risky. According to the post-accident investigation, it would have been safer if the master steered the ship to a south-southeast course (RMIMA, 2019). It is apparent that the ship did not prepare such a backup plan. Thinking of the absence of a backup route, we infer that there might not be sufficient passage-planning assistance available onboard as well. No information about ship position monitoring and formalized routing processes are found in this case.

- **Onboard procedures:** The crew complied with a risk assessment procedure, so we can know there is a standardized procedure. However, the result quality of the risk assessment is doubtful, which we consider misleading instructions for all people and have led to improper or insufficient risk controls. Furthermore, the master did not give any instructions on preparing for the severe weather even though he had known it in advance. Overall, proper instructions were missing on the ship.

- **Personnel training:** All the crew were experienced, but they only joined Cape Durango for a short time. Therefore, we doubt that they did not have sufficient time to be familiar with the ship, and relevant training was probably absent for most of them. Another issue is the decision of the master not to change the course beforehand based on the known weather information. We suspect that the ship not changing the course was to avoid delays as the south-southeast course indeed took a longer distance (RMIMA, 2019). Nevertheless, we still consider that the crew possessed the generic capability of understanding instructions based on their performance and activities during the severe weather.

- **Climate monitoring equipment:** No relevant information is available, so this is not applicable.

(3) Summary of the case

Case	Measured dimensions	Specific criteria	Indicator
Cape Durango	Weather forecasting	Accurate	
		Timely	
	Routing	Weather routing	
		Passage-planning assistance	
		Ship position monitoring	
		Backup routing	
		Formalized routing processes	
	Onboard procedures	Clear instructions for emergencies	
		Standardized emergency procedures	
	Personnel training	All levels of personnel included	
		Capability of understanding of instructions and contingency plans	
		Capability of properly using weather systems onboard and weather information provided	

		Capability for senior personnel of understanding the operational processes	
	Climate monitoring equipment	**Installation of climate monitoring equipment**	

Table 10: Summary for Cape Durango

4.1.6. Ship 6: Aleksey Kosygin

(1) Event description: The oil tanker ship, Aleksey Kosygin, arrived at the Escravo Terminal, Nigeria, to load oil on May 25th, 2013 (LMA, 2019). The loading started at 16:06 on May 25th and was still in progress on May 26th (LMA, 2019). At around 04:30 on May 26th, a thunderstorm at a wind speed of 49 knots (Beaufort Level 10) came (GISIS, 2015; Hastings, n.d.). As the vessel started to drift, the tugboat Jascon 4 came to assist at 04:34 (GISIS, 2015). However, the tugboat capsized and started to submerge at 04:45 in the horrible weather (GISIS, 2015). At 04:50, the tug line between the two vessels completely slipped. This accident caused ten dead and one missing (GISIS, 2015). Only one person survived (LMA, 2019).

- **Weather forecasting:** METAREA II forecast at 00:00 UTC (Nigerian time: 1:00) that there would be thunderstorms in the north of the Gulf of Guinea on May 26th (LMA, 2019). The actual situation after 04:15 proves the consistency with the forecast (LMA, 2019). However, no weather forecasting and warning systems were accessible around the area to make local predictions and issue warnings (LMA, 2019).

- **Routing:** The ship docked at the Escravo Terminal in Nigeria as shown in Figure 14. No direct information about routing activities was found in this case.

Figure 14: Location of the ships (Google, n.d.)

- **Onboard procedures:** Aleksey Kosygin arrived at the Escravo Terminal, Nigeria to load oil on May 25th, 2013 (LMA, 2019). On the same day, the ship completed mooring at 11:48 and got secured by a pullback tug at 12:00. The loading started at 16:06. Early on May 26th, the thunderstorm approached, so the loading rate reduced (LMA, 2019). To avoid a collision between the SBM[10] buoy and Aleksey Kosygin, another tugboat, Jascon 4, was assigned to assist the ship at 04:18 ("tug" or "tugboat" below refer to Jascon 4) (LMA, 2019). The tugboat was connected to the ship while increasing its power to 20%. Between 04:20 and 04:25, the second mooring master[11] asked to suspend the loading activity due to the deteriorating weather conditions (LMA, 2019). Simultaneous orders included getting the main engine ready and increasing the power of Jascon 4. Until 04:29, the power of Jascon 4 already rose up to 50% (LMA, 2019). At 04:30, the loading of Aleksey Kosygin completely stopped, while the storms escalated further, accompanied by violent winds and rains. The wind speed reached up to 25.2 m/s (49 knots, i.e., Beaufort Level 10). As the general alert went off at 04:32, all the crew went on deck (LMA, 2019). The first mooring master came to the ship bridge and instructed the tug power to rise to 60%, then 70%. When informed that the tugging chain received too much tension, people decreased the tug power to 30% (LMA, 2019). After the bow watch indicated the chain was overloaded at 04:33, Jascon 4 decreased the power to the minimum and stayed away from the propeller of Aleksey

[10] "SBM" stands for single buoy mooring. It is an offshore loading buoy, acting as a mooring point and a connecting point for (un)loading activities of tankers. (Rutkowski, 2019)
[11] There was a terminal team for guiding the mooring. The second mooring master was part of the team. (LMA, 2019)

Kosygin as instructed. In four minutes (04:37), the tugging chain slipped, and the ship began to move away from the SBM, which threatened the cargo hoses (LMA, 2019). The subsequent action included adjusting Aleksey Kosygin's power and rudder direction to keep the ship in place (LMA, 2019). At 04:43, the ship starboarded hard at dead slow ahead. In the meantime, the tugboat reported an emergency on the boat. Then there was no further answer when the first mooring master called the tug (LMA, 2019). The tugboat was sighted in the severe weather with its lights on and drawn into a two-meter storm surge. The ship shut down the engines and attempted to contact the tugboat as the lights on the tugboat went out. At 04:45, the tugboat was confirmed capsized and submerged (LMA, 2019). The first mooring master issued a distress call via VHF to ships around for urgent support.

Without Jasco 4's assistance, the ship manipulated its engine and bow thruster to keep close with the SBM and the hoses at 04:50. Around 05:06, one hose snapped, followed by a second breakage at 05:20 (LMA, 2019). In between, Jascon 3 came for a search-and-rescue operation. In the following several hours, accident announcements, tests, and inspections of the crew and the ship were made, while the search continued (LMA, 2019). However, only one of the twelve people survived, finally.

- **Personnel training:** No direct information to prove the training and qualifications the involved crew had.

- **Climate monitoring equipment:** Aleksey Kosygin had radars in place to watch out for the approaching of the storms (LMA, 2019). The monitoring of the weather was conducted every 30 minutes. The observed data were written into the ship log book every hour (LMA, 2019).

(2) Evaluation

- **Weather forecasting:** Even though METAREA II accurately forecast the thunderstorm in the Gulf of Guinea, there were no weather systems available locally in that area (WMO, n.d.). Therefore, because of the absence of a proper weather system, the accident area failed to get forecasting information timely.

- **Routing:** Since the ship had radars for detecting the storms, they could also help monitor the ship's position and tracks. The other criteria in routing are not applicable due to the absence of information.

- **Onboard procedures:** Looking at the execution of the crew, we consider the masters' instructions clear. However, the orders of the masters seemed not based on a standardized procedure but on their experience and gut feeling, for example, the continuous increase in the tug power followed by a sudden drop to the minimal power. If a proper standardized procedure was in place, it would not suggest such a sudden drop as it could make the tugboat lose stability (LMA, 2019).

- **Personnel training:** Due to the absence of information about qualifications and training, we cannot know whether the involved people at different levels were all trained properly. Thus, the corresponding criteria are not applicable in this case. Based on the performance of the masters and the crew, we assume that the crew performed properly with the masters' instructions. However, the masters probably were not familiar with the operational process. Otherwise, he would not have instructed to keep increasing the tug power, should know the overload of the chain owing to the increasing power, and would not make 0% power suddenly in the stormy weather. Despite the fact that the masters took immediate action once they noticed the weather changes, the masters' overall performance in between was not sufficiently effective.

- **Climate monitoring equipment:** Radars were in place.

(3) Summary of the case

Case	Measured dimensions	Specific criteria	Indicator
Aleksey Kosygin	Weather forecasting	Accurate	
		Timely	
	Routing	Weather routing	
		Passage-planning assistance	
		Ship position monitoring	
		Backup routing	
		Formalized routing processes	
	Onboard procedures	Clear instructions for emergencies	
		Standardized emergency procedures	

	Personnel training	All levels of personnel included	
		Capability of understanding of instructions and contingency plans	
		Capability of properly using weather systems onboard and weather information provided	
		Capability for senior personnel of understanding the operational processes	
	Climate monitoring equipment	Installation of climate monitoring equipment	

Table 11: Summary for Aleksey Kosygin

4.2. Interviews

We transcribe the three interviews with a ship master, senior ship engineer, and a chief officer in Annex 2, create a coding table for the interviews in Section 4.2.1 and evaluate the interview results in Section 4.2.2.

4.2.1. Coding table

Table 12 below is the coding table for providing a straightforward summary of the interview results. These codes can describe the current situation based on the interviews in terms of the five dimensions in our operationalization table (Table 5). Categorized into the five dimensions, Codes 3 and 4 respond to weather forecasting; Codes 6 – 10 are responsible for routing; Code 11 is relevant to onboard procedures; Codes 2, 13, and 14 are linked to personnel training; and Code 19 is about climate monitoring equipment. The rest of the codes supplement the insights into shipping.

Code	Answer content	Interviewees		
		1	2	3
1	Role & Responsibilities			
1.1	Master	x		
1.2	Senior engineer		x	
1.3	Chief officer			x
1.4	Overseeing the whole processes on a ship	x		
1.5	Weather monitoring	x		
1.6	Navigation monitoring	x		x
1.7	Equipment handling		x	
1.8	Cargo operations		x	x
1.9	Crew management			x

1.10	Vessel maintenance			x
2	Sailing duration			
2.1	2006 -2021 (15.5 years)	x		
2.2	2011 - 2021 (10 years)		x	
2.3	2003 - 2020 (17 years)			x
3	Weather forecasting quality			
3.1	Accurate	x		
3.2	Becoming more precise		x	
3.3	Accuracy improved a lot			x
3.4	The weather you see with your eyes is the real time	x		
3.5	Report interval: 3 - 6 hours, enough for preparations	x		x
3.6	Real-time quality depends on the Internet conditions onboard		x	
3.7	24 - 72 hours of early forecast received, so still have time for preparation		x	
3.8	Real-time quality improved			x
3.9	Real-time technology is in progress			x
4	Weather agency option			
4.1	Local weather authorities also broadcast weather information	x	x	x
4.2	Local weather authorities update on fixed times	x		x
4.3	Having a weather agency for a ship is not mandatory	x		
4.4	Companies have the freedom to use weather agencies, besides the local weather authorities	x	x	x
5	Language used for weather information			
5.1	English	x		x
5.2	Weather agencies chosen use English		x	
5.3	African local authorities may use local languages		x	
5.4	May depends on the way of speaking English in different regions		x	
5.5	May depends on the frequency tuned into			x
6	Route determination			
6.1	Coastal voyage routing: not much can do	x		
6.2	Long voyage routing: route options provided by the weather routing agency → discussion with the master → determining the final route → continuously monitoring and updating the route.	x		
6.3	If without the weather agency, the second officer would plan routes: 2nd officer has discussions with the master by looking into the Ocean Passages of the World → Send route plans to the company for review → make final decision based on the company feedback	x		
6.4	The 2nd officer plan routes with assistance of ECDIS → the master and the bridge team made the final decision		x	

6.5	The 2nd officer conducts an appraisal → provide options from the fastest to the slowest, make decisions based on weather, vessel speed, distance expected arrival date, fuel consumption, etc.			x
7	Prioritized factors in route determination			
7.1	Safety of life → safety of environment → safety of cargo. Therefore, weather is always number one to be considered in route planning.	x		
7.2	Fuel consumption, safety, voyage time. But weather is always assumed the first priority. If the weather on the routes is not suitable, ECDIS would not consider and show the routes.		x	
7.3	Distance, speed, fuel consumption, but weather is critical one.			x
8	Passage-planning assistance			
8.1	Weather facsimile (e.g., synopsis, prognosis) (mandatory)	x		x
8.2	NAVTEX (mandatory)	x		x
8.3	Book: Ocean Passages of the World	x		
8.4	System: ECDIS. (mandatory)		x	
8.5	INMARSAT(C) (mandatory)	x		x
8.6	GMDSS book			x
8.7	Now can also go on Internet		x	x
8.8	Navigational and weather routing paper charts available for backup			x
8.9	Manuals available to instruct route planning			x
8.10	The installation of assisting equipment depends on the region the ship works in. Not all of them need to be installed			x
9	Backup routes			
9.1	Yes	x	x	x
9.2	Backup routes, even weather routing, are not mandatorily required	x		
10	Position monitoring equipment			
10.1	Yes (e.g., GPS, GSP2, DGPS, AIS, radars, etc.)	x	x	x
10.2	Mandatory to install	x	x	x
11	Standardized emergency procedure			
11.1	It is mandatory for companies to have a safety management system (SMS) manual in place. The manual includes instructions and contingency plans for 30 - 40 emergencies	x		
11.2	When facing a severe weather, the ship must inform its company immediately, as well as charterers, owners and next-port agents	x		
11.3	Common action includes reducing speed and going windward	x		
11.4	The setup of SMS manual is inspected by the Port State Control. If such setup is not in place, the ship can be detained and the company can be blacklisted	x		

11.5	Depends on companies. If in a good company, checklists and protocols are always in place, which have clarified responsibility divisions during a bad weather.		x	x
11.6	With a checklist in a rough weather, the crew just need to follow the checklist. When the weather is badly serious, there can be some self-analysis steps, such as the master can decide to drop the anchor or let the ship float.		x	
11.7	When no plan or checklist in place for a bad weather, the master needs to discuss about actions with the other management people.		x	
11.8	When departing from port: secure for sea			x
11.9	Weather monitoring is done constantly			x
11.10	As weather deteriorates, notify all department (deck, engine and galley)			x
11.11	Secure all loose items on the vessel			x
11.12	Ensure all deck opening, hatches, manhole covers, securely fastened to prevent water ingress.			x
11.13	For good companies, they also have risk assessments in place			x
12	Shackles			
12.1	To give the ship more leeway to move	x	N/A	
12.2	To avoid drifting away		N/A	x
12.3	To reduce tension over the cable chain, avoiding breakage		N/A	x
13	Frequency of training			
13.1	Have training monthly	x		
13.2	At least one heavy weather training each quarter	x		
13.3	Drills are done normally once two weeks		x	
13.4	Video or online trainings are done at the person's convenience		x	
13.5	Drills for different emergencies are scheduled from every week to half a year			x
14	Type of training & involved crew level			
14.1	All levels of personnel have their own training	x	x	x
14.2	Heavy weather training is never an individual module but combined with other drills	x		x
14.3	Heavy weather training is not mandatory for any levels of personnel.	x		
14.4	Man-overboard drills		x	
14.5	Cargo spillage drills		x	
14.6	Fire drills		x	x
14.7	Engineers have training on engineering side. Weather emergency training is more for the bridge team, e.g., the master and officers		x	
14.8	Abandon drills			x
14.9	Training based on a drill metrics			x
15	Rest interval between two voyages			

15.1	Depends on personal choice	x	x	x
15.2	No mandatory rules regulating to have a minimum rest time before starting next contract	x		x
16	Specific training for a voyage			
16.1	Not mandatorily required	x	x	
16.2	Practically impossible as no sufficient time for such specific training	x		
16.3	There is such straining only when the ship needs to cross a high-risk area (HRA)		x	
16.4	Especially for sailing to unfamiliar ports, specific training will be done but only the management teams on the ship are involved. Operational crew only needs to follow orders			x
17	Psychological tests & training			
17.1	No training	x		
17.2	Have tests and assessments	x	x	
17.3	The tests and assessments are only done for the master, chief officer, chief engineer and second engineer.	x		
17.4	Not every company has the psychological setups		x	
17.5	At least for good companies, psychological tests are done yearly			x
18	Crew's objections against life threatening decisions			
18.1	Depends on companies	x		
18.2	A personal example: When the ship crew find the master's decisions life-threatening or unsafe, they can directly report to the head office through an anonymous channel	x		
18.3	The crew can raise objections, but the master is the person making the final decision		x	
18.4	A personal example: the company trained the younger crew to challenge their seniors and give feedback to both sides			x
19	Climate monitoring equipment			
19.1	Anemometer (mandatory)	x	x	x
19.2	Barograph	x		
19.3	Barometer		x	x
19.4	Radar (mandatory)		x	

Table 12: Coding table

4.2.2. Evaluation

In this section, we evaluate Table 12 in terms of the five measured dimensions.

- **Weather forecasting:** We can see from Code 3 and 4 in Table 12 that the accuracy and timeliness of the weather forecasting have become more precise and have been making progress. And they work well with the current weather forecasting. The shipping companies are free to choose weather agencies, and ships have access to the Internet nowadays, besides the free, reliable assistance from the local weather authorities. Therefore, we consider the accuracy and timeliness of the current weather forecasting greatly improved and find no outstanding issue.

- **Routing:** Weather is always a prioritized factor in route planning, as the interviewees perceive (Code 7), so we infer that weather routing is a common practice today. The second officer is normally responsible for routing with the assistance of weather and routing equipment, paper materials, and agencies (Code 6 and 8). The passage-planning support must have been sufficient. The interviewees stated that there were always backup routes on their ship, but this is not mandatory, which can be a hidden danger (Code 9). We assume ship positioning equipment is in place as it is regulated to install such equipment nowadays (Code 10). Code 6 indicates a similar routing procedure in different shipping companies, and no issue is found there.

- **Onboard procedures:** Code 11 indicates that emergency manuals are mandatory to be in place. However, the quality of these guidelines or checklists for emergencies depends on the companies, so the clarity of instructions and standardization of emergency procedures can vary a lot from company to company, which we consider can be a risk when dealing with storms.

- **Personnel training:** Codes 13 and 14 show that, there are drills covering various emergencies. The drills happen weekly to semi-annually, depending on companies and emergency types. Meanwhile, all levels of personnel have their own training for their specific roles. Considering the drill frequency and personnel engagement, we think that the ship personnel possess this basic capability of understanding instructions and plans. Moreover, the career descriptions of the interviewees present that they have stringent promotion procedures from cadets to seniors (Code 2 and Annex 2), implying that the seniors should have sufficient knowledge of the operations. Nevertheless, heavy weather drills seem not an individual discipline for the training of any level of personnel, which raises our concern if the ship personnel can pay sufficient attention and effort to those alarming weather information.

- **Climate monitoring equipment:** No issue is identified in climate monitoring equipment as the installation of equipment, such as radars and anemometers, is mandatory (Code 19).

4.2.3. Evaluation summary

Based on the evaluation in Section 4.2.2, we summarize the evaluation results in Table 13.

Measured dimensions	Specific criteria	Indicator
Weather forecasting	Accurate	
	Timely	
Routing	Weather routing	
	Passage-planning assistance	
	Ship position monitoring	
	Backup routing	
	Formalized routing processes	
Onboard procedures	Clear instructions for emergencies	
	Standardized emergency procedures	
Personnel training	All levels of personnel included	
	Capability of understanding of instructions and contingency plans	
	Capability of properly using weather systems onboard and weather information provided	
	Capability for senior personnel of understanding the operational processes	
Climate monitoring equipment	Installation of climate monitoring equipment	

Table 13: Evaluation summary

4.3. Current Situation

Now we formulate the current situation based on the results of the case studies and the interviews as shown in Table 14. In Table 14:

(1) Occurrence: The numbers in Column "Occurrence" represent the times of issue occurrence in that criterion, i.e., the number of the red blocks in the case studies.

(2) Persistence: As the interviewees provide more recent insights, Persistence is about whether there are still issues in the criteria nowadays based on the interview results.

(3) Weight: We give a weight of 70% to Occurrence and 30% to Persistence. Such a weight division is because even though the interviewees provide more recent opinions, our interview base is only three professionals, which is limited and more likely to involve subjectivity compared to the case studies. Thus, we value the results of the case studies more.

(4) Current situation: The current situation = Occurrence × 70% + Persistence × 30%. If the result is greater than 0, it means that there is a problematic situation in those criteria. Meanwhile, the magnitude of the results can also reflect the severity of the situation. We divide the severity of the situation into five classes:

- Score 0 = good (green);
- 0 – 1 = slightly bad (light gold);
- 1 – 2 = moderately bad (dark gold);
- 2 – 3 = bad (orange);
- >3 = severe (red)

Thus, we can see that apart from the criteria of ship position monitoring and installation of climate monitoring equipment, there are problems in all the other criteria in the current situation.

Measured dimensions	Specific criteria	Ships in case studies						Occurrence (70%)	Interviews	Persistence (30%)	Current situation
		1	2	3	4	5	6				
Weather forecasting	Accurate							3		0	2.1
	Timely							2		0	1.4
Routing	Weather routing							4		0	2.8
	Passage-planning assistance							3		0	2.1
	Ship position monitoring							0		0	0
	Backup routing							4		1	3.1
	Formalized routing processes							1		0	0.7
Onboard procedures	Clear instructions for emergencies							3		1	2.4
	Standardized emergency procedures							4		1	3.1
Personnel training	All levels of personnel included							2		0	1.4
	Capability of understanding of instructions and contingency plans							2		0	1.4
	Capability of properly using weather systems onboard and weather information provided							5		1	3.8
	Capability for senior personnel of understanding the operational processes							3		0	2.1
Climate monitoring equipment	Installation of climate monitoring equipment							0		0	0

Table 14: Current situation

Chapter 5. Gap Analysis

Except for ship position monitoring and installation of climate monitoring equipment, there are problematic situations in most of the criteria (Table 14), which lead to gaps between the ideal and current situation (Table 15). To be comparable with the current situation, we convert the ideal situation into numbers which are all zeros meaning no issue. Besides identifying the gaps, we infer the possible issues behind the gaps from the empirical findings in Table 15.

- **Weather forecasting:** The possible issue with accuracy is the technical limitations. Looking back to the empirical findings, Cases 1 (2018), 3 (2016), and 5 (2014) have problems with the accuracy of the forecast values and impacted scope. Later, the interviews provide more recent insights (2021), suggesting that the accuracy has made great progress but still has space to improve. Thus, we infer that the issue preventing accurate forecasts is the technical limitations.

  As to timeliness, the first possible issue is the inefficient communication flow. Case 2 describes that the two vigilance advisories did not reach the ship. The ship's agent did not receive them from the Typhoon Countermeasures Council and the ship did not ask initiatively either. Thus, there must be a communication issue. Another issue is identified according to Case 6 and Code 3.6 (Table 12), where there might be no accessibility of weather forecasting infrastructure in that area, which forbids ships in the area to receive information timely.

- **Routing:** There is no issue identified for ship position monitoring. Due to no mandatory requirements according to Code 9.2 (Table 12), The routing crew may get slack at weather routing and backup routes, thereby leading to the gaps in weather routing and backup routes. Besides, we attribute the gaps in passage-planning assistance and formalization of routing processes to the same possible issue – poor quality of formalized routing processes. Even though shipping companies formalize similar steps for route planning as Code 6 (Table 12) and Case 4 introduce, the quality of formalization in some companies may be substandard, depending on factors such as how stringent the company is about complying with the formalized processes and what kinds of support the company has invested in the formalization. The poor quality of formalization may also lead to the gap in passage-planning assistance. Despite the fact that there are mandatory requirements for passage-planning support nowadays (Code 8 in Table 12), the quality of the formalization can determine whether the assistance is applied effectively. Without proper formalization, route planners may utilize the assistance at their convenience or with personal experience, which may not produce the optimal routes and is a waste of the assistance provided.

- **Onboard procedures:** Even though it is mandatory to have standardized emergency procedures in place (i.e., the safety management systems), the standardization quality varies between companies (Code 11 in Table 12). In addition, similar to the relationship between the passage-planning assistance and the formalized routing process, the criteria in onboard procedures are correlated. The standardization of the emergency procedures can influence the clarity of the instructions by guiding the bridge team when they give instructions to the operational crew. Thus, the gaps in the onboard procedures can come down to one issue – poor quality of standardized procedures for emergencies.

- **Personnel training:** As described in Codes 15 in Table 12, the crew may start another contract immediately after finishing one contract, so they might not have sufficient time to get familiar with the ships and be trained for the next contract – we conclude that the intensive shipping schedules are the underlying issue. Moreover, specific training for a voyage is not mandatory (Code 16 in Table 12). Even if there is specific training, it is normally only for the management teams onboard, which can cause the management to lack operational insights. Thus, we attribute the gaps in the involvement of personnel levels and senior personnel's understanding of the operational processes to improper training arrangements. Inferring from the interviews (Code 14 in Table 12), no specialized training for bad weather can explain the gap in the capability of properly using weather systems onboard and weather information provided.

- **Climate monitoring equipment:** No issue.

In summary, we have identified nine issues in terms of the five dimensions:
(1) Technical limitations;
(2) Inefficient communication flow;
(3) Poor availability of weather forecasting infrastructure;
(4) No mandatory requirements for weather routing and backup routes;
(5) Poor quality of formalized routing processes;
(6) Poor quality of standardized procedures for emergencies;
(7) Improper training arrangements;
(8) Intensive shipping schedules;
(9) The absence of specialized training for bad weather.

Measured dimensions	Specific criteria	Ideal situation	Current situation	Gap	Issues
Weather forecasting	**Accurate**	0	2.1	2.1	- Technical limitations
	Timely	0	1.4	1.4	- Inefficient communication flow - Poor availability of local weather forecasting infrastructure
Routing	**Weather routing**	0	2.8	2.8	- No mandatory requirement
	Passage-planning assistance	0	2.1	2.1	- Poor quality of formalized routing processes
	Ship position monitoring	0	0	0	
	Backup routing	0	3.1	3.1	- No mandatory requirement
	Formalized routing processes	0	0.7	0.7	- Poor quality of formalized routing processes
Onboard procedures	**Clear instructions for emergencies**	0	2.4	2.4	- Poor quality of standardized procedures for emergencies
	Standardized emergency procedures	0	3.1	3.1	
Personnel training	**All levels of personnel included**	0	1.4	1.4	- Improper training arrangement
	Capability of understanding of instructions and contingency plans	0	1.4	1.4	- Intensive shipping schedules
	Capability of properly using weather systems onboard and weather information provided	0	3.8	3.8	- The absence of specialized training for bad weather
	Capability for senior personnel of understanding the operational processes	0	2.1	2.1	- Improper training arrangement
Climate monitoring equipment	**Installation of climate monitoring equipment**	0	0	0	

Table 15: Gap analysis

Chapter 6. Solutions

In this chapter, we come up with solutions to the nine issues identified in Table 15, and remind shipping companies of the strengths and weaknesses of these solutions. Before providing specific solutions to the issues, we have a general suggestion for shipping companies, which is to prioritize issues with high severity scores in Table 15. The specific solutions are as follows.

(1) Technical limitations: To break through the technical limitations for the accuracy of weather forecasting, we suggest the leading shipping companies setting up close cooperation in research and development (R&D).

As technical breakthroughs always ask for huge investments, which small or medium enterprises (SMEs) cannot afford, the leading shipping companies are the best choice for this task. However, the leading companies might not be willing to run such projects as they have been dominant in the market. Huge investments can impact their financial state. Besides, such cooperation may involve conflicts of benefit distribution between the cooperation companies, as none of the enterprises is willing to see the rivals become more competitive than themselves.

Nevertheless, looking on the bright side, the R&D outcomes can bring extra income for these investor companies by selling their products to other companies. Also, such cooperation can be healthy for the technical growth of the shipping industry by facilitating technical communication and exchange between the companies. Meanwhile, SMEs, which cannot afford the most advanced technologies, can also benefit from the cooperation. As the leading companies start utilizing the new technology, the SMEs may access the old technologies at a lower price, which is an overall improvement in the technical level of the industry.

(2) Inefficient communication flow: We advise that in the daily routine of a voyage, the ship should take the initiative to inquire about the weather information from the local weather authorities or agents at a fixed interval (e.g., every three hours). Besides, the master should record these inquiries in the logbook.

One drawback of this solution is that this additional step looks quite negligent, which might be easily ignored or skipped. To mitigate this weakness, we suggest including this step into routine manuals of the shipping companies, making it obligatory, and monitoring execution via logbooks after ships arrive.

The strengths of this solution are apparent. It does not generate extra financial costs. Also, once the solution becomes part of the routine, the certainty of receiving timely weather information is enhanced. Therefore, the safety of the voyage is improved.

(3) Poor availability of local weather forecasting infrastructure: For this issue, we propose that the leading shipping companies can invest in infrastructure setups, such as the local weather systems and Internet development. SMEs cannot afford as huge investments as infrastructure, so large shipping companies are the best candidates for this solution.

Such infrastructure can improve the safety of ships in the area by providing more timely information. Also, with these investments, the leading shipping companies may negotiate with the local authorities on local costs, such as port fees. Meanwhile, the invested infrastructure may bring extra income by charging other companies for using the infrastructure.

Nevertheless, these investments are high costs for companies at any scale. Besides, the local traffic volume is a factor to be considered. If there is only a little shipping volume in the area, these investments cannot reach their full earning potential.

(4) No mandatory requirements for weather routing and backup routes: The step that the route planners send the planned routes to their head offices for approval should become obligatory in execution manuals of all the shipping companies.

By executing this step, the voyage can run more safely as weather risks are taken into account, and remedial action (backup routes) is also in place. Nonetheless, the small companies may hesitate to take this step as it means more workload to the head offices and requires extra routing specialists in offices, which generate costs.

(5) Poor quality of formalized routing processes: The solution to this issue is launching an annual aid program. In the program, the top five companies that performed well in routing processes offer aid to the last five companies that underperformed in routing, helping the underperforming companies identify their issues in the routing processes and giving suggestions.

Such aid can improve the quality of the routing processes industry-wide, enhancing the safety of voyages. For the well-performing companies, this program is also their chance to strengthen their sustainable image in the industry, conducive to their reputations.

However, these well-performing companies may still be reluctant to participate in the program if they value their financial health or own development more at the stage or have concerns about losing competitiveness by offering aid to other companies.

(6) Poor quality of standardized procedures for emergencies: This issue is also about the quality of the standardized procedures, so the solution to this issue can be the same as the last issue – launching an annual aid program. Thus, the weaknesses and strengths are the same as the last issue.

(7) Improper training arrangements: This issue occurs before a voyage starts and when only the management team is involved in the training for the specific voyage. Therefore, the suggestion is to ensure at least two ship operational members participate in the training to cross-check whether the practice is proper. If there is any improper practice, they can raise questions to the management team in time before the ship departs.

By involving the operational crew, the preparation for a voyage can be more practical and thoughtful, thereby reducing safety risks during the voyage. Nevertheless, shipping companies should watch out that the management team may disregard the operational crew's opinions, relying on their own experience.

(8) Intensive shipping schedules: Considering that ship crews have intensive schedules, they may not have sufficient time to be familiar with the ship and fellows for the next trip. We suggest that before the departure, the ship crew for the next trip should have a meeting with the last batch of the crew on the ship, learning about matters needing attention and some defects of the ship.

In this way, the ship crew can execute instructions and plans more efficiently when facing emergencies. And this solution is time-saving for mastering the ship state and getting familiar with fellows.

One drawback can be that, the last batch of the crew might be on other trips, so they are not available for the meeting. If this is the case, the shipping company can require these previous crew to prepare notes or reminders onboard for the crew of the next voyage with the ship.

(9) **The absence of specialized training for bad weather:** For this issue, specialized training for bad weather should be in place. The training should not only cover standardizing actions during bad weather but also repetitively training the sensitivity of the ship crew to different emergency levels of weather alerts.

Such training can strengthen the ship crew's risk consciousness of bad weather and reduce the possibility of making mistakes during severe weather. The weaknesses of this solution can be generating additional training costs for shipping companies, and in the meantime, occupying the extra time of the crews.

Table 16 is a summary of the specific solutions to the issues, including their strengths and weaknesses, which shipping companies should keep in mind when deciding to implement the solutions.

Issues	Solutions	Strengths	Weaknesses
(1) Technical limitations	Cooperative R&D investments of leading shipping companies	- Potential of generating extra income for the investors - Facilitating the technical growth industry-wide	- High financial costs - Potential conflicts of benefit distribution between the investors
(2) Inefficient communication flow	Initiative inquiries about weather information at a fixed interval & recording the inquiries in logbooks	- No extra costs - Enhancing the voyage safety	- Easy to be ignored
(3) Poor availability of weather forecasting infrastructure	Investments in local weather infrastructure by leading shipping companies	- Improvement in the shipping safety in the area - Port preferential policies for the investors - Extra income for the investors	- High financial costs - Not suitable for areas with a little traffic

(4) No mandatory requirements for weather routing and backup routes	Setting up an obligatory company rule of sending planned routes to head offices for approval	- Improvement in the shipping safety	- Heavy workload and costly for small companies
(5) Poor quality of formalized routing processes (6) Poor quality of standardized procedures for emergencies	Launching aid programs	- Improvement in the quality of standardized procedures industry-wide - Improvement in the shipping safety - Strengthening the sustainable image of the aid providers	- Concerns of the well-performing companies about losing competitiveness
(7) Improper training arrangements	Involving at least two operational members in training for the specific voyage	- Improvement in the shipping safety	- Risk that the management team may disregard the opinions of the operational members
(8) Intensive shipping schedules	Having a meeting with the last batch of the ship crew before departure	- More efficient execution of instructions and plans in emergencies - Time-saving	- The last batch of the ship crew may not be available
(9) The absence of specialized training for bad weather	Specialized training for bad weather	- Strengthening the ship crew's risk consciousness - Reducing the possibility of making mistakes in severe weather	- Additional training costs - Occupying extra time of the ship crew

Table 16: Summary for the solutions

Chapter 7. Conclusions

By reviewing the literature, studying the cases, and conducting the interviews, now we can come back to answer the main question - how should shipping companies deal with the deteriorating natural conditions to guarantee shipping reliability?

We suggest the shipping companies take the following actions:

(1) Prioritizing the gaps with the highest severity. The gaps we identify show severe situations in backup routing, standardized emergency procedure, and capability of using weather systems and information provided, so these three gaps should be prioritized.

(2) Cooperative R&D investments of leading shipping companies. By setting up close cooperation in R&D between the leading shipping companies, it can break through the

technical limitations more efficiently, reaching a higher-level accuracy of weather forecasting.

(3) Initiative inquiries about weather information at a fixed interval & recording the inquiries in logbooks. This way can improve the efficiency of the information flow, thereby enhancing the timeliness of weather forecasting.

(4) Investments in local weather infrastructure by leading shipping companies. Then the accessibility of weather information improves, strengthening the timeliness of weather forecasting.

(5) Setting up an obligatory company rule of sending planned routes to head offices for approval to improve the execution of weather routing and backup routing.

(6) Launching aid programs to improve the standardization quality of the routing and emergency procedures.

(7) Involving at least two operational members in training for the specific voyage to ensure each level of personnel is involved and the seniors are clear about the operations.

(8) Having a meeting with the previous ship crew before departure so that the outgoing ship crew can learn about the ship and fellows efficiently.

(9) Providing specialized training in bad weather to train the crew's sensitivity and performance for different levels of weather emergencies.

With these actions taken, shipping companies can deal with storms more properly, thereby improving shipping reliability. Additionally, we take one further step of analyzing the strengths and weaknesses of the solutions, which shipping companies should keep in mind when deciding to implement them.

Chapter 8. Limitations & Future Research

There are several limitations to this paper. Firstly, the case size is limited as we could only access six cases via public authoritative sources. Also, we only conducted three interviews due to the tight time. These constraints limit the objectivity and depth of our paper to some extent.

Considering these limitations, we advise future researchers to expand the case size and interview base. Besides, the target group of this paper is shipping companies. Another research direction in the future can also be other stakeholders, such as ports, governments, and shipping clients because looking into the same topic from different angles can produce an integrated outcome.

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Annex 1: Question list

1. What is your role on a ship, and what are your responsibilities?
2. When did you start the role, and for how many years?
3. What do you think about the accuracy and real-time quality of weather forecasting during a voyage?
4. When a ship enters a certain sea area and if there are weather agency options, can the ship staff choose a weather agency on their own for the local weather forecasting? Or the ship has a system that can only receive information from weather agencies pre-determined in the system?
5. Is the weather information received by a ship always bilingual, namely English and the local language?
6. How does a ship determine routes for a voyage?
7. What factors are prioritized when a ship plans routes? In these factors, in which place can the weather factor be ranked?
8. What kinds of assistance are available for planning routes?
9. Should a backup route always be in place, or it's optional?
10. Nowadays, do ships always have position monitoring equipment installed?
11. When knowing or facing a severe storm, is there always a standardized emergency procedure to follow onboard? Which are the steps in general?
12. I learned of the "shackles of a cable chain" from a case study. Why is it better for the ship to veer out more shackles for mooring in severe weather?
13. How often do you have training in your role?
14. What kinds of training do you have? Do all levels of the ship personnel have their own training?
15. Generally, what is the length of an interval between two voyages for a seafarer?
16. Before starting a new voyage, do all the ship personnel need to be trained specifically for the voyage?
17. There was a case of ship Cemfjord that the master knew the storm would come on the course, but he did not change the route probably to avoid delays, and finally, the ship sank with no survivors found. So, besides technical training, are there any psychological tests or training for all the crew?
18. If other crew members found the decisions of the master life-threatening, such as in the Cemfjord case, can they raise objections?
19. What kinds of climate monitoring equipment are set on a ship (e.g., anemometers, barometers)? Are they always installed on a ship?

Annex 2: Interview transcriptions

Note: the numbers in the brackets represent corresponding interview questions. The sentences in green are relevant to the corresponding questions.

Interviewee 1

Interviewer: Yuecen Li (Hereafter called L)

Interviewee: Vinay Bhandari (Hereafter called V)

Time: August 8th, 17:30

L: Okay. Yeah, let's start. Yeah. Okay. So, uh, I saw that you, uh, you were a ship master and could you, uh, introduce a bit about your responsibilities and, uh, like when you started and, uh, how many years you were in the role?

V: **(2)** Okay. So, I started in 2006, 2007. Yeah. As a cadet. That is the first rank, like a training cadet. And then we have to rise up through the ranks, become third officer second officer, and then chief officer. And then finally I became captain in 2017 and. Okay. And, uh, from 2017 and I was captain on four ships for four contracts, four different ships. Oh. And then I left sailing in 2021 July. Oh, so yeah, that is what, uh, is my career trajectory like. So, I was at sea for 15, 15 and a half years. And, uh, uh, as per my, you also want to know responsibilities, right? Or…

L: Yeah, sure.

V: Okay. So, **(1)** responsibilities, uh, as a master, I will tell you because every rank has their own responsibilities. So as a master, basically I am overall in charge. I am the, uh, uh, like head of the vessel, whole vessel, not only my department, but also the engineering department. Actually we, me as a master, I don't possess technical knowledge with relation to engine that is being done by chief engineer mm-hmm, but, uh, I have to, uh, basically, uh, oversee chief engineer in certain matters, like legal matters, like replying to, uh, various, uh, stakeholders, like charters, like owners, like managers. Okay.

L: Yeah.

V: **(1)** So technical part he sees and the legal part and the more like communication part I oversee. Okay. And also, he takes my advice, uh, with respect to safety. And this is with respect to engine department for my department. I am perfectly knowledgeable because I have also done all the jobs, which the, uh, my juniors are doing because I rose up through the ranks. So, I know everything about the jobs, what they are doing. **(1)** So, I oversee their operation. I, uh, my main, uh, my main, uh, how you can say. My main motto is safe navigation. **(1)** Okay. So, uh, with respect to weather, yes, that is my primary responsibility because it affects navigation. So, navigation is one of the most important things, which, uh, I am responsible too, other than many other things. So, uh, I can keep listing things where I am responsible, but the list is very long. But I, I think you got it in brief whatever I said.

L: Yeah. Yeah. So, uh, I think, uh, actually you you've already, uh, gave me some information that I haven't asked, like, uh, so I, I, I assume you, uh, you are, you are clear about the, the whole operational process and. For the, uh, for the engineer part, you, you, you don't have to know. Uh, don't have to like know all the technical things. But you must have a big picture thinking something like that, correct?

V: Yeah. Correct. Correct. Yeah. Yeah. That is correct. Yes.

L: Okay. So, um, I'm wondering from, like, from your, uh, your view as a master, uh, what do you think about the, uh, accuracy and, uh, real time quality of the weather forecasting during, during your voyages before.

V: Okay. So, uh, now here, this question, uh, whether forecasting is being done by various, various authorities. So, there can be, uh, let's say weather department of, uh, a country. There can be, uh, like, uh, kind of private stakeholders. Mm-hmm, and there can also be like, uh, uh, weather rooting services, which are being arranged for the ship by the company, by the charters mostly. Okay. So, I will give you one by one. So, if, if I go by meteorological agencies, let's say I am in, I'm close to Japan. I, I, I get the messages from Japan Meteorological Agency that is called JMA. Okay. So JMA is giving us weather charts. They're giving us written messages, weather warnings, snap warnings, lot of things they're giving for that. **(8)** We have special equipment on board who receive this kind of messages.

L: Okay.

V: **(8)** Those are called INMARSAT, International Maritime Satellites. Okay. Weather faxes. So, we get information from these, these kinds of equipment. Okay. So now these information we have to rely on because this is government, uh, uh, uh, giving us some information we have to, uh, and, and most of the times it is true. Yes. They, they are very accurate for their information. **(3)** I won't say a hundred percent accurate, but they're mostly accurate. If they say that there is a gale force wind in Taiwan Strait. It is supposed to be gale force in Taiwan Strait. It'll be 90% of the times.

L: Oh, but…

V: Okay?

L: Sorry for interrupting. Like…Yeah?

V: Yeah, yeah, yeah, yeah.

L: Yeah. Like you, you mentioned in Japan. So, when you enter the, the country, you, you cannot, you cannot choose the, uh, weather agency yourself. You just…

V: We can choose, we can choose. This is, this is three of…

L: I mean, I mean the, uh, the ship, you said the, the company they will, your company will decide.

V: Ah, okay. That is, that is, I was that I told you about the weather routing services. That is paid service. That is specialized service for your ship, especially for your ship. And **(4)** the message which we are getting from Japan metrological agency - that is like a broadcast message. Any ship within the range with a special equipment will receive that message.

L: **(4)** Ah, so it's automatic. So…

V: **(4)** Yeah, it's automatic and it it's fixed on times. We have, we have the information at what time the weather information is going to come. So sometimes the issue can be the time because they, they, uh, promulgate information every six hours. So, in six hours, something can change. Okay. So you, you have an information, uh, let's say at 00:00 hours. Okay. They have given one information. Next information is going to come at 06:00 hours. **(3)** So, you have a six hours gap. This is fixed because this is free information. This is a broadcast information. This is being given by a government agency. They have, so they have fixed timing at what time they're going to give the information.

L: So, in, so in between, uh, you, you…

V: **(3)** We don't.

L: So you don't, you don't even rely on the weather agency you chose? Like, because in one of my case…

V: Yeah. So yeah…

L: You say.

V: **(4)** Yeah, so we do, we do so that's why that there comes a second option, which is, which is actually not given to all of the ships. Okay. So, if your company is not taking, this is not mandatory. This is not required by any law, any rule, it's just a company paying extra to keep their ships safe. So, **(4)** there can be chance that you are when, when you go on a ship, there is no weather routing service provider. Uh, okay. So now let's say I have a weathering service. So, these are private contractors who monitor data. They have some softwares yeah, which can see, take input and give some output. And then they give you your ship-based data. So, if, uh, there is a wave of two meter, how much your ship will experience this two-meter wave? Will it roll too much? Will, will it not roll too much? Will it, will it be steady? Will it not be steady? Because they have your ship characteristics, they have all the data of your ship, so they can even find out how much rolling will you experience when you get this kind of weather. **(4)** So this is very particular information only for your ship.

L: Ah, okay.

V: So then we, then we go to, uh, we have to of of course we, uh, any captain would like to have, uh, a ship based data, right?

L: Yeah.

V: So, our first go to is the weather routing service. So, we rely on that. Okay. We also rely on that. But, but at the same time as a master, I should be aware that government agencies are also giving some data, which can be very, very helpful and, and, and, uh, very, very reliable because they have also put lot of ex … experts doing this service. Okay. So I also rely on the government data. So, **(3)** but, but only problem with that data is it is six hours apart.

L: Yeah. It's not a real time, right?

V: Yeah, yeah, yeah, yeah. Yeah. **(3)** Most of the data will not be real time. Even the weather routing service, they will send you package of data. Okay. On ships, these data come in package. So, it, it comes via mail and goes into your software – the weather routing software. So, so this, this service also is giving you data, let's say, three hours. **(3)** No data is real time. The real time data is the, is the weather you see with your eyes is the real time. There is no software on board which can provide you real time data.

L: Uh, I think at this moment, uh, there's no such technology?

V: No. Okay. No, no.

L: Yeah. That's technical…

V: At least I have not seen, at least I have not seen. **(3)** So, it's the minimum gap is I have seen it three hours. I think it can be maybe even less, but I have seen it three hours and that actually works well for me. It worked well for me. Three hours is good enough because whether it is ever changing, whether no one, whether it is by like, if, uh, God's you are at God's mercy, so it can change at any time. Okay.

L: Yeah. Yeah. Clear. And, um, like for the, like for the information provided by the government, they are broadcast in bilingual, right?

V: **(5)** Yeah, they mostly in, mostly in English. Yeah. Mostly in English because, uh, they know that, uh, all, all the ships are foreign ships around them. So this information is mostly coming in, coming in English, even when we are in China, Taiwan. All information is in English. Everything is in English.

L: Okay, then that's okay.

V: Yeah.

L: And then, well, okay. We are done with, uh, weather forecasting part. And about the, uh, the routine. Uh, maybe you, uh, you can give some details how your, how a ship determines the routes for a voyage.

V: Yeah. So now what happens is, uh, weather, uh, uh, see, seeing from a ship point of view, the, uh, if, **(6)** if we are doing coastal voyages, let's say, I'm going from, uh, from, uh, Guangzhou to, to Xiamen or maybe, yeah, so Guangzhou to Shenzhen is very close, very, very close. It's like a hundred miles hundred and 50 miles maximum.

L: Mm-hmm.

V: **(6)** So I will not need weather data, weather routing to be done here because there are specific route, because this is very close to the land. So actually, actually, China, Hong Kong, uh, they have their meteorological experts. Have already decided which route ships should follow in this region when they're close to our land. So, there we cannot do anything much.

L: Ah.

V: **(6)** Where we can do much is when we go on long voyages, let's say, I'm starting a voice from Yokohama, Japan, and I'm going to, uh, San Francisco in US. So, I have to cross the Pacific. Now, now Pacific can have different types of weather. So now Pacific, let's say, imagine we have a very heavy weather in Pacific. There is a low pressure. Uh, in the north, there is a place called Aleutian, Aleutian Islands. Okay.

L: Mm-hmm.

V: So it's, it's in Alaska. So, let's say there is a low pressure there. So now I, I, as a master have to decide, but nowadays at present, what does **(6)** the normal practice is that these weather routing services, which I told you before they will send us, uh, uh, a route based on their weather data available three days before. So…

L: Who will send this data?

V: These weather routing services. I told you before, right? There are private contractors arranged by the company. **(6)** So, these weather routing, uh, uh, services, what they will do is before three days of our voyage, when, uh, from when our voyage will start, let's say from Oklahoma to San Francisco…

L: Mm-hmm.

V: So **(6)** three days before Oklahoma, they will send us a file. They have some data, weather data available with them. According to that data, they will give us a file. Okay, captain, we have sent you a file. Can you please check this, uh, uh, route and, uh, this route will not only avoid heavy weather, but also be as short as possible. Also consume as least fuel as possible. Because, uh, we cannot avoid the fact that we are also working in a commercial industry. We have to save.

L: Yeah.

V: **(6)** So, these three things have been considered by this with, by this weather routing service and they provide us this data and then it is on my scrutiny to accept that data immediately. Or maybe, maybe give them some my input or no, I think maybe we can do this, do that. And then they will also come back. And finally, it is decided mostly it is the route, which is given by them. And then they keep on changing the route as the weather changes. Because it's a fact that weather we'll keep on changing.

L: Yeah.

V: So sometimes we, we do not even follow the route, which we decided earlier. A completely different route which we will go on. Sometimes it, it happens like that also. And sometimes it happens that the first route we decided is the route we went on throughout the 15 days. So this is how it is done.

L: So, uh, but this is the case that when there's, uh, routine agency in place, but, but without the routing, paid agents.

V: Yeah.

L: So who, who will be responsible for…

V: Yeah. **(6)** So now without the routing agency, we have a, a planning officer on board a second officer.

L: Yeah.

V: But of course, he cannot make decisions without asking the master.

L: Mm-hmm.

V: So, master has the overall authority. **(6) (8)** So what we normally do is there is, uh, a book, uh, admiralty publication, called Ocean Passages of the World.

L: Mm-hmm.

V: Okay. So, you refer to ocean passages of the world. Lot of, uh, experts have cert. They set and they have made the routes around the world. **(6) (8)** This is a huge book giving routes all around the world for ocean passages. So, for ocean passages, we have a fixed point to start fixed point to end. How to go. Okay. So now this is being done, looking at that book, we'll decide the passage. And then I, **(6)** I, superposed my passage on a weather map. Let's say on the weather map, I see, oh, there is a low pressure and this low pressure will come on this date, so I have to avoid this low pressure. So, I have to be south of the low pressure. So then these kind of decisions are made. For review, we send these, this plan with our, uh, comments to the company and their company might or might not have a safety department. If they have a safety department, they will come back with their comments. And then final route will be decided. If company is a very small company, they will just rely on the captain and they will say, okay, captain, go ahead. You can do whatever you want. And then we, we go ahead with our plan. So, this is the procedure.

L: OK. Understand. Yeah, yeah, yeah. That's clear. So, so, oh, I, I think you just already mentioned some factors. Uh, when you plan the routes, like you need to consider economic impact and also the weather impact these factors. Um, when you make as a master make, make decision, what do you normally prioritize?

V: Weather.

L: Yeah?

V: Number one. Weather is always number one for me as a master.

L: Yeah.

V: It'll always be number one. We, you, you cannot run into, uh, low pressure, just because you will save money there. Because safety of life… uh, on, on ship, uh, is like this: the safety of life, number one of priority. Safety of cargo. Okay. Oh, sorry. **(7)** Safety of life. Safety of environment and safety of cargo. So, these are three. This is the step. So, number one is always safety of life. Number two is always safety of environment. Number three is always safety of cargo. So, safety of cargo comes at the last, so safety of life is taken over always, even though we are in commercial industry, uh, we have to consider life as priority. So, when you fight with weather, basically you are putting a life in danger, so you cannot do that. **(7)** So, it's always number one priority when you take, uh, routing decision to avoid heavy weather.

L: Okay, yeah.

V: Yeah.

L: Okay then. Yeah, I think number, uh, question eight. You have answered it.

V: Yeah.

L: And, uh, yeah, for, uh, coming to question nine and do, do you always have backup routes?

V: Yeah, yeah. It is always good to have a backup route, because, uh, as I told you, the weather it's ever changing, right?

L: Yeah.

V: Yeah. So, uh, so, uh, so let's say if you have a, uh, if you have thought that this low pressure is going to move continuously towards northwest. Okay. So, I have kept this kind of route, but suddenly what it does is it changes the direction to southwest. So, it is now coming towards you. So now you have to take, uh, an avoiding action. So, you, you should actually already have a plan in your head that if this kind of things happen, what will I do. In this case, I will do like this. **(9)** So always there is a backup plan. Even when the weather routing agency send, they normally send two or three weather, uh, route. And they, they say, okay, captain asks for us, number two route is the best. But, but you can also comment whether you like, uh, what do you like in number one and number three route. If you feel that they are better than number two. So, so always there are options.

L: Yes. But, but, uh, backup routes are just, uh, optional or it's mandatory?

V: Yeah, **(9)** it is optional. No, no, no. It's not mandatory. Even weather routing is not mandatory. First of all, ah, whether routing is not mandatory, it's not, it's a non-mandatory factor. It's just a, a safe passage between point A and point B is mandatory…

L: Mm-hmm.

V: which also considers weather, **(9)** but there is no publication in this world saying that weather routing is mandatory. So, so that's why the half of the companies in the world don't have weather routing service.

L: Okay. And yeah, that, uh, one, one more about, uh, how the, uh, I'm not sure now is, uh, all the ships, the merchant, merchant ships, uh, are equipped with, uh, position monitoring equipment or some of them?

V: Yeah, yeah, yeah, yeah. It's a, it's a mandatory requirement. It's a mandatory requirement as for SOLAS. SOLAS is a book called Safety of Life at Sea. So, all the regulations are based on SOLAS. So as for **(10)** SOLAS Chapter Five, yes, it does. Uh, Chapter Five is safety of navigation and Chapter five states that there should be a position monitoring equipment and also a backup position monitoring system on all the ships. And this is mostly, uh, as GPS. So, we have GPS one and GPS two.

L: Oh, okay.

V: Now, even now, even DGPS, which is called differential global positioning system. So, it is a mandatory requirement.

L: Oh, I heard of it but I don't know what it exactly does.

V: It is more accurate than … its basically more accurate than GPS. And it's taking a position reference online to calculate the GPS error and then this error will be introduced in your equipment to make it more accurate. So that is how it works.

L: Okay. Got it.

V: Yeah.

L: I'm surprised you still remember the, the chapters.

V: Yeah, because we have been doing for this for 15 years. So this is a, like a good normal practice.

L: Okay. And then like, if, if, uh, unfortunately, you face a, a severe weather. Then do you have a standardized, uh, emergency procedure to, to follow?

V: Yeah.

L: Like to the, um, what do you need to do for mooring or the engine or something like that?

V: Yeah. So yes, we have a, we have procedures. We have a, uh, normally, uh, Uh, written by the company. If you're working for a company…

L: Mm-hmm.

V: **(11)** As for regulations, the company has to give you a book called, uh, safety management system procedures, SMS manuals, safety management system manuals. In this safety management system manuals, there are emergency contingency plans. So there are, let's **(11)** say at least 30 or 40 emergencies listed out of them. Heavy weather is one of the emergency. **(11)** And there are point by point instructions listed that what we should onboard as master or as chief officer do. Even every rank responsibility is being written there. **(13)** And, and we are doing these trainings every month to keep our crew or people on board trained every month.

L: Every month, every month training?

V: Yeah. Yeah. We have such training. So, for all the emergencies, so it, it, it is not possible to have heavy weather every month, but they will make a schedule that **(13) (14)** at least every three months heavy weather is on your training list because there are a lot of emergencies to discuss. And we have very less time. So, every month we discuss at least 10 emergencies. So you can see that 10, 10, 10, 30. **(13)** So every, every three months, at least we will cover one, one time. Every quarter, one time we will do a heavy weather training.

L: Oh…

V: So in, yeah, so in this, uh, let's say it, it'll start number one. What we'll do. Okay. **(11)** Immediately, if we face heavy weather, we have to call the company and let them know, oh, we are facing heavy. Okay, then, then it is my duty as a master to inform charters, to inform owners that we are stuck in heavy weather, okay. To the next export agent, because, because this might delay our ship, so he has to also plan accordingly. So we have to inform the agent also. Now the, as for, as per what I have to do on board is if there is lot of, uh, strong wind and strong waves from the head…

L: Mm-hmm.

V: **(11)** It is prudent of me to reduce the speed of the vessel. Because by reducing the speed of the vessel, what I'm doing is I'm not challenging the wave. Once I challenge the wave with high speed, the, the waves may break the vessel also. **(11)** So the prudent way to handle a wave is to reduce the speed and always head into the wave always. So these are like a, I cannot…why I'm doing this.

L: So, you mean to go windward?

V: Yeah, yeah, yeah, yeah. Go Windward. Yeah. Yeah. Face the wind. Always face the wind. Always face the wave. That's the best way to handle a ship because that way you can steer the best at slow speeds. Even at slow speeds. And, and, uh, uh, if you are on a high speed, immediately reduced to slow speed. That is also one of the best practices while in during heavy weather, if you face heavy weather.

L: Okay. Is this the, uh, heave-to approach? I, I heard, of, heaving-to approach such approach.

V: Yeah, correct. That is correct. Perfect. Because heaving, heaving-tois heading the wind, heading the wave at a slow speed. That is called heaving-to. That is the heaving-to approach. **(11)** And there is also an IMO circular, if you can, uh, uh, find it out that is called, uh, "navigation of weather in following sea". So, following sea means basically you are not heading the weather, weather it is from, from the stern of you, from behind you. And that is considered so dangerous that IMO as an organization have written an article about it…

L: Mm-hmm.

V: And published it as a circular that how you should behave when the weather is behind you, because when weather is behind you, it becomes extremely dangerous, extremely dangerous.

L: Okay. So, so for all this kind of situation there, there's always a guideline or instruction?

V: Yeah, yeah, yeah.

L: But, but except for the IMO uh, guideline, **(11)** what do you mention before, the procedures, are they company-wide or they…

V: Company. Company wise, because company will also like you to report it to them. So, so they have given a phone number there, an emergency contact details, uh, where to mail, where to call. Everything, they have given. If you are in US whom to call, call this agent, call that guy, because in us, everything changes. So in US, the procedures are totally different because you have from many other authorities. **(11)** So, so it is all mentioned nicely in a book. So you can always refer that. That is called contingency plans. Yeah. And that is a requirement of, uh, SOLAS, like mandatory.

L: It's not always like, uh, like for your company, they did a good job, but for other companies they just… it's not guaranteed, right?

V: It it, uh, **(11)** why I can say that it is supposed to be there is because there is a practice. There is a, there is a practice in place that every ship, when it goes to some other port, port, state control inspector is coming on board and he's checking these things. So, if your ship will not have these, this thing, he will detain your vessel and also blacklist your company.

L: Oh.

V: **(11)** So most of the companies will have to do. So you cannot actually avoid this because there is a, a procedure in place to check these things. Okay. That is called port state control PSC.

L: Okay.

V: Since it is a requirement, you have to follow it. Any foreign ship has to follow it because it is a mandatory requirement to have SMS manuals on board. 50 management system manuals.

L: Okay. Yeah. I'm taking notes, wait moment.

V: Yeah, yeah, why not.

L: Uh, okay then next, uh, next question. Um, uh, I learned about, uh, shackles of a cable, uh, cable chain. So, but, but I, I'm not sure, um, how the number of shackles mean to a ship in a severe weather.

V: Yeah. Yeah. So in, in, uh, here **(12)** shackle is referring to the anchor chain cable.

L: Okay.

V: So now what, what it is, what, what, uh, study you have done is most, probably the ship was moved using anchoring, anchors.

L: Okay.

V: Okay. So if, if the ship has an anchor on the ground.

L: Yeah.

V: **(12)** It's floating on the water, but the anchor is tugged on the ground, sea bed. So now it is holding the ship in one place. So now suddenly what happens, the weather is deteriorated, is very heavy. There are swell and wave. And so, it is prudent from, from a ship master's perspective to let go more shackles one shackle means 27.5 meter of the length of anchor. So you…

L: Mm-hmm.

V: So, **(12)** to make it easy on board, we say one more shackle. It is marked. So, we don't have to say you give 10 meters, so no one can measure 10 meters, but we can see, oh, this is one shackle. This is two shackles. So, it is easy. So, every cycle is 27.5 meters. So, uh, master will say, okay, leave, uh, one more shackle. So what, what you are doing, basically, you are releasing the tension on the cable. So if, if you imagine if the weather is from right ahead and your anchor is holding on the ground and you will not, you are not letting go more shackles. What it'll do is it'll push your vessel behind, and it'll tighten the cable at some point. The cable will just break. If it'll not be able to take the load…

L: So **(12)** it's like to give, give the ship more leeway to move, right?

V: **(12)** More leeway. Yeah. Yeah.

L: Okay.

V: Yeah. So you are, what you are doing is slacking the cable and, and I will give you even more. What is more prudent is to just lift the anchor and go, never anchor in heavy weather. **(11)** We had guidelines from our company that if the wind is above four, five, do not anchor, it is better to just drift on water than to anchor in heavy weather because it is more dangerous. Okay.

L: Okay. Got it. Yeah. I think, uh, we can skip 13, and it's already 32. We are running over time. We need to hurry up. So, um, I think you also have answered 14, but do, do other, do all the ship personnel has such emergency training?

V: Uh, yeah, **(14)** they have, they have certain bit of training, which is all mandatory, but **(14)** I'm not sure that they have training about heavy weather because they're being trained on board for this. So, so no, I, I don't think so they have this training because this is not a part of mandatory training. Mandatory training is like fire training, safety training. **(14)** No, heavy weather training is not mandatory for…

L: It's only mandatory for master?

V: **(14)** No, not even for master because, uh, there is no course specifically teaching us weather routing or, or heavy weather handling, but it is just part of a bigger course. Let's say I, **(14)** if I am having a competency in, um, becoming a master, I might have studied heavy weather as part of some course, but I do not have certificate for it. No certificate.

L: Oh.

V: **(14)** Specifically for, I'm telling you specifically for heavy weather, no.

L: Okay.
V: **(14)** But on a broader picture, yes. Maybe in some course I have studied in navigation most probably. Yeah.

L: Okay.

V: Yeah.

L: Yeah. And, uh, like, uh, oh, uh, I'm also wondering the, the length of the, uh, interval between two voyages. So after you finish an interval, uh, uh, no…a voyage, uh, how long you can have a rest before you start next voyage?

V: Uh, I, I don't understand the question here. The, uh, like a voyage means you say, let's say I go from, uh, Yokohama to San Francisco. That is one voyage. It's…

L: Oh, I, I mean, it's like you finish a contract. After one contract.

V: Okay. That, **(15)** that is completely dependent on the person. If you want to earn more money, you immediately go on ship. If you want to. And if you have enough money to survive, you, some people even stay six months at home. So, so the company cannot force you to join.

L: But, so after you finish one contract that you can immediately join another one?

V: Yeah.

L: But the…

V: Yeah, yeah.

L: Don't they have some like, uh…

V: No.

L: Health test that you need to have a rest like that.

V: Nothing, nothing. I have joined ships, ship in five days also. I, I have been asked by my company to join the ship, get down from one ship, take off flight to Singapore and join another ship in Singapore. They also asked me to do this. So, but I did not agree. I said, oh, I'll at least give me four or five days. So they gave me five days.

L: Oh.

V: So like that also can happen. So, it just, it's okay. **(15)** It's all on you. There is no regulation for it, basically.

L: There is, or there's not?

V: There is no regulation for it. No one, no one is monitoring this. No, no one is checking this. No one is monitoring this and it is not written anywhere that when can you join and when can you not.

L: That sounds quite um, tiring, I would say.

V: Yeah. Yeah. But it's on you. So it's on, depends on you. No one can force you to join.

L: Um, and, uh, like, uh, for, before you start, uh, uh, you start a new voyage and do, do other personnel need to be trained for the specifically for that one?

V: **(16)** No, no, not required actually, because, uh, because, uh, you don't even know where you are going sometimes. Uh, so I'm going from home, right? That is what you're saying.

L: Yeah.

V: OK. So, when I'm going from home, I might go on a ship, which has no voyage fixed yet. It is lying at an anchor, uh, no charter is fixed. So I don't, I don't even know. Neither does the company know, nor does the owner know. So, no one knows where the ship is going. So, you cannot train someone for something which no one knows. So, it's immediately one day I will go on board and the next day message will come. Oh, now you have to go to South America.

L: Oh, **(16)** so there is no time for training?

V: **(16)** Yeah. I have to just start the vessel and start moving. So there is no time, not practically possible.

L: Okay. And yeah, last three.

V: Mm-hmm.

L: Then I don't think you have any like, psychological test these things, right?

V: Oh yeah, we have, we have.

L: You have?

V: We have, yeah.

L: Because I read a case and the, the master, he know he knew the, the weather, the deteriorating weather, but he still decided to go through that way. So…

V: Most probably commercial pressure.

L Yeah. Yeah. Yeah. He, I think he was worried about the delays. So that's why…

V: Yeah. Commercial pressure. Yeah.

L: So like for such kind of pressures, did you ever have a training or some test for, for it?

V: **(17)** No training, but. We have, uh, some psychiatric tests, uh, psychological assessment test, which is being, uh, which in my last company it was done for only four senior officers. So chief officer, captain, chief engineer, and second engineer, we had to go through these tests, but I, I don't think so how it'll make a difference and. Yeah, doctor suggested me something, but I don't know, but it is like, uh, I don't know how it'll help, uh, the, these psychological tests, but yeah, they are being done now, but, uh, when it comes to commercial pressure, it's a totally different thing because it depends on the, on, on the individual, how it takes these pressure.

L: Yeah.

V: So if, if he feel, if he feels too pressured, if he feels that he might lose a job if he reaches late there or, or if he is not even able to explain why, why he cannot go through that route and why he has to change the route and reach the next port after two days, which is very safe in his, but he cannot explain this. What he will do is he will say, f**k it. I will just go directly straight to, through the weather. And, and then these kinds of things happen. But I, I, I cannot blame master also because I don't know what state of mind you are in that time.

L: Yeah.

V: Sometimes you have some family issues going on, you know, it is, everything is in your head. What kind of…

L: Yeah, I understand.

V: Yeah. Yeah. So I can, I cannot even explain this.

L: Then, but, uh, but if, uh, if the other, the other crew they noticed, okay, this decision is, uh, risky. Can, can they advise or, or have to obey the order?

V: **(18)** No, no, no one has to obey when it comes to safety of life. Actually, I will tell you, uh, a very good example in my last company…

L: Uh-huh.

V: There is a procedure to report such incidents. If you feel your senior is taking a action, which is life-threatening, or not even life-threatening, it is just not safe…

L: Mm-hmm.

V: You have all the right to report directly to the head office of the company. And they have given a procedure to do that. That's very, very confidential. They will not even come to know who has done this message. It'll, only the ship's name will go and the action will go – that what is happening on ship. And then immediately a big call. It will come from head office, Hong Kong directly to the ship. And what is happening on your ship. So it is, it is that way. So, uh, they have given a channel of direct contact with the head office of the company. Some company…

L: But it depends on the company, right?

V: Yeah, it all depends on the safety culture of the company. **(18)** So, I will answer here, uh, the best answer to this question – it depends on the company.

L: Okay.

V: **(18)** The better, the more safer the company, the more better procedure they will have in place. If the company is not safe, I don't think so. I think everybody has to just obey. Then there will be a big fight on board. That's so.

L: Yeah. Okay. We come to the last one. So, uh, you need to monitor the real time weather situation. So, uh, it's mandatory to equip this, uh, weather monitoring equipment, right?

V: Yes.

L: On ship?

V: So, so **(19)** anemometers…

L: Yeah.

V: Which you have written is for wind speed and direction. That is mandatory about a certain graph on it, which you can, I think, easily check online.

L: Yeah.

V: **(19)** Anemometer requirements. Okay. As for SOLAS. Barometers, I think. Uh, bar, I'm not sure. Barograph is there, which is, I'm pretty sure not mandatory. **(8)** Uh, then there are weather faxes, which are mandatory again.

L: Oh, sorry. Weather what?

V: Weather fax. Weather fax machine. Yeah. They are, they're normally received via INMARSAT, International Maritime Satellite. So it is, there is an equipment on board to receive weather faxes, weather faxes.

L: Yeah. Uh, to receive in real time. Right?

V: I, I told you that weather faxes are being transmitted every six hours, so it's not real time. **(8)** But they, they can also give you, uh, weather faxes you can receive as synopsis chart. Synopsis means weather which has happened. And a prognosis chart, which means weather, which is going to happen based on our knowledge. So, you can also get a future prediction chart from there. Those are called pro prognosis chart. So yes, you can get a future weather from there, but that is all predicted by humans. So, uh, then we have these equipments, **(8)** then we have NAVTEX also. This is also mandatory equipment, NAVTEX for receiving weather.

L: Mm-hmm.

V: And then you are weather routing services, which is not mandatory. It depends on the company. And then your company, sometimes your company safety department also sends you something that is also not mandatory as per SOLAS, but depends on your company.

L: Yeah.

V: So I think that is all.

L: So the only mandatory one is the, uh, anemometer and…

V: Barometer. And weather facsimile or weather faxes. And INMARSAT and NATVEX.

L: They are all mandatory?

V: Yeah. They're all mandatory.

L: Okay. Yeah.

V: Yeah.

L: I think I've got a fruitful interview with you.

V: Yeah.

L: Quite helpful. And we are done, I think. And thank you very much for the help!

V: Yeah. Best of luck.

Interviewee 2

Interviewer: Yuecen Li (Hereafter called L)
Interviewee: Manish Singh (Hereafter called M)
Time: August 9th, 11:00

M: We have to sound, sound very professional into this?

L: No, no, no. Just like a casual chat.

M: Yeah.

L: Don't, don't be nervous. <laugh>, you're getting nervous.

M: <Laugh>. No, no, that's, that's good. And like, may I know how many, how many, uh, case studies you did previously? Like…

L: Uh, six. Okay.

M: And then you analyze based on that, on those six studies?

L: Uh, but also based on your interviews, because, uh, those are just cases and maybe I missed some information there, so that's why I…

M: Sure, sure.

L: Yeah.

M: Sure, sure, sure. Okay. Yeah. That's good. That's good.

L: Okay. Let's start?

M: Yeah, let's start.

L Okay.

M: So, I, I I'll start with my distinct general questions. Uh, what are responsibility as a ship engineer. **(1)** So, I was actually working as a second engineer.

L: Yeah.

M: **(1)** So my whole, whole responsibility is to, is to take care and handle each and every equipment, which is onboard the machinery room. So in engine room, so I'm actually working with a team of around seven to eight people. So there are three engineers, four engineers, and, uh, three crew members are there. **(1)** So I'll be responsible for the job, which we are getting, uh, from the company side to, uh, to done, uh, by my staff and help them to do it. So, my whole responsibility is to, is to do the loading and discharging and cargo operations in a more perfect and crisp way. And, uh, try to move the vessel from point A to point B in, in very, uh, in like safe way. So, everything should be crisp and fine and should be ready to use. That kind of role was, was mine. Okay. And, uh, then, uh, when did you start the role? So I started the role…

L: Manish, let me ask you, <laugh>, you are going through the questions yourself.

M: <Laugh>, yeah, yeah. I'm sorry. Sorry.

L: Yeah, we need to show conversations.

M: Sure, sure, sure. Yeah. Yeah.

L: Okay. So, yeah, so, oh, uh, yeah, just, uh, just continue. When did you start? And, uh, how, how many years please. <laugh>.

M: <Laugh>. Yeah, so, uh, **(2)** so I started my career in 2011.

L: Uh-huh,

M: Uh, **(1) (2)** but I was working as a senior engineer from 2015 to 2021.

L: Mm-hmm.

M: So, uh, that is, uh, a real, **(2)** so like from 2011 to 2015, I was as a operational engineer. So it's more like a junior rank.

L: Mm-hmm.
M: But 2015 to 2021, I was working as a senior junior. So it is more about the more responsibility and you have to be accountable for every job and, and everything which you do on board.

L: Okay. Yeah. So, you are quite experienced.

M: Yeah.

L: Yeah. So, okay. So, uh, um, next, the, the questions are more, uh, based on what you… it, it doesn't need your professional knowledge but just based on what you observed during the voyages you had before.

M: Sure.

L: Yeah. So, what do you think about the accuracy and the real time quality of the weather forecasting during your voyages?

M: So, like, as I mentioned that I have around 10 years of experience, so initially. Then when the technology was not that, that much developed…

L: Mm-hmm.

M: So like **(3)** my initial times of my, uh, my career, uh, we do find a certain, uh, accuracy issues, but right now, as a weather forecasting is become more prominent and more precise. And we are actually using kind of a subscription-based model in which we are getting, uh, a very correct and very accurate, uh, weather forecasting. So, I think, uh, now as a technology develop, **(3)** it has become more and more accurate and more and more correct, uh, based onto the new developments.

L: Okay. And what about the, uh, real time? Uh, the real time quality? Uh, can we make it, uh, real time now at this moment with the technology?

M: Yeah, **(3)** I guess so we can make it real time a quality, **(8)** but it all depends onto the kind of Internet conditions you have on board. So sometimes what happened that, uh, like if you, if you, if you are a ship owner that is not ready to invest much into the, into the Internet service…

L: Mm-hmm.

M: Then sometimes this, the possibilities are there that when you're in a rough weather condition or where, because sometimes there are few patches on the, on the global map, where you may find a zero, uh, Internet, uh, locations.

L: Oh, yeah. I heard of that.

M: Or, uh, yeah. Or there is some, some situation where the war zones are there. So they themselves barred the area, uh, for the further communications. So like if you're not having a good Internet connection in that case, uh, like, uh, re refreshing the, the weather routes or, or the weather forecasting details was not always done in a, in a correct way. So then, uh, it makes cases, amount of issues. But generally I think, the real time quality of with the standard companies are quite good. I'm not sure about the substandard vessels, but if you are working with a good companies, reputation in the market, uh, they're quite good into this.

L: Okay. Yeah. Got it. And like when you, um, when you entered, uh, a sea area, and if you have options about the, the weather agencies, uh, like, uh, can the ship … I mean the, the people on the ship choose the agency or, uh, it depends on the co… uh, the decision is made by the company? Or it's just an automatic, uh, choice?

M: Yeah. So it, it is more about that. Uh, **(4)** the company is the one. Actually, they are buying the, uh, the bundle or the, the packages from the weather forecasting companies.

L: Ah.

M: **(4)** So, uh, we, we do have only two or three options of the weather forecasting, and generally we rely onto the, onto the best of, the better, best of service. So, if we have three services available, we already have a pre-perception in our mind that, which one is best for us. And we generally, uh, follow their instruction, **(6)** but the weather, uh, forecasting, which we received is, is always a kind of an input, the final call, the final decision, uh, and, and the final routing routine is always done by the master. So master is always having an overriding authority over these, uh, weather forecastings and … and weather analysis. **(6)** So final call is done by the bridge team and by the master, for sure. Uh, but we always depend upon, uh, to the weather forecasting and we prefer to take the, the best one. **(4)** So if we have a three service, we know that which one is best. And we, uh, just follow them.

L: Okay. **(4)** So, so you still have options.

M: Yeah.

L: Okay. That's good. And, um, like the, but, uh, at the same time you also receive, uh, the local author…weather authorities' information, right?

M: Yes. Yes. **(4)** So like we are getting the VHF, uh, information from, from local authorities that if you're going to this region, you may find, uh, a low pressure region or a typhoon, which, which may give you a speed of around eight knots or 10 knots. So, like those kind of things, uh, is always, uh, is always coming to you as a feedback. So it's always important to the person who's actually doing the watch. It is always important for them to note it down, that what is going to come in in coming days.

L: Mm-hmm.

M: And then, uh, like supposedly if you're getting an information, then after two days, we are reaching to a location, which is a low pressure region. And then, uh, the wind speed is going to be around, uh, maybe 15 or 16 knots. So these things are to be well calculated before and then, uh, it can be discussed with, uh, with all the bridge staff and all, all the bridge team. So, can we, uh, can we reroute the entire vessel or can we change the passage? And these things also needs to communicated to the, to the cargo owners and, and the operators and, and the vessel managers, uh, of the, of the, of, of the company. So, it also requires a good amount of coordination between all the stakeholders.

L: Okay. Yeah. So, but like in … if it's a place that, as you said, uh, without good con… uh, Internet or there's, uh, there's no weather radar, so neither, neither the local authority or the, uh, agency you chose, they, they, they couldn't, um, get information for you, right?

M: Yeah. Yeah.

L: Okay. That, that's a tricky situation.

M: Yeah. That's a tricky situation. Yeah, that is, yeah. **(3)** That is tricky situation. But like, let me explain you in, in, in this way that like you will get constant symbols or a constant, uh, like views that, okay, this is going to come. So, like, uh, there, there must be only a patch of six hours or eight hours where you may don't have an Internet or you may in a region where the Internet is not there. But before six hours also, you, you may get a certain amount of input from your, weather forecasting signal that okay, after two days or after one day or after 72 hours, or maybe after three days, you're reaching to a shadow region. So, it's not like that, that abruptly something, uh, coming up and then you are not aware of that.

L: Oh.

M: So because of the, because of the nice forecasting system, generally, what happens? People miss those, uh, those details and those informations, which is necessary, because generally people in perception that, okay, this is coming after three days or after four. Then we'll see, uh, and then we analyze, and then we do the, do our research.

L: Oh, okay. So, you still have some time to prepare.

M: Yeah. To, to prepare. **(3)** So there there's always an option to, to prepare well in advance.

L: Okay. And all the weather information you received in, um, two languages? I, I mean, uh, both English and, uh, the local language, right?

M: Yeah. I mean like, **(5)** uh, generally, uh, it is not always English. So, it all depends upon the region in which you're traveling.

L: Uh, so, so some of them don't provide English forecasting?

M: Yeah. Yeah. Sometimes they do provide English forecasting. Uh, but like, uh, you are talking about the VHF conversation or you're saying that, uh, the information which we're getting from the, from the subscriptions?

L: Uh, I, **(5)** I think from subscriptions, they, they definitely give in English, right?

M: **(5)** Yeah, they definitely give English.

L: **(5)** For the regional one. I mean the local authority. Sometimes they don't provide in English?

M: **(5)** It, it is because sometimes what happens like, uh, if you go to some African countries, you may find they're actually communicating in, in the local language.

L: Ah.

M: **(5)** But generally, but generally what happens like it is also depends that people coming from different region, they have a different way of speaking the English.

L: Oh yeah.

M: Yeah. Communication will be … so if, if a guy who's actually onto the bridge and if he's already stressed out, he's already worked. Uh, and he's already, uh, like, you know, he is overworked. And then, uh, he's getting information maybe, uh, maybe, uh, speaking by someone, the English is not clear and not coming clearly onto the VHF. Then he may miss that, even if the person who's actually on the other side of the VHF is speaking English. So, uh, the, the, these kind of, uh, issues, uh, kind of miscommunication, not the miscommunication is the correct term. Uh, but we all speak English because of different region.

L: Yeah, I know the way of speaking is, is different.

M: Yeah, pronunciation. Maybe the pronunciation is, is different for different. And then sometimes, uh, you may miss a important information. And generally, **(5)** on board, people do have a perception not to every time bother the, the local authorities, because then they, you know, then they come up with different, uh, uh, questions and rules and regulations. So, whatever they say, just try to note it down and then, you know, list as, as much as list you can interact with is better.

L: Oh.

M: Unnecessary interaction is, is not, uh, acceptable sometimes.

L: Okay.

M: Yeah.

L: Okay. We, we are finished with the weather, weather forecasting part.

M: Yeah.

L: And the, uh, do you know how the, how a ship normally determine the routes? I mean, if there's a standardized procedure to do?

M: Yeah. So generally, **(6)** we have ECDIS. ECDIS is, is a kind of a radar system. So it, it is…

L: Sorry, you have what?

M: **(6) (8)** ECDIS, ECDIS is the, is the, is the equipment which we generally use for, for plotting the routes and, uh, for finding out. So, it is more like an electronic display. So how we have in the part. Generally, you put the, you put your destination and then, uh, and then it tells you that, okay, you have to follow this route, and you have to go by this route. And if you follow this route, you'll take this much of time. If you follow this route, you'll take this much of time.

L: Oh, could you, could you spell it for me?

M: ECDIS? So, that is called as, uh, let me check the full form of this. I forgot right now, but I remember it.

L: Do you mean. NATVEX?

M: No, it, it is called as electronic chart display and information system. So it is called as E-C-D-I-S.

L: Uh, E-C-D-I-S. Oh.

M: Yeah. So, it is electronic chart, display information system.

L: Okay. So you use it to, uh… it, it helps you, uh, the, the ship crew to determine the routes.

M: Yeah. Yeah. So, it actually gives you a detailed analysis that what the depth of the water is, where you find the different, uh, like land bodies, how you have to navigate, what is a safer navigation region, uh, where is, uh, HRA, where the high risk zones are, where the naval bases are, where you are from, where you are not allowed to go, where are the full seaway passages are there, where canals are there, challenges are there. So it's give you a detailed, detailed overview of your passage. **(6)** And then it is your call to decide that, uh, what all points you want to pick and, uh, what all locations you want to pick, and then you can, uh, plot your entire passage. So it gives you a good amount of structure about 70, 80%, and then it's your call, not your call. It's all depend upon the bridge team. And the, and the second officer is the one who's in charge for the, for the planning and passaging. So he'll prepare the chart.

L: **(6) (8)** So, for you guys, you don't use any, um, paper or books to, uh, search for the, uh, routine information now? It's all electric?

M: **(6) (8)** Yeah. Yeah, yeah. And, uh, previously it was what…

L: Uh, who normally, uh, is responsible for this, uh, this job?

M: Uh, this is **(6)** done by the second officer.

L: Oh, okay.

M: So previously it was done by the charts, but, uh, like right now it is done by ECDIS.

L: Okay. Yeah. It sounds more advanced.

M: Yeah, yeah, yeah. Like it, you cannot, uh, you cannot rely on, on, on, on papers. So it'll be tough to, to, uh, do that.

L: But, but it depends on companies, right? How, like how much, uh, the company invests. Not every company has such a system, I, I assume?

M: no, but like, there, **(8)** there there's a proper regulation and rule that you should have at least one ECDIS on board. So, like, if you really want to, uh, run your vessel onto the ocean-going fleet. Uh, then, uh, it is a mandatory requirement of, of, of safe navigation system to have one ECDIS on board. So you cannot like your, your vessel cannot sail if it is not having an ECDIS on board.

L: Oh, okay.

M: So it is a regulation, it's a regulation, which, which has to be fulfilled.

L: Okay. Then, um, uh, after you getting this inform … uh, route information, uh, and I mean, the master, they need to, uh, determine, uh, determine which way, which route to go. And, and, uh, from your point of view, what, what are the factors, um, that should be considered when determine your route? I mean, how you observe, how you, um, like in your previous experience, what do… what have you observed that your, uh, your masters determine on the route.

M: Yeah. So like, uh, what I understand, uh, uh, the deciding factors are a lot, but one of them is always, uh, is, is, is, should be, uh, **(7)** less amount of fuel consumption. So the nautical miles are less, uh, people prefer to go with that. There's the first thing.

L: Oh, sorry. What is that?

M: **(7)** So distance, if the distance is less, then we will, then we will consume less amount of fuel and then we will save a decent amount of money. So that's always a first factor. The, the second thing is, is, is considered to be that that passage should be completely safe. So we should not passing any, any reef, any narrow channels…

L: Mm-hmm.

M: Any, any, any cable line areas, any naval bases, any, uh, regions, uh, like these kind of things.

L: It's climate-related, right? Like, uh, uh, based on the weather.

M: No, it is, it is based on that you should not enter into wrong territories. So like, if, if you are crossing and if Indonesia is having a naval base area, which is the design, which is subjected to be 13 article miles, so should not, you know, enter into, into that region.

L: Oh.

M: Because then it's a, it's, it's a breakage of international law and regulation, so that, uh, that factor will be keeping into consideration.

L: Okay. And… So, so short distance, safe and any other else?

M: Uh, and **(7)** after that, generally, master need to communicate with the, with the vessel manager and the cargo owner. So like, uh, just to know that what is the best suited path and how we can reduce the time. So like shorter distance and reduce the time is also like correlated with that. **(7)** And, uh, uh, it, it also depends upon the safe navigation passage. So the graph, which is done below of the vessel should always be perfect. So it should be eminent amount of depth of, uh, water should be available.

L: Okay. Uh, so you mentioned several factors and, uh, in these factors, uh, I didn't, I didn't see the, where, where weather, uh, is located. So do, do you also consider…

M: Yes. Yes. Yeah. We…

L: I mean, in, in this priority of where the weather is, is ranked,

M: Uh, yeah, I guess, uh, **(7)** weather, uh, from my end, it's, it's always like, is always on the first priority. So if it is something, uh, like how, how can I say, like, **(7)** if the weather is, is actually not really compatible for the voyage, the EDICS will not show you that that passage. So generally how that's the way it works. So this electronic chart, the space system is actually keep on updating on regular basis. And, uh, if you have a wrong weather forecasting, generally, uh, you will not see that forecasting, uh, onto the EDICS. So some, some, some sort of, uh, assumption is it, **(7)** but the weather is always a crucial effect. And, uh, sometimes what happened that the master is, uh, is not able to assess the situation that how bad the weather condition is. So they generally follow, uh, the same, uh, the same track. And then they say that, okay, we're going to decide once we are reaching close to that bad weather condition and then try to communicate with the local authorities and then, you know, turn the vessel, navigate the vessel, or just, uh, just turn around. So like, uh, if. How can I say, generally what happens? The, the client, the cargo owner is always, uh, put the pressure on the commercial staff. And the commercial staff is actually saying to the ship that, okay, you have to reach from China to Rotterdam in 28 days for sure. So, uh, the master will not say that. Okay. I know that after 15 days, the, the bad weather is coming. So, I really want to move the vessel from the Cape of Good Hope. So, like, I cannot move the vessel from Africa because then it'll take 45 days of voyage, and then the fuel costs will double. So master will not say like this, because then they say that, okay, you're, you're an untrained guy because you are costing us more money. So generally what kind of decision they say that they decide, they say that, okay, let's, let's follow the route. And once we're approaching, uh, the, the condition, then we'll talk to the local parties, and then we'll talk to the, uh, talk to the people, talk to the ship owners and then say that, okay, how severe it is. And then they can, uh, then we can change the part. Yeah. I just change the part or tweak the part. So pre-decision, decision is not always. A practical solution, maybe.

L: Okay. Yeah. Yeah. I think we've already done, uh, question eight.

M: Yeah.

L: Yeah. So question nine, like, uh, **(9)** you also said that you also have optional routes.

M: **(9)** Uh, yes.

L: Yeah, yeah. So that's also done and yeah.

M: Mm. Yeah,

L: I think the position monitoring equipment. Uh, I assume now…

M: Yes, we,

L: Yeah, keep up.

M: **(10)** Yeah. So it is called as AIS. So it is a automatic indication system is there. So, generally on board you have a AIS, which is actually telling exactly telling the, the position of vessel to a satellite and then it is keep on updated. So, uh, it is called as the Automatic, Automatic Indication System.

L: **(10)** And I think it's mandatory, right? It's written in the regulations.

M: **(10)** Yes. Yeah, yeah, yeah. Yes. Yes. You have to, you should have AIS for sure.

L: Okay. And, um, okay. Now we are coming to the onboard procedure. Uh, like when you, when you guys, uh, face a severe storm and, um, do you have standardized emergency procedures to follow? Uh, like, uh, what, what do you need to do with the engine? And like, or if you are … if the ship is anchored, what do you need to do with mooring those things, those kinds of things.

M: Yeah.

L: Do you have a standardized procedure there?

M: Yeah. So, uh, **(11)** that's what I again say. It all depends upon to company to companies.

L: Yeah.

M: So if you, **(11)** if you're working with a good standard company, which is having a nice, licenced standards, they do always have a checklist or a, or a protocols…

L: Mm-hmm.

M: **(11)** So like, if you have a rough condition, you, as a crew, don't have to think. They already prepare a checklist. So you have to just take the printout of the checklist, which is having somewhere around 25 or 30 points. And then you have to just, uh, like robotically. You have to keep on following all the steps in a more, uh, precise way. So it is, it is also a checklist part, which is into the place. But beyond that, uh, there, there is also a certain kind of, uh, self-analysis is done and, uh, like you can take your own steps also. So sometimes what happened if the weather condition is severe, like, uh, a master can decide that, should I drop the anchor or should I allow my vessel to, to float. Uh, like, or it is better to, to find a shallow region where I can drop my anchor and, and let the, let the weather pass, and then I can, uh, sail through. **(11)** So these kind of decisions is also is also taken by only one man. **(11)** And rest, what I mentioned is like all the other crew, they already have a procedures in plan, which is in place. And, uh, they have to follow a standard company checklist, which is prior to them and they have to follow it. And then you have to keep on doing the things and then they keep on picking. Okay. I did this part, that part and the work is segregated.

So like if the rough condition is there, like **(11)** every member on board, they have their responsibility, which they have to do it based on the checklist requirements.

L: Yeah. Yeah. But that that's the best situation, right? If the company has such a standard.

M: Yes. Yeah. Yes, yes. Yeah. That's the best situation. **(11)** And if it is not there, then generally it is completely DIY. So it's all depend upon the one man, and that is master. So he will decide, but he will also consult, with others. So, like he will consult the chief engineer, chief mate.

L: Mm-hmm.

M: Second engineer, second officer, maybe sort of officers also. So, uh, they can communicate and then they can decide that, uh, what step is better for the vessel and for the cargo and for the, for the people.

L: Okay. Yeah. Mm … **(12)** I think 12. Yeah. Yesterday I, I did the interview with, uh, Vinay, so he, he has explained question 12 for me, so…

M: Oh, okay. That's good.

L: Yeah. **(12)** So we can, we can skip this one for, to save some time.

M: Yeah.

L: Yeah. And yeah, like for your, for your role, how, how often do you need to get training?

M: Uh, so for me, role, for my role, if you really want to ask about weather training, I don't think so we have any kind of weather training.

L: Here is a, a general one as an engineer.

M: Yeah. So, uh, for me, like we have, uh, training on board, is sometimes approximately, uh, twice in a two week. And, uh, if, **(13) (14)** if you are, uh, going towards maybe some. Some certificate renewal, some surveys, or if you're going for the USCG and all. So we have a USCG, US Port Guard Inspection. So generally, then it is every week. But on a, on a normal basis, it is, it is twice a week.

L: Twice a week. Twice a week?

M: Yeah.

L: That sounds frequent.

M: No, no, no. Uh, uh, once in two weeks, actually, I'm sorry for that.

L: Oh, once in two weeks.

M: Yeah. So, in every 14 days we have one training.

L: Okay. Eh, but for, for engineers, you, you, you don't have, uh, specific training for, uh, to prepare for weather, the bad weathers, right?

M: Uh, **(13)** for specific training, uh, like we do have, but that is all about the checklist. And then, uh, it, it's more like a morning meeting in a verbally. We decide that okay, uh, we are, we are expecting today, it is going to be a rough weather condition. So, we are going to take, this is, this is this step. And, uh, then the work is distributed among the team. So that, uh, that is the kind of, uh, session is there, **(13)** but there is no specific like training where you actually read the, where should read the manual or see the videos to, to do that.

L: Okay. Okay. And, um, like according to your observation and do, do all your colleagues and you have, uh, have their, have their own training for their own roles or, or only … I mean only chief officer, uh, master and, uh, engineers have trainings.

M: **(14)** Uh, oh yeah, I guess every, so like right now the standards are becoming so high that everybody is, is having their training sessions. Uh, everybody is having their own portals actually. So like, uh, if you are a person on board and if you have a specific rank, then company provides you online. It's a dashboard portal where you have around 20 or 30 courses, which you have to do it when you're on board. So, this is, this is more about the training. So like you have to see the videos and then you can answer the questions in, in the next session…

L: but these are kind of online courses. Do you have any drills also?

M: Yes we, yeah, but that is, those **(14)** drills are completely based on the lifesaving appliances. So like, if you have a fire on board or if you have a man over board, or if you have a cargo spillage, or, uh, or you have a salvage operation where the vessel is actually going to sink. So that kind of training. So, so these trainings are actually, uh, done as a team. So these training, these drills are done as a team. But there is the individual trainings are done onto the, onto the portals or the extra where you have to see the video and then you have to do the answering to, to whatever you understand from the video.

L: Okay. And how, how often, and do you have those drills?

M: Yeah, **(13)** those drills I mentioned to you is, is, uh, uh, once in two week.

L: Oh, so, uh, you referred to drills. Okay.

M: Yes, yes. Yeah. I referred to drills. So training is, uh, **(13)** the extra training, which I really want to mention is, is a pretty much of your own, uh, of your own convenience.

L: Ah.

M: So like, if you start your time for six months, then you, like, once you finish your work after six or seven. Then you can go to a common local area, like common places, like room, mess room, or officer room there, you have a deskstop and then you can do your training.

L: Oh.

M: So that is your responsibility. How you're going to, to manage it, but you have to do it.

L: Okay. And also the, so, so you also mean that the, uh, the drills … in the drills, you don't have specific drills for weather, for bad weather, right? You also referred to that, right?

M: Yes, it is, **(14)** it is not for me as an engineer, but it is, it is there for the people who are actually handling the bridge. So, in the bridge team, they have master chief officer, secondary officer, and third.

L: Only they have?

M: Yes, only they have. **(14)** So, we have a separate deal, which is completely dependent upon the engineering side and they have a different build, which is depend upon the navigation side.

L: Oh, okay. Uh, and also the … okay. The next one is, um, like when you finish one voyage, let's more, uh, more accurate, one contract. And, uh, before you start another contract, how many, how much rest time do you have in between normally?

M: **(15)** Uh, it depends person to person, but if personally, if you ask me, I I'll take around four to five months of rest. And then again, I, I generally, I, I go to, uh, for the next contract for them the next time.

L: Uh, there, uh, there's no minimum rest, hours, uh, rest time for, for such a situation? I mean generally required by some regulations that you … after you finish one contract, you must have several or some … sometime for rest, something like that?

M: No, I am … I'm not clear, aware about that and I never heard that kind of, uh, like, uh, contracts or, or recipe because I know people who actually come back with other contract after 15 days.

L: Mm-hmm.

M: so, uh, that is also there. And I mean, I know people who actually come back to second, uh, to the next contract after nine months. So, uh…

L: It just depends on when you want right?
M: Personally. Yeah, yeah, yeah. So it is, it is like own your, your own personal decision and it all depends upon what kind of, uh, like responsibility or liability you have towards your home, or like, whatever work you have when you're taking, when you're off.

L: Okay, then what, uh, before you start a new voyage, do you have time to … like the whole team, do, do you need to, um, do a specific drill or training for the specific voyage or you just get on board directly?

M: Yeah, I like, uh, when, when you're, when you're not on board. You're also doing the training when you're actually at home, because in the company you get, like you get, you've already known that, okay, I will start, I will do this voyage. I will do this contract and you know where to go.

L: And before that, the team, the whole team, do you need to do some specific training preparations for the, for that specific voyage?

M: Yeah. So like if, uh, **(16)** if you are crossing a higher risk region, so like if you're moving from, uh, uh, from China to Europe and then you're passing the HRA, so bubble area, or maybe Sudan or Djibouti area. So it's a, it's HRA zone. So we do have to do the drills when we are crossing those areas. So those drills are actually combined drills, in which we, uh, distribution tells each one roles and responsibility, what work everybody has to do. So, uh, that kind of things are there. **(16)** It's only there when you're crossing the HRAs.

L: Across, uh, across what, sorry?

M: High risk area. So that is for HR. So, so when you cross that active continent, you may find that pirates may attack the vessel. So, uh, to avoid this, we, we have to do the training previously, so that once we have been attacked by someone, we should not be scared or we should not, we, we should know what we have to do.

L: Ah.

M: So generally we'll do, we'll do the pre, uh, preparation. So like before entering into that, we do the training drills. Uh, roles and responsibilities will be distributed to everyone. Okay. So that is what it's.

L: Is this, uh, is this, uh, regulated or it's your company asking you, asking you, like when you cross, uh, when you cross HRS you, uh, we need to have a drill. Is it a mandatory rule or not?

M: **(16)** According to my knowledge, I don't think it is mandatory. It is actually prepared by each and every company. Uh, they have their own procedures, which, uh, every company vessel has to follow. So there is no IMO regulation or standard or, or any kind of guidelines that, that every vessel has to do this.

L: Ah, okay.

M: But generally, companies will do it so that they can save their, their assets and then, and their, and their crew and the cargo. So that's the reason they, they do it.

L: Okay.

M: Yeah.

L: Uh, we have three to go. Uh, let's hurry up… it's run over time. Sorry about that.

M: Yeah. Yeah, no problem. No problem.

L: And yeah, because I read a case that the, the ship master knew the storm, uh, will come and, but he still decided to go across the route that they, uh, they intended to do before. Uh, and finally, they met, met the storm and the ship sank and we, uh, um, it shows it probably because the, the master didn't want to, uh, delay, have delays. So I, we, I'm just wondering, besides the technical drills or training, do you also have some psychological tests or training to prepare, you know, your mental health for the voyage?

M: Uh, yeah, **(17)** so like, uh, what I know is me is having that kind of a psychological test, which is there. Oh, so they're testing, uh, they're testing the psychological test, **(17)** but not every company is having, uh, that kind of, uh, that kind of setup available to them.

L: Okay. So it depends.

M: Yeah, so it depends. And, uh, the situation which you mentioned in this situation, maybe that master is, is getting a pressure from the…

L: Yeah.

M: From the owners and the vessel operator side that you have be on time. And then he may be not able to assess the situation in a correct way. And then he will not, take the correct decision to, uh, do, to change the passage or, or a pathway.

L: Like, yeah. So like for, for a ship, if it, if it's delayed, the master would, would get fined or something like that?

M: Like if, if the, if the vessel got delayed, then the port authority would, uh, will put a fine on onto the, onto the ship owner. And, uh, and the, and the ship owner will also get a fine from the cargo owner because the cargo is also delayed. And, uh, and the port authority will also put the same claim onto the, onto the ship owner. So ship owners is actually into a big trouble. So that's why the reason ship owners will always try to push the masters or the ship to start that, okay, we have to be on time or we have to deliver the, the stuff on time.

L: And, uh, does the ship owner, does the ship owner also probably put, uh, put a claim on the, on the master? That that's, that might be the case as well. Right?

M: Yeah. But I don't think so the master is having the strong money to pay back because these claims, as, as we all know, these claims are quite big claims. So it'll be costing you around maybe like sometimes 80,000 or eight, maybe a billion or something.

L: But there's risk of being fired, something like that?

M: Yeah. So like, so like, even if they, even if they can fire the master or even, even if they, like take his all salary for six months and months, the claim is so big that it'll, uh, it'll not be compensated. So, so that, that's what the thing is. So there's a very small trade, which is in between, which is, uh, which, which is master. So, they only try to order the ship staff. So they only try to push them so that they can, uh, you know, perform to their optimum.

L: I feel so much pressure.

M: And, <laugh>, yeah. yeah. And, and, and, you know, master again, report to a ship manager is saying that, okay, weather is, is worse, but because the manager is not in that, in that, in the middle of the ocean. So trying to explain him, and he's also in pressure because he's getting a pressure from cargo owners that, okay, I want my cargo to be in, in, in Belgium, by noon. And if I don't get it, my plant will stop. So these things will create, uh … and like master will also not go and talk to his, his crew members because like everybody see him as a, as a, as a person who knows everything. Like if he start going and talking to his own people, then he will get a negative image. So he is also he, so he he'll be pretty much in his own way to, to handle the situation and to find it out what's the best for this.

L: <Sigh> sounds so tough.

M: Yeah, sometimes it's sort of tough, but generally it's kind of easy, not easy, but manageable.

L: Like, and also then, then if the master, because he has to make, uh, make it on time, but the, uh, the other crew, they, uh, they they've already noticed the master's decision life threatening. Can they raise objections? Or they must obey the order?

M: Yeah. I mean, it's like, they can, **(18)** they can raise the objection. But, uh, like if you go and read any laws and regulations, so master is a kind for owner representative. So the master command is the last command…

L: So he, yeah, you speak.

M: So he, he, at the end of the day, he he's the whole soul … he's the whole soul, spokesperson of ship, ship owner on board ship. **(18)** So you, so generally the situation is that you have to convince him and tell him that, okay, what you are doing is not correct. And let's do it in this way. So like, uh, you cannot retaliate or you cannot shout in front of him and say that, okay, you have to do this because this is really important.

L: So the, the, the crew, they can raise objections, but, uh, whether, whether the master change decisions or not, it depends on the master. Right? He made the final decision.
M: Yeah. He, because he is the whole soul in charge. So he will take the final call unless there's a big dispute where you can, you know, physically harm him or do him something where he will not be capable and somebody else take over. Then it's a different story, but otherwise, uh, according to book, uh, his, his call is the last call.

L: Oh, okay. Yeah. Yeah. Uh, and yeah, we, we come to the last one. I, I was just thinking about the, the tough situation you mentioned <laugh>.

M: <Laugh> yeah, it it's, it's kind of sometime tough.

L: Yeah. Okay. So, um, on our ship, uh, what kinds of climate monitoring equipment there? Uh, could you make some examples?

M: So generally, we have a, uh, like, uh, the, **(19)** this equipment, which can sense the, what is the wind speed is there. And, uh, I guess wind speed is the, is the only thing.

L: And, and then humidity?

M: Yeah, humidity is also there. And then you can also find the direction of the, of the wind. So you can understand that from, from where the, the wind is coming and what is the speed of the wind and, uh, like well, that's it. And the low pressure and high pressure regions, you can, you can see it onto like this. And, uh, yeah, and **(19)** radar is also there. So the radar is also a kind of equipment, which tells you that, okay, how much is the depth of the water down below the ship, uh, and how, how far is the coastal area is, so that is a kind of equipment which is utilized.

L: Okay. And are they, are they mandatory?

M: Yes, they are mandatory. Uh, like when, uh, wind knots speed is mandatory. The radar is, is obviously mandatory and yeah.

L: All of them? I think I misheard something.

M: Uh, are, are they? Yeah. All of them actually. Uh, these anemometers and barometers, uh, is actually a pressure. So, it, it tells you the pressure.

L: Mm-hmm.

M: What is outside. Is, is more about the pressure. **(19)** But what I understand, generally, we have, uh, uh, a wind where wind speed monitor. So it tells you the direction of the wind, and what is the speed right now of the wind is.

L: Mm-hmm.

M: That's uh, that, that is one of the very important. **(19)** And then we are getting, uh, the radar is also there.

L: Okay. Okay.

M: Yeah.

L: Okay. I think I've already got a complete picture from you.

M: Yeah, it's good.

L: Yeah. I think we are done. We, we've run over time. We've run over time.

M: Yeah, no problem. No problem. It's, it's always pleasure to, to help you out whatever I can know.

L: Yeah, your answers are quite helpful!

Interviewee 3

Interviewer: Yuecen Li (Hereafter called L)

Interviewee: Ashish Cecil (Hereafter called A)

Time: August 9th, 13:00

A: Hello? Can you hear me?

L: Yeah. Clear.

A: Okay, good. Uh, so can you pull up the, the word document I sent you?

L: Yeah, one moment. Can you see my screen?

A: Mm. Okay. Yeah. So, okay. Tell me how you want to start.

L: <Laugh> yeah, you are like the host. Yeah. So, uh, firstly, uh, let's just, uh, start with the general questions.

A: Mm mm-hmm.

L: Please tell me about your responsibilities as a chief officer. And, uh, when did you start a role and how many years?

A: Yeah. Okay. So, uh, well **(2)** I started my sailing career in 2003 as a cadet.

L: Mm-hmm.

A: And then, um, **(2)** I started with a company called Williamson Ship Management, uh, and I continued, uh, sailing on their LPG vessels. Um, and, um, I grew in, um, experience and rank. I continued, uh, sailing with them from a junior rank position that is third officer, second officer, and then continued till I became chief officer in 2012. And, uh, and I was at LPG chief officer with them from 2012 to 2014. Um, and in 2014 I gave my master's, uh, license, uh, exam. Uh, so I became a captain license order in 2015. Then in 2015, I changed over to, um, uh, sustainable. Uh, what do you say, uh, transport, uh, which is, uh, LNG, um, LNG, uh, with, uh, MOL ship, uh, MOL company, Mitsu Alliance. That was from, uh, 2015 until end of 2020. I sailed with them as an LNG chief officer. Uh, and, um, and after that, yeah, I joined MEL <laugh>.

L: Oh, so, so you, you were also a master at, uh, right?

A: I say, I, I have the master's license, but I did not sail as a master.

L: Ah.

A: Yeah. Yeah. So, I, when I got the opportunity in 2014 to take, uh, you know, like, um, a captain's position, but I switched over to LNG at that point. Yeah. So, uh, responsibilities, uh, well, **(1)** as a chief officer, per se, you are in charge of, uh, cargo operations. You know, when the vessel loads, the cargo …

L: Mm-hmm.

A: **(1)** Uh, you are in, uh, in charge and responsible for loading operations, planning the loading operations, uh, then planning the storage of the cargo and then discharging the cargo. And that is the primary, uh, duty upon chief officer.

L: Mm-hmm.

A: Sec … **(1)** secondary duties are, uh, managing the crew. Uh, so I had about 10 to 12 crew members under me working. So, my job was to give them job orders, uh, and ensure that the vessel is, uh, maintained. **(1)** So another job was maintenance of the vessel and, um, and then let's, uh, looking after the equipment and, uh, per se everything well. Uh, in detail, yes, of course there is a long list, but this is, uh, I'm just giving you a brief idea.

L: Yeah.

A: Uh, and, uh, also to. Well, uh, when you are on board, we work as a team. So, yes, uh, also one of the part, uh, **(1)** chief officer also places navigation, where he is part of eight hours. **(1)** He has to do navigational watch where he's, uh, solely responsible for navigating the vessel. Uh, so for us, that is, uh, as a chief, you would keep four in the morning. Uh, I'd say 4:00 AM to 8:00 AM, then again in the evening, uh, 4:00 PM, two 8:00 PM. Uh, so that time, yes, uh, that will concern your questions over here, that how, you know, you take care of navigation and weather and everything. Okay. Okay.

L: Yeah. That's clear. Yeah.

A: All right.

L: Okay.

A: All right.

L: Yeah, we move on to the practical questions. Yeah.

A: Mm-hmm.

L: Okay. So from now on, all the, the questions are just, you just need to answer based on your, uh, previous experience or what you observed? Uh…

A: Mm-hmm.

L: In previous voyages. It, it might not be your, uh, responsibilities, but yeah, just based on your observation in those voyages.

A: Okay.

L: That's fine. Yeah. So, okay.

A: Yeah. Okay.

L: So the first is about like, what do you think about the, uh, accuracy and, uh, real time quality of the weather forecasting during your voyages?

A: Okay, so **(3)** accuracy. Um, well, it, it depends from, uh, region to region.

L: Mm-hmm.

A: Um, for example, I would say that, um, for, um, say Southeast Asia, Japan, the region, the waters around Japan and, uh, **(3)** wherever they cover the Asia region, uh, they have good database and technology to give accurate, um, weather forecast. So, uh, well, on the contrary, if you come to say, uh, Indian ocean, uh, so **(3)** you are in between say India and the middle east or Africa. So that part of the region is not, uh, very well covered in terms of accuracy. So this I'm talking at least, um, 10 years back then I will come to what was the present situation.

L: Okay.

A: So 10 years back, it was really not so great. You know, um, this particular region, uh, say Indian, from the Indian, Indian ocean region.

L: Mm-hmm.

A: Uh, then when you go to the other side, uh, **(3)** say red sea and then the mid middle, uh, Mediterranean sea. Those are very well covered. They're covered by, say the Europe and, uh, Africa side.

L: Mm-hmm.

A: And then you come again to the Atlantic side where north and south Atlantic. Um, that is, these are huge ocean, uh, oceans, you know, to, so to get a, a very accurate, um, weather forecast is very difficult because there's a lot of cost involved in, uh, setting up equipment, uh, or monitoring these. Basically, they sometimes do it through satellite, uh, projections, you know.

L: Mm-hmm.

A: So, yeah. So **(3)** when you come to big oceans that time, you might not get very accurate, uh, weather forecasting.

L: Mm-hmm.

A: Um, **(3)** but now the technology is changed and it is improved a lot from when I started sailing in 2003. Initially we would, uh, depend, uh, for the, uh, for, we would get weather. Uh, now we are coming to real time weather. <cough> sorry.

L: Okay. Yes.

A: Uh, in real time weather, **(3)** when, when I started off, um, uh, my career, I know that, you know, we would get, uh, reports every six hours, uh, you know, whichever region of, of the world you sailed in. Uh, you would, uh, get, uh, certain reports only in six hours. And sometimes you have to, uh, tune into that particular frequency to receive that, uh, weather information. So suppose you as a navigator, it, it, I am sailing and it is coming in a particular duty time. And I do not switch into that particular frequency. I will miss out the weather report, you know, So, uh, so that was, yeah.

L: Sorry. So, you mean, uh, if, uh, it's your time to be on duty, you need to switch the, uh, on frequency of updating the for forecast, uh, uh, the weather.

A: Yes. Yes. So …

L: But it is actually always six-hour report, as you said…

A: Yeah, it is six hours. But, um, certain equipment, for example, uh, it is called facsimile receiver.

L: Mm-hmm.

A: It, it scans, uh, it sends you like a fax, you know, a fax on a fax paper. It'll print …

L: Mm-hmm.

A: So it'll give you a chart, the entire region of where, uh, that particular area is. There's also this, for example, this facsimile receiver, you can, you can check, check it on Google.

L: Mm-hmm.

A: Uh, it is an equipment where you feed in the frequency. Okay. And then, and then when that time comes for that six-hour report, automatically, since you already tiered into that frequency, it'll latch onto the frequency and print out the report for you. OK. So suppose you are on watch and you forget about it, and then you try to. Uh, you know, uh, get that report, then it is impossible because your equipment is not firstly on the right frequency or maybe it is not switched on.

L: Uh, so you mean like, uh, uh, the, the duration of the report is six hours, but after six hours, you need to reset the frequency something like that?

A: Uh, no, it, it depends on, uh, you know, every, uh, uh, every part of the world there are dedicated, uh, stations, which send out weather, uh, reports. Yeah. This is one of the equipments I'm talking about. And there are other ways also, uh, will focus on this one and then get back to the other ones.

L: Yeah.

A: So, this facsimile receiver is a really good, uh, and it gives a good, uh, information about the weather.

L: Mm-hmm.

A: Because it'll, it'll draw. If you, if you're seeing these weather news channels, you see like a cyclone being formed if, if you remember, if you see like a cloud.

L: Yeah.

A: So it, this, uh, AI receiver also gives you a bird eye view of the, uh, where your ship is. And if there are any, uh, higher, low, um, uh, pressure contours being formed, you know?

L: Yeah.

A: So this is, uh, for example, you're sailing, uh, in the Indian ocean. And for example, say, uh, in the, say, uh, from India, they, they have a station and they will transmit at a particular time.

L: Mm-hmm.

A: If your receiver is off, you will not be able to receive that particular, this, yeah.

L: Mm-hmm.

A: So, so, so this particular station in India will only transmit at that particular time. Yeah.

L: Okay. Okay.

A: Okay. So, uh, and then they, all the timings mostly are said on GMT time, uh, which is Greenwich Meridian time. You will not go by, uh, even if India is saying I will transport a report, it'll say GMT. So, and so then, you know, your local time, wherever you are in the world, for example, we are, uh, what we like we have plus, Netherlands, what now? What time is it one o'clock right?

L: Yeah.

A: So we are two hours from GMT, something like that, you know? So ahead of gym.

L: Yeah. Okay.

A: So, uh, now coming the, to, uh, this is the older version I'm saying. Then there is something called, uh, INMARSAT C. **(3)** INMARSAT C also, uh, also more or less, it gives you three between three to six hours, the report, you know?

L: Yeah.

A: Uh, INMARSAT C...

L: Sorry, could you spell the name of the, of the …

A: I-N-M-A-R-S … Wait, how do I take? Okay. INMARSAT <typing> yeah. INMARSAT C.

L: Ah, okay.

A: It's it's actually international. IN stands for international. MAR is for maritime, and SAT is for satellite. And Marsat C and C is the, um, well, I don't remember now, but, um…

L: I can Google.

A: Yeah. Yeah. Uh, it's, it's basically **(8)** INMARSAT is the equipment which is installed on board. And then C is I think that particular, uh, thing where it is only related to, um, um, like sending messages and receiving messages, you know? Okay. Uh…

L: So, is it, uh, installed in, uh, every ship? Is it mandatory to install in every ship or it just depends?

A: No, actually, um, yeah, that's a good question. Actually. **(8)** It depends on, uh, the ocean regions the vessels are sailing, you know? So for coastal vessels, like for example, these barges, what we see, they don't need those kind of equipment. If you're into the, <cough> sorry, um, like ocean seagoing vessels, then you have to have certain number of equipments. You know… uh, and this is given in something called GMDSS, which in these, one of the links, now I have be posted it. Uh, so you will get it. But, uh, what we'll do is, um, so **(3) (8)** real time quality of weather is now it is improved in terms of, so your, your olden day, uh, data is still there, which is receiving through facsimile and INMARSAT C and there is something also called NAVTEX equipment. Okay.

L: I know that one. <laugh>

A: Ah, you know that one? Okay. I know. Okay. So that's good. So NAVTEX is also, uh, NAVTEX is basically dedicated only for, um, weather reporting. It can be weather reporting. It can be anything to do with a vessel in distress or, you know, uh, any emergency. Huh? Okay. Yeah. We also receive messages. Suppose our country is doing some military exercise, you know, sometimes they, um, have some, uh, missiles being tested and all that. So, uh, **(8)** NAVTEX basically give, will give you everything related to navigation in terms of weather, uh, then safety of the vessel.

L: Mm-hmm.

A: Any emergency, et cetera. All right.

L: Yeah.

A: So **(3) (8)** NAVTEX also, uh, is, um, uh, a mandatory equipment which is needed. Uh, NAVTEX is basically, um, it, all these come under something called GMDSS. Okay. This is very important when you, uh, mention it's called Global Maritime Distress Safety and, uh, Security something that you can check what is the, uh, acronym for that? It's, it's a publication, uh, which was, um, you know, uh, just a little history is that, um, um, shipping has evolved, right. You know, uh, many years back, uh, and there was no dedicated channel given for communication in terms of a vessel is in distress and all that, you know, so GMDSS brought everything together and digitalized it. Okay.

L: Mm-hmm.

A: So, uh, **(8)** under GMDSS are these things where NAVEX, facsimile receiver and, uh, INMARSAT C, and also there is something called VHF. If I, if you have heard VHF, uh, VHF and there is, uh, HF and MHF equipment also. Alright. So…

L: So actually, all these, uh, all the equipment you just mentioned, they all work, uh, work based on the information collected in GM, uh, GM I SS?

A: GMD SS. Yeah. GMDSS. Yeah. Yeah. So, uh, now, uh, I told you about, say, example, India transmitting, right. At a particular time.

L: Yeah.

A: As a sailor, I need to know which country is transmitting these, um, um, weather reports, right?

L: Mm-hmm.

A: So what I do is I will go into, um, the **(8)** GMDSS book

L: Mm-hmm.

A: And I will check, for example, China, and I'll say, okay, Shanghai, what time are there any reports they are transmitting? So it'll tell me Shanghai, so on, and so on time. So once a report, they will transmit. It'll say a facsimile report or INMARSAT C report, you know?

L: Oh.

A: So accordingly I will what time, what to receive at what time? Hmm.

L: So, so by using the GMDSS book, then you can know in that exactly region, which channel is like, which channel you, you need to use, right?

A: Yes. Which frequency I need to feed for what equipment.

L: Oh, okay.

A: Yeah. That is a GMDSS global maritime distress and safety system something like that, that you check. Mm. <screen scrolling> Then, uh, then yeah, I. Can check, um, uh, best weather map. This, I will tell you what links I put. This, uh, dtn.com is to do with some software. Nowadays, you know, they, um, like since, um, you know, there is Internet on the vessels, you know. Previously there was no like dedicated Internet, you know.

L: Mm-hmm .

A: So now with, uh, most of the companies have provided, uh, their shipping companies, uh, vessels with, uh, Internet. So a lot of, uh, now what we do is we, what we … okay. **(3) (8)** We have as a backup the facsimile receiver, uh, INMARSAT C, and, um, NATVEX and all. But, uh, now we have the liberty of going on the Internet. **(4)** And, uh, we can choose for any software or weather routing software, a good company. And then you, you just put in your route from point A to point B, and then you can select what kind of weather you want. Say, you want the wind, you want the current, you want any cyclone coming up or hurricane and, you know, uh, that way. So, and accordingly, you can change your route in that. So these three, uh, links, what I gave us, you can read. It's basically will tell you what is the, what are the updates, you know.

L: So, uh, **(3) (4)** so besides the, uh, local weather authorities that they provide, uh, information, weather information through GMDSS, this equipment, you can also now search on, um, the Internet.

A: **(3)** Internet. Yes. Yeah.

L: For the, uh, weather agencies to, to provide the more real-time information.

A: Real time information. Yes. So, uh, even these, even these softwares, um, like, uh, my company previously MOL also had a software, which they paid money to install it on all their ships. So these are also sent in packages. **(3)** Like, you know, you will get an update every three hours. So even if, even though it is real time, they say, it is not like how we look at the mobile

L: it's not every minute. It's, it's still …

A: Yeah, it is ... it is. Yes, because it is a package which is given, say every, **(3)** say three to six hours, sometimes even 12 hours, you know? So that is there. Hmm.

L: Oh.

A: Although it tells real time. **(3)** Real time can be, if you are very close to the coastline, you know, where you are very close, like this, how we see the land and water, you know? Yeah. Yeah. But when you are, for example, in ocean sea, and all it is given as a package, every three hours or six hours like that.

L: Yeah. And I think for this moment there hasn't been, uh, a, a technology that can provide so accurate and real time, um, information. Like a real time, like, uh, to one minute, sometimes something like that.

A: Yeah, it is. It is. Um, um…

L: It hasn't been developed, I think?

A: Uh, it is in process, I would say, uh, uh, I think this one, uh, uh, DTN or, uh, you let to check one of these websites. **(3)** I know Maersk company, uh, you know?

L: Yeah.

A: Uh, they, **(3)** they have invested in an equipment which will give them very accurate, weather instantly, something like that. You can, you can, you can just Google that because, um, uh, **(3)** it's something called autonomous weather reporting Maersk. So put like that, you know.

L: Okay. I'm taking notes.

A: Hm. Uh, one second, uh, just put Maersk latest weather equipment or something, something. Okay. So at least, you know, uh, what is the latest, uh, development, you know?

L: Yeah.

A: Yeah. Uh, when I was with MOL, I remember, uh, uh, that was my last ship and, and they had installed an equipment on the vessel, uh, on the outside of the vessel, uh, on top of the bridge, navigational bridge. It'll, uh, we didn't have to do anything with it. It'll automatically look at the weather and capture pictures, uh, and it would send this data automatically to Japanese, um, meteorological centers, because, since it was a Japanese designed it. Uh, it would, uh, send it to when we, whenever we were close to Japan, it would automatically send the data.

L: Okay.

A: So this is something new, which is, uh, come, uh, **(3)** you know, a lot of companies are, uh, looking into it now. So it's, it's progressing, I would say.

L: Yeah. OK. That's great.

A: So yeah, one thing is, uh, okay, here, you need to see, see, I've written weather routing charts. <watching screen sharing> Yeah. So in the initial days, uh, when, um, uh, navigation, before how it was done was, **(8)** whenever we got, uh, a voyage orders, first thing we would take out the navigational charts and draw the, uh, course and see how the vessel has to go. Second thing we look at is something called a weather routing chart. Yeah. That is, uh, uh, a, these are like every month they would be a dedicated chart of the whole world's maps there on that chart. That chart will have everything right from the wind, uh, conditions, the current. And, uh, also sometimes they give you, uh, the cyclone areas, you know, hurricane areas. So, so it is a chart which you, if you draw your, if you align on that map, uh, you will exactly know what kind of wind and current you will face in that particular month at that region. Yeah?

L: But, but this is, uh, for the old days, right? now, we…

A: Uh, uh, uh, **(8)** I would say as a backup, a lot of companies still keep it on the ships.

L: Yeah. So, so it's like a paper, uh…

A: **(8)** Paper chart. Yes.

L: Oh, okay. Paper chart.

A: So yeah, I, I have click, I put the link, right. If you click on the link, you will see exactly how it looks, you know?

L: Okay. Uh, I will check it later. Yeah.

A: Yeah, yeah. Later.

L: So now we we've already spent 15, uh, 15 minutes.

A: Yeah. Okay.

L: Okay. So I think, uh, question four, you've already answered.

A: <reading the question>.

L: I think we've already…

A: Yeah. It's part of the, what I answered, you know? Yeah. So we can skip this one.

L: Yeah. And, uh…

A: **(5)** Yeah, it's in English generally. Uh, you will receive only in English.

L: Yeah. Uh, but because in my last interview, uh, Manish told me that in some countries like the African area.

A: Mm-hmm.

L: They may have, uh, they might use their local language. And even they used English, but there might be some, you know, communication or, uh, different way of speaking that may lead to misleading. Something like that. Right.

A: Well, I see, um, **(5)** if, if you were to do coastal ship, like how these barges are going…

L: Mm-hmm.

A: **(5)** Then maybe you'll have, uh, uh, bilingual language. Otherwise, um, if you are in international waters. Yeah. It is always in English, I would say.

L: Okay.

A: Okay. Yeah, because, uh, it, otherwise it is very difficult to interpret, you know? Yeah. It'll, it'll create more trouble.

L: Okay. Yeah.

A: Then. But, uh, uh, uh, yeah, you said this reminds me, uh, I, what Manish is saying is also, uh, true, but you know, like I said, you need to tune to the right frequency, right?

L: Mm-hmm.

A: **(5)** These frequencies will also tell you which language, the, uh, messages going to come in. Yeah. So if I need in English, so I will have to use that particular frequency for that language.

L: Oh, okay. So it's fixed, you, you can only use that language in that frequency

A: Yeah. In the, in the, say, um, very close to land, international, for sure, it is English.

L: Oh, okay. Yeah. Got it now. Okay. We move on to the routing, routing part. So how does, uh, ship determine the routes? Is there a standardized procedure for, uh, for the crew and master to, uh, develop a, uh, route.

A: Yep. Uh, so for example, um, **(6)** you are the captain of the ship and you get the voyage orders. So you will come with your voyage orders to the navigation officer. Navigation officer is generally the second officer on the ship. So the second officer, what he will do is you have, okay, you received voyage where you have to go from the US to India, for example. Yeah.

L: Mm-hmm.

A: So you have many ways to go. You can either cross from the oceans, into the Mediterranean Sea, from Mediterranean Sea, come down to the Red Sea. Red Sea, then come into the Indian ocean and then go into, um, uh, India.

L: Mm-hmm.

A: Another way is you go around, uh, the Cape, you know, you go down, uh, from the, and then, so it all depends on your voyage orders. Like how, how fast does the ship needs to go? You know, to reach that destination. If the company says you have to reach at the earliest, you will, you, you will use the safest and shortest route. Yeah. If they say, okay, we have, we don't need to, you don't need to hurry up and then you can choose a different route, uh, to come. Yeah. So **(6)** it all depends on, uh, the, the contract you have, let's say a charter party and they say, you need to rush. Yeah. Or you need to come at an economical speed. So, uh, your question says, how do you should determine routes for a voyage.

L: Like the, uh, the steps that the chief, uh, the, uh, the second officer, uh, he needs to follow. Like, uh, is there a standard, a standardized, uh, procedure?

A: Yes.

L: Given by the company?

A: Yes, there is. Uh, actually **(6)** **(8)** there is, uh, it's a lot, uh, there is a complete, uh, manual on, uh, how to plan your route, you know, navigational plan. Yeah. But, uh, I, I have put some links. Um, if you go down, I will show you, um, just keep going down.

<Scrolling the screen>

A: No, no, go down. Oh, hold on. Okay. Let check where it is. Uh, <checking> there is one link somewhere I posted, uh, for route planning. Uh, I will put a link.

L: Okay. I will, I will check all the links after the interview. So…

A: Yeah. So I will tell you in a, in brief what the route planning is. Yeah. **(6)** First of all, like I said, when you get a voyage order, first you do is something called an appraisal. <looking at the screen> This is the one. Yeah. Yeah. This one voyage planning. You see <reading the screen sharing>.

L: Oh.

A: You see. These two links are related to voyage planning. Yeah.

L: Okay.

A: **(6)** So when you receive the, uh, voyage instructions, first you to something called appraisal where you gather all the information, what you need for your voyage, that can be right **(8)** from your chart, navigational charts, your, you, you, you put the route and then you calculate the distance and then you give the company the best ETA. ETA's estimated time of arrival.

L: Yeah.

A: You give that. Yeah. That is something where, uh, all the companies, uh, will look forward to when the ship will arrive to the next port. That is something they look forward to the, for the first thing.

L: Yeah.

A: Okay. **(6) (7)** So you will give all the options, um, uh, the fastest to the slowest. Okay. Depending on the distance and speed of the speed of the vessel. Then what you 'll look at is into this all comes under appraisal. Okay. Fuel consumption, how much fuel the ship will consume. Yeah. And in the appraisal process is where your question is about weather. You know, uh, what kind of weather the vessel will face from going from point A to point B. The point A to point B can be anywhere from say one day to months together. Okay. For example, I have done a couple of voyages, which were like for 45 days, uh, at sea. So, during 45 days, uh, a lot of things can change in terms of whether, uh, and everything. So it's a, it's it is it's prudent on the ship staff to really check the weather reports and see what is, what we are going to, uh, get into. Yeah. In terms of, uh, a cyclone, a hurricane, because, uh, for example, if you are in the office and, and you, I will tell you the ship is arriving on tomorrow or, you know, day after, but due to weather, you know. There have been instances where the ship is not able to, uh, keep the speed, uh, give the speed and then the ship will get delayed, you know.

L: Mm-hmm.

A: **(7)** So weather plays a very, um, important role. Okay. So that, uh, number six and seven, uh, or interlinked actually.

L: Yeah, yeah. Got it. Right then, then, yeah, I think you've already covered, uh, question eight already.

A: Yeah. Similar to question seven.

L: Yeah. And also, uh, back, backup route.

A: Uh, yeah. <reading the question> **(9)** Yeah, so. Basically, um, um, uh, you see, it's, it's a very dynamic thing, huh? Because weather is something which keeps changing at times to avoid a huge, um, say hurricane or a cyclone.

L: Mm-hmm.

A: The vessel does need to deviate from its, uh, original, uh, route. So there have been instances where we, we have taken action where the ship can be delayed by 12 hours also, where you really, you know, go around a hurricane or cyclone. Uh, **(9)** so one is for weather. Another is, um, I would like to just add when you said backup route. So suppose the vessel is, uh, under the vessel is in distress, you know.

L: Mm-hmm.

A: **(9)** So it is a more moral obligation. This vessel to assist the other vessel. Okay. Uh, so that also everything comes into play, uh, when it, uh, what do you say, when, um, uh, these things are planned. So, but any deviation you have to inform the company.

L: Okay.

A: Owners of the vessel and the company who hires the ship, the charters.

L: Okay. So, so, so if, if you, if this ship, it receives, uh, uh, distress from another ship, we, you have the obligation to, uh, support them that then you need to deviate from your original route original route.

A: Yes. So if, if, if it is within my range. Suppose, um, it is very far away, uh, it doesn't make sense, you know, like there might be some other ship which is close by.

L: Is it mandatory, or it's just the moral obligations to ...

A: Uh, it is actually a moral obligation, uh, like, you know, for a ship to help another ship. Um, well, if, if I do not assist a ship and I just decide, no, I don't, I, because of my, you know, my tight schedule, I cannot, uh. If, and if some other ship or somebody, an authority notices that I was in that position and I did not help…

L: Mm-hmm.

A: Uh, it can file a case against me also. You know?

L: Oh.

A: Yes. So international voters, it is a, a known fact that, um, you have to assist one ship, which is in distress.

L: Okay.

A: Yeah. Yeah. So these deviations also have to be reported even whether, uh, deviations, uh, you need to consult the company, not consult, I would say, uh, just keep them in the loop, you know.

L: Mm-hmm.

A: That, yeah, because of the situation we are going to.

L: Yeah.

A: Okay, so number 10.

L: Yeah. Yeah. Number ten's just about the position monitoring equipment. Yeah. Uh, so yeah, I think now, nowadays there must be radars or GPS, these things in every. Ship already, right?

A: Mm-hmm yeah. Um, uh, well, uh, most of the, **(10)** all the ships in fact have, um, at least a minimum requirement of having a GPS, uh, or a, uh, small radar or, or, uh, like I said, it is, it depends on which, uh, GMDSS zone you come in.

L: Mm-hmm.

A: Like these small coastal vessels will not need all the equipment, um, which are needed.

L: It, um, it depends on the region you, you are always working right? If the ship is only, uh, working in this region, some equipment isn't needed …

A: Not needed. Yeah. Correct. So like I said about this facsimile receiver, INMARSAT C and all is for ocean going vessels, you know.

L: Mm-hmm.

A: It might not be there on these small coastal vessels.

L: Okay. Yeah. It's clear.

A: Mm-hmm.

L: Then, yeah. So when you meet, when you meet a, a severe storm and, uh, then do, does the ship have, uh, a standardized emergency procedure to follow, such as for, for engine, for, uh, engineer or what they need to do to, uh, the engine and, uh, some emergency operational procedures, something like.

A: Yes. Uh, so weather, uh, out at sea is something which is we, we constantly monitor. Okay.

L: Mm-hmm.

A: Um, so, and we can see, a whether, uh, being developed, you know, a bad weather is being developed because…

L: Yeah.

A: The first indication of, uh, uh, uh, weather going bad is the pressure, uh, the atmospheric pressure.

L: Mm-hmm.

A: Yeah. So, if it drops, um, in a certain region, uh, say by three, uh, three, um, millibar, um, uh, we'd have to check that with the unit, but, um, three HPA. I think it is. Uh, it is a clear indication that the weather is going to get bad in the days to come. So, and, um…

L: Sorry. So, uh, when you notice this, uh, low pressure, you, uh, you observe it by the like, uh, anemometer or barometer, this kind of equipment on the ship?

A: Yes. Yeah. Uh, **(19)** one is your barometer. Uh, and then another is, uh, these, um, equipment, which give you the data. They say facsimile receiver, NAVTEX, uh, and INMARSAT C and, uh, the software, which, uh, the companies are, uh, you know, uh, Uh, invested in. So when, when you get the map, uh, and you see the route of the vessel …

L: Mm-hmm.

A: You will see where is the high pressure and low pressure.

L: Yeah.

A: The moment you see a low pressure L or something written, that means the weather in that, uh, particular, uh, region is going to deteriorate.

L: Mm-hmm.

A: So this, **(11)** you get to know, at least say a few days in advance. It's not like instantly, like, you know, it's not that. So the first action you take is you, you have, uh, a meeting with all the departments, uh, on the ship. You have, uh, like the deck department, the engine department, and the galley is the cooking department. Okay.

L: Mm-hmm.

A: So you need to inform these three departments that the weather is going to go bad, and what all precautions need to be taken. **(11)** Say, so prior to a vessel sails out, to, to the seas, open seas, everything is secured on the ship and you, you make sure no open, um, things are left, open on the deck. They can fly off, you know, everything is secured. Yeah. That is the, that one thing. **(11)** Like, you know what we call it se secure for sea. That is a term which everybody knows as sailors. When you, when I tell my crew secure for seat, that means they know that everything on the deck, everything in the open needs to be secured, no loose items. You know, that is one thing. Now we see…

L: Uh, this actually is taken before, before you sail to the, the open sea, right?

A: Yes, sail to the open sea. **(11)** So we have, uh, left, uh, port and we are now, uh, going to enter open sea before entering open sea. I will tell the group secure the secure for sea.

L: Okay.

A: Yeah. So when, when you get that order, you, you know, that you have to secure everything, you know, as small as a smallest of things. So you just put, uh, you know, tie everything up so that nothing flies off, you know?

L: Yeah.

A: **(11)** Then, then now coming to the weather, uh, you know, monitoring and you see the weather is going to get bad in the coming days, then you have a meeting with the, uh, department. Yep. And, and then each department has to has their own responsibility of taking care of everything. For example, uh, the tech department, we, we. Um, we will go on deck. Uh, like as a chief officer personally, I would go on deck with my crew and I will observe each, everything, which needs, I feel, which might be unsafe in the days to come, you know.

L: Mm-hmm.

A: So **(11)** we will secure those, and especially the anchor anchors.

L: Yeah.

A: Uh, you'll see whether they are secured well. Because when you enter rough weather, you know, the ship, uh, it, uh, rolls and pitches, right? Yeah. So with the, the pitching moment, uh, like this, the banging into the water, the first thing, you know, everything gets loosened. So, if the anchors are not secured, well, it can, it can…

L: Can drop.

A: Yeah. You can drop. And it is a very dangerous, uh, situation for the ship.

L: So, so the ship will lose balance something like that?

A: It, uh, it won't lose, um, balance. But, um, it can damage the, you know, anchor is attached with the chain, right?

L: Yeah.

A: So the chain … if the anchor slips, everything attached to the anchor will slip with it. So, and the momentum, these are like, you know, very heavy. If it gets little bit of speed, it can just pull, you know, uh, break and, you know, damage the equipment. Okay. Okay. **(11)** So you start from the front of the ship going all the way back. And then from, uh, the bottom to the top of the ship inside the, the accommodation also use secure everything. So that is the deck department. Then, um, **(11)** they cooking, of course you need to take care of everything there, uh, inside like the cutlery and, uh, they, they use these hot, uh, pans with cooking, right? So they need, they put some barriers to stop it from inner moving. Engine room, as similarly as they have a lot of, uh, heavy, uh, you know, spare parts equipment. So they also need to secure everything. Okay. So that is then, then when you enter rough weather, you, you monitor how the weather is behaving. Yeah. And based on our, uh, how we've been taught, uh, how to negotiate, uh, you know, the weather and, uh, using navigation, we use the best method to, uh, move away from the, uh, say hurricane or cyclone. Mm-hmm. Right. Oh, so those, uh, in addition to that, there is something called, um, this, you probably can write as, uh, every company, at least, **(11)** at least every good company, they have something called, uh, risk assessment, which is, uh, done, um, uh, prior to entering any critical areas. Like even rough weather is one of them.

L: Yeah, I've heard of that.

A: Yeah. Yeah. Okay. So that needs to be, uh, uh, checked, filled up, sent to the company and they also put their comments and, you know, approve it. Alright.

L: Okay. Yeah, that's clear. Okay. But, uh, these, uh, these procedures are written in a company book on, on the ship or it's just some, uh, some rules that everyone knows by default?

A: Yeah. **(11)** So everything is, um, uh, written. There are manuals, specific operation manuals, so, or navigation manuals. So certain sections of those will be related to how to, uh, encounter in terms of, uh, bad weather, you know, what the actions need to be taken.

L: Okay.

A: **(11)** So there will be specific checklists also, if there is an emergency in a bad weather also, you know?

L: Okay.

A: So, yeah. Uh, and **(11)** for everything, there will be some, uh, written documents. So if you're on the ship and you see, uh, situation is not going as planned and you go through the manual and it, some article you will find and you follow that procedure.

L: Okay. Yeah.

A: Mm-hmm.

L: And, uh, for, for 12, I, uh, I've already … it is just for my personal instrument interest. So, uh, I have already asked …

A: I, this is I, this is an interesting question. I want to know what, what you understood by this.

L: So it's, uh, uh, shackles are just, a unit of measure…

A: Mm-hmm.

L: Of the cable chain.

A: Mm-hmm .

L: So, because, on a ship, it's not, uh, if you say like, uh, one meter, 15 meters, it's not clear for, uh, to measure. So, uh, you use shackles to, uh, to replace the, the, the meters, uh, to indicate how long the cable should be, uh, veered out. And, uh, yeah. Uh, and I think in the severe weather, you veer out more shackles because you, uh, when the winds or storms, uh, come, you need to have more leeway, leeway to move. Otherwise, the cable chain can, um, break very quickly.

A: You're half navigator. Huh? <laugh>

L: <Laugh> thank you.

A: I was … okay, I told you about the anchor, right?

L: Yeah.

A: The anchor has these, um, shackles of cable chains. They are basically cable chain. So, uh, normally, uh, uh, vessel will have 14 shacks.

L: Yeah.

A: Shackles from one shackle to another shackle is 27.5 meters.

L: Mm-hmm.

A: Okay. Shackle to shackle. So, 14 into 27.5 meters.

L: Mm-hmm.

A: That is the length of the, uh, cable, uh, you have from the anchor till the end.

L: Mm-hmm .

A: So when, when, uh, this, this number 12 question is when a vessel is, uh, at anchor, you know, you, you drop your anchor and the vessel is just waiting and suppose the weather picks up. Then, and then what we do is … what happens is you see, can you see my hand? <gesturing>.

L: Yeah.

A: Yeah. This is a ship, for example, huh?

L: Yeah.

A: And then the shackle goes like this into the sea, sea bottom. So this, this section is free floating. It is in the water.

L: Yeah.

A: And then you have couple of shackles, uh, attached to the anchor on the seabed.

L: Yeah.

A: So it is lying, but when, uh, the weather picks up the, the, the, the ship is being pushed. So what happens is this, uh, the whole cable lifts up, you know?

L: Yeah.

A: It comes up so whatever…

L: **(12)** That's intense, right?

A: Yeah, yeah. Uh, it gets pulled. So what is there on the sea bed, it also get pulled. And then the ship will start dragging, you know, and the ship will, uh, but then what happens suppose you have other ships, uh, anchored close to you and you are dragging your, your anchor. You have the possibility of going and hitting that other ship.

L: Mm-hmm.

A: **(12)** So what we do is normally if we have a first enough sea room, we will put additional shackles in the water so that the, the cable is on the sea bed. And the anchor is enough holding pump, you know.

L: Mm-hmm. So you are not that easy to be drift away, right?

A: **(12)** Yeah. Yeah. But you, uh, you have to also look into the ships around you because you cannot just keep paying out and then you will eventually, you know, go and hit hit because the more, the more you pay out the shackle, you know, the ship is move more…

L: Far more.

A: Yeah. Further. Yes.

L: Yeah.

A: So another thing I wrote is alternative use of engines. So what we do is, uh, to keep the ship in position, we use the engines to give like a, like a burst of power, you know, just to give some momentum. So there is no, uh, input, uh, more…

L: Uh, increase the power of the engine? Or…

A: No, no. Now the ship is getting pushed by the, uh, weather.

L: Yeah.

A: It is being moved from its position, right?

L: Yeah, yeah.

A: Yeah. So you, you have the engine, you, you just give a burst of, you know, your power just to keep a check, like, you know, bring it back.

L: You mean heave-to, right? You mean the, the approach heaving-to?

A: Yeah. Heave-to and just to keep the, the tension on the cable under control.

L: Yeah, yeah, yeah. Understand.

A: Okay, cool. So next time you can navigate also.

L: <Laugh> You can give me the certificate?

A: Yeah. Okay. So how often? <moving on to next question> Yeah. It all depends. Um, uh, from comp…

L: Yeah, here, I want to, uh, clarify the training is not only about the online, some video training, but also the drills. So the drills that you need to, uh, practice with your team.

A: Uh, you mean on onboard training or, or, um, uh, like, uh, uh, your mandatory certification training in this question?

L: No, I mean, I mean, onboard training for the emergency, especially.

A: Ah, okay. Okay. So onboard training, uh, uh, **(13)** the company will have a plan. It is called a drill metrics, you know, uh, I will type it out if you want, drill metrics.

L: Mm-hmm.

A: Uh, this is something which every company will have, and they will have, uh, every possible, uh, emergency. On that drill metrics. Okay. **(13) (14)** So certain drills are to be conducted every week. For example, fire drill, abandon drill. This will be conducted like weekly or two weekly. Yeah. Yeah. **(14)** Then, uh, there will be certain drills related to emergency in a weather condition, you know? **(13)** So, uh, every possible scenario will be in the drill metrics and each drill will have its own schedule, uh, every two months or three months or six months that way. So this is something which is done, um, by us and **(14)** we use these, uh, checklists for the emergency to train the crew.

L: Okay. So, uh, then for, uh, especially for the, uh, weather emergency, how, how often will be the drills?

A: **(14)** So for weather per se, uh, I don't think, uh, uh, there will be, um, a particular drill because weather can change any moment, you know?

L: Yeah.

A: Uh, so what we do is **(14)** we combine an emergency with weather sometimes.

L: Ah.

A: Yeah. Okay. So suppose, um, um, we say, uh, for example, there is, uh, say, a flooding drill. Flooding is where water is coming into the ship. So we will build a scenario where the vessel is approaching bad weather, and we are taking the necessary actions as for the checklist. And then, but the situation went out of hand and now water is coming into the ship. What action will you take that way?

L: Okay.

A: You know, so you can say that it's never an …

L: It's never individual.

A: No, uh, not for, particularly for weather, I would say, but we do have, uh, like I said, um, meetings with the crew.

L: Mm-hmm.

A: Before we enter bad weather, like, uh, uh, sometimes we might have a special meeting, uh, gathering all the ships, crew and officers and discussing, yeah, the weather is going to go bad and what all actions to be taken.

L: Okay. Yeah. Clear. And then I think, um, and for question 14, um, I, I assume for all the ship personnel they have, uh, they have their own specific drills or trainings in own role, right?

A: **(14)** Yes. Yeah. Based on their rank, they will have.

L: Yeah. Yeah. Okay. Then I think in 14 is done, eh, yeah. 15 is about, uh, like I, I'm just wondering between two tracks … uh, contracts, uh, how many, how much rest, uh, or rest time do you have, or it's just, uh, depend on your, uh, personal preference? I heard that some people, they just, uh, go directly to another … for another contract after these voyages are done something like that.

A: Okay. Maybe that person needs a lot of money then. <Laugh>. Yeah. Okay. See, in the, I would tell you in the shipping industry, um, uh, **(15)** basically there are two types of contracts. Okay. One is, uh, a round-year contract and then you have an actual contract: contractual contract.

L: Mm-hmm.

A: **(15)** The contractual contract is where you have, uh, a fixed period. For example, you sail for four months. Yeah.

L: Mm-hmm.

A: **(15)** and, and, and, um, and after that, technically the company should take you back after. Say, three months or four months of holidays, you know…

L: Mm-hmm.

A: but there is no, uh, fixed, uh, in the contract. It is not written that, yeah, this is what I'm talking about contractual contract.

L: Mm-hmm.

A: So, I worked with, uh, two companies where I had a contractual contract and, a round-year contract. So I will just talk about contractual contract first.

L: Mm-hmm .

A: **(15)** So I had six months contract and, uh, they, they just tell you, okay, we, you will get so much, so many number of holidays, for example, uh, I do six months on the ship and I get four months holidays. Yeah.

L: Uh-huh.

A: But it is, uh, not written anyway. It is just stated. Hmm.

L: Oh.

A: **(15)** So, so sometimes what they do, these type of companies, is if there is an emergency, they can call you before also. Hmm. And, and, and that is how it is. **(15)** In, in all, all round, round a year. It is different where there are fixed number of holidays. So if I do, and it depends from company to. Yeah. Uh, uh, for example, if you sail for one month on the ship…

L: Uh-huh.

A: Your holidays are 22 days. That is what I had, uh, when, uh, I sail with that particular company. So every, for every month on the ship, I get 22 days off.

L: Ah.

A: So if, if I do four months, four into 22 is, uh, 88 days. That's close to three months.

L: Yeah.

A: **(15)** So that is my leave period. And, and after that, automatically, uh, I have to be ready to join the next ship. If, if, if I do not follow the, this particular company's procedure, then it'll be, you know, uh, it'll not look good on my report and…

L: Or your image.

A: **(15)** uh, an image and everything. Of course, when there's an emergency, the companies will, uh, uh, accept that, yeah, there's some family problem or something, something, you know, medical issue and all that.

L: Well, this, this depends on company, right? For some of them, yes, they might say, oh, you can just directly, uh, start another, uh, voyage after, after this one. Or is there a minimal, a minimal, uh, requirement that you must stay for at least, uh, 1, 2, 3, 4 days to have a rest or something like that?

A: **(15)** I would say, uh, companies don't have, uh, like, you know, this requirement that you need a minimum rest.

L: Uh-huh.

A: But, uh, physically it is very ex… tiring, you know?

L: Yeah. Yeah.

A: Uh, you're coming out of one contract. You're mentally and physically exhausted and immediately you have to join … the guy will not be able to perform on the next contract. Yeah. So, uh…

L: But there's no specific regulation in place to…

A: No, no, no. I don't think there is any minimum. So maybe you have some information. Uh, that's why you're asking this. I know, uh, some people who finish one contract and they do not wait at home, they just go home for one or two days and then they, yeah. During the holidays they do another contract also, you know? Yeah. **(15)** So it is a personal choice I would say.

L: Oh, okay.

A: Yeah.

L: Okay. That's clear and okay. Yeah. And also, uh, I think we already run overtime…

A: <reading next question>.

L: So for, uh, uh, question six …16, it's like, um, when you start a new contract or a new voyage, uh, do all the ship personnel need to train for specifically for that, for that voyage, like, uh, to get some training, preparation for that specific, um, voyage. Do you have those preparations in, in place?

A: **(16)** Yes. So, um, let me read the question again <reading>. Okay, well, uh, it depends. Um, um, when you say all personnel, normally it is, uh, um, the navigation officers, who are mainly involved in the navigation part of it. And we, a lot of companies these days involve the engineers also, especially the chief engineer, the top boss of the engine room, because we have to work in coordination when it comes to, uh, you know … uh, fuel consumption, any restrictions on the engine, which might cost during the navigation. Uh, if you're going to, um, I would say unfamiliar ports …

L: Mm-hmm.

A: Suppose the ship has never been to this particular region of the sea.

L: Mm-hmm.

A: **(16)** Then it is a, we need to really, uh, do a lot of appraisal. Like I said, you know, you gather more information, so yes, that then you need to train and, and, uh, um, be very specific for the voyage …

L: but, but, uh, it's more like, uh, focusing on the management, uh, team right on the board. So the, this preparation, this trainings are more specific for the management team. But the, the operational crew, those, uh, they just, uh, they don't have any training?

A: **(16)** No, generally, the crew, crew, uh, only follow the orders given by the management of the officers.

L: Okay. Yeah, that's clear. And, uh, yeah, we have three questions left. Mm. Yeah. So 17 is about, um, uh, if, whether, whether there's some psychological tests or training for…

A: **(17)** Psychological tests are done yearly, uh, at least by the good companies, they do it yearly. Uh, so, but, um, I am, you never get to see the result. <laugh>.

L: But based on the results, do they give, do they, do they give some support or, um, you know, some, some treatment to help you keep, uh, I, you know, keep a mental health, something like that?

A: Uh, mental health, um, is difficult, uh …

L: Yeah.

A: To say based on the, the psychological test. Yeah. If it is very severe, they will not literally, uh, so hire this person, you know. Because this person will come on the ship and, you know, it'll be, uh, very difficult because when you are open in the open sea, you have nowhere to go, you know?

L: Yeah.

A: So, uh, a lot of companies before hiring, they do a lot of intense medical and psychometric and you know, all these psychological tests so that they know that they're taking a person who is mentally. Uh, you know, uh, same person. But, uh, after, um, you know, it's all demand and supply you send, if I tell you, uh, if, if, if in fit in the market, there are people available who are like many officers and you find one person who is psychological test, test, spin. The company will, you know, say, okay, you are good, but you know, you didn't fit in this and we will choose someone else. You know, if, if, if in my position, uh, like, you know, because I know there is a shortage of officers, could, like, you know…

L: Mm-hmm,.

A: Uh, in the management level, so company will try to do something, you know, okay. We will, you know, give you some medical assistance or train you, or, you know, we will do another test after a few months, you know, something like that.

L: Yeah.

A: So basically it's, uh, this one. It also depends on demand of demand and supply of officers, I would say. Okay. Yeah. Yeah. If, if, if, if the guy has been long time with the company, then yes, they do invest. Also, you know, they want that particular rank person…

L: But this is based on, um, whether the company…

A: companies actually, companies' decision, I would say.

L: Okay. And, uh, uh, next one, like, uh, if, if the master, he made a decision that, uh, life threatening. And can other crew members, uh, raise objections to stop the decision?

A: Yeah. Something like that. It's … this is a very good question, I could say. Because I remember when I started off, um, in 2003.

L: Yeah.

A: And the captain of the ship is a captain of the ship. Okay. Like, you know, uh it's it's uh, how you say, the hierarchy of the rank, you know, sometimes you, you hesitate because you assume that the captain knows everything and he is taking the right decision.

L: Yeah. Yeah. I think for new, for freshmen always, yeah, hesitate to tell about the, their thoughts and because they assume the higher management team ha… have the full knowledge.

A: Yes. So, um, well I know when I started off, uh, that time, we used to, as junior officers, feel hesitant to tell, cross with the captain, that whether his decision is, you know, right or wrong.

L: Mm-hmm.

A: But, that due to this mental block, there have been many incidents where, you know, vessels have faced some certain damages, or loss of cargo, or loss of ship, or loss of life also. So, uh, there has been a lot of study done on this, uh, and, uh, you know, on the ship, it is, um, uh, uh, a lot to do with your position, what you're holding.

L: Yeah.

A: So … sometimes it does happen that you tend to hesitate to cross and then that leads to problem. And there is some, uh, uh, terms used in, uh, these, uh, training, which we do, which is bridge team management and bridge resource management.

L: Mm-hmm.

A: **(18)** Based on whatever accidents and incidents have taken place. And, you know, these, um, courses have been developed, which is bridge team management and bridge resource management, where, uh, uh, the younger officers and the present, uh, rank captain or chief officer, you know, they work with, uh, them in, on, on simulators. Hmm. They're given in, in the, in, on the, on the short side, in the, uh, training center…

L: Mm-hmm.

A: **(18)** So they may, they will be challenged with, uh, you know, tough emergency situations. And they, the, um, uh, the training, uh, teachers, they will observe how they, uh, tackle the situations. Some of them can be real life situations, which happened out at sea. And then you use it in the training centers. Yeah. Based on that, they come up with, uh, the feedback that, you know, okay. Captain, you should have listened to your junior officer that you was not right. And, you know, blah, blah. Sometimes they are the trainers also tell the junior officers that you should cross-question the captain's, um, you know, yeah, decision.

L: Yeah. I, I think this is a good, a good training. Yeah.

A: Yeah. It is. It is good.

L: I think it's an effective solution to, yeah, such kind of problem.

A: Yeah. Yes. Uh, because in the end, uh, the motor is you need to navigate from point a to point B in a safe manner, you know? Yeah. So you have to function as a team to achieve it, your goal and result. Yeah.

L: Yeah. That's good. Because I also heard of, uh, another, another solution is there's there is, uh, um, a channel that the, uh, operational crew, they can directly, uh, report issues to, to the, to the company, uh, anonymously. So yeah, this, it was also a solution that I heard of.

A: Uh, it's a so valid point. A lot of good companies are investing in that. It has its pros and cons also. Pros are yeah, yes, you can directly go to the highest level in the company and report, but then sometimes, uh, people you know, people misuse it just, if they have some per… personal judge. They will, you know, just do, they will use that, misuse of this, but then of course the company will put an inquiry and they will find out the truth also, you know? Yeah.

L: Yeah. So, yeah. Okay. That's good to hear. And the last one is just, I think you have already answered that.

A: Yeah, yeah.

L: Yeah, but are these … I think these equipments are all mandatory, right?

A: **(19)** Depends on the regions. Uh, basically equipment like barometer and anemometer are, will, every ship will have, because barometer is the first indication of the pleasure, right? Uh, propping. So, uh, first indication of the weather going bad is a barometer. I would say.

L: Okay. Yeah, I think we are done, but we, yeah, we seriously ran over time. Sorry about that.

A: No worries. No worries. Uh, I think we took one hour, so it's good.