Evaluation of the Readiness of the Km Bung Tomo Pioneer Ship in Facing Bad Weather Conditions During the Rainy Season on the R-16 Route

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Pioneer *vessels play a crucial role in supporting inter-island connectivity across Indonesia's remote regions. This study evaluates the readiness of KM Bung Tomo, a pioneer vessel operating on Route R-16, in facing adverse weather during the rainy season. The research applies a descriptive quantitative approach through observation, interviews, and questionnaires distributed to 25 crew members, focusing on technical, operational, and human resource readiness.*

Results show that KM Bung Tomo achieves a high readiness level (82%), especially in navigation systems and crew coordination during rough weather. However, deficiencies remain in the maintenance of safety equipment and real-time weather data updates. Strengthening crew training, improving satellite-based weather monitoring, and enhancing emergency communication are recommended to boost overall preparedness.

This study provides useful insights for improving maritime safety and operational resilience of pioneer vessels under increasingly unpredictable weather conditions caused by climate change.

Keywords: pioneer ships, ship readiness, bad weather, rainy season, shipping safety

1. INTRODUCTION

Indonesia is the largest archipelagic country in the world that is highly dependent on sea transportation. In the 3TP (frontier, outermost, disadvantaged, and border) regions, pioneer ships play a vital role as they are the only mode of transportation

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capable of reaching remote areas. To ensure connectivity in these regions, the government operates pioneer ships through a public service obligation (PSO) scheme.

One of the pioneer ships serving an important route is KM Bung Tomo with route R-16, which connects the eastern part of Madura Island with small islands in the Java Sea and the coast of South Kalimantan. This route covers 8 main ports of call in both directions (a total of 16 points of call round trip), namely:

1. Kalianget Port (Madura, East Java) – Starting point of the voyage; an important port for logistics movements to and from Madura Island.
2. Masalembo Port (Masalembu Islands) – A high-risk water area, often experiencing extreme waves and storms.
3. Keramaian Port (Keramaian Island) – A small port with open geographical conditions, highly exposed to the west monsoon winds.
4. Matasiri Port (Kotabaru Islands) – An outlying island with limited infrastructure, difficult to reach during high waves.
5. Maradapan Port (Kotabaru Islands) – Narrow and rocky waters make ship maneuvering difficult, especially in strong winds.
6. Marabatuan Port (Kotabaru Islands) – The main challenge is the west wind, which causes strong currents and low visibility.
7. Pelaihari Port (Tanah Laut, South Kalimantan) – An inland port that serves as a transit point to coastal areas.
8. Batulicin Port (Tanah Bumbu, South Kalimantan) – A port with high traffic and the influence of bad weather from the Java Sea.
9. Kotabaru Port (Pulau Laut, South Kalimantan) – An important port in South Kalimantan, serving as the final point of the route before returning.

The KM Bung Tomo shipping route from Kalianget to Kotabaru, then back to Kalianget, presents a major challenge, especially during the rainy season (around November to March). During this period, rainfall intensity increases, waves can reach more than 2.5 meters, and high wind speeds can disrupt the stability of the voyage. These conditions are exacerbated by the lack of port facilities at several stops, making the process of mooring and loading/unloading risky.

Tabel I. 1 Route R-16 KM Bung Tomo

No.	ROUTE SECTION		DISTANCE (NAUTICAL MILE)
	FROM	TO	
1	KALIANGET	MASALEMBO	113
2	MASALEMBO	KERAMAIAN	40
3	KERAMAIAN	PELAIHARI	65
4	PELAIHARI	MASALEMBO	96
5	MASALEMBO	MATASIRI	99
6	MATASIRI	MARADAPAN	20

7	MARADAPAN	MARABATUAN	22
8	MARABATUAN	BATULICIN	62
9	BATULICIN	KOTABARU	22
10	KOTABARU	BATULICIN	22
11	BATULICIN	MARABATUAN	62
12	MARABATUAN	MARADAPAN	22
13	MARADAPAN	MATASIRI	20
14	MATASIRI	KERAMAIAN	72
15	KERAMAIAN	MASALEMBO	40
16	MASALEMBO	PELAIHARI	102
17	PELAIHARI	KERAMAIAN	65
18	KERAMAIAN	MASALEMBO	40
19	MASALEMBO	KALIANGET	113
	T O T A L:	19 Pelabuhan	**1097**

On January 19, 2025, at 10:00 a.m. local time, KM Bung Tomo collided with the Masalembu pier due to waves of approximately 1–1.5 meters, winds of 45 knots, and heavy rain, and decided to drop anchor. At 1:30 PM local time, wind speeds decreased to approximately 8–12 knots, prompting the captain to decide to move the vessel away from the pier. While maneuvering out and with the anchor already in the up-and-down position, the wind suddenly picked up and the ship was swept to the right, approaching the pier and hitting the pier's edge, making the collision unavoidable and causing damage to the pier's edge and scratches on the KM Bung Tomo.

Therefore, this study aims to comprehensively evaluate the readiness of KM Bung Tomo in facing bad weather conditions during the rainy season on route R-16, as well as to compile technical and operational recommendations to improve shipping safety and the quality of pioneer ship services.

2. METHODOLOGY

In this study, a qualitative method was used, which is research that aims to understand social reality, that is, seeing the world as it is, not as it should be. Therefore, a qualitative researcher must be open-minded and receptive to the opinions of others. Thus, conducting qualitative research properly and correctly means having a window to understand the world of psychology and social reality. Qualitative research is used when the problem is not yet clear in order to uncover hidden meanings, understand social interactions, develop theories, verify data, and examine historical developments.

According to Bambang Supomo (2018:147), data sources are an important factor to consider in determining data collection methods, in addition to the type of data that has been created in advance. It can therefore be concluded that data sources are the

most important factor in determining data collection methods in order to know where the data subjects were obtained.

1. Data sources are divided into two parts, namely:
   a. Primary data
   b. Secondary data
2. Data collection techniques

   Both types of data are collected using data collection techniques and must be appropriate to the problem to be solved. In this case the use of data collection techniques and data sources plays an important role in producing accurate and effective solutions to the problems at hand.

   a. Interview Method
   b. Observation Method
   c. Literature Study

3. DISCUSSION

As a pioneer ship, KM Bung Tomo has limited capacity compared to large commercial ships, with an estimated size of 2,000–3,000 GT, a length of around 70–80 meters, and the ability to transport passengers and cargo consisting of basic necessities for the community. Its main function is not only as a means of transportation, but also as a provider of logistics access for island regions that depend on distribution by sea.

Source: Researcher documentation

Figure 1. KM Bung Tomo

Geographically, the R-16 route is challenging. Several stopovers, such as Masalembu and Matasiri, are known for their unstable sea conditions, especially during the east monsoon season (June–September) when strong winds blow from the southeast, causing waves that can reach 2–4 meters. Meanwhile, entering October, which is the

transition period, rainfall begins to increase significantly, accompanied by the potential for local storms and lightning that can disrupt ship operations and sailing safety.
In addition to natural factors, another challenge is access to weather information. Although the BMKG regularly issues maritime weather forecasts, in practice, ship crews often still rely on manual radio communication to obtain information. This can lead to delays in decision-making, such as whether the ship should delay departure, reduce speed, or seek a temporary port of refuge.
Thus, this study focuses on KM Bung Tomo as it reflects the typical characteristics of pioneer ships operating in areas prone to severe weather. The results of this study are expected to provide an overview of the technical and operational readiness of the ship and its crew in facing severe weather conditions during the period from June to October, as well as to provide recommendations that can improve the safety and reliability of voyages on pioneer routes.

Weather Data for June–October

BMKG Maritime Data (2023–2024) shows weather conditions in the waters of route R-16:

Month	Waves (m	Wind (knot)	Rainfall (mm)	Main Conditions
June	1,5 – 3,0	18 – 25	90	Strong easterly winds, dry weather
July	2,0 – 3,5	20 – 28	70	High waves, local storms
August	2,0 – 4,0	22 – 30	60	Easterly peaks, extreme waves
September	1,5 – 3,0	18 – 25	110	Early sporadic rains
Oktober	1,0 – 2,5	15 – 22	190	Seasonal change, heavy rain & thunderstorms

Source: BMKG Maritime Data (2024–2025)

Source: Bad weather during KM Bung Tomo's voyage

Results of interviews & observations of 20 crew members of KM Bung Tomo:

Assessment Aspect	Percentage Ready	Notes
Understanding of SOP for bad weather	85%	Understands procedures, emergency practices still lacking
Mastery of navigation tools	80%	GPS mastered, ECDIS still limited
Safety equipment readiness	70%	15% of life jackets worn out, lifeboats insufficient
Training discipline	65%	Training only twice a year
Communication with BMKG	75%	Still manual via radio, not real-time

4. CONCLUSION

Based on research entitled "Evaluation of the Readiness of the KM Bung Tomo Pioneer Ship in Facing Bad Weather Conditions During the Rainy Season on Route R-16," the following conclusions were obtained:

1. The main obstacles faced by the KM Bung Tomo in dealing with bad weather on route R-16 are:
   a. Technical aspects: although the ship is seaworthy, the capacity of the lifeboats is not proportional to the number of passengers and crew.
   b. Navigation aspects: the radar is not optimal during heavy rain, reducing visibility, coupled with the risk of lightning strikes and high waves.
   c. Human resources: crew members are experienced, but emergency drills are rarely conducted, resulting in suboptimal responses to emergency situations.
   d. Operational aspects: adjustments to speed and schedule during extreme weather cause delays in the distribution of goods and logistics, which directly impact communities on the R-16 route.
2. Recommendations to improve the readiness of pioneer ships in facing bad weather based on the evaluation results of KM Bung Tomo, namely:
   a. Improvement of safety equipment by ensuring that lifeboat and evacuation equipment capacities comply with SOLAS standards.
   b. Improvement of emergency drills (fire drills, abandon ship drills, and enclosed space rescue) on a regular basis so that the crew is more prepared to deal with emergency conditions.
   c. Strengthening the weather information system, for example by using weather routing applications and real-time satellite data to support navigation decisions.
   d. More adaptive operational management, through flexible schedule planning and intensive communication with ports and the BMKG to anticipate distribution delays.

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