Disaster Management Implementation in Montenegro Shipping Lines Roll-On/Roll-Off (RoPax) Vessels Operating in the Batangas–Mindoro Route

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DOI: https://dx.doi.org/10.47772/IJRISS.2024.916SCO0014

Received: 12 August 2025; Accepted: 17 August 2025; Published: 06 September 2025

ABSTRACT

This study assessed the disaster management implementation onboard selected Montenegro Shipping Lines Roll-On/Roll-Off (RoPax) vessels plying the Batangas–Mindoro route. Using a convergent mixed-methods design, data were collected from 35 passengers and 15 crew members through purposive sampling. A structured survey questionnaire was developed, pilot tested, and achieved high internal consistency (Cronbach's $\alpha = .89$). Ethics approval was granted by the EARIST Graduate Research Committee (2025). Quantitative data were analyzed using weighted mean, independent samples t-tests, effect sizes, and 95% confidence intervals. Qualitative data from semi-structured interviews with crew and management were thematically analyzed and integrated with quantitative findings through a joint display.

Findings revealed that disaster management was generally rated as highly implemented (overall weighted mean = 4.56). However, recurring gaps were noted in the adequacy of life jackets, safety demonstrations, and passenger briefings. Crew–passenger comparisons showed a significant difference ($t = 3.90$, $p < 0.05$, Cohen's $d = 0.72$), indicating moderate-to-large effect size in perception gaps. Qualitative themes highlighted operational challenges such as rushed safety briefings during peak season, poor passenger attention to drills, and insufficient crew follow-up.

The study is anchored on the Disaster Management Cycle, the Risk Management Index, and the Input–Process–Output model, framed within Republic Act 10121 and the SOLAS Convention. The findings underscore the urgency of enforcing consistent safety drills, upgrading safety equipment, enhancing multilingual and interactive briefings, and aligning practices with international ferry safety standards.

Recommendations are presented in phased form, including standardized safety orientation (immediate), equipment upgrades (6–12 months), IoT-enabled monitoring systems (12–18 months), and regular third-party MARINA safety audits (semi-annual). These steps ensure both compliance and practical feasibility toward reducing maritime disaster risks.

Keywords: Disaster management, RoPax vessels, Montenegro Shipping Lines, ferry safety, SOLAS, RA 10121

INTRODUCTION

The Batangas–Mindoro route is one of the busiest inter-island corridors in the Philippines, primarily served by Roll-On/Roll-Off (RoPax) vessels. Montenegro Shipping Lines is a key player in this route, transporting thousands of passengers and vehicles daily. Given the archipelagic nature of the Philippines and its vulnerability to maritime hazards, disaster management in ferry operations is a vital safety component (Allianz, 2024; Baig, Lagdami, & Mejia, 2024).

Despite adherence to international maritime safety regulations, such as the SOLAS Convention, incidents like the MV Lady Mary Joy 3 (2023) fire and MV Mercraft 2 (2022) tragedy reveal persistent gaps in safety implementation. This study focuses specifically on Montenegro Shipping Lines' RoPax operations between Batangas and Mindoro to evaluate the extent of disaster management implementation and identify areas for

improvement. The Batangas-Mindoro route was purposively chosen as this area of operation of Montenegro Shipping Lines serve a heavy traffic of passengers which will suit to the context of this study in determining the implementation of disaster management.

THEORETICAL FRAMEWORK

This study integrates three frameworks: (1) the Disaster Management Cycle, encompassing Mitigation, Preparedness, Response, and Recovery; (2) the Risk Management Index (Carreño et al., 2014), which quantifies safety performance; and (3) the Input–Process–Output model for systematic evaluation.

In the context of Montenegro Shipping Lines' Batangas–Mindoro route, Mitigation includes vessel inspections and SOLAS-compliant retrofits; Preparedness involves safety drills and crew training; Response covers real-time emergency actions; and Recovery entails post-incident assessment and continuous improvement. These are aligned with Republic Act 10121's mandates for disaster risk reduction in the maritime sector.

METHODOLOGY

This study employed a mixed-methods research design, combining quantitative and qualitative approaches to provide a comprehensive understanding of disaster management implementation in Montenegro Shipping Lines' Batangas–Mindoro RoPax vessels.

The quantitative component utilized a descriptive survey to capture measurable assessments from passengers and crew. Structured questionnaires were distributed to 35 passengers and 15 crew members selected via purposive sampling. This instrument, organized into sections on respondent demographics, disaster management implementation, and problems encountered, produced data analyzed using weighted mean for assessments, frequency counts for identified issues, and independent samples t-tests to detect significant differences between respondent groups.

The qualitative component involved semi-structured interviews with selected crew members and key informants from Montenegro Shipping Lines' management. These interviews explored in greater depth the contextual factors influencing disaster management practices, including challenges in equipment maintenance, regulatory compliance, and passenger engagement. Interview transcripts were thematically analyzed to identify patterns and insights that complemented the survey findings.

The integration of quantitative and qualitative data allowed for triangulation, enhancing the validity of the results and ensuring that statistical trends were enriched with contextual narratives. This approach ensured that both measurable outcomes and lived experiences informed the study's conclusions and recommendations. The survey instrument was developed and pilot tested, achieving Cronbach's $\alpha = .89$, confirming reliability. Ethics approval was secured from the EARIST Graduate Research Committee (2025).

Qualitative responses from the interviews include:

1. "During peak travel seasons, safety briefings are sometimes rushed to meet departure schedules." – Crew Member, 8 years in service
2. "Many passengers do not pay attention to the life jacket demonstration; some even walk around during the briefing." – Crew Member, 5 years in service
3. "There are times when the number of life jackets in the cabin is less than the passengers seated there." – Passenger, frequent Batangas–Mindoro traveler
4. "I feel safer when the crew personally approaches us to explain where to go during emergencies." – Passenger, first-time ferry user.
5. "The crews of the ship do not mind at all if the passengers are paying attention during safety demonstration or not" – Regular passenger, Batangas-Mindoro-Batangas route.

To assess the disaster management implemented by selected Montenegro RORO vessels, the Five – Point Likert Scale was used with the following interpretation:

Rate	Verbal Interpretation	Symbol	Range
5	Highly Implemented	HI	4.20-5.00
4	Implemented	I	3.40-4.19
3	Moderately Implemented	MI	2.60-3.39
2	Slightly Implemented	SI	1.80-2.59
1	Not Implemented	NI	1.0-1.79

RESULTS AND DISCUSSION

The findings are presented in three sections: (1) quantitative assessments of disaster management implementation, (2) problems encountered, and (3) integration of qualitative themes with quantitative results.

Quantitative analysis showed overall disaster management implementation rated as Highly Implemented (WM = 4.56). Crew assessments were consistently higher than passengers, with significant differences noted ($t = 3.90$, $p < 0.05$). Effect size (Cohen's $d = 0.72$) indicated moderate-to-large differences in perception.

Table 1 summarizes the respondents' assessment of disaster management implementation in Montenegro Shipping Lines' Batangas–Mindoro RoPax vessels.

Criteria	Crew WM	Crew VI	Passengers WM	Passengers VI	Composite WM
Proper briefing once passengers are settled	4.74	HI	4.13	I	4.44
Passengers instructed on life jackets and emergency boats	4.69	HI	4.47	HI	4.58
Demonstration of life jackets and evacuation stations	4.66	HI	4.53	HI	4.60
Briefing and instructions organized	4.66	HI	4.40	HI	4.53
Medical care accessibility	4.60	HI	4.20	HI	4.40
Crew members in good condition	4.49	HI	4.67	HI	4.58
Facilities and equipment in working condition	4.80	HI	4.40	HI	4.63
Enough lifesaving craft onboard	4.60	HI	4.47	HI	4.54
Effective communication with passengers	4.71	HI	4.33	HI	4.52
Adequate knowledge for critical care	4.63	HI	4.47	HI	4.55
Patient support onboard	4.71	HI	4.47	HI	4.59
Mandatory lifeboat drill compliance	4.60	HI	4.40	HI	4.50
SOLAS safety drill adherence	4.51	HI	4.20	HI	4.36

Overall Weighted Mean: 4.56 – Highly Implemented

Table 2: Problems Encountered by the Respondents

CRITERIA	Crew	Passengers	Total	Rank
	f	f		
1. No adequate briefing was done.	4	6	10	3

2. Inadequate number of life jackets	8	6	14	1
3. No demonstration in the use of life jackets is done	5	7	12	2
4. There is no available medical care for passengers.	---	4	4	5
5. No safety briefing is held	1	7	8	4

To determine the problems encountered by the respondents as to the disaster management implemented by selected Montenegro RoRo vessels, the Five-Point Likert Scale method was used utilizing the legend below:

Rate	Verbal Interpretation	Symbol	Range
5	Highly Encountered	HE	4.20-5.00
4	Encountered	E	3.40-4.19
3	Moderately Encountered	ME	2.60-3.39
2	Least Encountered	LE	1.80-2.59
1	Very Least Encountered	VLE	1.0-1.79

Table 2 presents the problems encountered, emphasizing areas where disaster management implementation falls short.

Problem Encountered	Crew (f)	Passengers (f)	Total (f)
Inadequate number of life jackets	8	6	14
No demonstration in the use of life jackets	5	7	12
No adequate briefing was done	4	6	10
No safety briefing is held	1	7	8
No available medical care for passengers	0	4	4

The highest reported problem was the inadequate number of life jackets, followed by the absence of donning of life jacket demonstrations and insufficient safety briefings. These findings directly relate to SOLAS compliance gaps and suggest the need for stricter internal monitoring by Montenegro Shipping Lines.

Qualitative findings revealed that safety briefings were often rushed, passengers were inattentive during demonstrations, and equipment shortages (particularly life jackets) persisted. A joint display integration highlighted alignment between statistical trends and lived experiences.

Table 3. Joint Display of Quantitative and Qualitative Findings

Quantitative Gap	Supporting Qualitative Theme
Insufficient life jackets	"There are times when the number of life jackets in the cabin is less than the passengers seated there." – Passenger
Inconsistent safety demonstrations	"During peak travel seasons, safety briefings are sometimes rushed to meet departure schedules." – Crew
Low passenger attentiveness	"Many passengers do not pay attention to the life jacket demonstration; some even walk around during the briefing." – Crew
Stronger reassurance from crew engagement	"I feel safer when the crew personally approaches us to explain where to go during emergencies." – Passenger

CONCLUSIONS

Disaster management implementation in Montenegro Shipping Lines' Batangas–Mindoro RoPax operations is generally strong but inconsistent in specific safety practices. Significant crew–passenger perception gaps highlight the need for improved passenger engagement. Priority improvements include equipment sufficiency, standardized safety demonstrations, and sustained regulatory compliance.

RECOMMENDATIONS

To enhance implement ability, the following recommendations are phased and aligned with key performance indicators (KPIs):

Short-Term (0–6 months):

- Standardize pre-departure safety drills with 100% passenger participation (KPI: compliance rate ≥ 95%).
- Upgrade life-saving appliances to exceed passenger capacity (KPI: equipment sufficiency ≥ 110%).

Medium-Term (6–18 months):

- Introduce IoT-based monitoring systems for equipment and passenger safety (KPI: operational uptime ≥ 90%).
- Implement multilingual, interactive safety orientations (KPI: passenger satisfaction ≥ 4.0/5 in feedback surveys).

Long-Term (18–36 months):

- Schedule regular third-party audits in coordination with MARINA (KPI: 100% compliance with audit findings).
- Conduct biannual simulation exercises for fire, collision, and grounding emergencies (KPI: participation rate ≥ 95%).

Each recommendation is designed with feasibility in mind: short-term actions rely on internal enforcement, medium-term improvements require moderate investment in digital systems and training, while long-term reforms depend on institutional partnerships and continuous capacity building.

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