e-ISSN: 2745-9535
No. 105/E/KPT/2022
Jurnal Pengabdian Masyarakat
Editorial Office: Jl. Soekarno-Hatta, Rembuksari No. 1A, Malang, East Java, Indonesia, 65113
Contact: Phone: +62 (341) 478494 e-mail: jpm@asia.ac.id
The journal is published by Institut Teknologi dan Bisnis Asia Malang
Website: https://jurnal.stie.asia.ac.id/index.php/jpm
Member of: AJEBI
Indexed in: Google Crossref neliti GARUDA Journal Dimensions

Maritime Safety Through Participation Training and Practical Demonstration for River and Lake Vessels in Muarakumbang, Banyuasin, South Sumatra, Indonesia

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Volume
7
Issue
1
Edition
May
Page
244-252
Year
2026

Article History

Submission: 02-03-2026
Review: 01-04-2026
Accepted: 11-04-2026

Keyword

Maritime Safety;
Safety Training;
Community Service Program;

How to cite

Pujianto, E., Latuheru, P. M., Agustini, E., Firzatullah, R. M., & Sari, D. Y. (2026). Maritime Safety Through Participation Training and Practical Demonstration for River and Lake Vessels in Muarakumbang, Banyuasin, South Sumatra, Indonesia. Jurnal Pengabdian Masyarakat, Volume 7(1), 244-252 https://doi.org/10.32815/jpm.v7i1.2944

Abstract

Purpose: This community engagement program was designed to enhance local knowledge and awareness regarding the proper use and maintenance of maritime safety equipment, including life jackets, lifebuoys, portable fire extinguishers (APAR), and other emergency apparatus.

Method: The implementation strategy employed a direct practical approach, incorporating structured educational sessions, practical equipment demonstrations, and participatory discussions with community members.

Practical Applications: The results indicate a significant improvement in participants' knowledge, with the average score increasing from 48.25% in the pre-test (moderate category) to 82.75% in the post-test (good–excellent category), reflecting a learning gain of 34.50 percentage points. These findings based experience-based practices toward a more structured and preventive approach aligned with risk management principles. The training also enhanced participants' understanding of the importance of safety equipment, particularly life jackets, as well as compliance with national regulations, including the Regulation of the Minister of Transportation Number PM 25 of 2015. The study concludes that structured and context-specific training interventions are effective in addressing knowledge gaps and reducing the risk of water transportation accidents, particularly among amateur fishermen. It is recommended that such programs be institutionalized and supported by continuous monitoring, regulatory enforcement, and multi-stakeholder collaboration to promote a sustainable culture of maritime safety in inland waterway communities.

Conclusion: The structured educational interventions can serve as an effective mechanism for fostering maritime safety awareness at the community level. It is anticipated that such initiatives will contribute to the establishment of a sustainable maritime safety culture within coastal and riverine communities.

Introduction

Water transportation plays a vital role in sustaining the livelihoods of communities residing in coastal and inland waterway regions. Preliminary observations conducted in Muara Kumbang Village, Banyuasin Regency, South Sumatra, indicate that a significant proportion of individuals involved in fishing activities are not formally trained fishermen, where family-based labor systems dominate and occupational roles are often assumed without adequate preparation or awareness of safety risks. The untrained individuals fisherman about 72 people in maritime activities increases vulnerability to occupational hazards, particularly in environments characterized by dynamic and unpredictable water conditions. As the technical condition of the vessels used in daily operations presents a serious safety concern. Field observations reveal that about 18 boats are aged, 7 others poorly maintained, and about 9 boats structurally inadequate for safe navigation. Essential safety equipment such as life jackets, lifebuoys, first aid kits (P3K), and portable fire extinguishers is largely absent. This lack of compliance with basic maritime safety standards significantly elevates the probability of accidents and reduces the likelihood of effective emergency response in the event of incidents (Basri et al., 2020).

Previous studies have emphasized that vessel unseaworthiness and insufficient safety equipment are among the primary contributing factors to water transport accidents in inland and coastal regions. This knowledge gap is a critical issue, as effective accident prevention and response depend not only on the availability of equipment but also on the competency of users in utilizing such equipment correctly (Apriani et al., 2019). Without sufficient training, even when safety tools are available, their effectiveness remains minimal. From a regulatory perspective, the Government of Indonesia has established clear guidelines through the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 25 of 2015 concerning Safety Standards for River, Lake, and Ferry Transportation. This regulation must be equipped with standardized safety devices, including life jackets for each passenger, lifebuoys, fire extinguishers, and emergency signaling equipment.

Based on these considerations, this community service initiative prioritizes the implementation of structured maritime safety training tailored to the specific needs and conditions of the Muara Kumbang community. The training program is designed to address key competency areas, including the correct use of personal protective equipment such as life jackets, the deployment of lifebuoys, basic fire prevention in emergency situations. Participants are also introduced to fundamental navigation safety principles, including risk identification, weather awareness, and safe operational practices. By embedding safety awareness into daily practices, the program seeks to create a long-term impact that extends beyond the duration of the training itself (Kulkarni et al., 2020).

Limited public knowledge regarding safety procedures, combined with inadequate monitoring and enforcement, further exacerbates the potential for accidents that may result in fatalities and material losses. Monitoring and evaluation are integral components of the initiative, ensuring that the effectiveness of the training program can be assessed. Feedback from participants is also collected to identify areas for improvement and to adapt the program to local needs. Continuous evaluation is essential for maintaining program relevance and ensuring that intended outcomes are achieved (Eckmaier et al., 2022). In conclusion, the findings from initial observations highlight training implementation in both human capacity and technical readiness to maritime safety in Muara Kumbang Village. The involvement of individuals in fishing activities, combined with the use of inadequately equipped vessels, creates a high-risk environment that necessitates immediate intervention. Through the implementation of structured, participatory, and practice-oriented safety training, this community service program aims to enhance knowledge, improve skills, and foster a sustainable culture of safety. Ultimately, these efforts are expected to contribute to the reduction of water transportation accidents and to support safer for the local community.

Method

This community service activity was implemented using a participatory approach that integrated counseling sessions, practical demonstrations, and interactive discussions. The approach was deliberately selected to ensure that the material delivered was not merely theoretical but also comprehensible and directly applicable to participants' daily maritime activities. The program involved collaboration with relevant stakeholders, including the Muara Kumbang Village administration, the Provincial Transportation Office of South Sumatra, and the Water and Air Police Unit. The activity was conducted on 17 July 2025 at 08:00 a.m. at the Muara Kumbang Village Hall, Banyuasin Regency, South Sumatra Province. The preparatory phase included logistical arrangements, installation of informational media materials, and preparation of instructional content and demonstration equipment. A total of 40 participants registered for the program, consisting primarily of fishermen, traditional boat operators, ferry boat drivers, and local youth actively engaged in water transportation activities.

The implementation phase began with a classical counseling session supported by presentation media and short educational videos addressing the importance of maritime safety and the proper use of safety equipment. The materials were delivered using locally accessible language to enhance comprehension. The first session, themed "Challenges and Solutions in River and Lake Navigation Safety," was presented by Mr. Soyu in his capacity as a local administrative official, while the second session was delivered by Mr. Erli Pujianto, a lecturer at River, Lake and Ferry Transportation Polytechnic Palembang, focusing on maritime safety equipment for river and lake transport operators. Participants were subsequently engaged in hands-on demonstrations, including the correct use of life jackets, lifebuoys, and emergency self-rescue simulations. The activity concluded with an interactive discussion session, allowing participants to share experiences and raise concerns, followed by a brief evaluative reflection to assess participants' understanding and reinforce key safety messages.

Result

The community service program was conducted on 17 July 2025 at the Muara Kumbang Village Hall, Banyuasin Regency, South Sumatra Province. The activity commenced at 08:00 a.m. (Western Indonesia Time) and began with participant registration. The event was officially opened by Mr. Kodrat Alam, Head of the Academic Administration and Cadet Affairs Division at River, Lake and Ferry Transportation Polytechnic. The program was attended by relevant institutional partners, including representatives of the Muara Kumbang Village administration, the Water and Air Police Unit, and the Provincial Transportation Office of South Sumatra. Their presence underscored the collaborative and multi-stakeholder nature of the initiative in strengthening maritime safety awareness within the local community (Apriani et al., 2019).

Picture 1. Registration Member

Source: Private Documentation, 2025.

Picture 2. Opening Ceremony

Source: Private Documentation, 2025.

The Maritime Safety Counseling Program for River and Lake Vessels was attended by 40 participants, comprising fishermen, traditional boat operators, ferry boat drivers, and village youth actively engaged in water transportation activities. The first session of the program commenced with the administration of a pre-test designed to assess participants' baseline knowledge regarding river and lake maritime safety equipment prior to the delivery of instructional materials. The pre-test content was aligned with the topics to be presented by the two designated resource persons, ensuring consistency between the assessment instrument and the educational intervention (Maulani et al., 2023).

The pre-test consisted of 20 multiple-choice questions. This format was deliberately selected to facilitate ease of completion, considering that a substantial proportion of participants were local residents over the age of 50. The use of structured and straightforward question items was intended to ensure accessibility, reduce response bias related to literacy constraints, and obtain an accurate measurement of participants' initial level of understanding concerning maritime safety equipment and procedures (Daniels, 2024).

Picture 3. Pre Test

Source: Private Documentation, 2025.

The evaluation of the maritime safety training program conducted involved a total of 40 participants. The assessment designed to measure participants' knowledge, awareness, and basic competencies related to water transportation safety. The results indicate a substantial improvement in participants' understanding following the intervention. Prior to the training, the pre-test results revealed that the overall level of knowledge among participants was relatively low. The average pre-test score was recorded at 48.25%, indicating that most participants fell within the low to moderate category of understanding. Specifically, 18 participants (45%) were categorized in the low range (scores between 40%–54%), while 12 participants (30%) fell into the very low category (scores below 40%). Only 10 participants (25%) demonstrated a moderate level of understanding, and none achieved a "good" or "excellent" classification. These findings confirm that the majority of participants had limited prior knowledge regarding

maritime safety procedures, the use of safety equipment, and regulatory standards, thereby reinforcing the urgency of targeted training interventions.

Following the implementation of the structured training program, the post-test results demonstrated a significant increase in participants' performance. The average post-test score rose to 82.75%, placing the majority of participants in the good to excellent category. A total of 22 participants (55%) achieved scores within the excellent range (85%–100%), while 14 participants (35%) were categorized as good (70%–84%). The remaining 4 participants (10%) reached a moderate level, and no participants remained in the low or very low categories. This shift indicates a marked improvement in both conceptual understanding and practical awareness of maritime safety. In terms of learning gain, the average increase between pre-test and post-test scores was 34.50 percentage points, reflecting a high level of training effectiveness. This improvement suggests that the training program successfully addressed critical knowledge gaps, particularly in areas such as the proper use of life jackets, emergency response procedures, vessel safety standards, and risk identification. Furthermore, participants demonstrated enhanced comprehension of regulatory frameworks, including compliance with national maritime safety standards. From the consistency between pre-test and post-test constructs supports the validity of the findings. The instrument is estimated to have a reliability coefficient in the range of 0.85, indicating a high level of internal consistency. Additionally, the observed score improvements align with expected learning outcomes, suggesting that the intervention was both effective and appropriately targeted.

The findings confirm that the maritime safety training program produced a statistically and practically significant improvement in participants' knowledge and awareness. The transition from predominantly low baseline scores to high post-intervention performance underscores the importance of structured, participatory, and context-specific training programs in enhancing safety culture within vulnerable coastal communities. These results further imply that continued training and periodic evaluation are essential to sustain and strengthen long-term safety practices in water transportation activities.

Discussion

The instructional session delivered by Mr. Soyu can be analytically reframed through the lens of established theories on safety and risk management, particularly in relation to the empirical findings obtained from the pre-test and post-test assessments. His emphasis on maritime safety as a systematic and preventive framework aligns closely with modern safety management theory, which conceptualizes safety not merely as the absence of accidents, but as the presence of controlled and managed risks within a complex socio-technical system. From the result, a condition often described in risk perception theory, where individuals operating in high-risk environments tend to normalize hazards due to routine exposure. The training intervention introduced by Mr. Soyu can be further interpreted through the framework of Safety Management Systems (SMS), which emphasize structured processes for hazard identification, risk assessment, and risk control depends on the integration of human factors, organizational procedures, and technical safeguards (Oporia, 2022). The significant increase in the post-test indicates that participants began to internalize these principles, particularly in relation to proactive safety behaviors such as pre-departure checks, weather awareness, and the consistent use of personal protective equipment.

Furthermore, the improvement observed in participants' understanding can also be explained using the Human Factors. This model posits that accidents occur due to the alignment of multiple system failures, including latent conditions (e.g., inadequate training, poor infrastructure) and active failures (e.g., human error). The pre-test findings suggest the presence of several holes in the safety system, such as lack of training, absence of safety equipment, and limited regulatory awareness. Through the training intervention, these gaps were partially addressed by strengthening human competence and awareness, thereby reducing the likelihood of failure alignment.

Moreover, the instructional emphasis on discipline and adherence to safety procedures reflects the concept of Behavior-Based Safety (BBS), which focuses on modifying individual behavior to improve safety outcomes (Okon et al., 2023). The transition from low to high performance categories in the post-test where 90% of participants achieved good to excellent scores indicates a shift in safety behavior orientation. Participants not only acquired knowledge but also demonstrated an increased intention to apply safe practices, such as wearing life jackets and avoiding hazardous navigation conditions. The introduction of Law Number 66 of 2024 and Ministerial Regulation PM 25 of 2015, that adherence to formal rules and standards is essential for minimizing risk and ensuring system reliability. The improved post-test performance in questions related to safety standards suggests that participants developed a clearer understanding of their legal responsibilities and the importance of compliance in maintaining safety (Ladjaini et al., 2023).

As shown in the pre-test results, it indicate consistent with risk perception theory, which suggests that individuals who are repeatedly exposed to hazardous environments tend to normalize risks and underestimate their potential consequences (Rachman et al., 2019). As a result, safety is often perceived as a matter of fate rather than a controllable outcome of systematic planning and informed decision-making. From the perspective of the ISO 31000 Risk Management Framework, such traditional practices reflect the absence of formalized processes in risk identification, analysis, and mitigation. ISO 31000 emphasizes that effective risk management requires a structured and proactive approach, integrating knowledge, skills, and standardized procedures into daily operations (Rahmanita et al., 2023). or cargo capacity, and providing as well as consistently using safety equipment such as life jackets.

Picture 4. Challenge and Safety Solution

Source: Private Documentation, 2025.

The result improvement observed in the post-test results, which is demonstrates that the educational intervention successfully enhanced participants' understanding of preventive risk management. This shift indicates a transition from reactive, experience-based behavior toward a more systematic and anticipatory approach, where safety is viewed as the outcome of deliberate and informed actions rather than chance (Magister, 2020).. The second instructional session delivered by Erli Pujianto further reinforces this transformation by focusing on the technical and functional aspects of safety equipment, which is realte to the principles of Safety Management Systems (SMS), shows improved post-test performance suggests that participants not only acquired conceptual knowledge but also developed a functional understanding of how such equipment operates, thereby increasing their readiness to apply it in real-world scenarios (Xu et al., 2023). Moreover, the importance of safety equipment usage can be analyzed through the lens of Human Factors. According to this model, accidents occur when multiple layers of defense fail simultaneously. In the context of inland water transportation, the absence or improper use of life jackets represents a critical gap in the safety system. The pre-test results indicated the presence of such gaps, whereas the post-test outcomes demonstrate that the training intervention effectively strengthened this layer of defense by improving participants' awareness and behavioral intentions regarding

safety equipment usage (Priambudip, 2021).

Additionally, the findings can be interpreted using Behavior-Based Safety (BBS) theory, which emphasizes that safety outcomes are strongly influenced by individual behavior and decision-making processes (Latt, 2024). The transition from low pre-test scores to predominantly good and excellent post-test categories reflects a positive behavioral shift, where participants increasingly recognize the necessity of consistent life jacket use, even in routine operations (Fuad et al., 2015). This behavioral change is essential in fostering a sustainable culture of safety within the community, particularly in high-risk environments characterized by unpredictable currents, limited visibility, and delayed emergency response (Olsen, 2024).

The regulatory dimension, as outlined in the Regulation of the Minister of Transportation Number PM 25 of 2015, further supports the theoretical framework of regulatory compliance theory, which posits that adherence to established standards is fundamental to risk reduction and system reliability. The improved post-test results in regulatory-related items indicate that participants developed a clearer understanding of their legal obligations, including the requirement to provide life jackets corresponding to passenger capacity. This enhanced awareness contributes to bridging the gap between policy and practice, which is often a critical challenge in remote and underserved areas. (Satya et al., 2024). Proper usage is equally critical; life jackets must be worn correctly, securely fastened, and adjusted to fit the wearer's body. Crew members bear responsibility for providing clear instructions on their proper use prior to departure, especially on passenger ferry services.

From a regulatory perspective, the obligation to provide and utilize life jackets on river and lake vessels is mandated under the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 25 of 2015, which stipulates that every passenger vessel must supply life jackets corresponding to the number of passengers carried and ensure that such equipment meets established safety standards (Faridah & Fajarwati, 2022). This regulatory framework aims to safeguard water transportation users and reduce accident rates within inland waterway systems.

Picture 5. Safety Equipment for Crossing Navigation

Source: Private Documentation, 2025.

Conclusion

The findings of this community service initiative confirm that water transportation safety in Muara Kumbang Village remains constrained by limited knowledge and the prevalence of amateur fishermen who rely on experience rather than structured safety principles. This condition was reflected in the initial pre-test results, which showed a low average score of 48.25%, indicating inadequate understanding of risk management, safety equipment usage, and regulatory compliance. However, following the implementation of participatory training involving counseling, practical demonstrations, and discussions, the post-test results increased significantly to 82.75%. This improvement demonstrates a clear shift from reactive, habit-based practices toward a more preventive and systematic approach to maritime safety,

emphasizing hazard identification, risk assessment, and the proper use of safety equipment such as life jackets.

Based on these findings, it is recommended that maritime safety training be institutionalized and prioritized, particularly for amateur fishermen who are at higher risk of accidents in river and inland waterway environments. Training programs should adopt structured risk management frameworks and be complemented by strict enforcement of safety regulations, including the mandatory provision and use of standardized safety equipment in accordance with national policies. In addition, strengthening community-based safety awareness and fostering collaboration between local stakeholders and government institutions are essential to ensure sustainability. Through continuous education, supervision, and policy integration, the risk of water transportation accidents can be significantly reduced while promoting a long-term culture of safety within the community.

Acknowledgements

The authors express their sincere gratitude for the successful implementation of the community service program on river and lake maritime safety in Muara Kumbang Village, Banyuasin Regency, South Sumatra. The activity was conducted effectively and in accordance with its intended objectives, contributing meaningfully to the enhancement of public awareness and understanding of navigation safety principles. We extend our appreciation to the leadership and academic community of Politeknik Transportasi Sungai Danau dan Penyeberangan Palembang for their institutional support and commitment to community engagement. Our gratitude is also directed to the Muara Kumbang Village administration, the Provincial Transportation Office of South Sumatra, and the Water and Air Police Unit for their collaboration and active participation throughout the program. Finally, we are thankful to all participants fishermen, traditional boat operators, ferry drivers, and village youth whose enthusiasm and engagement significantly enriched the discussions and practical sessions. It is our hope that the knowledge and skills acquired through this initiative will contribute to the sustained development of a safety-oriented culture within river and lake transportation activities.

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