



Passengers' Safety Knowledge, Safety Awareness, and Safety Behaviour on Board Ship: A Literature Review of Human Factors in Maritime Safety

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Abstract. Maritime safety is a critical aspect of sea transportation that is influenced by technical factors, regulatory compliance, safety management systems, and human factors. Numerous maritime accidents have demonstrated that inadequate passenger understanding and awareness of safety can significantly increase the risk of casualties during emergency situations. This article aims to analyze passengers' understanding and awareness of onboard safety by reviewing academic journals, maritime regulations, and safety documents. The research employs a literature review, examining national and international journals, international and national maritime regulations, and ship safety documents relevant to passenger safety. The findings indicate that human factors remain the dominant cause of maritime accidents, particularly those associated with low safety awareness, inadequate understanding of safety procedures, and a weak safety culture. Furthermore, the effectiveness of safety briefings, the quality of crew communication, safety information media, and safety supervision have a significant influence on passengers' safety behavior. Regulations such as the International Convention for the Safety of Life at Sea (SOLAS), the International Safety Management (ISM) Code, national shipping laws, and ship safety documentation demonstrate that maritime safety is a shared responsibility among ship operators, crew members, regulators, and passengers. Therefore, improving passenger safety requires an educational and communicative approach, as well as the continuous strengthening of safety culture.

Keywords: *Maritime Safety, Safety Awareness, Ship Passengers, Maritime Regulation, Literature Review.*

1. INTRODUCTION

Maritime transportation plays a strategic role in supporting interregional connectivity, particularly in an archipelagic country such as Indonesia. As a maritime nation, the mobility of people using passenger vessels continues to increase in line with the growth of trade, tourism, and logistics distribution sectors. This situation makes maritime safety one of the most critical aspects of sea transportation operations.

Maritime safety is not solely the responsibility of ship crews and shipping operators but also requires the active participation of passengers as users of maritime

transportation services. According to the International Maritime Organization (IMO), safety culture is a key factor in establishing a safe and sustainable maritime transportation system. Safety is influenced not only by the technical condition of a vessel but also by human behavior, the level of safety awareness, and compliance with safety procedures.

Numerous maritime accidents that have occurred in recent years indicate that human factors remain the dominant cause of shipping casualties. The sinking of the MV Sewol in South Korea in 2014 is one notable example of an accident caused by failures in the evacuation process and the low level of passenger preparedness in responding to emergency situations. Most passengers remained inside the vessel because they followed instructions without properly understanding emergency and safety procedures. In addition, the sinking of KM Sinar Bangun on Lake Toba, Indonesia, highlighted a lack of concern regarding passenger capacity limits and compliance with maritime safety regulations. The overloaded vessel eventually sank, resulting in a significant loss of life. Another case, the fire aboard KM Barcelona, demonstrated that passengers' non-compliance with safety regulations can also contribute to the occurrence of maritime accidents.

Based on these cases, it can be understood that passengers' understanding and awareness of safety have a significant influence on the effectiveness of accident risk mitigation. Passengers who understand safety procedures are generally better prepared to respond to emergency situations, while those with a high level of safety awareness tend to be more compliant with regulations and crew instructions.

Previous studies have examined maritime safety from various perspectives, including human factors, safety awareness, evacuation behavior, and safety culture. However, studies that specifically integrate the aspects of passengers' understanding and awareness of safety remain relatively limited. Therefore, this article aims to review the existing literature on passengers' levels of understanding and safety awareness onboard ships as a basis for developing strategies to strengthen maritime safety culture.

2. METHODOLOGY

This article employs a literature review method using a descriptive qualitative approach. The review process was conducted through the collection, identification, analysis, and synthesis of various scientific sources and maritime safety documents relevant to the research topic.

The data sources used in this study consist of:

- a. International and national journals on maritime transportation safety.
- b. International maritime regulation,;
- c. National shipping regulations.;
- d. Ship safety documents.;
- e. Maritime accident investigation reports.;

The international regulations reviewed include:

- a. The International Convention for the Safety of Life at Sea (SOLAS)

- b. International *Convention for the Safety of Life at Sea* (SOLAS)
- c. Regulations issued by the *International Maritime Organization* (IMO)

The national regulations examined include:

- a. Law Number 17 of 2008 concerning Shipping
- b. Law Number 64 of 2024 concerning Amendments to the Shipping Law
- c. Regulations of the Ministry of Transportation related to passenger vessel safety.

The safety documents reviewed include:

- a. Muster lists.
- b. Safety Management Systems (SMS).
- c. Passenger safety information.
- d. Emergency response procedures.
- e. Safety briefing procedures.

The literature review process was carried out through the following stages:

- a. Identification of relevant literature and documents.
- b. Selection of sources based on their relevance to the research topic.
- c. Content analysis of journals and regulations.
- d. Comparison of findings from previous studies.
- e. Synthesis of the reviewed literature.
- f. Formulation of conclusions.

This review approach was adopted to obtain a comprehensive understanding of the relationship between safety knowledge, safety awareness, maritime regulations, and passengers' safety behavior onboard ships.

3. DISCUSSION

The literature review findings indicate that maritime transportation safety is no longer viewed solely as a technical aspect related to vessel conditions and navigational equipment, but rather as the result of interactions among human factors, technology, regulations, and safety culture. Recent studies have identified human factors as a major contributing factor, as the majority of maritime accidents are associated with non-compliance with safety procedures, inadequate communication, and insufficient preparedness among both passengers and crew members.

In the context of modern maritime transportation, passengers are no longer regarded as passive recipients of services provided by shipping operators. Instead, they are recognized as an integral component of the maritime safety system. Passengers who understand safety procedures and demonstrate a strong awareness of safety issues are better equipped to respond effectively when confronted with emergency situations.

The literature further suggests that passengers' safety behavior is influenced by numerous interrelated factors, ranging from individual characteristics to the safety management systems implemented by shipping companies. Consequently, enhancing passenger safety requires a multidisciplinary approach encompassing education, communication, behavioral psychology, safety management, and transportation policy.

Furthermore, advances in digital technology have created new opportunities for improving maritime safety. The use of digital media, such as interactive safety videos, onboard display monitors, mobile safety applications, and modern communication systems, has been shown to increase passengers' attention to safety information. Nevertheless, the effectiveness of these technologies ultimately depends on the ability of ship operators to communicate safety information in a clear, engaging, and accessible manner.

A review of international studies also indicates that countries with a strong safety culture tend to achieve higher levels of compliance with safety regulations. A strong safety culture is developed through a combination of effective regulatory frameworks, consistent enforcement, continuous education, and the active participation of all stakeholders involved in the maritime transportation system.

Maritime Transportation Safety and Human Factors

Maritime transportation safety refers to a condition in which safety requirements are adequately fulfilled in shipping operations to protect passengers, crew members, and cargo from the risk of accidents. According to Park et al. (2022), modern maritime safety systems are determined not only by vessel technology but also by the quality of human resources and the safety culture implemented within maritime operations. Xi et al. (2025) further explain that human factors are among the leading causes of maritime accidents worldwide, particularly those related to human behavior, decision-making, and compliance with safety procedures. Park et al. (2022) also noted that although advances in maritime technology have significantly improved the efficiency of shipping systems, vessel accidents continue to occur largely due to the predominance of human factors.

Human factors encompass behavior, competence, compliance with safety procedures, communication, and decision-making during emergency situations. In the context of maritime transportation, passengers constitute an essential component of the safety system, as they are the most vulnerable group to the consequences of maritime accidents.

The study by Xi et al. (2025) highlights that human factors have a substantial impact on operational safety within the maritime industry. Factors such as low safety awareness, inadequate understanding of emergency procedures, and undisciplined behavior can significantly increase the risk of onboard accidents.

Furthermore, maritime transportation safety is influenced by the quality of ship safety management, the availability and adequacy of safety equipment and facilities, the effectiveness of crew communication, and the quality of safety briefings conducted before departure.

Analysis of the Relationship Between Human Factors and Maritime Safety

Human factors have become a central issue in modern maritime safety. The International Maritime Organization (IMO) states that the majority of maritime accidents are influenced by human factors, whether committed by crew members or passengers. These human factors may include a low safety awareness, fatigue, poor decision-making, inadequate communication skills, and non-compliance with established safety procedures.

In the context of passenger vessels, human factors often manifest in the form of unsafe or undisciplined behavior, such as the improper use of safety equipment, ignoring safety information, carrying excessive baggage, smoking in restricted areas, and failure to comply with crew instructions. Although these actions may appear minor, they can have serious consequences during emergency situations.

Maritime accidents that have occurred in various countries demonstrate that mass panic frequently exacerbates evacuation processes. Passengers who are unfamiliar with evacuation routes and the locations of safety equipment are more likely to experience confusion during emergencies. Therefore, safety education should be conducted continuously and should not be treated merely as a procedural formality before departure.

Furthermore, a close relationship exists between psychological factors and passenger safety. Individuals with a low perception of risk tend to pay less attention to safety-related issues. In contrast, those with a high level of risk awareness are generally more compliant with safety regulations and procedures. This finding suggests that improving safety awareness involves not only increasing knowledge but also fostering positive attitudes and a strong safety culture.

Passengers' Understanding of Onboard Safety

Passengers' safety knowledge refers to an individual's ability to understand and apply safety procedures during a voyage. This understanding includes:

- a. Knowledge of the locations of safety equipment.
- b. Knowledge of the proper use of life jackets.
- c. Knowledge of muster station locations.
- d. Understanding of evacuation routes.
- e. Understanding of emergency procedures.
- f. Familiarity with safety signs and symbols.

A study by Wang et al. (2021) found that although most vessels provide adequate safety information, many passengers still do not fully understand the information provided. The study further highlighted that passengers' limited attention to safety briefings is one of the primary factors reducing the effectiveness of safety communication. Moreover, according to the International Maritime Organization (2023), safety information that is not delivered clearly and engagingly may prevent passengers from understanding the actions required during emergency situations. This problem is often associated with passengers' lack of attention to safety briefings and their limited interest in reading safety instructions.

Several studies have indicated that educational background and previous experience with maritime transportation are significantly associated with passengers' levels of safety understanding. Individuals who travel by sea more frequently tend to have a better understanding of safety procedures than first-time passengers.

In addition, the method used to communicate safety information plays a crucial role in shaping passengers' understanding. Safety messages delivered in a monotonous or overly formal manner often fail to capture passengers' attention during safety briefings. Therefore, innovative approaches to safety communication are required, including the use of animated safety videos, digital displays, interactive posters, and practical demonstrations of safety equipment.

A low level of safety understanding can have serious consequences during emergency situations. Passengers who are unfamiliar with evacuation procedures are more likely to panic, which may hinder and delay evacuation and rescue operations.

The Importance of Safety Briefings for Passenger Safety

Safety briefings constitute a fundamental component of the maritime safety system. The safety information provided before departure is intended to enhance passengers' preparedness for emergency situations. However, numerous studies indicate that ensuring the effectiveness of safety briefings remains a significant challenge in maritime transportation.

Many passengers tend to disregard safety briefings because they perceive the information as routine or of little importance. Furthermore, overly formal and monotonous delivery methods often result in reduced passenger attention and engagement with safety instructions.

Recent studies have demonstrated that the use of visual media and interactive simulations can significantly improve passengers' attention to and understanding of safety information. Animated safety videos presented in simple language and supported by engaging visual content are more effective than verbal presentations alone.

An effective safety briefing should include several essential elements, such as:

- a. An explanation of the locations of safety equipment.
- b. Instructions on the proper use of life jackets.
- c. Information on evacuation routes and muster station locations.
- d. Procedures to follow in the event of a fire.

- e. Safety regulations, restrictions, and prohibited activities during the voyage.
- f. Emergency contact information and emergency reporting procedures.

In addition to the content itself, the quality of crew communication plays a crucial role in determining the success of a safety briefing. Crew members should possess strong interpersonal communication skills to effectively capture passengers' attention, build trust, and encourage compliance with safety procedures and instructions.

Passengers' Safety Awareness

Safety awareness refers to an individual's recognition of the importance of safety during maritime travel and activities. It is reflected in passengers' attitudes toward paying attention to safety information, complying with regulations, maintaining order, and assisting fellow passengers during emergency situations.

A study by Kuncowati et al. (2023) found that safety awareness has a significant influence on an individual's level of preparedness in responding to emergency situations. The study explained that individuals with a high level of safety awareness are more likely to pay attention to safety information, understand potential risks, and comply with safety instructions than those with lower levels of safety awareness. Similarly, Prasetiawan et al. (2024) argued that safety culture is closely associated with individual safety behavior, and enhancing safety culture is an essential component of transportation safety systems. Individuals who demonstrate a strong concern for safety tend to respond more quickly to safety instructions and are generally better prepared to participate in evacuation procedures.

In the context of maritime transportation, passenger safety awareness continues to face several challenges. Many passengers:

- a. Do not pay adequate attention to safety briefings.
- b. Ignore safety signs and warnings.
- c. Are unaware of the locations of safety equipment.
- d. Fail to comply with no-smoking regulations.
- e. Show little concern for vessel capacity limitations.

Low levels of safety awareness are also influenced by societal attitudes that regard safety as solely the responsibility of crew members. In reality, maritime safety is a shared responsibility among ship operators, crew members, regulatory authorities, and passengers.

Research conducted by Prasetiawan et al. (2024) further indicates that safety culture has a strong relationship with individual safety behavior. Environments characterized by a high level of safety culture are more likely to foster disciplined behavior and a stronger commitment to safety among individuals.

Safety Culture in Maritime Transportation

Safety culture refers to the values, attitudes, and behaviors that support safety within an organization or workplace. In maritime transportation, safety culture is a fundamental pillar of an effective safety management system.

Safety culture should not be limited to ship operators and crew members alone; it must also involve passengers as users of maritime transportation services. Passengers who possess a strong safety culture are generally more aware of safety regulations and more proactive in protecting both their own safety and the safety of others.

Research indicates that a positive safety culture can be developed through continuous education, exemplary behavior demonstrated by crew members, consistent supervision, and effective safety communication. Conversely, a weak safety culture may contribute to the emergence of unsafe behaviors that increase the likelihood of accidents.

In several maritime accident cases, a lack of safety culture has been reflected in passengers' willingness to board vessels despite the fact that passenger capacity limits had already been exceeded. Furthermore, many passengers continue to neglect the proper use of safety equipment and fail to recognize the importance of complying with crew instructions.

The implementation and strengthening of safety culture should be carried out systematically through:

- a. Safety awareness campaigns.
- b. Public safety education programs.
- c. Safety drills and simulation exercises.
- d. Strengthening and enforcement of safety regulations.
- e. Continuous safety monitoring and supervision.
- f. Communication skills training for crew members.

Through these measures, a stronger safety culture can be established, contributing to improved safety awareness, greater compliance with safety procedures, and a reduction in the risk of maritime accidents.

Passenger Safety Behavior

Safety behavior refers to the actions undertaken by individuals to protect their own safety as well as the safety of others. In the context of maritime transportation, passenger safety behavior includes:

- a. Following crew instructions.
- b. Using safety equipment correctly.
- c. Maintaining order and discipline onboard.

- d. Following designated evacuation routes.
- e. Complying with safety regulations and procedures.

A study by Hua et al. (2024) found that passenger behavior significantly influences the effectiveness of evacuation procedures during emergency situations. The study highlighted that panic, delayed decision-making, and non-compliance with safety procedures can slow down evacuation processes and increase the risk of casualties. Likewise, Andreadakis and Dalaklis (2024) emphasized that human behavior is a critical consideration in the design of passenger ship evacuation systems, as passenger responses often differ from the assumptions underlying planned evacuation scenarios. In many maritime accidents, passengers frequently act contrary to established procedures due to panic and insufficient understanding of safety requirements.

Safety behavior is influenced by the interaction between cognitive and affective factors. Safety knowledge is associated with an individual's understanding and awareness of safety-related information, whereas safety awareness relates to attitudes, perceptions, and sensitivity toward potential risks.

Passengers who possess both a high level of safety knowledge and strong safety awareness are more likely to demonstrate positive safety behaviors than those who have a limited understanding of the importance of safety. Consequently, improving passenger safety behavior requires not only the dissemination of safety information but also the development of attitudes and values that support a strong safety culture.

Factors Influencing Passengers' Safety Knowledge and Safety Awareness

Based on the findings of the literature review, several key factors influence passengers' safety knowledge and safety awareness onboard ships. These factors play a significant role in shaping passengers' understanding of safety procedures, compliance with regulations, and preparedness for emergency situations.

According to several studies, educational attainment affects an individual's ability to understand safety-related information. Wang et al. (2021) reported that passengers with higher levels of education tend to have a better understanding of safety instructions and emergency procedures than those with lower educational backgrounds.

1. Educational Level

Educational level influences an individual's capacity to comprehend safety information. Passengers with higher educational attainment are generally better able to understand safety instructions and emergency procedures.

Experience with maritime transportation is another important factor contributing to passenger preparedness. Hua et al. (2024) found that individuals who frequently travel by sea possess greater familiarity with safety procedures and are generally better prepared to respond to emergency situations than first-time passengers.

2. Experience in Maritime Travel

Passengers who regularly use maritime transportation tend to have a better understanding of safety procedures and emergency response measures than those with limited or no prior experience.

Gabedava and Hu (2025) emphasized that safety communication plays a strategic role in maritime safety systems. Safety information delivered in a clear, understandable, and engaging manner can enhance coordination and reduce misunderstandings during emergency situations.

3. *Quality of Crew Communication*

Clear, effective, and easily understandable communication by crew members can significantly improve passengers' attention to and understanding of safety information.

According to the International Maritime Organization (2023), visual and digital safety communication media are more effective in attracting passenger attention than conventional communication methods. The use of safety videos, onboard display monitors, and interactive media has been shown to improve passengers' understanding of safety procedures.

4. *Safety Information Media*

The use of visual and digital communication tools can enhance the effectiveness of safety information delivery and improve passenger engagement with safety-related messages.

Prasetiawan et al. (2024) explained that safety culture is a crucial factor in shaping disciplined behavior and compliance with safety regulations. Environments characterized by a strong safety culture are more likely to foster positive safety behaviors among individuals.

5. *Safety Culture*

A strong safety culture promotes disciplined behavior, greater compliance with safety procedures, and a stronger commitment to safety among passengers.

Xi et al. (2025) noted that consistent safety supervision can improve compliance with safety procedures and reduce risky behaviors within transportation environments.

6. *Safety Supervision*

Effective supervision by crew members is essential to ensuring passenger compliance with safety regulations and minimizing unsafe behavior onboard.

Overall, these factors are interrelated and collectively influence the development of passengers' safety knowledge, safety awareness, and safety behavior. Strengthening these factors through education, communication, supervision, and the promotion of a positive safety culture can contribute significantly to improving maritime safety outcomes.

Research Gap Analysis

Based on the review of the existing literature, several research gaps remain and warrant further investigation.

1. Most previous studies have focused primarily on the technical aspects of ship safety and operational factors in maritime transportation, while relatively less attention has been given to passenger behavior. However, passenger behavior

plays a crucial role in determining the effectiveness of evacuation procedures and overall maritime safety.

2. Research on passengers' safety knowledge and safety awareness has generally been conducted separately. In practice, these two variables are closely interconnected and mutually influence one another in shaping passenger safety behavior.
3. The majority of existing studies have employed quantitative approaches, which may not fully capture the psychological and social factors influencing passenger safety behavior. As a result, a deeper understanding of the underlying motivations and perceptions related to safety remains limited.
4. Studies on passenger safety in Indonesia remain relatively scarce compared with international research, particularly those examining safety culture and passenger preparedness on commercial passenger vessels and pioneer shipping services.
5. The role of digital technologies in delivering safety information has received limited attention within the context of maritime transportation in Indonesia. Despite the growing use of digital communication tools, their effectiveness in enhancing passenger safety knowledge and safety awareness has not been extensively explored.

These research gaps highlight the need for more comprehensive studies that integrate the dimensions of safety knowledge, safety awareness, and safety behavior. Such studies should adopt a mixed-methods approach to provide a more in-depth understanding of passenger safety onboard ships. By combining quantitative and qualitative perspectives, future research can offer richer insights into the factors influencing passenger safety and contribute to the development of more effective maritime safety strategies.

The Strategy for Enhancing Passengers' Safety Knowledge and Safety Awareness

Based on the findings of the literature review, several strategies can be implemented to enhance passengers' safety knowledge and safety awareness onboard ships. These measures are expected to improve passenger preparedness, strengthen compliance with safety procedures, and promote safer behavior during maritime travel.

1. Effective Safety Briefings

Safety briefings should be delivered in a clear, engaging, and easily understandable manner. The use of simple language, visual aids, and interactive communication techniques can help ensure that passengers understand essential safety information and emergency procedures.

2. Regular Safety Drills and Simulations

Practical demonstrations and periodic safety drills involving the use of safety equipment and evacuation procedures can enhance passengers' preparedness and confidence in responding to emergency situations.

3. Utilization of Digital Safety Education Media

The use of digital safety communication tools, such as safety videos, onboard display monitors, mobile applications, and interactive educational media, can increase passenger engagement with safety information and improve information retention.

4. Strengthening Safety Culture

The development of a strong safety culture can be promoted through continuous safety campaigns, public awareness programs, and ongoing educational initiatives that encourage positive attitudes toward safety.

5. Communication Training for Crew Members

Crew members should be equipped with effective communication skills to ensure that safety information is conveyed clearly, accurately, and persuasively. Effective communication can improve passenger understanding, trust, and compliance with safety instructions.

6. Safety Supervision and Enforcement

Consistent monitoring of passenger behavior and strict enforcement of safety regulations are essential for maintaining compliance and reducing unsafe practices onboard. Effective supervision helps reinforce safety standards and encourages responsible passenger behavior.

The successful implementation of these strategies requires collaboration among ship operators, crew members, regulatory authorities, and passengers. Through a combination of education, communication, supervision, and the promotion of a strong safety culture, the level of passenger safety knowledge and safety awareness can be significantly improved, thereby contributing to safer and more sustainable maritime transportation.

Implications of the Study for Maritime Safety

The findings of the literature review indicate that improving passengers' safety knowledge and safety awareness can have a significant impact on the effectiveness of maritime safety systems. Passengers who possess a high level of preparedness are generally able to make faster and more appropriate decisions during emergency situations, thereby reducing the risk of casualties and enhancing overall safety outcomes.

For shipping companies, the findings of this study provide valuable insights for evaluating safety briefing practices, safety communication media, and crew communication strategies. Ship operators should continuously enhance the quality of safety services to ensure compliance with regulatory requirements while fostering a strong safety culture among passengers and other users of maritime transportation services.

For regulatory authorities, this study offers important insights for the formulation and enhancement of maritime safety policies, particularly those related to passenger safety education and the monitoring of safety culture implementation on passenger vessels. Strengthening these areas may contribute to greater compliance with safety standards and improved passenger preparedness.

For maritime education and training institutions, the findings may serve as a useful reference for the development and refinement of maritime safety curricula, especially in areas related to safety communication, human behavior, human factors, and emergency management. Enhancing these educational components can help prepare future maritime professionals to address safety challenges more effectively.

Furthermore, this study has broader social implications, as it can contribute to raising public awareness of the importance of safety in maritime transportation. Greater public concern for safety is expected to foster a safer, more orderly, and more sustainable maritime transport culture. In the long term, increased safety awareness among passengers and other stakeholders can support the reduction of maritime accidents and strengthen the overall safety performance of the maritime transportation sector.

4. CONCLUSION

Based on the findings of the literature review, it can be concluded that passengers' levels of safety knowledge and safety awareness onboard ships still require significant improvement. Many passengers do not yet have an adequate understanding of safety procedures and often pay insufficient attention to the safety information provided before departure.

Several factors contribute to this condition, including educational level, experience in using maritime transportation services, the quality of crew communication, safety information media, safety culture, and safety supervision.

Safety knowledge and safety awareness are closely associated with passenger safety behavior. Passengers who understand safety procedures and demonstrate a high level of safety awareness are generally better prepared to respond to emergency situations and are more likely to comply with safety regulations and instructions.

Efforts to enhance passenger safety should focus on the implementation of more effective safety briefings, regular safety drills and simulations, the utilization of digital safety education media, the strengthening of safety culture, communication training for crew members, and more effective safety supervision and enforcement.

By improving passengers' safety knowledge and safety awareness, the risks of maritime accidents and loss of life can be significantly reduced. Ultimately, these improvements will contribute to the development of a safer, more resilient, and more sustainable maritime transportation system.

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