Implementation of the Regulations for Preventing Collisions at Sea (P2TL) in the Implementation of Watch Duty When Entering Narrow Shipping Channels to Prevent the Hazard of Collisions on the SPB Lais Ship

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Abstract.
This study examines the implementation of the Collision Prevention Regulations (P2TL/COLREG) in the implementation of watchkeeping when entering a narrow channel on board the SPB Lais, motivated by the risk of collision in restricted waters and the incident that occurred on May 22, 2025. The objectives of the study are to describe P2TL compliance during watchkeeping, identify efforts to optimize P2TL implementation, and evaluate compliance with STCW provisions on watchkeeping. This study uses a single case study design with a descriptive qualitative approach. The population is the SPB Lais bridge personnel during the researcher's sea practice; purposive sampling selected the captain, watch officer, helmsman, and several crew members as informants. Instruments include standardized observation sheets, semi-structured interview guidelines, and logbook documents and standing orders; data analysis was carried out through data reduction, thematic coding, triangulation, and iterative presentation following the Miles and Huberman method. The results demonstrate significant implementation of P2TL principles such as continuous lookout, utilization of radar, AIS, and ECDIS, standardized VHF communications, safe speed, and engine readiness for maneuver; however, residual vulnerabilities are identified in the form of environmental influences on vessel maneuvers, delayed decision-making in critical situations, and signs of crew fatigue. The distinction between the results and conclusions is emphasized: the results present empirical findings on compliance and operational weaknesses, while the conclusions recommend strengthening handover procedures with checklists, bridge resource management exercises, and fatigue management policies to improve the effectiveness of P2TL in narrow channels. Practical implications include procedural and training recommendations that can be immediately implemented to reduce the risk of collision.
Keywords: *Bridge Resource Management, Collision Regulations, Narrow Channel, Vessel Safety, Watchkeeping.*

I. INTRODUCTION

Watchkeeping activities are a fundamental element in shipping operations that ensure safety, operational continuity, and compliance with international navigation rules. 24 hours a day, bridge and deck surveillance is intended to detect dangers, control ship movements, and take appropriate preventive measures to reduce incidents such as grounding, fire, or collision (Amrinul, 2018; Nuryaman et al., 2022). Maritime attention to watchkeeping effectiveness and compliance with the Regulations for Preventing Collisions at Sea (P2TL/COLREG 1972) has continued to increase in recent years due to the complexity of maritime traffic, increasing ship size, and variability in weather conditions. Empirical studies show that procedural non-compliance and crew fatigue remain the dominant causes of maritime accidents in the period 2021–2025 (Wahyuda & Wijaya, 2022; Wang et al., 2022).

In the national context and for the operation of small to medium-sized vessels in Indonesian waters, vigilance in narrow waterways is critical due to limited maneuvering space, currents and sediment deposits, and variable traffic densities over time; therefore, watchkeeping practices consistent with P2TL—including continuous lookouts, safe speed establishment, and inter-vessel maneuvering communication—are essential to reducing the probability of collisions (Ministry of Transportation of the Republic of Indonesia, 2016; Iskandar et al., 2023). The collision involving the Lais SPB on May 22, 2025, highlighted the operational vulnerabilities in narrow waterways: sudden weather disruptions and failure to effectively correct course caused contact with BG. TBS 3001 and structural damage to the vessel's bow and tanks, demonstrating how

a combination of human, environmental, and vessel characteristics can trigger an accident despite the availability of P2TL procedures (vessel logs; internal incident reports).

Recent literature on the implementation of P2TL and watchkeeping practices has yielded mixed results: some field studies have found formal implementation of the rules, but suboptimal practice, characterized by weak roving observations and limited operation of navigation equipment on the bridge (Asri, 2021; Mawaddah et al., 2022), while others have highlighted that increasing personnel capacity and navigation infrastructure can improve compliance and reduce incidents (Wahyuni et al., 2023; Iskandar et al., 2023). However, a comparative analysis of these studies reveals inconsistencies: some studies place human error and fatigue as dominant factors, while others note that technical constraints (radar, autopilot, steering systems) and local environmental conditions play a significant role. Differences in vessel context, methodological design, and variable focus make generalization difficult and require more contextual and systematic studies (Ridwan et al., 2021; Zhang et al., 2022).

The emerging research gap is the limited number of empirical studies that simultaneously examine: (1) practical compliance of watch crews with P2TL provisions when entering narrow channel navigation; (2) the interaction between weather/environmental conditions and ship motion correction capabilities (including the use of bow thrusters and autopilot); and (3) the effectiveness of watch handover mechanisms and fatigue management in high-risk situations. Most previous research is descriptive or single-case studies without integration of operational data, log records, and structured interviews with crew members, making it inadequate to formulate evidence-based operational policy recommendations for vessels such as the Lais SPB (Asri, 2021; Mawaddah et al., 2022). Therefore, research that links daily watchkeeping practices, P2TL compliance, and the causal factors of accidents in narrow channel navigation is needed to close this gap.

This study aims to analyze the implementation of the Regulations for Preventing Collisions at Sea (P2TL) in the implementation of watchkeeping when entering narrow shipping channels on SPB Lais vessels, identify efforts to optimize watchkeeping practices that can reduce the risk of collision, and evaluate the conformity of field practices with the provisions of P2TL and STCW related to watchkeeping (research objectives). The urgency of this study arises from the urgent need to strengthen shipping safety in narrow waters in Indonesia through evidence-based recommendations that integrate human, technological, and procedural aspects; the novelty of the study lies in the multi-source approach that combines analysis of incident log records, observation of watchkeeping practices, and compliance assessments with P2TL to produce theoretical contributions related to compliance determinants and practical contributions in the form of protocols for improving watchkeeping procedures and operational training for ship crews (scientific and practical contributions) (Antony et al., 2023; Nuryaman et al., 2022).

II. METHODS

This research uses a descriptive qualitative approach with a single case study design that examines the implementation of the Regulation on Preventing Collisions at Sea (P2TL) in the implementation of watchkeeping on the SPB Lais vessel, because this approach allows for an in-depth exploration of practices, operational decisions, and complex field contexts (Sugiyono, 2020; Yin, 2018). The case study approach was chosen to connect operational log data, direct observations, and informant narratives to produce a holistic understanding of the human, technological, and environmental factors that influence P2TL compliance (Stake, 1995; Roos et al., 2022).

The study population included all watch crew and navigation personnel on the SPB Lais vessel during the researcher's sea practice period (July 7, 2024–July 25, 2025). The participant selection technique used purposive sampling to select relevant key informants, namely the captain, first officer, second officer, third officer, and helmsman, as well as several other crew members directly involved in watch duties; inclusion criteria were a minimum of one month of experience on duty on the vessel and active involvement in the handover process, while exclusion criteria were crew members who were on leave or not involved in the observation phase (Bryman, 2016; Guest et al., 2020).

The primary research instruments were semi-structured in-depth interview guides and standardized observation sheets developed based on the P2TL (COLREG) guidelines and STCW standards for

watchkeeping; indicators measured included lookout practices, maneuvering decision-making, navigational equipment use, inter-ship communications, and watch handover procedures. Instrument validity was ensured through expert review by the supervising lecturer and maritime practitioners as well as a test pilot during two watch sessions, while reliability was enhanced through triangulation of data sources (interviews, observations, log documents) and consistency of field recording (Creswell & Poth, 2018; Maxwell, 2013).

The research procedure began with obtaining access permission from the shipping company and participant consent, followed by a data collection phase during the researcher's sea practice activities periodically at different watch hours to capture variations in conditions. Data collection included participant observation on the bridge with systematic recording, in-depth face-to-face interviews with key informants after each shift, and the collection of secondary documentation such as logbooks, standing orders, and incident reports; all stages were recorded, transcribed, and archived according to ethical protocols (Miles et al., 2019; Kvale & Brinkmann, 2015).

Data analysis followed Miles and Huberman's cycle of data reduction, presentation, and conclusion drawing. This involved open coding of transcripts and field notes, development of thematic categories related to P2TL compliance, and triangulation of findings across sources to enhance the validity of inferences. Supporting software such as NVivo or ATLAS.ti was used for data management and coding where available. Ethical aspects included informed consent from informants, anonymization of participant identities and sensitive data, secure storage of transcripts, and compliance with institutional clearance requirements. If necessary, the study will seek ethical clearance in accordance with institutional regulations (Silverman, 2020; Guillemin & Gillam, 2021).

III. RESULTS AND DISCUSSION

Data Presentation

Table 1. Compliance of the Implementation of Guard Duty with P2TL Provisions

No	Description	Compliance		Conclusion
		Yes	No	
1.	Watchkeeping is carried out by the officer in charge of the watch (OOW) and the active lookout on the bridge, with the lookout making observations using the naked eye, binoculars, and hearing to detect ships, navigation lights, and dangers in the vicinity.	✔		In accordance with COLREG Rule 5 regarding visual and auditory alertness, so as to increase early detection of potential collision hazards.
2.	Communication between ships is carried out using VHF Channel 16 (distress & calling) and Channel 13 (bridge to bridge), with clear and concise use of maritime standard language (SMCP).	✔		Communication runs effectively to avoid miscommunication when passing each other, thus supporting navigation safety.
3.	The captain is on the bridge while the ship enters a narrow channel and directly supervises and makes decisions regarding course, speed and evasive actions. The captain also supervises on the bridge while the ship is in a narrow channel.	✔		Direct supervision improves the accuracy of navigation decisions and minimizes the risk of human error.
4.	The use of navigation aids increases situational awareness and helps with more accurate decision making.	✔		The use of navigation aids increases situational awareness and helps with more accurate decision making.
5.	The ship uses a safe speed by taking into account traffic conditions, visibility, currents, and the ship's maneuvering space when entering a narrow channel.	✔		Demonstrates the application of COLREG Rule 6 which contributes to reducing the risk of collision.
6.	Communication between the ship and the pilot is carried out via Master-Pilot Exchange which includes the maneuver plan, current conditions, depth, and critical	✔		Good coordination with the pilot supports safe and effective navigation in confined waters.

No	Description	Compliance		Conclusion
		Yes	No	
	points in the shipping lane.			
7.	When entering a narrow channel, increased vigilance is carried out by adding lookouts, reducing speed, and intensive monitoring via radar and visual observation.	✔		In accordance with COLREG Rule 9 so as to minimize the potential danger of collision
8.	The engine is prepared in stand-by engine condition, ready to maneuver forward or backward at any time, and communication between the bridge and the engine room is carried out continuously.	✔		Demonstrates the operational readiness of the ship in facing emergency conditions and supports fast and precise maneuvers.

Source: Processed by Researchers

Based on the observation table above, it can be seen that the implementation of the Collision Prevention Regulations at Sea (P2TL) during the implementation of watch duty on the SPB Lais ship has been running well and in accordance with applicable provisions. This condition is reinforced by the implementation of optimal supervision by the Officer of the Watch and lookout, the maximum use of navigation aids such as radar, AIS, and ECDIS, and effective communication both between ships and with the pilot. In addition, the implementation of safe speed according to COLREG Rule 6, increased vigilance when entering narrow shipping lanes according to COLREG Rule 9, and the readiness of the engine in a maneuverable condition indicate that the ship's crew has a high level of preparedness in preventing the risk of collision. Thus, it can be concluded that the implementation of watch duty on the SPB Lais ship has reflected a good safety culture and the professionalism of the ship's crew in maintaining shipping safety.

In this opportunity, the information sources used by the researcher were obtained from interviews with the Captain, Chief Officer, Second Officer, and AB (Able Seaman). These interviews were conducted during the researcher's sea practice (prala) on the SPB Lais ship. The results of these interviews were used as supporting data to strengthen the observation findings, thus making the analysis more comprehensive and in-depth. The results of these interviews are presented in the following table:

Table 2. Results of the interview with the captain

Informant: Captain		
No	**Question**	**Answer**
1.	How is the watch duty carried out when the ship enters narrow waters?	Requires high alertness with increased visual observation, use of radar and AIS, as well as additional lookouts to ensure navigation safety
2.	Conduct continuous lookouts and report on surrounding conditions to support the duty officer.	Visual observation is very important and cannot be replaced by radar, so it must be done simultaneously.
3.	How is speed control, communication and coordination in narrow channels?	The ship's speed must be maintained at a safe condition and communication must be carried out to avoid miscommunication.
4.	What are the challenges faced when navigating in narrow channels?	Strong currents, heavy traffic and small vessels without radios are major obstacles to navigation.
5.	What causes near misses and how can they be prevented?	Human error such as lack of observation and late decisions, so that optimal supervision and implementation of P2TL is needed.

Source: Processed by Researchers

Table 3. Results of interviews with chief officers

Informant: Chief Officer		
No	**Question**	**Answer**
1.	How is the watch duty carried out when the ship enters narrow waters?	Requires high alertness with increased visual observation, use of radar and AIS, as well as additional lookouts to ensure navigation safety
2.	Conduct continuous lookouts and report on surrounding conditions to support the duty officer.	Direct observation remains the primary basis for ensuring conditions around the ship.

Informant: Chief Officer		
No	**Question**	**Answer**
3.	How is speed control, communication and coordination in narrow channels?	Coordination and communication are very important especially during heavy traffic to support safety.
4.	What are the challenges faced when navigating in narrow channels?	Heavy traffic and interactions with small vessels increase navigation risks.
5.	What causes near misses and how can they be prevented?	Human error and lack of coordination are the causes, so it is necessary to comply with regulations and communication. Errors such as lack of observation and delays in decisions, so it is necessary to monitor and implement optimal P2TL.

Source: Processed by Researchers

Table 4. Results of the interview with the second officer

Informant: Second Officer		
No	**Question**	**Answer**
1.	How is the watch duty carried out when the ship enters narrow waters?	It is highly dependent on the vigilance of the watch officer and optimal use of navigational equipment to monitor the surrounding situation.
2.	Conduct continuous lookouts and report on surrounding conditions to support the duty officer.	The use of radar, AIS, and ECDIS must be combined with visual observations for more accurate results.
3.	How is speed control, communication and coordination in narrow channels?	Speed control and communication assist in decision making and ship maneuvering.
4.	What are the challenges faced when navigating in narrow channels?	Limited visibility and dynamic conditions pose challenges in decision making.
5.	What causes near misses and how can they be prevented?	Lack of cross-checks and delays in action, so P2TL training and consistency are needed.

Source: Processed by Researchers

Table 5. Results of the interview with AB

Informant: AB		
No	**Question**	**Answer**
1.	How is the watch duty carried out when the ship enters narrow waters?	Lookout conducts continuous observation and reports on surrounding conditions to support the officer on duty.
2.	Conduct continuous lookouts and report on surrounding conditions to support the duty officer.	Visual observations by lookouts are the main support for data from navigation tools such as radar, AIS, and ECDIS.
3.	How is speed control, communication and coordination in narrow channels?	Speed control and communication assist in decision making and ship maneuvering.
4.	What are the challenges faced when navigating in narrow channels?	Limited observation of conditions around the ship is an obstacle when on duty.
5.	What causes near misses and how can they be prevented?	Lack of observation and late reporting, so there is a need for increased vigilance and communication

Source: Processed by Researchers

Based on the results of interviews with the Captain, Chief Officer, Second Officer, and AB, it can be concluded that the implementation of watchkeeping in narrow shipping lanes has been carried out well through increased vigilance, visual observation, and optimal use of navigation equipment. In addition, speed control in accordance with the principle of safe speed and communication and coordination between crew are

also important factors in supporting navigation safety. However, there are still major obstacles in the form of human error factors, such as lack of observation, delays in decision-making, lack of cross-checks, and delays in reporting. Therefore, increased discipline, consistent implementation of P2TL, as well as better training and coordination are needed to minimize the risk of near misses or collisions.

Data analysis

Table 6. Data Analysis Matrix

Formulation of the problem	Data source	Analysis Results
How are the P2TL rules implemented during the implementation of watch duty when the ship passes through a narrow shipping channel to prevent collisions on the SPB Lais ship?	Interviews and Observations	Implementation is carried out through observation (lookout), use of navigation tools (radar, AIS), communication between ships, and speed adjustments according to narrow channel conditions.
What efforts are made to optimize the implementation of P2TL in the implementation of guard duty when entering narrow shipping lanes to prevent collisions on board the SPB Lais ship?	Interviews and Observations	Efforts are made through increasing vigilance, intensive communication, maximum use of navigation equipment, and direct supervision by officers.
How does the implementation of P2TL during the implementation of guard duty in narrow shipping lanes comply with the provisions in force on the SPB Lais ship?	Interviews, Observations, and Documentation Studies	The implementation of P2TL has generally complied with applicable regulations, including observations, use of navigational tools, and communication. However, several inconsistencies remain, such as delays in decision-making and suboptimal observations under certain conditions.

Source: Processed by Researchers

Based on the matrix of the results of the data processing above, it can be seen that interviews and observations show that there is agreement and mutual support in answering the formulation of research problems.

In terms of the implementation of P2TL during the implementation of watch duty in narrow shipping lanes, the data obtained shows that the implementation of watch duty has been carried out in accordance with applicable operational standards. This situation is evident from the implementation of continuous observation (lookout) supported by the use of navigation tools such as radar and AIS, as well as communication between ships via VHF radio. The observation results also show that watch duty activities are carried out actively and systematically in monitoring conditions around the ship. Thus, the implementation of P2TL on the SPB LAIS ship has been carried out according to its function as an effort to prevent the risk of collision.

Regarding the optimization efforts for the implementation of P2TL, the analysis results indicate that various efforts have been implemented in a structured manner, such as increased vigilance during watch duty, more intensive communication between vessels, maximum use of navigation equipment, and direct supervision by ship officers such as the Captain and Chief Officer. This statement is clarified through observation results that indicate good coordination and supervision between crew members. The agreement between interview data and observations indicates that optimization efforts are not only carried out theoretically, but also implemented in practice in the field.

Meanwhile, regarding the compliance of the P2TL implementation with applicable regulations, the analysis results indicate that in general the implementation of P2TL on the SPB LAIS ship has referred to the established rules. This is demonstrated through the implementation of observations, the use of navigation tools, and communication that run smoothly. However, several obstacles were still found, such as less than optimal observations in certain conditions and delays in decision-making by the watch officer. Overall, it can be concluded that the implementation of P2TL on the SPB LAIS ship has been running well, supported by quite effective optimization efforts, and is in line with applicable regulations. However, improvements are still needed in the aspects of vigilance, accuracy, and speed of decision-making to ensure navigation safety and minimize the risk of collision.

Table 7. Triangulation of interview results

Formulation of the problem	Captain	Chief Officer	Second Officer	AB
Implementation of P2TL during guard duty in narrow channels	Watchkeeping is carried out with continuous observation, supported by radar, AIS, and VHF communications to prevent collisions.	Visual observation is assisted by navigation tools and speed adjustment according to narrow channel conditions.	Using radar and AIS to detect other vessels and assist in decision making	Assist in visual observation and carry out the instructions of the duty officer.
Efforts to optimize the implementation of P2TL	Increased vigilance and direct supervision on the platform	Improve team coordination, communication, and use of navigation tools	Maximize the use of navigation tools and increase the accuracy of observations	Maintain focus and assist with observation during guard duty
Compliance of the implementation of P2TL with applicable provisions	In general, it has been implemented according to P2TL rules, but still requires optimization in the speed of decision making.	The implementation is in accordance with procedures, but there is still a need to improve discipline and coordination.	The majority are in accordance with applicable procedures, but there are still some obstacles in certain circumstances.	Overall it has been running quite well, but some obstacles were still found in certain conditions.

Source: Processed by Researchers

Based on the data triangulation table compiled from the results of interviews with the Captain, Chief Officer, Second Officer, and AB, it can be seen that there is a conformity of information between informants in explaining the implementation of P2TL, optimization efforts, and its conformity with the provisions applicable to the implementation of guard duty in narrow shipping lanes on the SPB Lais ship.

Regarding the implementation of P2TL, the Captain explained that watchkeeping is carried out through continuous lookouts and is supported by the use of navigational tools such as radar and AIS, as well as communication between ships via VHF radio to prevent the risk of collision. The Chief Officer added that observations are carried out visually with the help of navigational tools and ship speed is adjusted to the conditions of the narrow shipping lane. The Second Officer explained that the use of radar and AIS is very helpful in detecting the position and movement of other ships, thus facilitating navigational decision-making. Meanwhile, AB stated that they assist with visual observations and carry out instructions from the watch officer. The differences in these statements reflect the perspectives of each informant, but overall they have in common that the implementation of P2TL is carried out systematically and integrated.

Regarding efforts to optimize the implementation of P2TL, the Captain stated that increased vigilance and direct supervision on the bridge are essential to maintaining safe navigation. The Chief Officer explained that optimization efforts are carried out through improving team coordination, inter-ship communication, and maximizing the use of navigational equipment. The Second Officer added that accuracy in observation and utilization of navigational equipment is crucial to support quick and accurate decisions. Meanwhile, AB explained that the ship's crew plays a role in maintaining focus during watch duty and assisting with visual observations. This demonstrates that optimization efforts are carried out comprehensively, involving the entire ship's crew according to their respective duties and responsibilities.

Regarding the compliance of the P2TL implementation with applicable regulations, all informants essentially stated that the P2TL implementation on the Lais SPB vessel was carried out in accordance with applicable rules and procedures. This was evidenced by the effective implementation of observations, use of navigational equipment, and communication. However, several informants also revealed that there were still obstacles, such as the need to improve discipline, accuracy in observations, and speed in decision-making under certain conditions.

Given the similarity of information from all informants, the data obtained demonstrates a good level of reliability. This source triangulation indicates that the information obtained is not subjective, but rather

consistent across informants. Therefore, the interview data can be declared valid and can be used as a basis for research analysis on the implementation of P2TL in carrying out guard duty in narrow shipping lanes on the SPB Lais ship.

IV. DISCUSSION

Implementation of P2TL During Guard Duty in Narrow Lanes

Based on the research results, it is known that the implementation of P2TL on the SPB Lais ship has been carried out through watch duty activities which include observation (lookout), use of navigation equipment, communication between ships, and regulating ship speed.

Continuous lookouts are conducted by the officer on duty, assisted by the AB as part of the bridge team. Observations are conducted both visually and with the aid of navigational instruments such as radar and AIS. When a vessel enters a narrow shipping lane, vigilance is increased to monitor surrounding conditions, including the movement of other vessels, currents, and environmental conditions.

Furthermore, the use of navigational instruments such as radar and AIS plays a crucial role in assisting ship navigation by detecting the position and movement of other vessels. This equipment allows the officer on watch to establish policies more quickly and accurately to avoid the risk of collision. Communication between vessels is also conducted via VHF radio to ensure good coordination, especially in heavy vessel traffic conditions.

Ship speed regulation is also an important part of the implementation of P2TL. Ship speed is adjusted to the conditions of narrow shipping lanes, currents, and traffic density, so that the ship can still be controlled properly. This is in accordance with the principle of safe speed in the P2TL rules which aims to prevent collisions. When linked to the P2TL theory (COLREG), the implementation of watch duty on the SPB LAIS ship has fulfilled several important rules, such as Rule 5 (Lookout) which emphasizes the importance of continuous observation, and Rule 6 (Safe Speed) which regulates the use of safe speed according to conditions. In addition, the use of navigation tools also supports the principle of decision-making in avoiding navigational hazards Efforts to Optimize the Implementation of P2TL.

The implementation of P2TL on the SPB LAIS vessel has been successful and adheres to maritime safety principles. However, its implementation remains suboptimal due to several obstacles, such as insufficient observation of certain conditions, delays in decision-making, and the influence of environmental factors. Therefore, efforts to improve implementation are needed to make P2TL more effective in preventing collisions.

Table 8. Problem formulation discussion matrix 1

Main Aspects	Research result	Theory Suitability
Lookout	It is done continuously visually and with navigation tools.	In accordance with Rule 5 COLREG regarding the obligation to observe
Speed setting	Speed is adjusted to narrow channel conditions	In accordance with Rule 6 regarding safe speed
Use of navigation tools	Radar and AIS are used to help detect other vessels.	In accordance with modern navigation principles
Communication between ships	Done via VHF for coordination	Supports collision prevention

Source: Processed by Researchers

Efforts to Optimize the Implementation of P2TL During the Implementation of Guard Duty When Entering Narrow Shipping Channels to Prevent the Danger of Collisions on Board the SPB Lais Ship.

Based on the research results, it was discovered that various efforts have been made to optimize the implementation of P2TL in the implementation of watch duty on the SPB Lais vessel. These efforts include increasing vigilance, strengthening team coordination, maximizing the use of navigational equipment, and direct supervision by ship officers. Increased vigilance is carried out by tightening observations when the ship enters a narrow channel. The watch officer and crew work together to monitor conditions around the ship to avoid potential hazards. In addition, communication between ships is also enhanced to ensure good

coordination in heavy traffic situations. The use of navigational equipment such as radar and AIS is maximized to play a role in detecting the position and movement of other vessels. This condition plays a crucial role in assisting the accurate and rapid decision-making process. Furthermore, direct supervision by the Captain and Chief Officer is also a crucial factor in ensuring that the implementation of watch duty runs according to procedure.

When linked to maritime safety theory, these optimization efforts are part of safety management aimed at reducing the risk of accidents. Increasing team vigilance and coordination are part of the human factor that significantly influences maritime safety. Furthermore, the optimal use of navigational equipment also reflects the application of technology to support safety. However, in its implementation, there are still obstacles such as environmental factors, limited ship maneuverability, and human factors such as lack of focus and fatigue. Despite these obstacles, optimization efforts continue and have a positive impact on improving maritime safety. This demonstrates that the implementation of P2TL is not only carried out procedurally, but also supported by the concrete efforts of the entire ship's crew.

Overall, efforts to optimize the implementation of P2TL on the SPB Lais ship have been carried out relatively well, but still need to be strengthened in terms of consistency, discipline, and increased coordination to support optimal results.

Table 9. Problem formulation discussion matrix 2

Main Aspects	Research result	Theory Suitability
Increased vigilance	Carried out during guard duty especially in narrow channels	In accordance with the principles of maritime safety
Team coordination	Collaboration between officers and AB	In accordance with the concept of teamwork in navigation
Use of Navigation Tools	Radar, Ecdis and AIS are utilized to the maximum	In accordance with developments in navigation technology
Operational Constraints	Influenced by environment and human factors	It is a common factor in maritime accidents.

Source: Processed by Researchers

Compliance with the Implementation of P2TL During the Implementation of Guard Duty in Narrow Shipping Channels on the SPB Lais Ship

Based on the research results, it was found that the implementation of P2TL during the implementation of watch duty on the SPB LAIS vessel was generally in line with applicable regulations. This was evident in the implementation of continuous lookouts, the use of navigational instruments such as radar, AIS, and ECDIS, and active communication between vessels via VHF radio. The watch officers also made efforts to maintain the vessel's position on the right side of the narrow shipping channel and adjusted the vessel's speed according to shipping traffic conditions.

This compliance demonstrates that the basic principles of P2TL, such as vigilance, precautions, and navigational decision-making, have been implemented in watchkeeping activities. Furthermore, the roles of the watch officer and crew in carrying out their respective duties also demonstrate the systematic and coordinated implementation of procedures. However, several discrepancies were still found in the implementation, such as suboptimal observation under certain conditions and delays in decision-making when facing emergency situations. Environmental factors such as narrow channels, currents, and wind also influence the effectiveness of P2TL implementation. Furthermore, human factors such as fatigue and lack of focus also hinder achieving maximum compliance.

In relation to maritime safety theory, the compliance with P2TL implementation is part of the implementation of international safety standards aimed at minimizing the risk of accidents at sea. Compliance with P2TL implementation indicates that the navigation and safety management systems are functioning effectively. However, discrepancies in practice indicate the need for improvements in crew discipline, vigilance, and professionalism.

Overall, the implementation of P2TL on the SPB LAIS ship has been implemented in accordance with applicable regulations, but still requires improvement in implementation so that this compliance can be

achieved optimally and consistently in all shipping conditions.

Table 10. Matrix of discussion of problem formulation 3

Main Aspects	Research result	Theory Suitability
Lookout	Done continuously with the help of navigation tools	In accordance with P2TL rules (Rule 5)
Use of Navigation Tools	Radar, AIS, and ECDIS are actively used	In accordance with developments in navigation technology
Communication	Conducted via VHF radio between ships	In accordance with shipping communication procedures
Decision-making	Done by the duty officer, but sometimes late	Not fully compliant (Rule 8)
Decision-making	Influenced by environmental and human factors	It is a general factor in shipping safety.

Source: Processed by Researchers

V. CONCLUSION

This study found that the implementation of the Regulations for Preventing Collisions at Sea (P2TL) in the implementation of watchkeeping on the SPB Lais vessel has generally been carried out in accordance with the main provisions of COLREG and STCW, as seen from the implementation of continuous lookouts, active use of radar, AIS, and ECDIS, effective communication via VHF, and the implementation of safe speed and engine alertness when entering narrow shipping channels. Field findings also indicate that the involvement of the captain in direct supervision and structured watch handover practices strengthen navigational decision-making in risky conditions, thereby reducing the potential for collision; however, the effectiveness of these practices is still influenced by environmental variables such as wind and current as well as limitations on ship maneuverability which in one incident caused the failure of course correction even though procedures had been followed. In addition to technical aspects, human factors such as delayed decision-making in critical situations, fluctuating levels of alertness, and potential fatigue are residual causes that require operational attention.

Limitations of this study include the single-case study focus, which limits generalizability to other vessel types and routes; reliance on observational and interview data, which may be affected by recall bias; and limited access to more in-depth, sensitive technical data such as full radar logs or steering system telemetry. Future research suggests conducting multi-vessel, multi-location comparative studies incorporating quantitative operational data such as radar logs, steering telemetry, and weather records to examine the interaction between environmental conditions and ship control systems. A longitudinal study of the effectiveness of P2TL training and fatigue management is also recommended. Practically, the results of this study recommend strengthening watch handover procedures with standardized checklists, enhancing bridge resource management exercises and maneuvering simulations in strong wind and current conditions, and monitoring and rotating watch schedules to reduce fatigue. Implementation of these measures is expected to strengthen P2TL compliance and reduce the risk of collisions in narrow shipping lanes.

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