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Effectiveness of Marine and Shipping Surveillance Through Patrol Reports at Class II Bitung Sea and Coast Guard Base

Zoserijal Damanik¹, Recky Sendouw², Itje Pangkey³

Public Administration Master Program, Universitas Negeri Manado, Indonesia

Email: zosedamanik@gmail.com¹, reckysendouw@unima.ac.id²,
itjepangkey@unima.ac.id³

Abstract. This study aims to analyze the reporting system of marine and shipping surveillance patrol results at the Class II Bitung Sea and Coast Guard Base, focusing on the structure and content of the report, the reporting mechanism, and the implementation of technology used in supporting the implementation of surveillance tasks. The method used in this research is a descriptive qualitative approach, with data collection through in-depth interviews to, direct observation of the patrol and reporting process, and documentation studies of the form and content of reports used. The results show that the reporting system implemented is still not standardized, with diverse and inconsistent report structures and contents. The reporting mechanism is still manual and does not support real-time reporting, while the utilization of digital technology such as reporting applications has not run optimally due to limited equipment, networks, and technical training for officers. As a result, the effectiveness of the report as a monitoring and decision-making tool is low, causing delays in operational follow-up in the field. This study recommends the need to develop national standards for patrol report formats and procedures, strengthen technological infrastructure on patrol vessels, continuous training for officers related to digital reporting systems, and develop a real-time-based integrated reporting system that supports cooperation across marine surveillance agencies. With these steps, the reporting system is expected to become an important element in strengthening the effective and sustainable monitoring and management of marine resources.

Keywords. Effectiveness, Marine and Shipping Surveillance, Patrol Reports, Digital Reporting System

A. INTRODUCTION

Indonesia as the largest maritime country in the world faces complex challenges in managing its marine area, which reaches 3.25 million km² (Wijayanto et al., 2024) [1]. The Directorate General of Marine Spatial Management of the Ministry of Maritime Affairs and Fisheries states that the condition of national waters is currently in a critical phase which requires a multidisciplinary approach to understand various interrelated aspects (Detikcom, 2020) [2]. From an ecological perspective, the Directorate General of Sea Transportation (DJPL) of the Ministry of Transportation noted that damage to marine ecosystems has reached an alarming level with 35% of coral reefs in a severely damaged condition and the rate of mangrove damage reaching 52,000 hectares per year (Kassa, 2023) [3]. This fact contradicts

the marine economic potential estimated at US\$ 1.2 trillion per year, of which only around 30% is currently optimally utilized.

The dimension of marine surveillance and security also faces serious problems. Data shows that Indonesia's surveillance capacity only covers 15% of the total Exclusive Economic Zone, while illegal fishing cases still cause losses of up to IDR 101 trillion annually (Choiro et al., 2024) [4]. The patrol reporting system that spearheads surveillance in the field has not been well integrated, both vertically between levels of government and horizontally between related agencies. In fact, the development of modern surveillance technology should be a force multiplier for the effectiveness of national maritime surveillance.

The socio-cultural aspects of coastal communities that reach 65 million people add to the complexity of the problem. There is a paradox where most traditional fishermen still live below the poverty line, while on the other hand there is an erosion of local wisdom in managing marine resources. Value shifts in the younger generation of marine communities that tend to leave the marine sector are a serious threat to the sustainability of Indonesia's maritime culture (Fatmasari, 2016) [5].

Overlapping legal and regulatory frameworks further complicate the situation. There are at least 32 sectoral regulations that are often unsynchronized in their implementation on the ground. The compliance index with Law No.32/2014 on Marine at the regional level only reaches 58%, indicating weak law enforcement in the marine sector. This condition is exacerbated by the lack of synergy between agencies both at the central and regional levels in the management of coastal and marine areas (Quina & Subagiyo, 2015) [6].

From an oceanographic perspective, climate change has significantly affected the dynamics of Indonesian waters. Research by Adi Wijaya (2015) from the Marine Research and Observation Center shows that the increase in average sea surface temperature of 0.5-1.2°C in the last two decades has disrupted ocean current patterns and fisheries productivity. This phenomenon has a direct impact on food security and the economy of coastal communities that depend on marine resources. The methodological challenges faced are not small, given the size of the study area and the complexity of the issues. However, with a phased approach and selective choice of case study locations, this research is expected to produce outputs that are relevant both academically and practically. The expected end result is the formulation of an integrated marine management model that considers ecological, economic, socio-cultural and defense and security aspects in a balanced manner [7].

The transformation of Indonesia's ocean management requires a strong and comprehensive scientific basis. This research is designed to meet that need, with the hope of contributing to the realization of Indonesia's vision as a sustainable and sovereign global maritime axis. This in-depth analysis of various aspects of ocean management is expected to be a starting point for the development of more integrative and effective marine policies in the future.

Based on the Decree of the Minister of Transportation Number KM 65 of 2002, the Sea and Coast Guard Base (PPLP) has the task of carrying out guarding, rescue, security and order activities as well as enforcing regulations in the field of shipping in sea and coastal waters [8]. In this context, the Class II Bitung Sea and Coast Guard Base plays a strategic role in carrying out marine surveillance and patrol duties in Sulawesi waters and surrounding areas. The division of the base's working area is based on the Decree of the Director General of Sea Transportation No. 13/VIII/DV-05 dated August 13. The Sea and Coast Guard Unit has 5 (five) main bases spread throughout Indonesia. Class I is PPLP Tanjung Priok (Jakarta), Class II is

PPLP Tanjung Uban (Riau Islands), PPLP Bitung (North Sulawesi), PPLP Tanjung Perak (Surabaya), and PPLP Tual (Maluku).



Figure 1. Class II Coast Guard Station, Bitung

In carrying out its duties and functions, the Bitung Class II PLP Base is equipped with 6 State Ships, namely 1 class 1 ship, 1 class 2 ship, 1 class 3 ship, 2 class 5 ships and 1 RIB ship. The number of ship officers is 54 people with a total of 97 employees. The patrol areas of class 2 ships are: Balikpapan the westernmost point, Miangas Island the northernmost point, Kendari the southernmost point, Boven Digoel South Papua Province the easternmost point.



Figure 2. Boundaries of the working area of PPLP Class II Bitung

One aspect that determines the effectiveness of marine surveillance is the patrol reporting system. The patrol report serves as an official document that records all monitoring activities, threat identification, and actions taken by officers in the field. This report is the basis for policy makers in determining the next steps in the maritime surveillance strategy (Kadarisman, 2017) [9].

According to the facts encountered in the field, the patrol reporting system at the Bitung Class II Sea and Coast Guard Base still faces various challenges that hinder its effectiveness. Problems such as uncertainty of report standardization, limited access to technology and infrastructure, limited human resources seen from the number of officers who are still inadequate, and data security that is still vulnerable to being hacked by irresponsible

parties cause major obstacles in efforts to maximize the patrol reporting system at the Bitung Class II Sea and Coast Guard Base.

Based on the various problems described above, the authors are interested in conducting further research with the title "The Effectiveness of Sea and Shipping Supervision through Patrol Reports at the Class II Bitung Sea and Coast Guard Base". This study aims to determine, describe and analyze the sea and shipping surveillance patrol report system at the Class II Bitung Sea and Coast Guard Base and what factors control the patrol report system.

B. METHOD

The research method used is qualitative method. Qualitative research allows researchers to understand phenomena in a broader context by looking at how individuals or groups give meaning to the situations they experience. As stated by Creswell and Poth (2018) in Sendouw et al. (2023), qualitative approaches are well suited to exploring complex phenomena that have not been widely researched or that require interpretive-based understanding [10].

The research location chosen in this research is the Bitung Class II Sea and Coast Guard Base. The focus of this research is the effectiveness of the patrol report system to improve the effectiveness of sea and shipping surveillance at the Class II Bitung Sea and Coast Guard Base, with indicators: 1) report structure and content, 2) report mechanism, and 3) technology implementation in the reporting system. The research sample was the leaders and employees of PPLP class II Bitung which was determined using purposive sampling technique. Data collection techniques are interviews, observations and documentation studies.

This research uses qualitative analysis techniques that are carried out during data collection and after completion of data collection within a certain period (Sugiyono, 2024), namely data reduction, data display, and conclusion drawing [11]. Testing the validity of the data, researchers used 4 (four) main criteria put forward by Lincoln and Guba in Pangkey et al. (2023) to ensure the validity of qualitative research data, namely: credibility, transferability, dependability, and confirmability [12].

C. RESULT AND DISCUSSION

1. Effectiveness of the Marine Surveillance and Shipping Patrol Report System

Report Structure and Content

Effective sea and shipping surveillance is a key pillar in maintaining maritime security, protecting marine resources and upholding national sovereignty. The Bitung Class II Sea and Coast Guard Base (PPLP) plays a crucial role in carrying out this function in its region. However, the effectiveness of this surveillance is not static and is influenced by various dynamic factors, especially in the context of information management and operations in the field.

Patrol reports are at the heart of the marine surveillance information system. Information theory emphasizes that the quality of information-accurate, relevant, timely and complete-is essential for effective decision-making. In this context, patrol reports serve as the primary data source that reflects the reality on the ground. According to Laudon & Laudon (2018), effective information systems provide accurate, timely, and relevant information to support an organization's operations and decision-making [13]. In the context of marine surveillance, patrol reports are a key component of this information system. Interviews with various parties at PPLP Class II Bitung highlighted the importance of patrol reports, but also revealed challenges regarding the quality and management of the information within them.

The structure and content of the patrol report used by PPLP class II Bitung shows inconsistency and incoherence in the form and format of its presentation. From interviews with officers in the field, it was found that reports were still made manually with different formats between ships and between officers. There are reports that only include time and location, but lack chronology, actions, and visual documentation such as photos or GPS recordings. This finding shows the weakness of the documentation system that should support the accountability and speed of the agency's response to violations at sea.

The absence of a standard format for reporting is in line with Robbins & Coulter's (2018) warning about the importance of standard operating procedures (SOPs) in public organizations to ensure consistency and efficiency [14]. Non-standardized reports not only complicate the process of data recapitulation and analysis, but also hinder the integration of information between patrol units and to the central system. Research by Prasetyo et al. (2021) confirms that the weakness of reporting formats is one of the main obstacles in Indonesia's marine surveillance system, which has a direct impact on weak data validation and legal action against violators [15].

In terms of content, the reports prepared by officers tend to be descriptive in nature without a more in-depth analysis of the situation or risk assessment. This reflects the absence of substantive guidance on what important elements must be included in each patrol report. Organizational communication theory by Daft (2016) in Supit (2023) emphasizes that information in reports should reflect work processes, work results, and situational dynamics that can influence strategic decision making [16]. However, in the context of PPLP Bitung Bitung, the report structure has not fully become an analytical tool or basis for marine surveillance risk management.

This condition is exacerbated by the weak utilization of information technology in preparing reports. Although several reporting applications such as I-Motion have been introduced, their implementation in the field is still minimal due to limited equipment and technical training. Reports are still compiled manually on paper or through informal text messages which are then compiled on the ground. Research by Fajar and Mutmainnah (2019) shows that manual reporting in the context of marine surveillance is highly vulnerable to errors, data loss and delays [17]. This shows that the issue of report structure and content is also closely related to the readiness of digital infrastructure and technical competence of officers.

Problems with the structure and content of reports are not only administrative in nature, but are a reflection of the suboptimal data-driven work culture in the maritime surveillance system. Without systematic, accurate and real-time reports, policy-making, operation planning, and patrol performance evaluation are not evidence-based. In addition, the incoherence of reports also hampers synergy efforts between institutions such as the Indonesian Navy, Bakamla, and Polairud, which should share information through a uniform format.

Therefore, it is necessary to reform reporting by establishing a national patrol report template that must be used by all marine surveillance work units. This template should include elements of time, GPS location, actions taken, visual evidence and a narrative of the situation. This should be accompanied by technical training for officers and the provision of portable digital devices such as waterproof tablets on every patrol vessel. In addition, reports should be directly linked to a central database system so that information can be verified, monitored and archived in real-time. This approach is in line with the principles of digital governance and smart maritime surveillance that have been implemented in countries with more advanced water surveillance systems.

Report Mechanism

Reporting mechanisms in the context of marine surveillance patrols by PPLP Bitung still face a number of crucial issues. Based on interviews, the reporting mechanism has not yet been fully standardized. The reporting process is generally carried out after patrols are completed, either through handwritten physical reports or simple digital files sent to the base office. This flow creates delays in the delivery of information, resulting in suboptimal responses to findings of violations at sea. Reliance on post-operation reporting causes information to lose urgency and situational accuracy.

According to the theory of management information systems by Laudon & Laudon (2018), an effective reporting system should fulfill the elements of speed, accuracy, and ease of access to information [13]. However, in the mechanism found at PPLP Bitung, there is no real-time reporting system or integrated tiered communication flow between organizational levels. Research by Siregar & Pradana (2020) supports this finding, stating that weaknesses in the reporting mechanism hinder vertical and horizontal coordination in marine resource monitoring.

In addition, the reporting mechanism does not actively involve feedback procedures. Patrol officers often feel that the reports they make are only administrative in nature with no clear follow-up or reward for findings in the field. This has an impact on motivation and discipline in compiling reports. In the perspective of Denhardt & Denhardt (2015) in Masengi et al. (2023), the ideal public service bureaucracy should be participatory, where information from the bottom becomes an important input for decision making at the top level [18]. When the reporting mechanism is one-way, the monitoring function will not be dynamic.

Technical constraints also color the reporting mechanism. Many patrol vessels are not equipped with digital devices or online reporting systems, so the reporting mechanism must wait for the ship to return to base. This condition reinforces the results of a study by Putri & Widodo (2021) which states that the weakness of communication and reporting infrastructure in Indonesia's marine surveillance sector is a structural obstacle in maintaining maritime sovereignty. The absence of facilities such as GPS trackers, satellite connections and reporting applications means that reports cannot be followed up quickly by central authorities.

This leads to the need for an integrative and technology-based transformation of the reporting mechanism. It is not enough for the report mechanism to rely solely on information collection, but it must be part of the maritime surveillance intelligence system. In other words, each report must be able to trigger validation processes, risk analysis, and follow-up decisions in the shortest possible time. This requires a mechanism that connects directly from field officers to the data center through structured and auditable communication protocols.

Strategic solutions that can be implemented include the development of standardized and national reporting mechanism SOPs, procurement of digital reporting applications based on location and visual evidence (photos/video), technical training for officers, and monitoring and feedback systems based on performance indicators. A national maritime reporting center can also be developed as a data node that synchronously records reports from all bases. By building a sophisticated and integrated reporting mechanism, marine surveillance in Indonesia will not only be a symbol of sovereignty, but also an adaptive and responsive system to the dynamics of the waters.

Technology Implementation

The implementation of technology in patrol reporting at PPLP Bitung is still not optimal and is limited. Based on the results of interviews, the use of applications such as I-Motion or digital devices based on information systems has not been evenly distributed across

patrol vessels. Most reporting is still done manually, either through written notes or informal communication, such as instant messages through personal cellphones. This shows that technology adoption is still sporadic and has not yet become an institutionalized system in supporting patrol activities and digital reporting.

According to the theory of technology adoption by Rogers (2003) in Indiarma (2023), the success of technological innovation in public organizations is highly dependent on five elements: relative advantage, compatibility, complexity, testability, and observability of results [19]. In this context, the available technology has not fully met the elements of compatibility with operational needs at sea, especially regarding network infrastructure and device durability against extreme conditions. Research by Sulaiman & Harahap (2019) corroborates these findings by stating that the success rate of reporting digitization is largely determined by the technical readiness and human resource capacity of users at the operational level.

Furthermore, the limitations of technology implementation are also evident from the lack of integration between patrol reporting and the central information system in real-time. Patrol vessels often do not have automatic GPS devices or satellite internet connections to transmit field data directly to the surveillance center. As a result, data can only be compiled after the vessel returns to base. This condition is contrary to the concept of e-Government proposed by Heeks (2006) in Mandagi (2023), which states that technology in public services should enable faster, transparent, and accountable work processes [20].

From the technical and institutional aspects, it was also found that there was no integrated training specifically designed to increase officers' capacity in using digital reporting applications. Most patrol operators are not familiar with digital data input systems, so the available technology is not maximally utilized. This finding is consistent with a study by Mulyadi et al. (2025) which emphasizes that digital transformation without being accompanied by an increase in technological literacy will result in a digital divide that widens the efficiency gap between work units [21].

An in-depth analysis of these issues shows that the root of the problem lies not only in the absence of tools, but also in the lack of institutional commitment to building an integrated maritime technology ecosystem. The lack of technology investment in patrol vessels suggests that digital reporting has not been prioritized in PPLP's institutional strategy. In fact, the implementation of technology has great potential in improving responsiveness, data accuracy, and predictive capabilities in managing vast and dynamic water areas.

Therefore, national policies that encourage digital transformation in marine surveillance reporting systems are needed, including the procurement of weather-resistant hardware, application-based reporting systems connected to cloud servers, and the integration of spatial data such as AIS and GPS. In addition, regular training and technical assistance to patrol officers is essential to ensure successful implementation. A collaborative approach with other agencies such as Bakamla, TNI AL, and KKP is also needed so that the technology system does not run sectorally, but rather forms one smart and sustainable maritime surveillance ecosystem.

2. Constraining Factors and Their Implications

The interviews also identified various constraining factors affecting the effectiveness of marine and shipping surveillance at PPLP Class II Bitung. These factors are interrelated and have significant implications for the patrol reporting system.

Human Resources

In management theory, the quality of human resources (HR) is one of the key elements in organizational effectiveness. According to Mathis and Jackson (2020), good HR management includes competency development, motivation, and employee welfare, which have an impact on work productivity and decision-making accuracy. Laudon & Laudon (2018) emphasize that even good information systems require supportive HR management to run effectively. This theory is relevant in the context of marine surveillance at PPLP Class II Bitung, where the quality of human resources directly affects the accuracy, completeness and timeliness of patrol reporting. Without trained and motivated human resources, the implementation of digital and manual reporting systems is suboptimal, hindering the surveillance and law enforcement process.

Previous research such as by Hidayat and Ridwan (2019) shows that HR weaknesses are one of the main factors for weak maritime security in Indonesia. This research highlights the need for continuous training and capacity building of human resources, especially for marine surveillance officers. This finding is in line with the conditions in the field at PPLP Class II Bitung, where interviews with informants show that most officers have not received thorough training in digital reporting systems, still rely on manual methods, and experience fatigue due to heavy workloads. This results in data being recorded that is often incomplete, inaccurate or submitted late, which ultimately impacts the effectiveness of surveillance.

The findings also revealed that fatigue among field officers, especially after long patrols and in challenging weather conditions, reduced the thoroughness and accuracy of data recording. Interviews showed that officers at PPLP Bitung faced difficulties in filling out detailed and consistent reports due to limited time, technological means and skills. This fatigue not only affects individual performance, but also reduces confidence in the data produced. In addition, the limited number of personnel exacerbates the situation as the high workload cannot be shared proportionally, making patrol reports less reliable for quick and effective decision-making.

The implications of this HR constraint factor are significant. The low quality of report data generated can affect PPLP Class II Bitung's ability to detect trends in violations, respond quickly to maritime security threats and take appropriate preventive measures. It also impacts institutional reputation, decreases the effectiveness of inter-agency collaboration, and slows down the evidence-based policy process. Therefore, a strategy to strengthen human resources through regular training, provision of easy-to-use supporting technology, additional personnel to reduce workload, and development of an incentive system to motivate officers is needed. Improving the competence and welfare of human resources will be an important foundation in building a reliable reporting system and supporting the effectiveness of maritime surveillance.

Availability and Condition of Patrol Infrastructure

Operations and logistics management theorists Chopra and Meindl (2019) emphasize the importance of adequate infrastructure as the foundation for smooth operations, including in the marine surveillance sector. Infrastructure, which includes patrol fleets, communication systems and modern monitoring equipment, determines the effectiveness of surveillance, especially in a vast and complex water area like Indonesia. In this context, the availability of reliable patrol vessels, stable communication systems and technology-based monitoring (such as AIS and radar) will support rapid response to violations. Without adequate infrastructure support, surveillance activities will be hampered by limitations on mobility, coverage and speed of decision-making.

Previous research, such as by Hutagalung et al. (2020), showed that the limited patrol infrastructure in Indonesia is one of the main factors for weak marine surveillance. This study found that most patrol vessels used by surveillance agencies are old, not equipped with modern technology, and often experience technical breakdowns. This study is consistent with field findings at PPLP Class II Bitung, where interviews and observations showed that patrol boats in use often experience engine problems, limited cruising range, and lack of communication facilities. Patrol officers revealed that these conditions made it difficult for them to reach distant surveillance locations or respond quickly to incidents.

Field findings at PPLP Bitung also show that supporting infrastructure such as docks, ship maintenance facilities, and communication equipment at surveillance posts are inadequate. This is exacerbated by the lack of spare parts and emergency equipment on patrol vessels, so that if technical malfunctions occur in the middle of the sea, the repair process is slow and risks hampering surveillance. These shortcomings mean that patrol activities can only focus on nearby areas that are easy to reach, so larger or strategic surveillance areas are often left unmonitored. In emergencies, communication limitations result in slow reporting to the command center, exacerbating incident response.

The lack of a reliable fleet and supporting technology reduces the speed and reach of surveillance, increasing the opportunity for violations of the law, including illegal fishing and smuggling. It also undermines public confidence in the government's surveillance capabilities, and leads to a decline in officer morale and motivation. Addressing this requires long-term investment in the procurement of new patrol fleets, modernization of communication and monitoring technology, construction of supporting facilities at surveillance posts, and technical training for personnel. With adequate infrastructure, maritime surveillance can be more proactive, responsive and effective in maintaining the sovereignty of Indonesian waters.

Budget Limitations

In public financial management theory, budget constraints are one of the main factors affecting the effectiveness of program management and organizational activities, including marine area surveillance. According to Anthony and Young (2019), the budget is not only a tool for allocating funds, but also an instrument for controlling and evaluating organizational performance. Budget limitations experienced by surveillance agencies such as PPLP Bitung will limit their ability to provide facilities, technology, human resource training, and the development of supporting infrastructure. This condition can lead to a gap between planning and implementation, so that supervision that should run optimally becomes less effective.

Research results from Rahman et al. (2021), confirmed that budget constraints are often the main obstacle in the implementation of maritime surveillance in Indonesia. This study shows that the lack of budget causes limitations in the procurement of new patrol vessels, modernization of communication equipment, and training of human resources. This research is relevant to the findings of the field at PPLP Class II Bitung, which shows that the available budget is only sufficient for minimal maintenance of patrol boats, not for procurement of new units or cutting-edge technology. In addition, budget limitations make technical training activities for personnel infrequent, thus reducing adaptability to new technological developments and procedures.

The field findings also found that budget constraints had a direct impact on surveillance operations. Officers revealed that limited logistics such as fuel, spare parts and emergency equipment forced them to limit patrol areas and the duration of surveillance activities. This is exacerbated by the lack of incentives for officers, which results in low

motivation. In emergency situations or vessel breakdowns, budget constraints make the repair process slow and require improvisation, which risks reducing surveillance effectiveness. In addition, the development of modern technology-based reporting systems is often delayed due to insufficient budget for digital infrastructure.

The implications of this budget constraint are far-reaching. Not only does it hamper improvements in the quality of surveillance, but it also reduces public confidence in the effectiveness of maritime surveillance agencies. Limited funding stifles innovation, reduces the ability to detect violations early, and slows down incident handling. This opens up opportunities for legal violations such as illegal fishing and smuggling, and weakens state sovereignty in the territorial waters. Overcoming this requires innovative budget management strategies, including cross-agency collaboration, partnerships with the private sector, and utilization of cost-effective technologies. Improving the efficiency of budget utilization is also key to ensuring effective oversight, despite limited resources.

Inter-Agency Coordination

In organizational management and leadership theory, Mintzberg (2017) and Robbins & Coulter (2018) emphasize that effective inter-agency coordination is one of the important foundations in realizing organizational synergy and efficiency, especially in the public sector involving multiple agencies. Good coordination allows for a clear division of tasks, quick decision-making and reduced duplication of work. In the context of marine surveillance, coordination between agencies such as PPLP, Basarnas, TNI AL, Police, and KKP is essential to ensure integrated and responsive actions. Without good coordination, surveillance activities could potentially overlap or even be neglected, reducing the effectiveness of controlling maritime violations.

Previous research by Damanik and Siregar (2021) identified that weak inter-agency coordination in the monitoring of coastal and marine areas in Indonesia was caused by differences in authority, sectoral ego, and lack of communication across agencies. The results of this study show that ineffective coordination impedes the flow of information, slows responses to violations, and creates confusion in the field. This is reinforced by field findings at PPLP Class II Bitung, where officers revealed that communication between agencies is often only incidental or informal, without a formal mechanism that regulates communication flows and joint procedures. It is not uncommon for important information regarding violations not to be conveyed in a timely manner to the authorities, thus slowing down enforcement.

The findings also show that the absence of a digital-based integrated reporting system is one of the causes of weak coordination between agencies. Each agency tends to use their own internal systems that are not connected to each other, making it difficult to exchange data in real-time. The lack of regular coordination forums and the lack of affirmation of roles between agencies add to the complexity of this problem. As a result, oversight activities are often partial, with different priorities between agencies, and without an overarching joint strategy. This not only reduces the effectiveness of supervision but also creates the potential for conflicts of interest between agencies.

The implications of this lack of inter-agency coordination are significant for the effectiveness of marine surveillance. Without solid coordination, potential violations such as illegal fishing, smuggling and boundary violations will be difficult to detect and act on in a timely manner. Weak synergy between agencies can also reduce the government's credibility in maritime law enforcement, as well as hinder data-based strategic decision-making. Therefore, efforts are needed to build a formal coordination system based on information technology,

develop joint SOPs between agencies, strengthen communication between agencies, and establish regular coordination forums. With this approach, sea area surveillance can be implemented in an integrated, effective and adaptive manner to field dynamics.

3. Research's Recommendation

The effectiveness of marine and shipping surveillance at PPLP Class II Bitung is the result of complex interactions between various factors, including information quality, information systems, knowledge management, organizational structure and resources. The results revealed challenges that need to be addressed to improve surveillance effectiveness, particularly in relation to the patrol reporting system. Based on this analysis, several recommendations can be put forward:

- 1) Investment in Information Technology: Adopt an integrated digital system for patrol reporting, including mobile devices for officers in the field, a centralized database, and data analysis tools.
- 2) Standardize Reporting Procedures: Develop clear and uniform SOPs for recording, reporting, and managing patrol data.
- 3) HR Training and Development: Provide adequate training to patrol officers on the use of technology, reporting procedures, and the importance of data quality.
- 4) Effective Knowledge Management: Implement knowledge management practices to collect, store, share, and apply knowledge gained from patrol reports.
- 5) Improved Inter-Agency Coordination: Strengthen cooperation and information exchange with relevant agencies to create a comprehensive maritime security picture.
- 6) Adequate Resource Allocation: Ensure the availability of adequate resources, including budget, personnel, infrastructure, and technology, to support effective surveillance operations.

By implementing these recommendations, PPLP Class II Bitung can improve the effectiveness of marine and shipping surveillance, which will ultimately contribute to maritime security, protection of marine resources and enforcement of state sovereignty.

D. CONCLUSION

Based on the results of the discussion in the previous chapter, the researcher can conclude that the marine and shipping surveillance patrol reporting system at PPLP Class II Bitung is not optimal, this can be seen from: 1) report structure and content: reports prepared by officers do not have standardized standards and uniform formats. Reports are simple narrative and descriptive without important data elements such as coordinates, visual documentation, or situational assessments. This lack of integration means that the report does not function optimally as a documentation tool and basis for analysis of follow-up actions. 2) Reporting system: The flow applied is still manual and not real-time. The reporting process is conducted post-patrol activities and relies on physical collection or written reports sent to base. This mechanism is inefficient in responding to dynamic situations at sea due to the lack of direct connection between patrol officers and the central system. In addition, there is no integrated feedback and reporting system between units and levels of authority. 3) Technology implementation: the use of reporting applications and digital devices has not been optimized. Although there are initiatives such as the I-Motion application, its use is limited because patrol boats are not equipped with supporting devices such as automatic GPS, satellite networks, or weatherproof devices. In addition, low technological literacy among officers and the absence of intensive training means that available technology is not utilized to its full potential. Thus,

technology implementation has not been able to support the transformation of the reporting system towards one that is efficient, accountable and adaptive to the needs of modern marine surveillance.

There are obstacles in the marine and shipping surveillance patrol report system at the Class II Bitung Sea and Coast Guard Base which are influenced by several factors, namely: limited human resources, inadequate infrastructure and technology, limited budget, and challenges in inter-agency coordination that affect the effectiveness of surveillance. These constraints directly or indirectly impact the quality and management of patrol reports, as well as the overall operational capability of PPLP Class II Bitung. Overall, optimizing marine and shipping surveillance at PPLP Class II Bitung requires comprehensive improvements in the patrol reporting system, supported by effective handling of the various constraining factors.

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