



The Role of KSOP Patrol Vessels in Integrated Maritime Safety and Security Surveillance

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Abstract

Purpose: This study analyzes the legal framework, implementation, obstacles, and solutions regarding the role of patrol vessels operated by the Batam Special Harbor Master and Port Authority Office (KSOP) in an integrated maritime surveillance system within the Bareleng waters to enhance maritime safety and security.

Research Methodology: This study applies a normative-empirical legal research method using statutory, conceptual, and empirical approaches. Primary data were collected through interviews with KSOP officials and officers selected through purposive sampling, supported by secondary data from national and international regulations and relevant literature. Data were analyzed qualitatively through legal interpretation, classification, and deductive reasoning.

Results: The findings reveal that KSOP patrol vessel operations are based on national and international maritime regulations, including the 1945 Constitution of the Republic of Indonesia, the United Nations Convention on the Law of the Sea 1982, SOLAS, MARPOL, the International Ship and Port Facility Security Code, and national shipping laws. KSOP holds authority in shipping supervision. Patrol activities include risk-based planning, vulnerable area identification, routine and incidental patrols, and vessel inspections. However, challenges remain, including overlapping authorities, limited facilities, and weak information system integration.

Conclusions: Strengthening KSOP patrol vessel functions requires regulatory harmonization, clearer inter-agency authority, integrated information systems, and improved fleet capacity and human resources.

Limitations: This study focuses only on the Batam Special KSOP Office and Bareleng waters, limiting generalization.

Contributions: This study contributes to maritime and administrative law studies and provides policy insights for KSOP, the Indonesian Maritime Security Agency (Bakamla), and maritime surveillance institutions.

Keywords: *Integrated Maritime Surveillance, KSOP, Maritime Safety and Security, Patrol Vessels*

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1. Introduction

The waters of Indonesia hold a strategic constitutional position as a space for livelihood, economic activity, and national sovereignty. Article 25A of the 1945 Constitution of the Republic of Indonesia (*Undang-Undang Dasar Negara Republik Indonesia Tahun 1945/UUD NRI 1945*) affirms that Indonesia is an archipelagic state characterized by the concept of the archipelago, which entails the legal obligation of the state to ensure the security, safety, and orderly utilization of its maritime territory, including shipping and marine transportation activities. In this context, the Barelang waters, encompassing Batam, Rempang, and Galang, possess significant strategic value as they serve as domestic and international shipping routes while supporting industrial and port activities in Batam City. Its geographical proximity to the Malacca Strait and Singapore Strait makes this area a high-density maritime route for commercial vessels, passenger ships, and traditional vessels. This condition is also reflected in Batam institutional dynamics as a special economic zone requiring clear cross-sectoral governance and coordination ([\(Andriyanto, Respationo, Erniyanti, Ramlan, & Dahlan, 2024\)](#)).

The intensity of maritime traffic creates significant risks to shipping safety and order, including the operation of unseaworthy vessels, incomplete ship and crew documentation, violations of shipping lanes, and potential marine pollution resulting from industrial and port activities. To ensure maritime security and orderly navigation, Indonesia has developed an Integrated Maritime Surveillance System involving various state institutions with their respective authorities, including the Harbor Master and Port Authority Office (*Kantor Kesyahbandaran dan Otoritas Pelabuhan/KSOP*), the Indonesian Maritime Security Agency (*Badan Keamanan Laut Republik Indonesia/Bakamla*), the Water and Air Police Directorate (*Kepolisian Perairan dan Udara/Polairud*), the Indonesian Navy, and Customs. Legally, KSOP holds a strategic authority in supervising and enforcing administrative shipping regulations as stipulated in Law No. 17 of 2008 on Shipping. One of its main instruments is patrol vessels, which function to inspect vessel seaworthiness, verify documentation, supervise safety standards, and conduct administrative enforcement. Studies on maritime surveillance institutions emphasize that effective supervision depends on clear institutional mandates and adequate organizational resources ([\(Andriyanto et al., 2024; Setyawati, Pahala, & Susanto, 2024\)](#)).

However, the plurality of authorities among maritime surveillance institutions often creates challenges in coordination and operational effectiveness at the regional level. Unclear boundaries of operational authority, sectoral interests, and limited facilities and infrastructure remain major obstacles in implementing an integrated maritime surveillance system. Similar challenges have been identified in studies concerning overlapping authority among maritime supervisory institutions in various regions of Indonesia ([\(Mufti, Malik, & Fathurrahim, 2025\)](#)). One event illustrating the importance of strengthening integrated maritime surveillance was the operation conducted by Bakamla RI in cooperation with the Malaysian Maritime Enforcement Agency (MMEA) to seize the MT Arman 114 tanker, which later became a legal dispute. The High Court of Riau Islands subsequently declared the seizure legally valid. This case demonstrates that effective maritime surveillance relies heavily on inter-agency coordination among institutions with different mandates, including KSOP as the authority responsible for shipping safety and security. This finding aligns with previous research indicating that Indonesian maritime law enforcement against illegal maritime activities requires stronger institutional synergy ([\(Dirhamsyah, Umam, & Arifin, 2022\)](#)).

From the perspective of administrative law, authority granted normatively by legislation will lose its effectiveness if it is not supported by a clear implementation framework and adequate supervisory instruments. This empirical condition raises fundamental questions regarding the extent to which the role of KSOP Special Batam patrol vessels has been implemented in accordance with the legal mandate established by applicable regulations. Previous studies on maritime surveillance have generally examined the authority of specific institutions separately or focused on broader maritime security issues. Meanwhile, studies specifically analyzing the role of KSOP patrol vessels as instruments of administrative maritime supervision within an integrated surveillance system,

particularly in strategic archipelagic areas such as Barelang waters, remain limited. This research gap represents the urgency and novelty of this study.

This study seeks to answer three research questions concerning the legal framework governing the role of KSOP patrol vessels within the integrated maritime surveillance system in Barelang waters, the implementation of KSOP Special Batam patrol vessels in maritime surveillance activities, and the obstacles and solutions affecting their implementation. Academically, this study contributes to the development of maritime law and administrative law studies by examining authority, inter-agency coordination, and administrative law enforcement at sea. Practically, the findings are expected to provide policy recommendations for decision-makers and maritime enforcement authorities in developing a more effective, coordinated, and legally certain maritime surveillance strategy.

2. Literature Review

The theoretical framework of this study is structured hierarchically through three levels, namely grand theory, middle theory, and applied theory, which are interconnected to establish a comprehensive analytical framework for systematically addressing legal research problems.

The grand theory employed in this study is the Theory of the Rule of Law (*Rechtsstaat*/Rule of Law), which positions law as the foundation, limitation, and direction of all state administrative actions, including the management and supervision of maritime areas. The expansion of the rule of law concept from land-based domains to maritime spaces requires reconsideration of assumptions regarding territoriality, community, and the protective functions of the state, given the distinctive characteristics of maritime areas compared to land territories ([Sevel, 2023](#)). Comparative doctrinal studies of international norms and state practices emphasize that the enforcement of coastal state sovereignty at sea, including responses to transboundary violations, must remain subject to binding international legal frameworks ([Hasan & Islam, 2025](#)). Meanwhile, China experience in reforming maritime environmental governance demonstrates that strengthening the rule of law in the shipping sector requires continuous institutional reforms in supervision over an extended period ([Xing, Cao, & Su, 2022](#)). In maritime areas where jurisdictional boundaries remain unsettled, law enforcement faces particular challenges that require clear international legal norms as a prerequisite for effective surveillance ([Khan, 2026](#)). The Rule of Law Theory is used as the grand theory because it provides a philosophical foundation for assessing whether the role of KSOP patrol vessels has been implemented as an effective state instrument in ensuring maritime safety and security in the Barelang waters.

The middle theory bridging the grand theory and applied theory is Soerjono Soekanto Law Enforcement Theory, which states that the effectiveness of law enforcement is influenced by five factors: legal factors, law enforcement officers, facilities or infrastructure, society, and legal culture. A socio-legal approach to law enforcement emphasizes that elite interests and social structures may limit the effectiveness of legal implementation in practice, consistent with Soekanto argument that law does not operate in a social vacuum ([Burhanuddin, Wahyuniar, & Maskawati, 2024](#); [Rumboirusi, Umar, & Urip, 2024](#)). Studies on human resource capacity gaps in Indonesia legal reform process further highlight that law enforcement capacity and institutional facilities remain major structural barriers to achieving effective law enforcement ([Jarodi, Khafid, & Yulianto, 2024](#); [Mohammed, 2026](#)). Law Enforcement Theory is applied as the middle theory because it enables this study to evaluate the effectiveness of KSOP patrol vessel operations not only from a normative perspective but also from institutional capacity, infrastructure availability, and interaction with maritime communities.

The applied theory used in this study is the Theory of Government Administrative Authority, which explains that governmental authority originates from three primary forms: attribution, delegation, and mandate, each determining the legality and accountability of administrative actions. Doctrinal studies emphasize that delegation transfers both authority and responsibility, whereas a mandate only authorizes the execution of authority without transferring the authority itself, resulting in different legal consequences for administrative accountability ([Tumuhulawa & Moonti, 2021](#)). Analysis of attribution authority in regulatory formation indicates that unclear sources of authority may create

normative contradictions in administrative practices ([Al, 2023](#)). Furthermore, normative studies on administrative authority confirm that the validity of every governmental action must be traceable to a clear legal basis of authority to prevent abuse of power ([Gandara, 2020](#)). Comparative studies on administrative discretion review mechanisms in Indonesia and the Netherlands demonstrate that administrative courts generally assess whether there has been an abuse of authority rather than evaluating the substance of policy decisions themselves ([Suparto, Adinda, Esanov, & Normurotovna, 2024](#)). The Theory of Government Administrative Authority is used as the applied theory because it enables direct analysis of the legality of KSOP patrol vessel actions, including whether such actions derive from valid attribution, delegation, or mandate under applicable laws and regulations.

Previous studies on maritime surveillance demonstrate several consistent patterns. Research on the authority of Bakamla as a maritime security coordinator indicates that the institution possesses a strong legal mandate to coordinate maritime security functions that were previously fragmented ([Kurniaty, Suryokumoro, & Widagdo, 2021](#)). However, its implementation remains constrained by fragmented authority and weak inter-agency coordination ([Gumelar, Santoso, & Habib, 2026](#)), leading to proposals for strengthening Bakamla toward an integrated coast guard model supported by unified command and information systems ([Sondakh, Ekowanti, Wahyuni, & Sulistiyo, 2025](#)). Studies examining the synergy between Bakamla and the Sea and Coast Guard Unit (*Kesatuan Penjagaan Laut dan Pantai/KPLP*), which oversees KSOP patrol vessels, emphasize the need for harmonization of duties and authorities to prevent overlapping functions between maritime security institutions ([Tampi, 2023](#)). A case study in Ternate also confirms that overlapping authority among six maritime surveillance institutions in Indonesia represents a recurring structural problem across various regions ([Mufti, Malik, & Fathurrahim, 2025](#)).

From the perspective of international cooperation, studies on coastal state cooperation mechanisms in the Malacca Strait and Singapore Strait demonstrate that joint patrol zones and intelligence-sharing mechanisms among states provide effective models for reducing piracy and maritime terrorism threats in high-density shipping routes ([Ho, 2009](#)). This finding aligns with proposals to strengthen littoral state cooperation in securing the Malacca Strait against transnational maritime threats ([Pulungan, 2021](#)). Regarding law enforcement against fisheries violations, studies show that actions against foreign vessels conducting Illegal, Unreported, and Unregulated (IUU) fishing within Indonesian jurisdiction must remain consistent with UNCLOS 1982, despite the implementation of strict enforcement measures ([Ernawati, Shafira, Achmad, Tarigan, & Silviani, 2022](#)). Other studies indicate that administrative sanctions and enforcement measures against foreign vessels must be adjusted according to the jurisdictional zones where violations occur ([Lutfi, 2020](#)), while inter-agency coordination remains a key factor in the successful implementation of IUU fishing policies across Indonesian provinces ([Suhaidi, Rosmalinda, Alhayyan, & Tarigan, 2022](#); [Susanto, Pahala, & Setyowati, 2023](#)).

From the perspective of port operations, research on the issuance of Sailing Approval Certificates (*Surat Persetujuan Berlayar/SPB*) by harbor masters emphasizes that such documents serve as key instruments for port authorities in ensuring compliance with safety standards before vessels depart ([Sonhaji, 2018](#)). This is consistent with studies on KSOP activities in other Indonesian ports, which demonstrate similar operational patterns in maritime safety supervision to those observed in this research locus ([Yusnidah, Lilis, & Saragih, 2024](#)). A global systematic review of port state control inspections highlights the importance of integrated inspection databases to improve the effectiveness of vessel seaworthiness monitoring ([Sheriff, Anantharaman, Islam, & Nguyen, 2025](#)). Statistical analysis of MARPOL implementation through port state control data also demonstrates a relationship between inspection intensity and vessel compliance with pollution prevention standards ([Mantoju, 2021](#)).

Technological developments in maritime surveillance have also become a significant area of study, including the use of artificial intelligence-based tethered drones for port and coastal monitoring ([Belmonte-Hernández, Grauby, Tardi, Houge, & Gutiérrez, 2026](#)), big data integration models for maritime surveillance systems in vulnerable areas, risk-based vessel traffic monitoring priority

indexes ([Lee & Kim, 2022](#)), surveys on Automatic Identification System (AIS)-based anomaly detection methods to support vessel traffic services ([Stach, Kinkel, Constapel, & Burmeister, 2023](#)), and cloud-based vessel operation monitoring systems in port areas ([Abramowicz-Gerigk, Burciu, Gerigk, & Jachowski, 2024](#)). Based on this synthesis, this study positions itself to address the research gap concerning the role of KSOP patrol vessels as instruments of administrative maritime surveillance within an integrated maritime surveillance system, with an empirical focus on the Barelang waters.

3. Research Methodology

This study employs a normative-empirical legal research method, which combines the examination of written legal norms (law in books) with their practical implementation in the field (law in action). This approach aligns with the characteristics of legal research aimed at addressing contemporary legal issues and problem-solving ([Wiraguna, 2024](#)). Three approaches are applied simultaneously, the statutory approach to examine national and international legal frameworks governing maritime surveillance, the conceptual approach to analyze the theories of the rule of law, law enforcement, and government administrative authority, and the empirical approach to obtain factual information regarding the implementation of KSOP Special Batam patrol vessel operations in practice.

The research was conducted at the Batam Special Harbor Master and Port Authority Office (KSOP Special Batam), focusing on the Barelang waters. Primary data were obtained through in-depth interviews with KSOP Special Batam officials and officers, including the Head of the Security, Patrol, and Investigation Section, Patrol Vessel Captains, Ship Safety Inspection Officers, and Shipping Safety Supervisors. The participants were selected using a purposive sampling technique because this study emphasizes data depth and relevance rather than the number of respondents. Secondary data consisted of primary legal materials, including national legislation and international maritime conventions, secondary legal materials including books and journal articles, and operational documents related to KSOP patrol activities. Tertiary legal materials, such as legal dictionaries and encyclopedias, were also used as supporting references. Data collection techniques included in-depth interviews, documentation studies of patrol reports, and literature reviews.

The collected data were analyzed using qualitative juridical analysis through four stages. First, data reduction was conducted to select information relevant to the research focus. Second, data classification was performed by categorizing findings into themes, including normative aspects of maritime surveillance, patrol operational practices, legal and institutional obstacles, and infrastructure limitations. Third, legal interpretation was applied by analyzing empirical findings based on applicable laws, regulations, and legal theories. Finally, deductive conclusion drawing was conducted by deriving conclusions from general legal norms toward specific facts concerning maritime surveillance practices carried out by KSOP Special Batam.

4. Results and Discussions

4.1 Legal Framework Governing the Role of KSOP Patrol Vessels in Integrated Maritime Surveillance

The legal framework governing the role of KSOP patrol vessels cannot be separated from the constitutional foundation established in the 1945 Constitution of the Republic of Indonesia. Article 1 paragraph (3) affirms that Indonesia is a state based on law, meaning that all governmental actions, including maritime surveillance activities and shipping law enforcement, must be based on legitimate legal authority and conducted to protect public interests. Article 33 paragraph (3) provides the state with the authority to regulate, administer, manage, supervise, and control the utilization of maritime spaces, including shipping activities. Meanwhile, Article 25A emphasizes Indonesia status as an archipelagic state, positioning the sea as a unifying element rather than a separating boundary of the national territory. Within this framework, KSOP patrol vessels serve as state instruments to implement

these functions through patrol operations, vessel inspections, and administrative law enforcement at sea.

At the international level, the legal basis for the role of KSOP patrol vessels derives from the United Nations Convention on the Law of the Sea (UNCLOS) 1982, which was ratified by Indonesia through Law No. 17 of 1985 and grants coastal states the authority to conduct supervision and law enforcement within their maritime jurisdiction. The expansion of coastal state authority at sea must remain subject to binding international legal frameworks to prevent cross-border disputes ([Hasan & Islam, 2025](#)). This principle is also reflected in the practices of littoral state cooperation in the Malacca Strait and Singapore Strait, which emphasize joint patrol arrangements and intelligence-sharing mechanisms to reduce transnational maritime security threats ([Ho, 2009](#); [Pulungan, 2021](#)). In addition to UNCLOS 1982, the SOLAS Convention, MARPOL Convention, and International Ship and Port Facility Security (ISPS) Code provide technical references for KSOP patrol vessels in ensuring compliance with vessel safety standards, marine environmental protection requirements, and port facility security measures.

At the national level, KSOP authority is regulated under Law No. 17 of 2008 concerning Shipping, as amended, including through Law No. 66 of 2024, as well as Law No. 32 of 2014 concerning Maritime Affairs. The findings of this study indicate that KSOP possesses attribution authority in conducting shipping administrative supervision, vessel inspections, administrative law enforcement, and maritime safety patrols. This authority is an original authority directly granted by legislation, distinguishing it from delegated authority, which transfers responsibility or authority, and mandated authority, which only provides authorization for implementation without transferring the underlying authority ([Tumuhulawa & Moonti, 2021](#)). The clarity of the legal basis of authority is essential to prevent normative contradictions that may weaken the legitimacy of KSOP administrative actions in practice ([Al Arif, 2023](#)). One of KSOP main technical instruments is the issuance of the Sailing Approval Certificate (SPB), which serves as a mandatory requirement before vessels are permitted to depart and functions as a key instrument for port authorities in ensuring compliance with safety standards ([Sonhaji, 2018](#)).

Nevertheless, the existing legal framework does not yet comprehensively regulate the detailed operational mechanisms of an integrated maritime surveillance system and the position of each institution within such a system. As a result, implementation often relies on memoranda of understanding and sectoral technical policies. This condition is consistent with findings that overlapping authorities among maritime surveillance institutions represent a recurring structural issue in various regions of Indonesia, including areas geographically close to the research locus ([Mufti et al., 2025](#); [Andriyanto et al., 2024](#)). Overall, the legal framework governing the role of KSOP patrol vessels has a strong and hierarchical foundation. However, a gap between *das sollen* (what should be) and *das sein* (what exists in practice) remains evident, particularly regarding the technical harmonization of operational functions among maritime surveillance institutions.

4.2 Implementation of the Role of KSOP Special Batam Patrol Vessels in Maritime Surveillance

The implementation of the role of KSOP Special Batam patrol vessels in the Barelang waters is carried out through a structured operational mechanism. Patrol planning is developed based on regional vulnerability levels, shipping traffic density, and reported violations using a risk-based supervision approach. This approach enables more effective utilization of limited surveillance resources. It is consistent with the risk-priority-based vessel traffic monitoring model developed for busy ports in various countries, which allows vessel traffic service operators to focus surveillance efforts on vessels with higher risk levels ([Lee & Kim, 2022](#)). The patrol areas cover shipping routes around Batam, Rempang, Galang, Telaga Punggur, Kabil, and Sagulung, taking into account vessel traffic intensity, the presence of public and private ports, and the simultaneous operation of traditional vessels within the same maritime area.

Routine patrols are conducted periodically using patrol vessels operated by the Directorate General of Sea Transportation. These activities are directed toward monitoring vessel movements, inspecting

shipping documents, supervising compliance with safety standards, and identifying potential maritime law violations at an early stage. The presence of patrol vessels directly provides a preventive effect against violations while also serving as an educational mechanism for vessel operators and owners. In addition to routine patrols, KSOP Special Batam conducts incidental patrols based on public reports, maritime intelligence information, vessel accident incidents, or suspected marine pollution cases. These activities are frequently carried out in cooperation with other institutions within the framework of integrated maritime surveillance.

Each patrol activity is documented through reports containing information on location, vessel types, identified violations, and follow-up actions. These reports serve as evaluation instruments and provide a basis for developing future surveillance strategies. This reporting and evaluation function aligns with the need for integrated inspection databases emphasized in global reviews of port state control practices ([Sheriff et al., 2025](#)). It is also consistent with findings that inspection intensity is correlated with vessel compliance with safety and pollution prevention standards ([Mantoju, 2021](#)).

The implementation of surveillance activities conducted by KSOP patrol vessels includes the inspection of vessel documents, such as Sailing Approval Certificates (SPB), vessel certificates, safety certificates, and crew documentation. Physical seaworthiness inspections are also conducted, covering vessel hull conditions, engines, navigation systems, and communication equipment. In addition, patrol activities include inspections of safety equipment, such as life jackets, life rafts, fire extinguishing equipment, and Emergency Position Indicating Radio Beacons (EPIRBs), as well as monitoring vessel loading and manifests to prevent overloading.

These operational surveillance practices demonstrate similar patterns to KSOP activities at other Indonesian ports, where shipping safety supervision remains a core function of port authorities ([Yusnidah et al., 2024](#)). The findings indicate that the presence of KSOP patrol vessels has made a significant contribution to improving compliance with shipping documentation requirements, reducing potential administrative violations, preventing marine pollution, and supporting the protection of maritime service users. Therefore, KSOP patrol vessels function not only as administrative supervision instruments but also as preventive mechanisms for achieving maritime safety and security in the Barelang waters. Nevertheless, as identified in studies concerning other maritime surveillance institutions, the effectiveness of surveillance implementation remains influenced by the clarity of institutional responsibilities and the availability of adequate supporting resources ([Andriyanto et al., 2024](#)).

4.3 Obstacles and Solutions in the Role of KSOP Special Batam Patrol Vessels

This study identifies three main categories of obstacles affecting the role of KSOP Special Batam patrol vessels. First, legal obstacles arise from overlapping authorities among institutions responsible for maritime supervision, including KSOP, Bakamla, Polairud, the Indonesian Navy, and Customs. Although these institutions have different normative mandates, their functions often intersect in practice, particularly in vessel supervision and maritime law enforcement. Other legal obstacles include the absence or ambiguity of norms governing the operational mechanisms of integrated maritime surveillance, as well as regulatory disharmony concerning supervisory authority. This condition is consistent with previous findings that overlapping authority among maritime surveillance institutions represents a structural problem that occurs in various regions of Indonesia ([Mufti, Malik, & Fathurrahim, 2025](#)).

Second, institutional obstacles involve suboptimal inter-agency coordination, sectoral interests, and the absence of an integrated information-sharing mechanism. As a result, violations detected by one institution are not always immediately accessible to other relevant institutions in real time. This condition aligns with findings emphasizing that institutional consolidation and integrated command and information systems are urgent requirements for strengthening Indonesia maritime security governance ([Sondakh, Ekowanti, Wahyuni, & Sulistiyanto, 2025](#); [Gumelar, Santoso, & Habib, 2026](#)).

Third, infrastructure and resource obstacles include limitations in patrol fleet capacity, surveillance equipment, monitoring technology, and operational budgets. These challenges are further compounded by limitations in the number and competence of personnel, as well as the relatively low compliance level of some maritime operators. This finding is consistent with research indicating that human resource capacity gaps remain a major structural challenge in strengthening law enforcement reform in Indonesia ([Jarodi, Khafid, & Yulianto, 2024](#)).

To overcome these obstacles, KSOP Special Batam has implemented several efforts, including strengthening routine patrol activities, improving inter-agency coordination, conducting shipping safety awareness programs, and utilizing surveillance technologies. This study formulates four groups of solutions. First, strengthening the legal framework for integrated maritime surveillance is required through harmonization of regulations governing supervisory authority and clarification of KSOP position within the national maritime surveillance system. This includes establishing clearer coordination mechanisms between KSOP under the Sea and Coast Guard Unit (KPLP) and Bakamla as the coordinator of maritime security functions ([Tampi, 2023](#)). Second, integrating maritime surveillance information systems is necessary to ensure that vessel traffic data, violation records, and patrol results can be accessed in real time by relevant institutions. This approach is consistent with developments in maritime surveillance technology based on big data and artificial intelligence, which support early detection of vessel movement anomalies ([Stach, Kinkel, Constapel, & Burmeister, 2023](#)). The integration may also include the utilization of tethered drones to expand surveillance coverage in ports and coastal areas ([Belmonte-Hernández, Grauby, Tardi, Houge, & Gutiérrez, 2026](#)) and cloud-based vessel monitoring systems in port environments ([Abramowicz-Gerigk, Burciu, Gerigk, & Jachowski, 2024](#)).

Third, enhancing patrol fleet capacity and human resources is required through additional vessels, improved equipment, and continuous competency development programs for patrol personnel. This is necessary because limitations in infrastructure and human resources remain consistent challenges among maritime surveillance institutions ([Andriyanto, Respationo, Erniyanti, Ramlan, & Dahlan, 2024](#)). Fourth, implementing a collaborative integrated maritime surveillance model is needed through stronger inter-agency cooperation, including joint patrol arrangements and maritime intelligence exchange mechanisms, as practiced in littoral state cooperation in the Malacca Strait and Singapore Strait ([Ho, 2009](#); [Pulungan, 2021](#)). Strengthened coordination is also essential in addressing illegal fishing violations, which frequently involve multiple institutions simultaneously ([Suhaidi, Rosmalinda, Alhayyan, & Tarigan, 2022](#); [Ernawati, Shafira, Achmad, Tarigan, & Silviani, 2022](#)).

Analyzed through the perspective of the Rule of Law Theory, these solutions emphasize that every maritime surveillance action must be supported by clear and coordinated legal foundations, consistent with the need to extend the rule of law principle into maritime areas with jurisdictional characteristics different from land territories ([Sevel, 2023](#)). Through Soerjono Soekanto Law Enforcement Theory, these strengthening measures address improvements in legal factors, law enforcement institutions, facilities, society, and legal culture. Meanwhile, through the Theory of Government Administrative Authority, these measures ensure that every KSOP patrol vessel action remains based on legitimate attribution authority, preventing abuse of power (*detournement de pouvoir*) and supporting the sustainable realization of maritime safety and security in the Bareleng waters.

5. Conclusions

This study concludes three main points. First, the legal framework governing the role of KSOP patrol vessels within the integrated maritime surveillance system has a strong and hierarchical legal foundation, beginning with the 1945 Constitution of the Republic of Indonesia, international maritime regulations including UNCLOS 1982, SOLAS, MARPOL, and the ISPS Code, as well as national legislation such as the Shipping Law and Maritime Affairs Law. KSOP holds attribution authority in maritime administrative supervision; however, the operational mechanisms of an integrated maritime surveillance system involving multiple institutions have not yet been regulated in detail. Second, the

implementation of KSOP Special Batam patrol vessels in the Barelang waters has been conducted through risk-based planning, identification of vulnerable areas, routine and incidental patrol operations, as well as inspections of vessel documents, seaworthiness, and safety equipment. These activities have made a significant contribution to improving shipping compliance and preventing maritime violations, although their effectiveness remains influenced by coordination with other institutions involved in the integrated maritime surveillance system.

Third, the obstacles affecting the role of KSOP patrol vessels include legal obstacles in the form of overlapping authorities and regulatory disharmony, institutional obstacles related to suboptimal coordination and information integration, and infrastructure constraints involving limited patrol fleets, technology, and human resources. These challenges can be addressed through regulatory harmonization of integrated maritime surveillance, information system integration, enhancement of fleet capacity and personnel, and the implementation of collaborative inter-agency coordination models. Overall, these three conclusions confirm that strengthening the role of KSOP patrol vessels is a fundamental requirement for achieving sustainable maritime safety and security in the Barelang waters.

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Author Contributions

DG contributed to the conceptualization, research methodology, data collection, data analysis, interpretation of findings, and manuscript preparation. SR contributed to the development of the theoretical framework, legal analysis, and critical revision of the manuscript. SN contributed to literature review, research validation, and manuscript improvement. R. contributed to supervision, academic review, refinement of the manuscript, and final approval of the published version. All authors have read and approved the final manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article. The research was conducted independently, and the findings presented in this manuscript do not represent any personal, institutional, or financial interests that could influence the objectivity of the study.

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