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Review Article

Comparative Legal Analysis of Maritime Technology Utilization in Indonesia and China

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Abstract: Managing maritime borders is a vital issue that needs special attention from coastal nations such as Indonesia and China. Both designed and deployed various systems to monitor marine activity as declared in UNCLOS 1982. The goal of this study is to give a comparison of marine surveillance technologies and to analyze the legality of their usage under international law. The research methods include literature review and analysis of material from official sources, scientific publications, and relevant reports. This study discovered that Indonesia has created an integrated maritime surveillance system based on satellite, radar, and Automatic Identification System (AIS) technologies. Besides that, China is deploying more advanced and extensive maritime surveillance and monitoring technologies, such as a modern fleet of patrol vessels, aircraft, and remote monitoring equipment. Indonesia and China have generally employed marine surveillance technologies in compliance with international law principles such as territorial sovereignty, freedom of navigation, and maritime law enforcement. However, there are indications of limits on access to information and potential privacy concerns that should primarily concern the Chinese. Stronger regional coordination and collaboration are required to guarantee that the deployment of marine surveillance technologies complies with international law and current maritime security concepts.

Keywords: Maritime technology; International law; Maritime defense; Indonesia and China

1. Introduction

The Maritime territory is a worldwide strategic concern for all countries with coastal borders, including Indonesia and China. These two countries are taking substantial steps to improve maritime security and sovereignty. To that purpose, both have developed and deployed various technologies to reach and monitor any activities within such a broad maritime jurisdiction, including preventing prohibited marine activity (Chan, 2024). Managing and protecting marine sovereignty involves issues distinctive to both countries, particularly in maritime territories directly bordering other countries. The challenges posed by the scope and complexity of the waters to be monitored, the threats to maritime security, and the increased economic activity and maritime transport in Southeast Asia all encourage Indonesia and China to strengthen their maritime monitoring and surveillance capabilities. Both sides aim to ensure the best use of technology to increase surveillance effectiveness and maritime management's scope and assure navigation safety in their respective domains.

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Indonesia is a waterfront country that covers 65% of the ocean. This indicates that the water dominates Indonesia, whereas the land accounts for only 35%. This fact demands Indonesia's use of technology to manage marine riches and safeguard national sovereignty along its borders with other nations, more than half of which are maritime (Pudjiastuti et al., 2021). The geopolitical and geostrategic interactions between Indonesia and China are extremely important. Its strategic positions in the Pacific and Indian Oceans have ramifications since they are involved in boundary disputes in the South China Sea, maritime security, marine resource extraction, and other critical concerns (Pudjiastuti et al., 2021). As a result, marine surveillance and management technology becomes an important tool for both countries to safeguard their national interests, ensure that seawater enforcement runs smoothly, and, equally important, maintain national sovereignty in the waters. The use of technology will be extremely beneficial in mining data and information immediately from all maritime operations, which can be used to develop suitable and accurate policies and actions (Kristiyanti et al., 2023; Sarjito, 2023; Yuliarta & Rahmat, 2021).

However, sea surveillance technology has created legal and ethical concerns, as has China's use of maritime technology. National sovereignty constraints, freedom of navigation, and privacy protection are all issues that must be carefully studied. Furthermore, employing this technology could increase tensions between countries in maritime boundary disputes (Bowden, 1997; Lapadengan & Afriansyah, 2023; McCarron, 2016). As a result, this essay will examine the legality of China's use of technology in maritime management and monitoring. Overall, China technology looks more advanced and innovative than Indonesian technology. It demonstrates China daring to confront certain countries directly in a border issue dispute in the LCS by demanding land from another country (Misalucha-Willoughby, 2023). It looks difficult for China to make disproportional and unlawful claims unless a more advanced technological force supports it as a dependable weapon than the countries it confronts, like Indonesia, where China also claims an exclusive economic zone.

Therefore, comparative studies and legality analyses of Indonesia and China's usage of maritime surveillance technologies must be conducted. It seeks to learn best practices, identify issues, strengthen marine defense, and develop suggestions for water management in compliance with international law. This research aims to analyze and compare marine surveillance technologies deployed by Indonesia and China, as well as to assess the legality of their usage in light of the applicable international legal framework. The study's findings are anticipated to offer policymakers and key stakeholders' useful insights into effective and sustainable marine territory management.

2. Materials and Methods

The methodology employed in this study comprised library research and documentation analysis. Data and information were collected from official sources, scientific publications, and studies pertaining to marine surveillance technologies and applicable international legal practices. The study's structure was organized into distinct sections: an introduction, a comprehensive review of Indonesian and Chinese sea surveillance technologies, an in-depth investigation of the legal aspects surrounding technology usage, and a presentation of findings accompanied by relevant suggestions. To ensure a thorough examination of the subject matter, the researchers conducted an extensive review of existing literature. This involved systematically analyzing academic journals, government reports, and international legal documents related to Southeast Asia maritime surveillance and territorial administration. The documentation analysis phase focused on evaluating official records, policy documents, and technical specifications of surveillance technologies employed by Indonesia and China. This approach allowed for a comparative assessment of the two nations' capabilities and strategies in maritime monitoring. The study's comprehensive methodology, combining theoretical research and practical analysis, is expected to substantially contribute to the ongoing discourse and practice of marine territorial administration in Southeast Asia. By synthesizing information from diverse sources and examining legal implications, this research aims to provide valuable insights for the region's policymakers, legal experts, and maritime authorities.

3. Results

3.1. Sea Surveillance Technology in Indonesia and China.

Indonesia and China emphasize using technology to monitor and preserve maritime security and sovereignty inside their territories. Various innovative technology-based methods and equipment are constantly being created so that maritime monitoring and management may be conducted most effectively and efficiently while reaching the whole region. One of the primary reasons for the continued evolution of marine surveillance technology is the necessity for real-time and reliable information regarding maritime activity (Sarjito, 2023). Indonesia has developed various important technologies for marine surveillance, including Palapa and Telkom satellite-based monitoring systems, radar systems, and patrol ships equipped with modern technologies. The Indonesian government tracks sea activities and phenomena mostly using satellite-based monitoring systems. Several satellites, including Palapa and Telkom, serve as satellite-powered maritime surveillance systems with advanced sensors or detectors that detect and track ship movements and other activities in Indonesian seas (Hutabarat, 2003). The government uses coastal radar and air radar systems and

satellite-based surveillance equipment to monitor activities in Indonesian waters. Radars detecting ship and aircraft activity or navigation routes on Indonesian territory have been placed on many important islands along the coastline (Ariantoko et al., 2023). In Indonesian seas, the government's patrol ship vessel is equipped with modern communications systems, navigation systems, and detectors that are continually being developed and adapted to the unique characteristics of Indonesian waters. The patrol vessels are responsible for establishing maritime security through law enforcement, reacting to maritime events, and generally protecting sovereignty and ensuring the country's defense in Indonesian seas.

On the other hand, China has created innovative technologies for sea surveillance. One of China's primary systems is the BeiDou marine monitoring satellite network (Weiqiang et al., 2021). The system comprises satellites that can follow ship movements, detect unlawful behavior, and provide real-time information about weather and ocean currents. China has been disputing territorial limits in the South China Sea and has high ambitions to strengthen their technological abilities. China has significantly improved surveillance and water surveillance technology and the BeiDou marine surveillance satellite network. The surveillance system, which consists of dozens of satellites, can follow, identify, and even forecast any illegal behavior in the China seas. In addition, the system delivers real-time information on ocean currents and meteorological conditions. China's constantly improving sea surveillance technology also includes the operation and equipment of its high-tech patrol ships, which other countries admire. China patrol ships are equipped with radar and electronic sensors, automated weapons systems, and the capability to respond precisely and rapidly to situations in China's seas. Also, in addition to continuing to advance satellite and ship technology, China has built a drone-based surveillance system that can be operated at sea to acquire real-time data and information. This technology is being developed as quickly and sophisticatedly as possible to cover the full region of China waterways, including locations other surveillance systems find difficult to access. Indonesia and China are developing maritime surveillance and management technology to preserve sovereignty defend, and secure national interests in their oceans. The utilization of contemporary and advanced technology allows both nations to get reliable data and information that can be utilized to address strategic policy concerns connected to poverty.

3.2. Comparison of Maritime Technologies Used in Indonesia and China

China has a substantial edge over Indonesia regarding satellite-based sea surveillance technologies. China has been used as a maritime surveillance satellite. This system's features include completely monitoring marine conditions such as currents, temperature, and weather. Quantitatively, China has expanded the amount and capacity of its satellites, expanding the scope of water monitoring and surveillance (Guo, 2020). Meanwhile, Indonesia has utilized water sighting and monitoring satellites such as LAPAN-A3, but the number remains restricted and poorly integrated, according to the most recent study. However, government budgetary restrictions prevent monitoring efforts in Indonesian waters, making access to isolated areas unfeasible. In addition to having major advantages in satellite surveillance technology, China surpasses Indonesia in using coastal radar equipment to monitor activities in waterways. According to recent research conducted by China's National Marine Data and Information Service (NMDIS), the country is developing a vast, contemporary, and sophisticated network of coastal radar stations, particularly in contested maritime areas with other nations (Hsu et al., 2021). Meanwhile, Indonesia has built numerous coastal radar stations (Ardi, 2023). Still, the number of coastal radar stations remains limited and unevenly dispersed over the needed coastal areas, according to the Ministry of Defense.

Another advantage demonstrated by China technology over Indonesia is the adoption of the Vessel Monitoring System (VMS), with the China VMS system covering more than 95% of commercial boats in its maritime region (Chen et al., 2023). While Indonesia has established a VMS system, it has yet to cover all the country's waterways. The Indonesian Ministry of Maritime Affairs and Fisheries does not adequately monitor many illicit ships. Furthermore, China has a huge edge in developing modern marine defense technology, including warships, drones, and long-range missile systems. China has produced warships with far more capabilities than Indonesia and has used several types of drones for patrol and surveillance. This offers China an edge in maritime security and control over Indonesia. Even though Indonesia has invested heavily in warships and improved the tool, there are still many difficulties and barriers to overcome, including insufficient funding and infrastructure, according to the country's Ministry of Defense report. Because of this, Indonesia can still not match China's advanced marine defense technologies.

3.3. Analysis of Indonesia's and China's Legality in Using Marine Surveillance Technology

Indonesia's and China's use of maritime technology should be examined in the context of international law regulating such operations. State rights and duties over waterways are primarily governed by the 1982 United Nations Convention on the Law of the Sea (UNCLOS). The purpose of this section on the legality of technology usage is to ascertain if the regulations set out by UNCLOS 1982 and the constantly changing use of maritime technology are compatible. This is due to the potential for China's unlawful marine technology development and usage and its interference with other nations' interests to be linked to its illegitimate claims to the South China Sea. Up to 12 nautical

miles from the baseline, the coastal state shall have complete authority over its territorial waters, which include the sea, the seabed, and the land below it. The coastal state shall have the only authority to conduct management, surveillance, marine defense, national sovereignty protection, and law enforcement operations inside this territory. UNCLOS governs the exclusive economic zone (EEZ), which stretches up to 200 nautical miles from the baseline and territorial waters. Coastal governments have the sovereign right to use and manage natural resources, both living and non-living, inside the Exclusive Economic Zone (EEZ).

UNCLOS gives coastal countries the authority to monitor and enforce maritime law and defense inside their ZEE region, which is relevant to marine surveillance. Coastal countries could monitor ship activity and enforce ZEE restrictions by employing sophisticated technologies, including radar and satellite systems. However, the concept of freedom of navigation and overflight in the ZEE is also affirmed by UNCLOS. As long as these actions don't conflict with or jeopardize the interests of coastal nations, other states are free to travel through and over a coastal nation's zone of exceptions (ZEE). China and Indonesia have used sea surveillance technologies per UNCLOS regulations. It is lawful and compliant with international law to utilize satellites, radars, and patrol ships in each nation's territorial waters and zone of extended enforcement.

However, certain problems with China's use of sea surveillance technologies need to be resolved. One might be a clash with ZEE's freedom of navigation principles, particularly if the technology is employed to impose restrictions on the operations of foreign ships and planes. China is accused of using marine technology illegally, for instance, by installing surveillance equipment in the disputed South China Sea region. The US government declared in 2018 that China has placed detectors, cameras, and sensors on islands in the South China Sea. Article 19 of the UNCLOS specifies that the equipment installed for collecting information might be deemed a danger to peace, security, and order. Additionally, the right of all governments to utilize the open sea, including the freedom to conduct scientific study, is reaffirmed in Article 87. Nevertheless, it is possible to see the placement of unauthorized monitoring equipment within the contested area as a breach of these liberties.

Allegations that China monitored activity in the South China Sea using drones and satellites without the consent of the rival countries were also made public in a 2019 International Crisis Group study. 2019's International Crisis Group. One may argue that this violates UNCLOS Article 19 on "peaceful crossing through territorial seas." Without authorization, conducting surveys or scientific studies might be seen as a danger to the community's safety, security, and harmony. Furthermore, coastal nations have the sovereign right to explore and utilize natural resources inside their exclusive economic zone (ZEE), according to Article 56 of the UNCLOS. Also, deploying marine surveillance technologies may raise privacy issues for planes and ships operating in the ZEE. States along the coast need to ensure that technology is not employed in a way that infringes on civil rights or has unjustifiably detrimental effects. In order to resolve these concerns, China and Indonesia must ensure that sea surveillance technology is done transparently and in compliance with the goals and tenets of national legislation.

5. Conclusions

Indonesia and China employ maritime technology for diverse purposes, including maritime surveillance, marine resource exploitation, shipping security, and safeguarding national sovereignty. Both nations have developed advanced technological systems such as monitoring satellites, uncrewed vessels, and radar detection systems. However, a significant disparity exists, with China's maritime technology appearing to surpass that of Indonesia. From a legal perspective, Indonesia has established clear regulations governing the use of naval technology through various laws, including the Marine Act, Fisheries Act, and other related regulations. These legal frameworks delineate maritime technology utilization's limitations, permissions, and liabilities. By contrast, China adopts a more flexible and assertive approach to employing maritime technology to pursue its national interests, particularly in territorial disputes within the South China Sea. When examined through the lens of international maritime law, China's technological applications potentially contravene the United Nations Convention on the Law of the Sea (UNCLOS) 1982, especially concerning the use of technologies in disputed territories. Thus, Indonesia and China have tried to leverage maritime technology for their respective interests. However, there are notable differences between their legal frameworks and approaches. These disparities warrant attention, particularly in the context of regional stability and interstate maritime cooperation within the region.

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