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Supervision of Fishery Resources through Integrated Technology

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Abstract

Fisheries crimes damage ecosystems and fisheries resources in waters or sea areas. Although various efforts have been made to stop criminal acts in the fisheries sector, fisheries supervision is still carried out. Therefore, policies and implementation systems for monitoring criminal acts in the fisheries sector must be considered because the public, apart from authorized supervisory officers, can supervise fisheries. This research focuses on determining policies and implementation of supervision that uses integrated technology. The normative legal research methods used are the statutory and concept approaches. Researchers also collect data and conduct studies through qualitative analysis. Law Number 45 of 2009, concerning Amendments to Law Number 31 of 2004 concerning Fisheries, is the basis for supervision. Another law included in supervision is Law Number 1 of 2014 concerning Amendments to Law Number 27 of 2007 concerning the Management of Coastal Areas and Small Islands. According to this research analysis, integrated technology for fisheries monitoring is new and needs to be taken seriously by various legislative policies.

Keywords: Monitoring, Fisheries Resources, Technology, Integrated

Introduction

All aspects of people's lives are influenced by globalization (Bashmakova & Bondarev, 2021; Purba et al., 2018), including the fishing industry, which is currently developing thanks to advances in communication and transportation technology (KIPAS, 2017; Purba et al., 2019). In addition, the challenges caused by the development of globalization not only have a positive impact on society (Nederveen Pieterse, 2012; Bakhtadze & Danelia, 2017) but also hurt the progress of the fishing industry in Indonesia.

Because of its potential to accommodate many aspects of life, fishing is an industry that has a bright future. Fishing equipment and techniques must also be improved, and fisheries

management must be adapted to progress (Tarussy, 2018; Munro & Scott, 1985). Fisheries criminal acts are one of the global problems faced by countries around the world. This is because this type of criminal act does not only cause damage to ecosystems and fisheries resources in water or marine areas (Eigaard et al., 2014; Pauly et al., 1989; Ingtyas et al., 2020), but it also threatens state sovereignty, especially if the perpetrators of fishing crimes come from foreign countries who enter Indonesian waters without permission to catch fish.

Fisheries crimes are fisheries management activities that are illegal and prohibited by law. Fisheries crimes usually include pollution of marine ecosystems, excessive fishing (constructive fishing), fish theft (illegal fishing), use of prohibited fishing gear, or not having a fishing business permit. The fisheries crime that most frequently occurs in Indonesian fisheries management areas is fish theft, also known as illegal poaching. Although it is difficult to count and estimate the number of fisheries crimes that occur in Indonesian waters, fish theft is carried out by fishing vessels from neighboring countries such as Thailand, the Philippines, and Vietnam (Irawan, 2019; Hilborn et al., 2004). During the first quarter of 2020, 38 marine and fisheries crimes (TPKP) were processed by the Ministry of Maritime Affairs and Fisheries (KKP) through the Directorate General of Marine and Fisheries Resources Supervision (Ditjen PSDKP) (Newswire, 2019).

PSDKP arrested 114 Indonesian fishing vessels that violated the law and 53 foreign fishing vessels that stole fish in 2021. In addition, they arrested 96 perpetrators of destructive fishing (Arjawinangun, 2021). In 2022, PSDKP handled 137 violation cases, including administrative violations and criminal offenses in the maritime and fisheries sector. Of the 137 cases, 71 received administrative sanctions, and 59 others were brought to criminal court. Non-Tax State Revenue (PNBP) total is IDR 33,942,778,600 from administrative fines and compensation for coral damage (Public Relations of the Directorate General of PSDKP, 2022; Amal et al., 2022).

Fishery resources can experience negative impacts from various fishing businesses and problems related to using fish resources that need to pay attention to sustainability through destructive fishing gear. So, supervisory regulations must be implemented (Safira et al., 2021; Laitin, 2013; Wantu et al., 2021). Law Number 45 of 2009 concerning Amendments to Law Number 31 of 2004 concerning Fisheries, as well as Law Number 1 of 2014 concerning Amendments to Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands, regulates actions crimes related to fisheries.

To ensure that criminal acts do not occur in the management of fisheries resources, optimal supervision is needed from fisheries supervisors and the community. This is regulated in Articles 66-67 of the Fisheries Law and Articles 36-38 of the Law on Management of Coastal Areas and Small Islands. An integrated technology-based fisheries monitoring system is hoped to stop fisheries violations. However, the issue of how policies and implementation of technology-based fisheries resource monitoring are integrated must be considered.

Research Method

This research focuses on determining policies and implementation of supervision that uses integrated technology. Normative legal research uses a statutory approach (statute view) and a concept approach (concept view). This research is explanatory, which means it explains and aims to test a theory or hypothesis to support or oppose an existing theory or hypothesis (Harper, 2011). The data collection tool is a document study involving qualitative data analysis. Researchers want to see and examine how best to apply technology in Indonesian fisheries regulations.

Result and Discussion

Fishery Resources Monitoring Policy through Integrated Technology

Fish is one of the marine natural resources. About one billion people depend on fish as their primary source of protein, contributing about a fifth of all animal protein. Interestingly, fish production worldwide is much greater than poultry or beef production. The exploitation of the fisheries and marine sectors can occur due to the high demand for these fishery products (Wuryandani & Meilani, 2011). Exploitation results in criminal acts, which are prohibited by law. Excessive fishing (construction fishing), illegal fishing (fish theft), use of prohibited fishing gear, or not having a fishing business permit are all criminal acts that damage marine ecosystems.

In 2020, the Directorate General of Marine and Fisheries Resources Supervision of the Indonesian Ministry of Maritime Affairs and Fisheries handled 38 marine and fisheries crimes. In 2021, 114 Indonesian fishing vessels violated regulations, 53 foreign fishing vessels stole fish, and 96 caught fish using destructive methods. In 2022, there will be 137 cases of administrative violations and criminal acts in the maritime and fisheries sector.

Fishermen and fisheries businesses still need to improve in managing and utilizing fisheries resources. As a result, monitoring the sovereignty of marine and fisheries resource management is essential to carry out supervision (Listiyani et al., 2018; Hanifah & Purba, 2021). Supervision is carried out effectively while enforcing the law against individuals who commit fisheries crimes. Articles 66-67 of Law Number 45 of 2009 concerning Amendments to Law Number 31 of 2004 concerning Fisheries regulate fisheries supervision policies. Fisheries inspectors are responsible for supervising the following activities:

1. Fishing;
2. Fish cultivation and hatchery;
3. Fish processing and distribution;
4. Quality of fishery products;
5. Distribution of fish medicine in and out;
6. Conservation;
7. Pollution caused by humans;
8. Germplasm;
9. Fisheries research and development; and

10. Fish made with genetic technology.

According to Article 36-38 of Law Number 1 of 2014 concerning Amendments to Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands, certain officials who have authority in managing coastal areas and small islands are given police authority. Specifically, it involves carrying out supervision by the nature of the work. Minister of Maritime Affairs and Fisheries Regulation Number 30 of 2021 concerning Marine Spatial Supervision regulates monitoring policies using technology to optimize monitoring of fisheries and marine resources. Regulation of the Minister of Maritime Affairs and Fisheries article 8 paragraph (4) stipulates that to supervise the implementation of documents for approval or confirmation of Conformity for Marine Space Utilization Activities (KKPRL), methods such as:

a. Global Positioning System Tracker;
b. Drone;
c. Citra Satelit; and/or
d. Remotely Operated Underwater Vehicle (ROV).

In addition, the Regulation of the Director General of Marine and Fishery Resources Supervision Number 4/PER-DJPSDKP/2020 concerning Technical Instructions for Implementing Marine and Fishery Resources Supervision Operations by Air (air surveillance) permits air surveillance. Surveillance with civil aircraft includes :

a. Maritime patrol aircraft with twin engines;
b. Other aircraft with single engines, twin engines, or rotary engines;
c. Unmanned aircraft.

Integrated supervision combines human resources, facilities, and supervisory technology systems to monitor fisheries' resources (Nawawi, 2023; Hanifah et al., 2023). It is hoped that this system will prevent or minimize fisheries violations.

Implementation of a Fisheries Resources Monitoring System through Integrated Technology

One of the strategic priorities for sustainable development is the sustainable management of fisheries resources. Monitoring fisheries is one way to achieve sustainable development (Hasan, 2020; Vardhani et al., 2020). Fisheries supervision in general is an effort to supervise the implementation of laws and regulations relating to fisheries. Law Number 45 of 2009 concerning Amendments to Law Number 31 of 2004 concerning Fisheries regulates this. Fisheries supervision covers catching, cultivating, seeding, processing, distribution in and out, quality of fishery products, medicine, conservation, human pollution, germplasm, fisheries research and development, and fish produced from genetic engineering.

Fisheries supervisors supervise fisheries by the law's mandate (Zikri & Soemarmi, 2017; Komarudin, 2020). Fisheries supervisors are government institutions in the fisheries sector that are responsible for ensuring that applicable regulations in the fisheries sector are implemented correctly. Fisheries supervisors are appointed by the minister or officials appointed by the minister. The minister can also appoint functional officials. Regulation of the Minister of PAN

and RB Number 25 of 2017 concerning Functional Positions of Fisheries Supervisors legally recognizes the profession of fisheries supervisors. A functional fisheries supervisor carries out duties and functions closely related to functional services. These duties are based on specific expertise and skills to oversee the management of marine and fisheries resources and ensure that laws and regulations are implemented correctly.

Fisheries supervisors are appointed and dismissed by the Minister of Maritime Affairs and Fisheries, but administratively, this task is given to the Director General (Soemarmi et al., 2020). The qualifications required to be appointed as a fisheries supervisor are :

a. Civil servants who work in the fisheries sector with a minimum rank of Junior Regulator, class II/a;
b. Have attended and passed fisheries supervisor courses and training;
c. Physically and mentally healthy.
d. Fisheries supervisors can be civil servants at central or regional agencies (Pemda).

If the following things happen, the fisheries supervisor can be dismissed as follows:

a. Transferred from the field of fisheries supervision;
b. Resign as fisheries supervisor;
c. Not able to carry out tasks properly;
d. Abusing the authority given;
e. Has been indicted;
f. Experiencing permanent obstacles;
g. Dismissed as a civil servant.

All levels of society, especially coastal fishing communities, monitor fisheries resources. Community Monitoring Groups (Pokmaswas) help the community monitor illegal activities. Supervisors will take action according to information gathered from the public. Marine resource monitoring (PSDKP) success is greatly influenced by the role of fishing communities as informants.

All levels of society, especially coastal fishing communities, monitor fisheries resources. Community Monitoring Groups (Pokmaswas) help the community monitor illegal activities. Supervisors will take action according to information gathered from the public. Marine resource monitoring (PSDKP) success is greatly influenced by the role of fishing communities as informants.

Collaborating with various bilateral and international institutions or ministries, ratifying international conventions, and participating in international organizations are ways to implement a soft structure approach. Supervision is facilitated by a sophisticated technological device called the Fishing Vessel Monitoring System (VMS) or Fishery Vessel Monitoring System (SPKP). VMS is included in the fishing vessel monitoring systems category and uses specific equipment to monitor the movement and activities of fishing vessels on a satellite basis.

To implement fisheries conservation and management regulations at national, regional, and international levels, Indonesia is committed to implementing a Vessel Monitoring System

(VMS). The Directorate General of PSDKP has implemented a fishing vessel monitoring system (VMS) for fishing vessels since 2003. By building a VMS monitoring and operational system and installing transmitters on fishing vessels more significant than 30 GT, the Directorate General of PSDKP has made it possible to know the whereabouts and movements of fishing vessels and identify their activities. Apart from that, to monitor the movements of fishing vessels, the Directorate General of PSDKP currently uses Ship Surveillance System (VMS) technology combined with Automatic Information System (AIS) devices operated by the Maritime Security Agency and the Indonesian Space for Oceanography (Indeso). In the future, the use of technology will continue to be improved to support successful supervision.

SDKP monitoring partnerships at the national, regional, and international levels continue to develop, with efforts including:

a. National cooperation with related institutions such as the TNI AL, POLRI, Bakamla, Attorney General's Office, Supreme Court, LAPAN, and others;

b. Actively participate in the Regional Action Plan [RPOA] regionally to encourage responsible boating practices, including combating unreported and unregulated illegal boating in the region, for which the KKP acts as the RPOA Secretariat;

c. Actively participate in international monitoring, control, and oversight (IMCS) networks to improve MCS implementation;

d. Bilateral cooperation with neighboring countries in monitoring, such as cooperation with Australia through the Indonesia-Australia Fisheries Monitoring Forum (IAFSF) since 2007 and joint Malaysia-Indonesia operations.

Surveillance supported by advanced technological devices known as the Fishing Vessel Monitoring System (VMS) or Fishing Vessel Monitoring System (SPKP) is one of the fishing vessel monitoring systems. This system monitors fishing vessels using specific equipment to determine the movements and activities of satellite-based fishing vessels. Illegal fishing is one of the problems faced by many fishing vessels.

To comply with international, regional, and national fisheries conservation and management regulations, Indonesia uses a sophisticated vessel surveillance system (VMS) to carry out surveillance. The Directorate General of PSDKP has implemented a Fishing Vessel Monitoring System (VMS) for fishing vessels since 2003. By building a supervisory and operational system for the Vessel Monitoring System (VMS) and installing transmitters on fishing vessels of a specific size, the Directorate General of PSDKP has made it possible to determine the whereabouts and movements of fishing vessels and to identify the activities of these vessels. The Vessel Surveillance System (VMS) monitors the movement of fishing vessels and ensures that they comply with applicable regulations (https://kkp.go.id/djpsdkp/article/1140).

As part of the Minister of Maritime Affairs and Fisheries Regulation Number 42/PERMEN-KP/2015 which regulates the Fishing Vessel Monitoring System, every fishing vessel measuring more than 30 GT operating in the Republic of Indonesia State Fisheries Management Area (WPPNRI) and on the high seas is required to install transmission of the

Fishing Vessel Monitoring System (Suhendar & Kristófersson, 2012; Hadinata, 2010). This is very important to implement to ensure that fisheries resources can be utilized sustainably for the benefit of society.

In addition, fishing vessel monitoring systems (VMS) help fishing companies or fishing vessel owners because they enable them to know the fishing vessel fleet's location, movement, and activities. This system increases the efficiency of fishing operations, ensures the continuity of fishing operations, and makes it possible to save and rescue fishing vessels that encounter problems at sea (Lambert et al., 2012; Witt & Godley, 2007).

Fishing entrepreneurs or owners can access monitoring services for fishing vessels they own or cover via the vessel monitoring system (VMS) website or short message (Gustavsson, 2021; Terrebonne, 1995; Maina et al., 2018). Apart from that, the access provided by the owner or user of the Vessel Monitoring System (VMS) also allows them to know the whereabouts of their fishing vessels. In a situation of great power, the owner or user of the Ship Surveillance System (VMS) can access the ship's location and find out the fraudulent behavior of the Master by selling fish at sea without the owner knowing. In this way, the ship owner can remind the captain if he commits a violation.

Meanwhile, the implementation of the Vessel Monitoring System (VMS) in Indonesia involves 3 important elements (Hsu et al., 2019), namely:

a. The government, in this case, the Directorate General of PSDKP-KKP, as the organizer, only provides the system and does not provide transmitters and satellite services;

b. Business Actors or Fishing Vessel Owners, as users;

c. Providers: Companies that provide VMS transmission and satellite services.

Users and providers conduct direct transactions with vessel monitoring systems (VMS) and airtime. Customers can choose any Provider they want. Providers are only recommended by organizers if they meet the administrative and technical requirements for serving airtime payments as well as providing Ship Surveillance System (VMS) transmitters (Wang et al., 2015). Because installing a vessel monitoring system (VMS) is technically very easy, providers and users do it. Fishing vessels installed or with a VMS transmission will receive a Transmitter Installation Certificate (SKAT) from the Fisheries Supervisor.

Satellites do many things. One may help monitor the fishing industry (Omotoso & Daramola, 2005; Bernal et al., 1999). The Ministry of Maritime Affairs and Fisheries (KKP) uses satellite technology to monitor the fisheries sector in Indonesian waters. Satellite-based integrated technology is currently used to monitor fisheries. These satellites carry out surveillance and help the government understand and take necessary actions for the fishing industry. The Ministry of Maritime Affairs and Fisheries (KKP) uses technology such as the Vesel monitoring system, Sateli Radar-sat2, and Cosmo Skymed to stop illegal fishing. This technology is monitored at the Jakarta PSDKP control center and Bali base station, AIS (*Automatic Identification System*), *Airborne Surveillence* dan *Warning System Geofancing.*

To increase the effectiveness of implementing air surveillance of marine and fisheries resources (Air Surveillance) in Indonesian waters, Exclusive Economic Zones (EEZ), Rivers, Lakes, Reservoirs, Swamps, and other bodies of water. Objects for monitoring marine and fisheries resources by air (Air Surveillance) include Indonesian fishing vessels, foreign fishing vessels, fishing equipment, water pollution, mangrove areas, and estuaries.

Conclusion

Various aspects of human life, including fisheries, are influenced by technological advances. Technology such as vessel monitoring systems (VMS) can increase transparency in managing marine and fisheries resources. To reduce fishing crime. The Ministry of Maritime Affairs and Fisheries uses technology to stop illegal fishing. In maritime supervision, the ministry must collaborate with various sectors. Maritime implementation and supervision will only be able to operate with others. In addition, international law must establish territorial boundary laws. This will be one way to protect fisheries in the Indonesian seas.

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