Policy model of regional fishery management for Indonesia’s exclusive economic zone

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Abstract. The abundant potential of Fishery resources within the Indonesia’s Exclusive Economic Zone (EEZ) would be very beneficial for the entire community if it is properly managed. The correct management model can provide a balanced state between optimal economic benefits and resources preservation. This study aimed at developing a fisheries management policy model in the Indonesian EEZ as an effort to create optimal and sustainable utilization. The analysis was carried out qualitatively using a case study approach within an empirical juridical point of view which resulted in a descriptive report. The management models developed prescribes several policies to be carried out, such as: 1). New vessels development; and 2). Provision of Access Regulation for both Indonesian as well as foreign fishers. The management model also requires several important prerequisites, such as: 1). Periodic reasonable sea monitoring efforts; 2). Facilitation for the national business actors in the operation and marketing of catches; and 3). Simplification of fishing permits for foreign vessels accompanied by clear and firm cooperation agreements.

1. Introduction
Indonesia is a constitutional state based on Pancasila and the Undang-Undang Dasar 1945, which regulates all community life and ownership of natural resources. Therefore by law, the government is heavily involved in and responsible for managing every single national resource that the country owns, including the resources within the fisheries sector which is abundant in nature. The government involvement in fisheries management is established through creating policy guidelines for managing fisheries resources equitably and sustainably. Fisheries management carried out by the government includes waters in the Economic Exclusive Zone. The definition of “management” is all the efforts and activities of the government to direct and control the use of living natural resources in the Indonesian Exclusive Economic Zone (EEZ)” [1].

The definition of Indonesian EEZ is “a route outside and bordering the Indonesian territorial sea as stipulated by the applicable law on Indonesian waters which includes the seabed, the land beneath it and the water above it with an outer limit of 200 (two hundred) nautical miles measured from the baseline of the sea Indonesian territory” [2]. The United Nations Convention on the Law of the Sea 1982 (UNCLOS 1982) affirms that Indonesia has rights, jurisdiction, and obligations in the EEZ region [3]. Despite the fact that Indonesia has ratified the UNCLOS 1982 through a presidential decree
number 17 in 1985, but in practice, the rights and obligations specified by UNCLOS 1982 are still not optimally implemented by the Indonesian government.

Current fisheries practices within the Indonesian EEZ area are beset with several undesirable characteristics, such as: 1). Low level of involvement from Indonesian fishers in fishing within the Indonesian EEZ; 2). High operational costs; 3). Limited fishing range of local fishermen operating with small boats; 4). Most large vessels owned by companies operating in Indonesian EEZ are ex-foreign vessels; 5). Lack of research on fishing grounds within the Indonesian EEZ waters [4]. Along with the afore-mentioned internal characteristics, the lack of monitoring of claims of fishery resources ownership by the Chinese state in the South Natuna Sea which includes Indonesian EEZ, has also tainted the portrait of Indonesian EEZ waters management.

Marine zones are differentiated based on the sovereignty and sovereign rights of a country in the sea area. Sovereignty is the full authority over the territory, including all land areas, archipelagic waters, and territorial seas. Sovereign rights, namely the right to manage/use for exploration and exploitation, conservation, and management of natural resources (living and non-living) from waters above the seabed. UNCLOS 1982 states that in EEZ, there are sovereign rights, not sovereignty [5]. The material of this article can be interpreted if the government does not have full sovereignty over the EEZ but has the right to manage the natural resources contained therein. Indonesia’s sovereignty rights authority to manage natural resources in the EEZ waters is exclusive [6].

Exclusive means that if natural resources are not explored or exploited, no one/any country can carry out activities/make claims on these natural resources without Indonesia’s consent. Fishery management in the EEZ region influences Indonesia’s interest in safeguarding sovereign rights and increasing state revenue. If it is related to the condition of fish resource management in EEZ waters, it emphasizes Indonesia’s ability to utilize the latest potential data. The main problem currently occurring is that Indonesia cannot manage fish resources in the EEZ region optimally. Based on this, this study’s results are expected to provide guidelines for the government to formulate an appropriate fisheries management policy model in the EEZ area.

2. Methods
This research was conducted in 2020, with several chosen regencies as the loci, namely: Rote Ndao Regency, Natuna Regency, Talaud Islands Regency, and Biak Regency. These loci were chosen because they represent the fisheries management of the Republic of Indonesia Fisheries Management Area (WPPNRI) 572, 573, 711, 714, and 716, and a fisheries-based regional development business. The types of data used in this study are both primary as well as secondary data. Primary data is focused on extracted information from parties who has the knowledge concerning the EEZ. Secondary data sources are obtained from written information (online news), scientific research and secondary legal materials (international and national regulations) related to the discussion. Secondary legal materials are all information regarding regulations that have been passed or in effect and all information relevant to juridical issues [7].

Data collection techniques are carried out through:
- In-depth interview using the data topic.
  In-depth interviews are the process of obtaining information for research purposes using face-to-face questions and answer between the interviewer and the interviewee/person (with or without using the interview guide) [8].
- Focus Group Discussion (FGD)
  The term FGD is a small group discussion guided by a trained leader. This discussion is intended to learn opinions about a specified topic and guide future action [9]. The FGD was carried out to obtain the input and views of decision-makers involved in water management in the EEZ area, both as implementers, affected parties, and observers.
- Literature review
  The literature review is a survey of books, scientific articles, and other sources relevant to a specific issue, area of study, or theory, which in doing so can provide a description, summary, and
critical evaluation of these works concerning them with research problems that are being carried out [10].

The analysis used to study fisheries management models in the EEZ area uses the following methods:

- Juridical empirical with a case study approach
  This method is needed to review the supporting national regulations and the practice in the EEZ region. Interpretation of legal rules regarding EEZ and national regulations is also carried out to distill the meaning of regulations contained in the policy.

- Qualitative descriptive
  This method is needed to reveal facts, circumstances, phenomena, variables, and circumstances that occurred during the research by presenting what happened. Qualitative descriptive has the concept of a) interpreting and describing data related to the current situation; b) attitudes and views that occur in a society; c) conflict between two or more conditions; d) the relationship between variables that arise; e) differences between existing facts and their effect on a condition [11].

3. Results

3.1. Fishery management in Indonesia’s EEZ Region

Fishery management, by definition, is every single effort, including an integrated process in information gathering, analysis, planning, consultation, decision making, allocation of fish resources, and implementation and enforcement of laws and regulations in the fisheries sector, carried out by the government and other authorities, which is directed to achieve the continuity of the productivity of aquatic biological resources and the goals that have been agreed upon [12]. Fishery management must be carried out by integrating various activities that are the main tasks and functions of the government (Ministry of Marine Affairs and Fisheries). This management is crucial for Indonesia as a manifestation of the implementation of fisheries management and the countries that take advantage of the fisheries sector’s economy. The identification of research results was found at the WPPNRI 572, 573, 711, 716, and 717 locations, assessed based on vessels measuring ≤10 Gross Tonnage/GT (small fishermen) and> 29 GT (large fishermen). The study results on fisheries management in the EEZ area at the research location are shown in Table 1.

| Table 1. Identification of Fisheries Management in Indonesia’s EEZ Region |
|---------------------------------|----------|----------|-----------------|--------------------|-----------------|
| **Scope** | Acceh Fisch | Rote Ndao Fisch | Natuna Fisch | Talaud Fisch | Biak Fisch |
| **Fishing unit** | **Ship ≤10 GT** | **Ship >29 GT** | **Fish Species** | **Ship ≤10 GT** | **Ship >29 GT** |
| Oceanic Gill Net and Pukat Darat | Fishing Rod, Oceanic Gill Net, Pool, and Line | Trolling rods and Fishing Rods | Trolling Rods, Drift Ingsang Nets, and Stretching Rods | **Hand Line and Gill Net** |
| Longline, Purseine, Gill Net, Handline, Drifting Longlines, Oceanic Gill Net, and Squid Jigging | Handline, Longline, and Purseine | Boukeami/Lift Net, Castnet, Purseine, Gill Net, and Longline | Handline, Pool & Line, and Purseine | **Hand Line and Purseine** |
| Tuna, Skipjack, Tongkol, Coral fish, and Snapper | Sharks, Squid, and Sea cucumbers | Grouper, Tongkol Krai, Kuniran, Mackerel, Selar, Bloating, Bloating, Crab, Squid, and Cuttlefish | Large Pelagic, Small Pelagic, Demersal Fish, Coral Fish, Lobster, Shrimp, Crab, Crab, and Squid | Tuna and Tongkol |

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| Issue Problems                                      | Ship >29 GT                                                                 | Ship ≤10 GT                                                                 |
|---------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Far fishing landings (outside the port of Lampulo) | Large Pelagic, Tuna, Skipjack, Tongkol, Large Pelagic, Small Pelagic, Squid, and Shrimp | Tuna, Small Pelagic, Skipjack, Layang, and Malalugis                        |
| Lack of socialization of EEZ limits                |                                                                           |                                                                           |
| Lack of fishing gear and equipment in quality and  |                                                                           |                                                                           |
| Low technical/technology knowledge of fishing     |                                                                           |                                                                           |
| Lack of socialization of EEZ limits                |                                                                           |                                                                           |
| Fish theft by foreign fishers (ship >10 GT)        |                                                                           |                                                                           |
| Ship assistance does not match the characteristic of the sea |                                                                           |                                                                           |
| Many vessels >30 GT catch in area <12 miles        |                                                                           |                                                                           |
| Lack of socialization of EEZ limits                |                                                                           |                                                                           |
| It is not easy to get good quality Tuna           |                                                                           |                                                                           |
| Less ice supply                                   |                                                                           |                                                                           |
| Lack of socialization of EEZ limits                |                                                                           |                                                                           |
| The fleet of ships is inadequate for operations at the EEZ |                                                                           |                                                                           |
| The method of handling fish caught is not good     |                                                                           |                                                                           |
| Lack of socialization of EEZ limits                |                                                                           |                                                                           |
| Transfer of knowledge to migrant fishermen         |                                                                           |                                                                           |
| Competition of small fishers with central permits in Indonesia’s EEZ (conflict) |                                                                           |                                                                           |
| Transfer of fishing vessel technology              |                                                                           |                                                                           |
| Privatization of fishing areas by owners of capital |                                                                           |                                                                           |

Based on Table 1, it is observed that fisheries management in the EEZ Indonesia region at each location has various implications for its utilization.
The general problem issue for fishing boats using ships ≤10 GT at each location is the lack of socialization about the boundaries of the EEZ Indonesia area. This is because the human resources owned by the local government in providing information are insufficient. The socialization process is needed so that people behave as expected [13]. Supervision in the waters of EEZ Indonesia is currently not optimal, and its management must be improved. The area that must be supervised is not supported by good facilities/infrastructure, a sufficient number of human resources, and the legal basis for carrying out the supervisor’s duties. These problems prove that the policy agenda reflects the mobilization of political demands rather than the rational process of evaluating needs, values, and goals [14].

Policy guidelines as a legal basis for conducting supervision must be immediately drafted in a Ministerial Regulation. This legal product is vital so that every supervisor has legal power in carrying out disciplinary actions to maintain the sustainability of fishery resources in the EEZ Indonesia area. The policies made must create a sense of security and legal certainty, where the implementation must be done correctly. Power and authority will be very effective influences in every action and decision taken [15].

3.2. Policy Model for the Optimization of Fisheries Management in the EEZ Indonesia Region

International provisions that serve as guidelines for the management of the EEZ area are interested in making fisheries use in world waters responsibly and avoiding conflicts. The framework for developing a policy model for optimizing fisheries management in the EEZ region is shown in Figure 1.

Figure 1. Fishery Utilization Framework in the EEZ Region

Figure 1 explains that the fishery potential in the EEZ region is bound by international provisions (UNCLOS 1982) and national regulations governing the use of fishery resources. The ability to utilize fishery resources can be done by regulating access to Indonesian vessels and foreign vessels to the waters of EEZ Indonesia. The implementation of these policies must be supported by appropriate licensing mechanisms, a strict monitoring system, good data support for fishery production, and periodic evaluations. The right policy will make fisheries management in the EEZ area more optimal, increase state revenue and improve the community’s welfare.

The two models to optimize fisheries management in EEZ Indonesia were built by referring to the WPPNRI’s fishery potential data and an overview of fisheries management in the research location area. Fishery’s potential data that is closer to the truth is needed to develop an implementable design
model. Data collection on fishery potential can be done through the Vessel Monitoring System (VMS), logbooks, and onboard observers. The design of the model for regulating Indonesian vessels to the EEZ region is shown in Figure 2.

![Diagram of Indonesia Fisherman Access Regulatory Model](image)

**Figure 2. The Design of Indonesia Fisherman Access Regulatory Model**

Figure 2 shows that the basic design model for regulating access to Indonesian fishers is based on the potential in the WPPNRI. The right potential requires accurate data, so regular updating of data must be done. The goal is that fisheries’ production capability can be carried out optimally.

Fishery production data is used as the basis for identifying areas that are not managed optimally and those that are overproduced. This is a guide for the government in allocating ships in the EEZ region. The relocation of the Indonesian fishing fleet is intended as a means of equitable management of fishery production in every Indonesian territorial water. Relocation of ships from exploitation that has been maximally produced to areas where fishing has not been maximized must be done with the proper policymaking. The action plan for the relocation policy must be accompanied by technical guidelines to facilitate its implementation. Implementation is an activity that can be seen after the issuance of the right directions from a policy (including efforts to manage inputs to produce outputs or outcomes for the community) [16]. The utilization of fisheries makes regional business development close to fishing grounds more developed and sustainable. The essence of the issuance of public policies is that there has been a change in the development paradigm from focusing on the growth of economic interests to being based on sustainable development [17]. Regional business development policies are expected to contribute to fishery facilities and infrastructure, technology transfer, and absorption of the local workforce.

Regional business development can be well operated if it has synergy between the central government, provincial governments, and district governments. Good coordination between the provincial and district governments must be facilitated by the central government. Making a cooperation script in area management is needed so that policies and developments can be carried out correctly. The business development for fisheries management in the EEZ area is based on the production from the fleet carrying out fishing operations. Granting a ship relocation permit must also consider fishing space, types of fish, fishing gear used. The government must establish a quick and low cost licensing process mechanism. This is intended to attracting entrepreneurs to develop their business in the entire EEZ area so that regional development can be carried out as expected. A system of strict supervision, periodic monitoring, and strict law enforcement on the management of the EEZ
Indonesia area must be carried out in an integrated manner. Additional human resources and infrastructure in carrying out supervision are needed to maintain order and avoid conflicts that may occur.

Monitoring mechanisms for vessels operating in the EEZ area are required to include observers, install and operate VMS during operation, and also to fill in the logbook appropriately. The application of a fishing vessel monitoring system is intended to facilitate monitoring of the movement of fishing vessels in identifying vessels, monitoring vessel positions, and vessel activities. A written policy in the form of a Ministerial Decree must be made immediately so that fisheries supervisory officers have legal backups in taking action. Weaknesses in legal certainty lead to less than optimal policy implementation [18]. Implementation is a general process of administrative action that can be investigated at a specific program level [19]. The design of a model for access to fisheries management by Indonesian fishing vessels in the EEZ region requires evaluation in its continuous implementation. This evaluation is needed to find out the correctness of the catch production data for the relocation permit granted. Ship owner’s compliance in providing correct production data is used as a benchmark for continuing or terminating their operating permits, as well as vessel owner compliance, whether their permits are still granted or terminated. The evaluation period should be carried out once a year so that fisheries management in the EEZ area can be carried out in an orderly manner, optimally utilized, and sustainably. The evaluation results will later be used as a reference for determining the licensing quota based on the latest WPPNRI fishery potential data.

The design model for the arrangement of foreign fleets to the EEZ region is shown in Figure 3.

**Figure 3. The Design of Foreign Fishermen Access Regulatory Model**

Based on Figure 3, it is observed that granting permits for foreign ships to manage fishery resources in the EEZ area must consider the potential of each WPPNRI that cannot be utilized optimally. This is done to increase catch production and state revenue in the fisheries sector. Accurate fishery potential data must be owned by the government to determine the permits granted to foreign vessels. Granting permission for foreign ships to utilize the EEZ area is better if the capturing capability of the Indonesian vessels is no longer able to manage it.

The government needs to identify countries that will cooperate in managing fisheries in the EEZ Indonesia region. The goal is to prevent unwanted possibilities from happening in the future. Bilateral cooperation beneficial for Indonesia must be prioritized, considering that the managed area is
Indonesia’s sovereign right. Diplomacy must be further strengthened to carry out fisheries cooperation with foreign countries and promote free and active politics. This MoU is used as a guideline for the government to create programs and cooperation in improving good relations and sustainable management. The MoU must be followed up with the granting of permits for foreign ships to utilize fisheries in the EEZ Indonesia region, clauses for technology transfer, use of domestic labor, and investment in developing fisheries business areas. Strict licensing must be done to avoid economic losses and maintain the sustainability of the ecosystem. Striving to simplify the licensing mechanism and the process does not require a long time. This is done as a form of the government’s seriousness in managing fisheries evenly throughout the WPPNRI.

The government must give certainty to countries that get permission to utilize fisheries in the EEZ Indonesia region to take full responsibility if the fishermen commit acts of violation of the law (especially compensation). The monitoring and supervision system must be tightened further by requiring VMS installation, filling in logbooks appropriately, and placing Indonesian observers when the ship is operating. The granting of permits for each foreign ship must be evaluated annually. This is intended so that the government can take a stand on whether or not the permits that have been given have been continued. The design of a model for foreign vessel access to utilize fisheries in the EEZ Indonesia region aims to optimize foreign exchange and maintain diplomatic relations between the two countries. The competitive advantage of the policies of each country is determined by how capable the country is to create an environment that fosters the competitiveness of each actor in it, especially economic actors [20].

4. Conclusion
Fisheries management in the Indonesian EEZ waters policy scheme and its operation requires government actions through policy, implementation, and good socialization. A model designed as an effort to manage fisheries optimally requires close and periodic monitoring and supervision. The economic interest attained from the fisheries utilization is an essential capital for the government from the increase in the country’s foreign exchange reserve. The utilization of fisheries in the Indonesian EEZ must be supported by appropriate regional policies and business development. Good regulation arrangement and proper implementation are essential contributions to improving the local economy, absorption of labor, and optimizing fisheries utilization.

The addition of the fleet and the supervising human resources must be carried out to facilitate monitoring of the production activities of ships in operation. The government also needs to make written policies as legal guidelines for supervisors to carry out their duties. Optimizing the use of fisheries in the EEZ Indonesia region through the scheme of arranging the allocation of national vessels or granting access to foreign vessels can provide benefits and safeguard the sovereign rights of the country as mandated by UNCLOS 1982.

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