

Analysis Incentive or Disincentive Perception on Fisherman Ocean North East Java

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Abstract—Illegal unreported unregulated fishing undermines efforts to fisheries resource in Nort Sea East Java. As we now, fishing resource in ocean north east java has long indicated of overfishing or can be interpreted the area in poor condition. The Republic of Indonesia Ministry of Maritime Affairs and Fisheries has implemented a regulatory framework to try to reduce illegal, unregulated and unreported fishing practices using incentive and disincentive schemes. This paper analysis incentive or disincentive perception on fisherman ocean north east java. We use *cluster random sampling* with total respondents were 694 fishermen in 11 distric. Method of analysis: descriptive analysis and logistic regression model. The result showed that the policy of reducing IUU practices would be more effective if it used a sanction mechanism (disinsentive) rather than giving insentive to them not to carry out IUU practuces.

Keywords—*Fisheries management, Incentives, Illegal Fishing*

I. INTRODUCTION

In recent years, illegal, unreported and unregulated fishing activities (Illegal, Unreported and Unregulated (IUU)), have been the subject of international studies (Varkey et al., 2010; Sodik, 2009). IUU hampers efforts to conserve and manage fish populations in all types of capture fisheries (Ndiaye, 2011; Chen, 2012). The Food and Agriculture Organization (FAO) estimates that 61.3% of marine fisheries stocks are fully exploited, 28.8% are in the indicator of overexploitation of stocks and only 9.9% of marine waters are categorized as below the normal exploitation limit (under fished stock) (Fao, 2014). This situation certainly creates an increase in social costs and has a negative impact on food security and protection of capture fisheries resources. IUU fisheries activities can cause a decrease in fish sstock continuously and hinder efforts to rebuild stocks of fisheries that have fallen (Cisneros-Montemayor, etc., 2013; Polacheck, 2012; Osterblom and Folke, 2013). The scholars argue there are no effective instruments to control IUU practices, the lack of political will and limited human resource are the reasons for the implementation of IUU control policies that are no effective (Agnew et al, 2009; Stokke, 2009; Sumaila, 2012).

Especially for Indonesia, illegal fishing provides an understanding of fishing in archipelagic waters, territorial seas and exclusive economic zones (EEZs) of Indonesia which do not get permission to capture through existing

regulations (Bailey, 2003). So what is meant by illegal fishing is all types of fishing activities that are not in accordance with existing regulations, both carried out by Indonesian-flagged fishermen and foreign-flagged fishermen. For the category of unreported fishing, including fishing activities that are contrary to existing regulations, such as fishing using trawls or catching protected species or fishing that do not report catches (Fao, 2014; KKP, 2012). For catches that are included in unregulated, fishing activities are not regulated in the existing regulations. Some examples of IUU activities in this country are like foreign ships that catch without permission, in fishing using toxic substances, fishing in conservation areas and catching fish without documents or licenses.

IUU practices that occur in Indonesian waters result in losses of up to Rp. 30 trillion every year or about 25% of the fishery potential in Indonesia (Pusdatin DKP, 2010). This value is not included in the long-term impacts on marine habitats and environment, as well as negative impacts on the social aspects of fishing communities. Some examples of IUU of capture fisheries in this country include illegal fishing by foreign vessels, use of toxic substances and catching fish without a document or license. Some of the factors that contribute to this increase in IUU fishing include the lack of effective regulation and inadequate monitoring. The results of the FAO study (2012) show that of the 4,326 units of ships examined, only 20% entered the remaining court proceedings. The origin of these violators include Indonesia (317 people), Malaysia (10 people), Vietnam (407 people), Thailand (270 people), Philippines (266 people), Laos (1 person), Cambodia (1 person), Myanmar (1 person) and China (1 person).

The reason from the community side is the high level of IUU activities due to poverty and high inequality between workers in the fisheries sector and workers outside the fisheries sector (Pauly, 1989). This condition puts pressure on fishermen to exploit fisheries resources more in order to fulfill their decent lives. In particular, the Ministry of Marine Affairs and Fisheries has established a list of serious violations in accordance with the provisions of the IUU countermeasure action plan but has not yet arrived at operational indicators that can be applied as a control instrument in the field.

For example European Commission (EC) has established a list of IUU violations along with operational control instruments in the field. The instrument uses a point system

where fishing vessels will be forced to stop temporarily if the ship owner's fishermen have reached a certain number of points (EC, 2009, 2011). The application of these points is based on damage done to the marine environment that affects fish stocks. The following indicators of serious violations along with the points given to fishermen who violate. If the accumulation of fisherman points reaches 18 points, the fisherman may not go to sea for 2 months, 4 months may not go to sea if the accumulated points increase by 36 points, 8 months cannot go to sea (54 points), 12 months may not go to sea (72 points) and if accumulated points reach 90 so the fisherman loses a license to catch fish.

In addition to sanctions for revocation of permits, there are monetary sanctions ranging from Rp. 310.000(\$ 22) for minor violations of up to Rp. 3.500.000 (\$ 250) for maximum violations. The scenario begins replicated for this program to be successfully implemented, the European Commission builds a positive perception on the community about this regulation (Cochrane, 1999; Dimech et al., 2009). Building positive perception on the agents involved in regulation will contribute to the possibility of successful policies. The establishment of agent perceptions can lead to more effective management actions. Some studies of economics regarding the perception of an individual / agent are strongly influenced by the mechanism of incentives and disincentives (Eggert and Ellegrd, 2003; Hansen et al., 2006; Jernsen and Vestergaard, 2002).

Based on this background, this study focuses on how implemented incentive or disincentive mechanism can influence fisherman to comply with regulations by not conducting IUU activities. Some empirical literature shows that imposing monetary disincentives has a positive effect on compliance with IUU rules (Bodman et al., 2002; Furlong, 1991; Hatcher and Gordon, 2005; Viteri and Chávez, 2007). While other empirical studies found that attributes such as individual morality and level of social capital also have a positive effect on compliance with IUU rules (Jacquet et al., 2011; Jagers et al., 2012; Hatcher et al., 2000; Kuperan and Sutinen, 1998) From the debate on the results of the study, this study specifically has the aim of evaluating the perception of fishermen about the possibility of applying incentives / disincentives to comply with fisheries rights about IUU.

II. METHODOLOGY

This study uses a quantitative approach with primary data sources on fishermen along the north coast of East Java Province. Sampling in this study used the sampling method use stratified random. The questionnaire structure consists of three parts question. The first part is related to the incentive mechanism. The second part is related to fisherman decision making process and the third is related to monitoring. We have used a four point likert scale to ask the perception fisherman (Berghofer, 2008; Gelcich et al., 2008) to answer each question item in the questionnaire. Where the value of 1 means very unfavorable until value 4 is very profitable. The population studied is a ship operating in the northern sea region of East Java which is divided into 7 regencies which are directly adjacent to the north coast of East Java. Sampling

using cluster random sampling method. The total number of respondents was 694 fishermen. Characteristic data of fishermen can be seen in table 2.

The sample taken in this study uses a random sampling method with a total of 694 ships for 7 regencies north coast of East Java. Table 2 shows the characteristics of respondents based on the division of the ship segment used by using the fishing gear. As the data shown in table 2 shows the majority of vessels classified as small scale fisheries have an average vessel length of less than 10 m, without specialization in the use of fishing gear. So the fisherman in carrying out their activities uses various type fishing gear, depending on the species they want to capture The impact is that the cost for fishing gear for small scale fisheries fishermen is greater than for fishermen who have specialization in the use of fishing gear.

Small scale fishermen mostly have quite homogeneous winning activities in each of the winning areas and the shipowners do not make records related to income and costs. Because of this, we are not getting enough information to include income in statistical analysis. In terms of regulation, small vessels have not been regulated in the marine fisheries law (Marm, 2013). In addition to small-sized vessels, the types of ships that often operate in the North Sea of Java are purse seines and trawls. This type of ship can also operate far to the sea in Kalimantan or Sulawesi.

To identify the characteristics of individual fishermen we divide into three categories, namely social, economic and fishing techniques which affect the amount or least of fish catches. The econometric model built in this study uses logistic regression models that have been used by Agresti (1984) and Long and Cheng (2004). This model assumes there is a proportional probability, where the coefficient value of the variable illustrates the relationship between each group has the same results. The logistic model can be seen in the equation below:

$$Pr V = F(\beta_0 + \beta_1 Age + \beta_2 Shipowner + \beta_3 Crew + \beta_4 Length + \beta_5 Capacity + \beta_6 Fishing Segment + \mu)$$

Where for the fishing segment variable we divide based on the type of vessel as shown in table 2. We divide the dependent variable into three categories which will later display the regression results differently. The first category is related to perception related to the provision of reward and punishment. The second category is related to monetary incentives / disincentives. The third category is related to non-monetary incentives / disincentives. Then to find out if the model is in a robust condition, the proportional probability of the assumption needs to be tested through the Brand Wald test (Brant, 1990) and the likelihood-ratio test.

TABLE 1 INDICATOR ANDPOINT OF SANCTIONFOR FISHERMAN

No	Indicator	Point
1	Do not register on the ship satellite communication	3
2	Use Fishing Gear Prohibited	4
3	Capturing Excess Allowable Capacity	5
4	Fishing Restricted Area	6
5	Fishing Protecting Spesies	7
6	Trade with the black list ship	7

Source : (European Comision,2011)

TABLE 2 CHARACTERISTIC RESPONDENT

Aspect	Type Ship				
	Small-scale fisheries	Purse Seine	Coastal Longline	Coastal Trawl	Fixed Gillnet
Total Ship	142	284	79	101	88
Average Tonnage (GT)	1	6.2	4.8	7.1	5.5
Average Length (m)	6.5	22.4	15.1	28.4	16.9
Average Fishermen Age	42	34	39.2	45.7	36.6
AverageABK ^a	3	10	13	11	14

^aAbk :Ship Crew

TABLE 3 STATISTICAL ANALYSIS: INCENTIVES/DISINSENTIVE

	% Response		Binomial Sign Test
	Favorable	Unfavorable	
Insentif/Disinsentif Perception ^a			
Rewarding Compliers	71	29	0,402
Punishment non-compliers	91	9	0,33
Insentif/Disinsentif Monetary			
Subsidy Access	79	21	0,042
Access to financial	77	23	0,102
Pynalty	92	8	0,438
Insentif/Disinsentif Non Monetary			
Increase/Decrease Quota	69	31	0,04
Increase/Decrease Time Sail	62	38	0,382
Expand or Reduce Type Catch Fish	57	43	0,159

^aIn previous design was measured based on four likert scales, but due to conditions in the field, we modified likert scale only two acceptable or not. The binomial sign test is used to determine whether the proportion of fisherman perception

TABLE 4 RESULT LOGISTIC REGRESION FOR PERSEPTION REWARD/PUNISHMENT

Variable	Rewarding Compliers		Punishment non-compliers	
	Koefisien	S.E	Koefisien	S.E
Age	0,061	0,045	0,503	0,602
Owner	0,4908	0,243	0,292	0,026
Crew	0,712	0,381	0,781	0,208
Length	0,901*	0,225	0,657*	0,189
Capacity	0,422*	0,050	0,716*	0,190
TypeShip				
Purse Seine	0,204	0,108	0,537*	0,148
Small Scale	0,346	0,089	0,724*	0,018
Coastal Longline	0,351*	0,104	0,651*	0,128
Trawl	0,662*	0,521	0,721*	0,211
Fixed Gillnet	0,618*	0,422	0,641*	0,161

p < 0,1; level of significance.

TABLE 5 RESULT REGRESION LOGISTIC PERCEPTION MONETARY INSENTIF/DISINSENTIF

Variable	Subsidy Access		Financial Access		Pynalty	
	Koefisien	S.E	Koefisien	S.E	Koefisien	S.E
Age	0,029	0,08	0,063	0,05	0,802	0,67
Owner	0,652	0,42	0,497	0,72	0,509	0,19
Crew	0,402	0,21	0,437	0,33	0,807	0,46
Length	0,611*	0,24	0,566*	0,16	0,781*	0,08
Capacity	0,215*	0,58	0,502*	0,29	0,694*	0,09
Type Ship						
Purse Seine	0,614	0,16	0,183*	0,61	0,406*	0,22
Small Scale	0,204	0,22	0,261*	0,21	0,504*	0,09
Longline	0,514	0,01	0,166*	0,51	0,392*	0,31
Trawl	0,101	0,37	0,280	0,11	0,201*	0,26
Fixed Gillnet	0,108	0,35	0,365*	0,18	0,307*	0,27

*p < 0,1; level of significance

TABLE 6 RESULT REGRESION LOGISTIC PERCEPTION NON MONETARY INSENTIF/DISINSENTIF

Variable	Quota System		Fishing Ban		Endegared Fish	
	Koefisien	S.E	Koefisien	S.E	Koefisien	S.E
Age	0,042	0,45	0,061	0,03	0,592	0,61
Owner	0,591	0,21	0,414	0,24	0,324	0,03
Crew	0,799	0,38	0,701	0,31	0,809	0,39
Length	0,551*	0,53	0,855*	0,19	0,651*	0,18
Capacity	0,328*	0,59	0,306*	0,03	0,791*	0,18
Type Ship						
Purse Seine	0,102	0,03	0,305	0,11	0,206	0,22
Small Scale	0,250	0,53	0,548	0,09	0,209	0,11
Longline	0,512	0,72	0,351	0,11	0,328	0,31
Trawl	0,542	0,21	0,662	0,52	0,222	0,26
Fixed Gillnet	0,447*	0,24	0,418	0,42	0,305	0,27

p < 0,1; level of significance

III. RESULT AND DISCUSSION

The percentage of responses obtained through the kuiser to the fishermen's perception of the mechanism of incentives or disincentives shows that the majority of respondents support the implementation of sanctions against violations that fall into the IUU category. While only 9% of respondents opposed. The complete data can be seen in table 3 below.

In the case of monetary incentives / disincentives, fishermen generally show a favorable attitude for all proposed options. Even for the imposition of penalty penalties around 92% support this. However, for the non-monetary aspect of the incentive / disincentive in particular there is no significant difference between profitable and unprofitable.

The results of the logistic regression model on the decision to accept or reject incentives / disincentives are influenced by individual characteristics of fishermen. Table 4-6 shows the results of the regression calculations for each scenario. The results showed that the perception of fishermen to choose did not depend on demographic factors. We can see that their perception depends on the ship's fundamental factors, both in terms of length and capacity of the ship, and on the type of fishing gear. With regard to how they value reward compliers and punishment (Table 4), most fishermen show a positive and significant attitude towards both choices. Although the tendency of the calculation results of fishermen prefer to punish those who violate.

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Regarding part of the evaluation of incentives / disincentives on the monetary aspect, the results show that all fishermen from this categories are more responsive of imposing penalties on anyone who violates fishing rules (see table 5). However, the results also reveal that gill net and coastal longline fishermen also support an incentive system to be able to access financial institutions that are confirmed in compliance with the rules. Furthermore, with regard to the non-monetary incentive / disincentive factor (see table 7), it shows that only net net fishermen show a positive attitude towards the imposition of a quota mechanism. The results in Table 7 show that most fishermen do not show a positive attitude towards the non-monetary incentive / disincentive mechanism.

IV. CONCLUSION

The results obtained in this study show that, in fact we can direct the behavior of the fishermen not to commit IUU actions, based on a good incentive or disincentive mechanism. From these results it was also found that disincentive mechanisms are indeed preferred over incentive mechanisms. With this result shows that, the factor of legal reinforcement must be truly enforced so that the mechanism of incentives and disincentives goes well.

The results obtained from this study indicate that fishermen in the north coast of East Java strongly support the activities of controllers in fisheries. With a note that there is a harmony between violations and sanctions applied and there is a factor of justice. Our suggestion that the control mechanism work well is to first develop a system of incentives and disincentives that are really good, both to improve institutional quality and thirdly to prepare a good monitoring mechanism. When this policy is implemented, it can ultimately help increase fishermen's responsibility for the marine environment and help preserve fish stocks. Finally, knowing the fishermen's perception of the contract mechanism can contribute to designing and implementing more effective and efficient fisheries policy measures.

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