INSTITUTIONAL ANALYSIS OF MANGROVE RESOURCE MANAGEMENT AS CONSERVATION EFFORT OF COASTAL AREA

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Abstract

Illegal logging as well as mangrove forests conversioninto fishponds has caused destruction of mangrove resources on coastal area in Sidoarjo. This study aimed to answer the issues by analyzing the institutional management of mangrove resources as a way for conservation of coastal area in this region. This descriptive quantitative research employed survey method to obtain the data. Based on this research, the recommended institutional management of mangrove resources of coastal area in Sidoarjois good governance, namely the resource management mechanism involving government and non-governmentcooperations, namely synergizing mangrove resource management involving Community Group Supervisor (*Pokmaswas*) and the Government of Sidoarjo. There was limited issue being the focus of this this study; therefore the future research should expand the focus in order to explore the wider institutional variables that can affect the mangrove resource management.

Keywords: mangrove resource; coastal area; institution, management

1. Introduction

One of several areas in Indonesia where the condition of the mangrove forests have been damaged is mangrove forestin the coastal area in Sidoarjo Regency. Data from Department of Marine and Fisheries of East Java (2010), about 534.74 hectares of mangrove ecosystems are categorized into damaged condition. In terms of the extensive mangrove areas, the mangrove ecosystems in Sub-districts of Jabonand Sedatiregionswill be experiencing harsh coast.

The damage of coastal mangrove forest areas in Sidoarjo region has been mainly because of illegal logging for commercial timber since 2004. In addition, mangrove forests are converted into farmland particularly fishponds. The worst damaged coastal mangrove forestlies across coastal area of Sub-district of Jabon in eastern Sidoarjo. Other coastal areas are in Sub-districts of Waru, Sedati, Buduran, City of Sidoarjo and Candi, although the extent of damage was not as severe as mangrove forests in the Sub-district of Jabon (Department of Fisheries and Marine SidoarjoRegency, 2011).

The expansion of fish farming production in this region has not been executed environmentally which may cause to reduce the economic value of coastal resources in the region in the future. Therefore, the relevant institutions are expected to overcome the problem of the damage of the coastal environment. According to Hidayat (2008), institutions have the urgency to reduce uncertainty by establishing a structure or pattern of interactions, increasing the degree of certainty in the interaction between individuals. This may direct the behavior of individuals in the desired direction by the community members as well as to enhance the certainty and order among the society members, reducing opportunist behaviors. Institutional management is also important to control human behavior that tends to be pragmatic thinking, scheming, greedy and selfish in running their business. These are important components in the institutional law enforcementas no matter how good institutional management without any enforcement would be ineffective.

Institutional economics came after criticism of Veblen (1899) to the basic theory and implementation of classical and neoclassical economics, which both theories put super-rational human beings. The consequence of this assumption is that the human is considered very rational in determining the choices in order to meet their expectation. Veblen disagrees with this perspective as humans not only have a ratio, but also have feelings, tendencies, instincts, and habits that are bound by culture. Institutional economics is divided into two, namely the old institutional economics and new institutional economics. Both have in common that institutional they have an important role in achieving the efficiency of resource allocation and economic welfare (Hidayat, 2008).

According to Hidayat (2008), North (1990) classifies institutions into four types, namely: 1) internal institution, which is established by the experience of the community due to their capability to solve the problems whithinthe community, such as the values of the existing local wisdom in the society; 2) external institution, which is created by outsiders or third party which is then applied to a particular community, such as government regulations; 3) informal institution, which the institutions are not written formally, as the value of local knowledge, culture, convention, customary law and others in society; and 4) formal institution, the institutions which are made intentionally by the legislature in response to the increasingly complex economic life, such as laws, government regulations, decrees, and others.

Coastal management model through institutional approach was proposed by Ostrom (1996) in Hidayat (2008). There are two groups of users of coastal and marine resources: 1) group of people with an interest for the production of goods (such as fisheries and aquaculture) and services (such as ports and marine tourism); and 2) a group of people who use the sea for waste disposal. The interests of these two groups clearly contradict each other. It is necessary to enact regulations toward the management of coastal and marine resources as a shared resource wisely.

Using an institutional approach as proposed by Ostrom (1996), then there are several models of resource management policies toward the coastal and marine resourcesthat are to encourage the efforts in the economic, profitable and

sustainable levels, namely: 1) Tragedy Model of the Common Resource. Some strategies that can be done are including: a) regulations which are intended to regulate the utilization of the technology or how to choose the appropriate but not destructive method; b) regulations to limit the demand of the resources; c) regulation of natural resources or resource management system to maintain the supply or provision that system resources are sustainable to provide resource units; and d) regulations need to be enforced, thus it is necessary to conduct supervision and sanction powers; 2) Prisoners Dilemma Model. The important lesson from the illustrations are: a) when man is offered with choices, he or she will tend to choose the more profitable option for himself and rule out cooperation to achieve common interests; and b) cooperation is impossible to do without understanding the purpose, similarity of views and interests as well as minimize the difference. To achieve it (common goal) requires communication between relevant parties; and 3) Active Collective Logic Model. In a large group, rational and selfish individuals will not act to meet the interests of the group to voluntarily contribute to the efforts of the provision or preservation of the shared resource, if there is no encouragement to pursue the benefit (Hidayat, 2008).

To address all three models common pool resources problems, and then the the policies that can be recommended according to Ostrom (1996) are as follows: 1) Leviathan Approach, which controlsthe access and restricts the use of natural resources strictly by using the power of third parties (the government with the officers for law enforcement, e.g. police, soldiers and others); 2) privatization approach, which gives the right of every natural resource to the private sector (either individuals or firms), assuming that the private sectors are able to manage the natural resources efficiently as they manage the company; and 3) Self-organization/self-governance also called self-financed contract enforcement, which the management of natural resources is directed to the participation of the community or group of people. The key of this approach isthe cooperation or joint action (Hidayat, 2008).

This study aimed to answer the problems by analyzing the institutional management of mangrove resources as an effort to conserve coastal area. This research was expected to provide recommendations toward mangrove resource management institutions as coastal conservation efforts focusing on three factors, namely, economic, ecological and social aspects.

This research is expected to contribute to: 1) science, the results of this research can be used as a reference in the institutional development of mangrove resources management; 2) the community and investors, the results of this research can become the basis for mangrove resource management; and 3) the local government, the results of this research can be used as a reference in formulating policies in the management of mangrove resources.

2. Matherials and Method

This was descriptive quantitative research by using survey method to obtain the data. The data in this study were both primary and secondary data. Primary data were collected directly in the research area through observation, questionnaires and interviews. Non-probability sampling method was chosen to

determine the sampeusing purposive sampling procedure. The populations in this study were the local community in the coastal area (fishermen and fish farmers who experience direct impacts of the destruction of mangrove forests), an expert in the field of environment, an expert on aquaculture and fisheries. The number of respondents by proportional random sampling technique was according to the provisions of the Slovin formula of 309 respondents.

Institutional analysis was done through correlation analysis that explains the influence and relationships between the variables and testing the hypothesis. The raw data in the form of ordinal data were non-parametric data, thus the correlation test was using the Spearman Rank's correlation test, with a correlation of r ranges from -1 to +1, namely:

R > 0 there is a positive linear relationship or a positive correlation, the greater the value of the variable X (independent), the greater the value of the variable Y (dependent), and vice versa.

r <0 there is a negative linear correlation or negative correlation, the smaller the value of the variable X (independent) the greater the value of the variable Y (dependent), and vice versa.

Spearman Rank's correlation coefficient values can be calculated with the following formula (Sugiyono, 2008):

$$Rs = \frac{\sum x^2 + \sum y^2 - \sum d^2}{2\sqrt{\sum x^2 \sum y^2}}$$

Rs = Spearman Rank's correlation coefficient
d = margin rank value between the first variable and second variable
n = the number of samples

In order to know the strength or weakness of the level or degree of relationship between the studied variables, guideline criteria tables were used for the correlation coefficient in accordance with the opinion of Sugiyono (2008).

Rs = 0, there is no any correlation between the variables
Rs = 1 atau r = -1, there is a perfert linear correlation
Rs = 0.00 – 0.20, small correlation, the correlation is likely to be neglected
Rs = 0.20 – 0.40, low correlation, clear but small correlation
Rs = 0.40 – 0.70, moderate correlation, adequate correlation
Rs = 0.70 – 1.00, high and close correlation

In order to test the significant correlation Rs can be calculated through the following formula (Sugiyono, 2008):

$$Z = rs\sqrt{N-1}$$

Dependent variable of institution (K) consists of independent variable of good governance (L1) and the sustainability of resource (L2). Hypothesis testing employed in this study was Z statistic or Z test. In order to onbtain the value of Z-table can be seen in Table Z, which is on the level of reliability of 95%. Thus, the

value of Z-table was 1.645. Statistical hypothesis proposed for testing Z is as follows:

$Z_{statistic} \geq Z_{table}$, meaning H_0 is rejected and Hi is accepted
$Z_{statistic} < Z_{table}$, meaning Hi is rejected and H_0 is accepted

Hypotheses that will be tested in this research are:
Ho = there is not any effect of institutional components on the mangrove resources management based on the concept of sustainable blue economy
H1 = there is the effect of institutional components on the mangrove resources management based on the concept of sustainable blue economy

3. Result and Discussion

Institutional economic came after criticism of Veblen (1899) to the basic theory and implementation of classical and neoclassical economics, considering that the institution plays important role in achieving the efficiency of resource allocation and economic welfare (Hidayat, 2008).

Institutions are the rules that apply in the community agreed upon by members of the community as something that must be followed and obeyed (having strength sanctions) with the intention of creating regularity and certainty of the interactions among members of the community. Variables used in the preparation of the institutional component of the model are the independent and the dependent variables. The dependent variable was institution (Y), and the independent variables were: good governance (X1) and sustainability of resources (X2). The results of data processing using the Spearman Rank's institutional correlation with the assistance of MicrosotfExcel 2010 are presented in Table 1.

Table 1.Results of Data Management of Spearman Rank's Institution Correlatin

Independent Variables	**Value of correlation**	**Z value**
Good governance (X1)	0.908	15.942
Sustainability of resource (X2)	0.999	17.527

Source: data processed (2015)

Based on Table 1, the value of correlation coefficient of each independent variable suggests that:

1. The value of correlation coefficient of good governance variable (X1) of 0.908 illustrates that there is a relationship of good governance with the institution. This relationship is included into strong category. The correlation coefficient is positive, meaning that the higher good governance, the better the institutions. On the other hand, the lower the good governance, the institutional might be getting worse.

2. The value of correlation coefficient of sustainability of resource (X2) of 0.999 illustrates that there is a relationship to the institutions on the sustainability of resources. This relationship is included into strong category. The correlation coefficient is positive, meaning that the higher the sustainability of resources, the better the institutions. On the other hand, the lower the sustainability of resources, the institutional might be getting worse.

Hypothesis testing (Z testing) was used to determine the relationship of each independent variable variableon the dependent variable. This test was done by comparing the value of Z-statistic to the value of Z-table. The value of Z-statistic from the data processing through Microsoft Excel can be seen in Table 1. Statistical hypothesis proposed for Z test is as follows:

$Z_{statistic} \geq Z_{table}$, meaning that H0 is rejected and Hi is accepted
$Z_{statistic} \leq Z_{table}$, meaning that Hi is rejected and H0 is accepted

In order to obtain the value of Z-table can be seen in Table Z, which is the degree of freedom (df) of 299 and ½α = 5% : 2 = 2.5%, thus the value of Z-table was 1.645. By comparing the value of Z-statistic with Z-table that can be concluded as follows:

1. Distribution of welfare variable, the Z-statistic > Z-table or 15.942> 1.645 at the 95 percent of reliability level, so that H0 is rejected and the research hypothesis is accepted. It means that good governance has a significant correlation influence on the institutional.

   The parties involved in the exploitation of resources onthe coastal area in Sidoarjowere: 1) *Stock holder*, they are group of people who live and they are dependent economically and sociologically on the natural resources that exist on the coastal area; 2) *Share holders*, they are people who control the ownership of the land for aquaculture and other fishery businesses in coastal areas; and 3) *Stake holders*, they are broader parties including government, investors, and other people who are no in the coastal area but they have interest in the results of operations and management of natural resources operated on the coastal areas. The mechanism of resource management involves the government and non-government parties, including mangrove resource monitoring activities by Community Group Supervisor (*Pokmaswas*). However, lack of attention of the government may lead to institutional supervision has been less effective. Therefore, in order to maintain the good governance as expected, community and government must synergize each other, such as in terms of facilities and infrastructure provition to support *Pokmaswas* activities.

   Responses from the respondents to the statement “internalization of costs, benefits, and risk (economic valuation of resources) in making investment

and pro-growth policies", was as much as 56%;in other words, 174 respondents said it was important (88%) or categorized into a very strong category. It means that that the internalization of costs, benefits, and risk (economic valuation of resources) in making investment and pro-growth policies has very strong correlation with social concerns.

2. Sustainability of resource variable, Z-statistic > Z-table or 17.527> 1.645 at the 95% reliability level, it means that H0 is rejected and the research hypothesis is accepted. Thus, sustainability of resources has a significant correlation to the institution.

   Marine economy development model through blue economy model is expected to ensure the sustainability of resources, the balance of the ecosystem and environmental health, as well as encourage the use and management of the resources effectively.

   Marine economy model through blue economy model is built upon four pillars of marine economy policy, namely 1) the integration of development of land and marine, 2) clean, inclusive, and sustainable development, 3) increasing the value added and product competitiveness through innovation, and 4) improvement of fair, equitable, and reasonable income of the community (Indonesian Maritime Council (Dekin), 2012)).

   In terms of management of mangrove forests on coastal area in Sidoarjo should be institutionalized through Regulation Number 16/2003 on Community and Neighborhood in Sidoarjo Regency and Regulation Number 17/2003 on Protected Areas in Sidoarjo, with the executor (actor) is the local or district government of Sidoarjo.

   Responses from the respondents to the statement "internalization of costs, benefits, and risk (economic valuation of resources) in making investment and pro-growth policies", was as much as 51%; in other words, 157 respondents said it was important (81%) or categorized into a very strong category. It means that that the internalization of costs, benefits, and risk (economic valuation of resources) in making investment and pro-growth policies has very strong correlation with social concerns.

According to institutional theory, in order to solve common pool resources model problem on coastal area in Sidoarjo, recommended policy is not only through self-governance, in other words that the natural resources are directly managed by the participation of the community or group of people. Better governance mechanism, which is the integration of government and non-government parties to manage the natural resource, including supervision of the activities by Pokmaswasto the mangrove resources. Good governance should applied in order to synergizethe community and the government, including providing facilities and supporting infrastructure to Pokmaswas activities, such as

motor boats and communications equipment such as handy talky (HT). Key to the success of the management model of good governance is partnership or joint action among the relevant parties.

The policy model of coastal and marine resource management together is to encourage resource utilization on coastal area in Sidoarjo more economically, profitably and sustainable; this is a shared resource model of tragedy. Some things that can be done include: a) regulations to regulate appropriate resource utilization by choosing technologies or methods, such as the use of mangrove fruits for consumption, mangrove exess for briquettes and compost, utilization of mangrove foretsfor ecotourism activities, utilization mangrove environment as a habitat of marine life such as fish, shellfish and shrimp, and silvofhery aquaculture systems; and b) Regulations need to be enforced because it is important to have supervision and sanction powers, namely Regulation Number 16/2003 on Community and Neighborhood in Sidoarjo Regency Regulation Number 17/2003 on Protected Areas in Sidoarjo, the main executor (actor) is the local or district government.

Good institutional governance for coastal conservation in Sidoarjois urgent. Coordination among relevant agencies in managing mangrove resources, the division of tasks and responsibilities, as well as the enforcement of the laws is the key success of the program. The results of reseach by Dekin (2012) showed that the success of marine development requires a comprehensive planning and in line with the interests of the community as well as the environment. The development should be based on geographic cohesiveness, ecological adjustment, and integration between stakeholders, integration among relevant sectors, and the integration of related sciences. Marine as multi-sector field requires synergistic policies on marine economic sectors that are closely related to inter-oceanic economic activities, both within and outside the sector. These synergetic policies are instrumental in the successful development of marine economy.

4. Conclusion

Institutional resource management of mangrove as conservation effort on coastal area in Sidoarjo is through good governance, which is the mechanism of resource management involving the government and non-government parties, namely the synergy of resource management of mangrove involving *Pokmaswas* in monitoring and controlling resources mangrove, and the Government of Sidoarjo toprovide facilities and infrastructure for Pokmaswasto support their activities such as motor boats and communications equipment. Key success of this management model is a partnership or a joint action with the support of the Government of Sidoarjo. In this study, the issue was still limited; therefore the future research in this sector is expected to explore the wider institutional variables that may affect the mangrove resource management.

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