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THE SUSTAINABILITY DEVELOPMENT STATUS OF PIGS LIVESTOCK ON TRADITIONAL FISHERY HOUSEHOLD IN NEMBRALA VILLAGE OF ROTE NDAO ISLAND

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ABSTRACT

This study aims to determine the status of corporate sustainability on a pig livestock in the village of fishermen household in Rote Ndao Island. Data were analyzed using the approach of Multi-Dimensional Scaling. The analysis showed that the index of business continuity in domestic swine alternative fishing for ecological dimension of 30.82% with a status less sustainable, legal and institutional dimensions of 36.61% with less sustainable status, infrastructure and technology dimensions of 63.87% with continuous sufficient status, social and cultural dimensions of culture by 65.83% with sustained sufficient status, and economic dimensions of 79.71% with a sustainable status. The results of this study can be concluded importance of business continuity alternatives that contribute to the welfare of traditional fishermen in Nembrala, the regency of Rote Ndao.

KEY WORDS

Sustainability status, development, pigs livestock, Multi-Dimensional Scaling, Rote Island.

The coastal area has strategic significance because it is a transitional area between terrestrial and marine ecosystems, as well as having the potential of natural resources and environmental services are very rich. Resource wealth raises the appeal for the parties to take advantage of natural resources and various agencies to regulate their use. However, it cannot be denied, until now the coastal community life is still far behind urban life, even too far behind from upland forest. Many residents of coastal areas, especially fishermen who live below the poverty line. This is because most of them rely on sail alone as the main income source, although there are still plenty of alternative livelihoods that can be done by them when not at sea (Baskara et al, 2008).

Rote Ndao District is a district in the province of East Nusa Tenggara, Indonesia. It is the southernmost county in the Republic of Indonesia, has an area of 1280.10 km². The majority communities living on this island of livelihood as farmers and fishermen who are still living below the poverty line. Poverty data in 2014 there were 28.5% (39100 people) of the population categorized Rote Ndao is poor. On a macro scale shows that the fisheries sub-sector contribution to GDP Rote Ndao is still lower than the sub-sectors of food crops and livestock (BPS Rote Ndao, 2017). In fishing communities, poverty and other hardships are economic cycles social events recurring every year and even throughout the year. In addition to coastal and marine environmental issues, poverty fishing is a major issue that occurs because of complex factors (Kusnadi, 2002: 4-12). The issue of poverty is at the root of

fishing communities is a high dependence on fishing activities. To meet the daily needs of households of fishermen doing other jobs out to sea (Tain, 2006). Groups of people living in coastal areas are most afflicted with welfare level far below other communities (Kusumastanto, 2002). Factors dependence is very diverse.

However, other impacts such as climate change also cause problems for fishermen to engage in fishing because the greater the risk to fish and the effect on the number of catches. Climate change causes many problems in the life of coastal communities such as decreased quality and quantity of catches, hurricanes, tidal waves and drought. Many impacts of climate change will not lead to the vulnerability of coastal communities if the community has an adequate adaptation capacity (Panjaitan et al., 2017). Providing alternative livelihood for coastal communities in Rote Island is an essential part to cope with uncertainty arising from external and internal shocks in the communities (Paulus and Fauzi, 2017).

Climate change conditions that disrupt marine ecosystems can certainly exacerbate domestic economic life of fishermen in Rote Ndao. The decline in fish catches will have implications on household income, where fishermen in Rote Ndao has a dependency on the fisheries sector in particular fisheries. The diversity of revenue sources will greatly assist the ability of fishing communities in adapting to poverty. Poverty fisherman rated extends to the alarming poverty rates (Tain, 2013). In addition, the low skills of fishermen to diversify fishing activities and strong attachment to the operation of one type of fishing gear has contributed to the incidence of poverty fishermen. The choice of priority development of both combinations fisheries and non-fisheries (weave and pigs livestock) is due to unique characteristics of the Nembrala weaving effort and pig livestock whereby the market demand is relatively high or high economic value (Paulus, 2016). According Dewantoro & Talib (2015) that Indonesia is a country that has the largest swine germplasm in the world because it has five of eight species.

Pigs are one of the livestock producers of meat other than livestock (such as cattle, buffalo, sheep, goats, and so on). Type of pigs reared broilers generally are the type that has the main purpose to meet consumer needs in addition to it as a source of income. Based on this research background, we need a scientific study through the development of sustainable alternative efforts to encourage fishermen to increase welfare through the pig livestock.

METHODS OF RESEARCH

Data Collection Methods. The study was conducted using a survey method through interview and observation techniques. Respondents in this study were 35 taken purposively (intentionally) with the criteria that the respondent is to have a primary job as a fisherman catching and also undertake economic efforts more specifically the business of cattle pigs and craft weaving as an adaptation of fishermen to the risk of reduced revenue due by climate change.

Data Analysis. Data analysis in this research using the Multi-Dimensional Scaling (MDS) that approach with "Rap-Insus-Landmag" (Rapid Appraisal - Indeks Sustainability of Land Management) which has been modified from RAPFISH program (Rapid Assessment Technique for Fisheries) developed by Fisheries Center, University of British Columbia (Kavanagh and Pitcher, 2001, Fauzi and Anna, 2002).

RESULTS AND DISCUSSION

Status Pigs Livestock Business Sustainability. In the research of pig business in Nembrala Village, the determination of sustainability index is limited to five dimensions of sustainability ie ecological, economic, socio-cultural, infrastructure and technology dimension, and law and institution with attribute and scoring value from expert opinion can be seen in Figure 1. Based on the results of the analysis, obtained sustainability index for ecology dimension of 30.82% with less sustainable status, legal and institutional dimension of 36.61% with less sustainable status, infrastructure and technology dimension of 63.87%

with sustainability status, social dimension cultural culture of 65.83% with sustainable enough status, and economic dimension of 79.71% with sustained status.

In order for this index value in the future to continue to increase until it reaches sustained status, it is necessary to improve the attributes that are sensitive to the ecological, legal and institutional dimension index, infrastructure and technology as well as the socio-cultural dimension of culture. The attributes are considered sensitive by experts based on the existing condition of the area. The value of the five dimensions of sustainability indexes Rap-Ternak_Nembrala results of the analysis as shown in Figure 1.

Figure 1 – The Sustainability Index of the Pigs Business Development in Nembrala village, Rote Ndao

Ecological Sustainability Status Dimensions. The attributes expected to have an effect on the sustainability level on the ecological dimension consist of five attributes, namely (1) land tenure status, (2) availability of pig feed, (3) pig breeding, (4) livestock waste management and (5) livestock raising system. The leverage analysis used to look at the sensitive attributes has an effect on the ecological sustainability index value. Based on the leverage analysis results obtained all the attributes that exist is a sensitive attribute to the value of ecological sustainability index.

The availability of business land is an important attribute related to the feasibility of a safe place of business and does not disrupt the ecosystem of the environment and cause pollution let alone the location of research as a coastal area and has become a tourist attraction, the land factor of pig business is absolutely considered. A real land tenure is required as it relates to the utilization and management aspects. The status of business land that is not real cause the pigs business is not sustainable because the land use can change function according to regional development. Paulus & Yohanis (2017) suggested that the business of poultry and pigs on the coast capable of contributing to the increase in household incomes of traditional fishermen.

The availability of pig feeds is instrumental in ensuring sustainable pig business because the production cost of more than 60% is the cost of feed. For the provision of cheap pig feeds and easily accessible to breeders is absolutely necessary. Optimizing the utilization of local feeds such as coconut, tubers, rice bran, corn bran can be an alternative to the provision of cheap pig feed.

The types of pigs cultivated by breeders are an important attribute that ensures the business sustainably. Type of pigs with the level of adaptation to the environment is high can ensure the sustainability of the business. Therefore the use of local or cross breeds are more sustainable than the type of pig race despite higher production side but low adaptability to the environment.

Livestock waste management becomes important to avoid environmental pollution. Management of pig waste is strongly associated with system maintenance. System maintenance with impounding pigs provides convenience in a good waste management,

compared to loose livestock systems will lead to difficulties in managing waste pigs and can be a medium of environmental pollution.

Further enhance business sustainability status of pig farming in the ecological sector in Nembrala Village, improvement efforts are not only done to sensitive attributes so as to have an effect on the ecological dimension sustainability index value. Efforts that need to be done is to maintain or improve the attributes that have a positive impact on improving the sustainability of the ecological dimension of the region.

Status Sustainability Economic Dimension. The attributes that affect the sustainability of the economic dimension consist of five attributes, namely (1) business feasibility, (2) market price of pigs, (3) contribution to local revenue (PAD), (4) marketing chains, and (5) market access. Based on leverage analysis, three attributes that are sensitive to economic sustainability index value are market price of pigs, marketing chain, and contribution to PAD.

Livestock business is one economic sector that supports or contributes to local revenue. The results of this study were reinforced by Warouw et al. (2014) research that pig farming at the "Kasewean" company gained significant profits. In order for the sustainability status of pigs business to increase in the economic sector in Nembrala Village, the improvement effort is not only done to the sensitive attribute giving effect to the sustainability index value of the economic dimension, but other attributes that are not sensitive based on the leverage analysis also need to get serious attention to be addressed.

Efforts that need to be done is to maintain or improve the attributes that have a positive impact on improving the sustainability of the regional economic dimension, and suppress attributes that negatively impact on sustainability. The results of research Suranjaya et al., (2017) suggests that pig farm business is in great demand and can support the farm household's economy.

The attributes that need to be maintained or enhanced include: (1) market access and (2) business feasibility; whereas attributes negative impact on sustainability is the marketing chain. Easy market access for breeders is necessary, so they are able to sell products at the right time and price and can reduce marketing costs. Market access is strongly influenced by the availability of adequate facilities and infrastructure. Therefore, in ensuring the sustainability of the pig business in Nembrala village, the government should ensure the availability of adequate markets and transportation facilities.

Business feasibility is an important attribute because pig farming managed and economically feasible will have an impact on sustainable pig business activities because it can provide a reasonable profit for the business actors. Feasibility strongly influenced by cost and product prices. Efforts to reduce production costs and be able to sell at a price higher will ensure that efforts should be feasible.

Status Sustainability Social Dimensions of Culture. Attributes are expected to give effect to the level of sustainability in the social dimension of culture is composed of five attributes, namely (1) education, (2) the number of households pig farmers, (3) the role of pigs social system culture, (4) participation of families, and (5) the level of community empowerment.

The three attributes those are sensitive to social and cultural sustainability index, namely (1) the level of community empowerment, (2) the number of households pig and (3) participation of families. These three sensitive attributes have a close relationship in the development of pig business in Nembrala.

Community empowerment through pig farming can encourage an increase in the number of fisherman households that seek pigs as alternative economic businesses in improving their living standards. The activity of the pig business conducted by the fisherman households can encourage the participation of family members, especially women and children, to manage the pig business. Furthermore, to ensure sustainability, the empowerment of fishermen households, especially women and children, needs to be carried out continuously according to the empowerment scheme of government, NGOs or private parties committed to economic empowerment of fishermen families.

Attributes that need to be preserved is the role of pigs in social and cultural systems. The role of pigs in social and cultural system on the island of Rote may trigger development

of the pig because it was driven by the increasing needs of pigs in social rituals and cultural. The high demand for pigs for socio-cultural activities can increase the selling price of pigs, thus providing benefits for pig farmers.

Community empowerment needs to be enhanced through community-assisted activities in pigs. Community empowerment can be done by providing counseling or training, mentoring program and providing assistance of livestock business facilities and providing incentives through the services of fishermen cooperatives. Community empowerment is very closely related to the participation of families and the number of farming households. The higher participation of members of the family, then the number of farming households will also be increased so that the role of communities in the management can be optimized. The involvement of family members of fishermen, especially women and children in pigs, can utilize spare time that can have an economic impact on the family through additional income from pigs.

Status of Sustainability Dimensions of Infrastructure and Technology. Attributes are expected to give effect to the level of sustainability on the dimensions of the infrastructure and technology consists of five attributes, namely: (1) support facilities and infrastructure of livestock farming swine, (2) the level of mastery of technology of cultivation of pigs, (3) the extension of cultivation technology of pigs from technical service, (4) availability of processing industry, and (5) availability of livestock market.

Based on the result of leverage analysis, three attributes that are sensitive to the value of sustainability index of infrastructure and technology dimension are (1) counseling about pig farm technology from technical service, (2) level of mastery of pig farming technology, and (3) availability of processing industry. The three sensitive attributes are interconnected with each other, the intensity of extensively extending the technology of pig farming by related agencies can encourage technological capacity of pig farmers including pig production technology. The development of pork-based processing industries such as pork *Se'i* has an impact on increasing the added value of pork at a more expensive price.

Counseling on the technology of pig business can be done by technical offices as well as colleges and NGOs who are committed to the development of pigs as an alternative to community economic activities. The form of counseling that needs to be done in order to increase the capacity of farmers to the mastery of technology is participatory education, where farmers can actively engage in all extension activities, so that the process of technology adoption can be achieved and the increased capacity of pig farmers in managing pigs more productive and optimal.

Status of Sustainability Dimensions of Legal and Institutional. The attributes that are expected to affect sustainability on the legal and institutional dimension consist of four attributes, namely (1) availability of livestock business groups, (2) the existence of livestock breeding centers, (3) availability of livestock cooperatives, and (4) availability of local regulations on business. Based on leverage result, there are three attributes that are sensitive to legal and institutional sustainability index value: (1) availability of livestock business group, (2) existence of extension livestock center, and (3) availability of farmer cooperatives.

Institutional become a determining factor in opening opportunities to build business partnerships are broad. Sihombing (2006) states that there are three categories of pigs business people are seedling business, fattening business and business combination of both activities. Economically fattening business will give bigger profit, but also invested capital bigger than nursery business.

Pigs business group is an institution that grows from the community itself, the existence of pig business conducted in groups can facilitate aspects of development because aid funds or technology can be more efficient because it is managed in groups. Extension agency livestock is also an important attribute in ensuring the sustainability of pig business, because it can be a link between technology sources with pig farmers in the understanding and implementation of various technologies that are always growing and able to increase business productivity. Institutional cooperative livestock is also an important attribute because the scarcity of venture capital for farmers is still a major obstacle in the development

of their business, therefore through cooperative farmers can save joint capital which at any time can be used to finance the development of pig business.

Sustainability Status multidimensional. The results of Rap-Ternak_Nembrala multidimensional analysis of sustainability of pig business in Nembrala Village based on the existing condition of 67.63% is quite sustainable. This value is derived from the assessment of 24 attributes that exist in the five dimensions of sustainability namely ecological, economic, socio-cultural, infrastructure and technology, and legal and institutional dimensions. Multidimensional results with Rap-Ternak_Nembrala regarding the sustainability of pig business in Nembrala Village can be seen in Figure 2.

The sensitive attributes contributed to the value of multidimensional sustainability index based on leverage analysis of each dimension contained 17 attributes. These attributes need to be improved in the future to improve the sustainability status of Desa Nembrala for the development of pigs. Improvements that are intended to increase the capacity of attributes that have a positive impact on the increase in the value of sustainability index and otherwise minimizing the attributes that are likely to have a negative impact or lower the value of sustainability index.

Figure 2 – Index multidimensional sustainability of farming pigs in the village Nembrala

The result of Monte Carlo analysis shows that the index value of pigs business sustainability in Nembrala Village at 95% level shows the result that did not change much with the analysis of Rap-Ternak_Rote (Multidimensional Scaling = MDS). This means that errors in the analysis can be reduced both in terms of providing each attribute scoring, scoring for variation of opinion differences are relatively small, and the data analysis process that is done repeatedly is stable, as well as errors in the input data and the data lost can be avoided. Differences sustainability index value of MDS and Monte Carlo analysis is presented in Table 1.

Table 1 – The Sustainability Index Value of Monte Carlo Analysis with Rap-Ternak_Nembrala

Dimensions of Sustainability	Values Sustainability Index (%)		Difference
	MDS	Monte Carlo	
Ecology	30,82	30,36	0,46
Economic	79,71	78,98	0,73
Social and Cultural	65,83	64,69	1,14
Infrastructure and Technology	63,87	63,12	0,75
Law and Institutional	36,61	35,49	1,12
Multi Dimensions	67,63	65,32	2,31

Table 2 – Value of Stress & Coefficient of Determination (R^2) Rap-Ternak_Nembrala

Parameter	Dimensions of Sustainability					
	A	B	C	D	E	F
Stress	0,14	0,15	0,15	0,15	0,15	0,12
R^2	0,94	0,88	0,94	0,91	0,92	0,95
iteration	2	3	2	3	3	2

Notes: A = Ecological Dimension, B = Economic Dimension, C = Cultural Social Dimension, D = Infrastructure-Technology Dimension, E = Legal-Institutional Dimension, and F = Multidimensional.

The result of analysis from Rap-Ternak_Nembrala shows that all attributes studied on the sustainability status of pig business in Nembrala are accurate enough to give better and more reliable analysis result. This can be seen from the stress value that only ranges between 12% to 15% and the value of determination coefficient (R^2) obtained ranges between 0.88 and 0.95. This is in accordance with the Fisheries (1999), which states that the results of the analysis of stress sufficient if the value is less than 0.25 (25%) and the coefficient of determination (R^2) approaching a value of 1.0.

CONCLUSION AND RECOMMENDATIONS

The sustainability status of pig business development in fisherman households of Nembrala village for ecology dimension of 30.82% with less sustainable status, legal and institutional dimension of 36.61% with less sustainable status, infrastructure and technology dimensions of 63.87% with sufficient status of sustainable, social and cultural dimensions of 65.83% with a culture of continuous sufficient status, and economic dimension of 79.71% with sustained status.

This study is limited to the development of pig business. Studies will come need to examine other farm businesses that can help fishermen to improve welfare. Although there are limitations in this study, this study contributes, namely pigs are one of the livestock commodities that are potential to be developed in local communities on the coast.

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