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THE ANALYSIS OF SUSTAINABILITY INDEX OF THE PEOPLE'S SALT INDUSTRY IN PAMEKASAN USING MULTI DIMENSION SCALING

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ABSTRACT

This study aims to find out the dominant factors or the cause of failure in the salt industry and also to find out the value of the sustainability index of the people's salt industry in Pamekasan. The analytical method used in this study is the analysis of sustainability status with the "sustainability index of salt" approach that resulted from Rapfish analysis to determine the sustainability status of the people's salt industry in Pamekasan. Based on the analysis result of the sustainability status with the sustainability index approach, it shows that the value of ecological dimension (66.09) in the category is quite sustainable, meanwhile the economic dimension (49,33), social dimension (47,06), technological dimension (43,41), and institutional and policy dimension (39,73). Each of the dimensions is classified as a less sustainable category. To improve the sustainability status of the people's salt industry in Pamekasan, the improvements to the institutional and policy dimension must be the main priority in the management of people's salt industry in Pamekasan. The priority of improvement is also determined by the value of leverage analysis. The highest value of the attribute on leverage analysis becomes the first attribute that must be improved, so the priority of improvement needs to be focused on people's dependence on salt dike business, the role of farmers for business sustainability, and society's empowerment.

Keywords: *Sustainability Status, Sustainability Index, People's Salt Industry, Multy Dimension Scaling, MDS*

1. Introduction

Indonesia is the largest archipelago in the world consisting of 17,508 islands and an area of 7,700,000 km2. In addition, Indonesia is also said to be a maritime country, with a variety of abundant marine and fishery potential. The potential of the marine and fisheries sector is one of them is salt. Salt is a strategic commodity, also a basic need with a human consumption rate of approximately 4 kg/year, also used as an industrial raw material (Jumriati 2017). The use of salt in Indonesia is broadly divided into three groups, namely (1) salt for human consumption (2) salt for salting and various foods, and (3) salt for industry (Chlor alkali plant). The raw materials made in *petambak* mostly come from seawater through the process of evaporation on salt tablets. The manufacture of salt in Indonesia is generally carried out by PT Garam and the people's farmers. The business (petambak) of people's salt is an effort in producing salt whose management is carried out by the people/community. People's salt business consists of people's salt farmers who produce salt *krosok*, then the processing is carried out by industry/company into fine salt and briquettes. *Petambak* in the chain of people's salt business is the party that gets the lowest incentive compared to other parties concerned (Nurdiani 2013).

The Ministry of Industry (2016) projects that the need for salt for the industry will continue to increase by about 50,000 million tons every year, the high need for salt is triggered by the growing national food industry. The industries that use the most salt are the cosmetic soda industry, various foods, and

pharmaceuticals. While in Pamekasan Regency itself the need for salt consumption reaches 3.5 thousand tons/year. Existing salt production only comes from local farm farmers and is relatively small-scale, so the working pattern is still traditional. This pattern is what makes the sustainability level of the people's salt industry in Madura, especially in Pamekasan Regency, a thing that needs to be taken seriously. Referring to Munasinghe (2010) opinion, sustainability, in this case, is to improve the ability of humans both individually and community to fulfill their aspirations and potential to support and maintain the bending power of economic, social, environmental, and institutional systems. This is important because sustainable development in the process is always experiencing changes in efforts to use natural resources, investment direction, technological and institutional development. So it needs to be aligned and aligned with human needs and aspirations to increase potential in the present and future. But efforts must be adapted to the paradigm of sustainable development that meets the needs of the present without forgetting future generations (WCED, 1987; Marten, 2001). Dalam Perkembangannya pembangunan berkelanjutan tidak hanya dilihat dari tiga dimensi (ekologi, ekonomi dan sosial budaya) saja, tapi mengarah pula pada dimensi infrastruktur, hukum dan kelembagaan. Bahkan lebih jauh dikemukakan oleh Deng (2015) pembangunan berkelanjutan menyangkut pula sumber daya, investasi, teknologi dan kelembagaan. Masuknya dimensi teknologi ini untuk menilai sustainabilitasnya dilakukan oleh Primawati et al (2013) untuk perikanan laut, Fauzy dan Oxtavianus (2014) untuk kebijakan tembakau Faridz et al (2018)

Salt as a marine resource seems to be experiencing, this because its needs are rising every year by an average of 5% - 7%, and by 2020 Indonesia's total salt needs have reached 4,464,670 tons (BPS, 2020). But these needs were never fulfilled by the production of people's salt which was only about 2,327,078 tons, so the production shortage of 2,137,592 tons of fulfillment was done through imports (Al Amien and Adrienne, 2020). Looking at the context above, it is necessary to look for important efforts whether that becomes the leverage of the sustainability of people's salt businesses in Madura, especially Pamekasan Regency.

This study was conducted given the high level of salt needs at this time. One of the methods used to evaluate the sustainability of people's salt industry business (Kavanagh and Pitcher, 2001; Pitcher and Preikshot, 2001), is a sustainability assessment method based on a multidimensional scaling approach. This study applies the Rap-Salt method to evaluate the sustainability of people's salt industry business by taking cases in Pamekasan Regency. The purpose of this study is to analyze the sustainability of people's salt industry businesses and determine the factors of the levers.

2. Literature Review

Characteristics of Salt Farmers in Madura

Salt farmers as the main actors of production that contribute greatly to national salt production have livelihood conditions far from prosperous size. The condition of salt farmers as well as life in coastal communities generally faces various problems that cause poverty. Generally, they depend on their lives from the use of marine and coastal resources that require large investments and are very dependent on the season (Widodo, 2011). Often hostile climatic and weather conditions, price mechanisms, and salt markets that tend not to favor salt farmers make salt farmers helpless. The structure of salt land tenure will determine the accessibility of salt farmers in surplus over their production. Socio-economic salt farmers who control large areas of land are relatively more advanced/rich compared to farmers who control narrow land, especially farmers whose growers/workers, in general, are more backward/poor. Thus the polarization of salt land tenure by capitalists significantly contributes to the marginalization of salt farmers, especially small farmers, and cultivator farmers/ workers.

The condition and character of salt farmers are also described from the number of people's salt production actors in Madura consisting of owner farmers and cultivator farmers or *mantong* which amounts to more than 4,000 people. Another less-favorable characteristic is the condition of a low level of salt farmer education and limited trying skills. Facing these conditions, there needs to be economic empowerment carried out to salt farmers. Community economic empowerment in a more detailed scope is carried out as an effort to transform the economic growth of low and stagnant communities towards higher economic growth. This effort can be done with the concept of community economic empowerment through the approach of Hayami and Godo. This concept offers dialectics of community empowerment interaction in social systems (Ihsannudin et al., 2016).

Salt Farmer Categories

Salt farmers are business actors in an area that processes *krosok* salt from seawater raw materials with certain processes (Setiawan, 2019). Farmers, salt is divided into two types, namely the owner farmer, and the farmer is laborer or worker. Farmers owners are farmers who own property rights and control the land that is used to produce salt. While labor farmers or workers are farmers who only work or work to make *krosok* salt for landowners and do not have land ownership rights. Based on the type of work, labor farmers or workers are further divided into farmers, contractors or cultivators, "pengolok" farmers, transporters, and head workers (foreman). Farmers who are contractors, or cultivators, namely farmers who work, or work on the land, others with systems, profit sharing. The winding farmer is the farmer who works if requested and the payment is calculated per day. Transport farmers, namely farmers who work, transport salt from salt land to warehouses or to the street with a pay-per cap system. Furthermore, the foreman is the one who supervises the salt land owned by others who are being worked on by, farmers (Susandini & Jannah, 2021). Based on its socio-economic direction, more advanced salt farmers have more salt land than farmers who manage only small land and are generally more backward and poorer farmers. Therefore, the alienation of salt farmers is influenced by the polarization of salt land ownership, the number of producers, and the level of education of salt farmers (Ihsannudin et al., 2016).

Sustainability

Sustainability is defined as a form of the verb that describes a situation or condition that is ongoing continuously and continuously. Sustainability is an integrated process and will eventually lead to the existence or resilience of a situation. Sustainability is also a thing intended to develop and protect existing resources and enable the community to be able to meet current and future needs. Both are based on environmental, economic, and societal viewpoints (Zen et al., 2015).

Sustainability is the ability to continue resources by not harming or endangering the natural environment, over a long period of time. This refers to a form of concern for the welfare of the next generation, especially with non-renewable natural resources (Seliari & Ikaputra., 2021). Business sustainability is a business condition or condition in which there are various strategies to maintain, develop, and protect resources and meet the needs of a business (Agustin & Hasan, 2021). In general, sustainability includes five aspects, namely (1) after a certain period of time;(2) clinical programs, interference and strategy implementation which continue to be carried out; (3) maintaining changes in individual behavior,(4) programs and behavior of individuals who can evolve and adapt; (5) and continue to produce benefits for individuals and systems (Moore et al., 2017).

3. Research Method

This study was conducted given the high level of salt needs at this time. One of the methods used to evaluate the sustainability of people's salt industry business (Kavanagh and Pitcher, 2001), is a sustainability assessment method based on a multi-dimensional scaling approach. This study applies the Rap-Salt method to evaluate the sustainability of people's salt industry business by taking cases in Pamekasan Regency with the aim of knowing the dominant factors or those that influence the failure of the people's salt industry and knowing the value of the sustainability index of the people's salt industry in Pamekasan Regency.

The study used a survey method with the RapFish (Rapid Appraisal for Fisheries) engineering analysis tool modified to RapSalt. The analysis uses RapSalt techniques to evaluate the sustainability of salt resources in a multidisciplinary manner. RapSalt is based on the technique of ordination that is to place something (score) on a measured attribute using Multi Dimension Scaling (MDS). Aspects in RapSalt concern aspects of ecological, economic, socio-cultural, technological, and institutional. The initial stage in RapSalt analysis is the determination of the dimensions and sustainability attributes of an analysis of a resource. RapSalt analysis procedure can be seen in Figure 1 of the flow chart below, while the sustainability status category can be seen in Table 1.

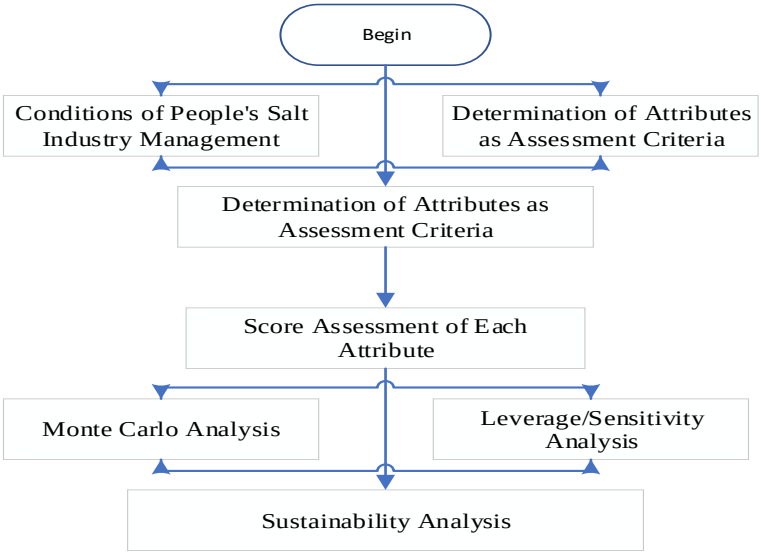

Figure 1. RapSalt implementation flow diagram
(Source: Modified from Alder, et al., 2000)

Table 1. Sustainability Status Categories

Index value	Category	Sustainability Status
0.00 – 25.00	Not good (bad)	Unsustainable
25.01 – 50.00	Less	Less sustainable
50.01 – 75.00	Enough	Quite sustainable
75.01 – 100.00	Good	Very sustainable

Source: Kavanagh and Pitcher, 2004

4. Results and Discussion

Sustainability Analysis of Economic Dimensions

The results of MDS analysis in the index and the sustainability status of the people's salt industry based on the economic dimension in Pamekasan Regency can be seen in the figure below:

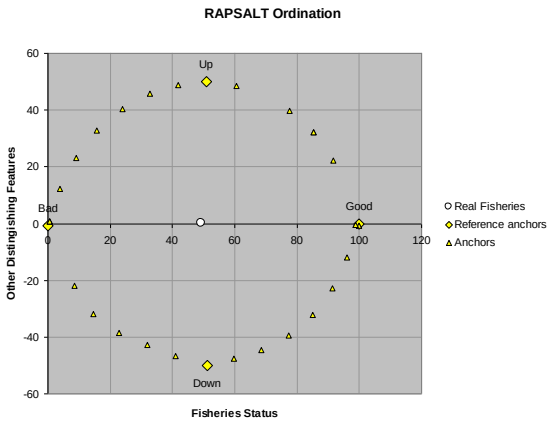

Figure 2. Results of analysis of RapSalt economic dimensions

(Source: Primary data, processed, 2019)

Figure 2 shows that the value of the sustainability index of the people's salt industry obtained from the results of the RapSalt analysis is 49.33%. The value of 49.05% indicates that the management of the people's salt industry based on the economic dimensions in Pamekasan Regency is currently categorized in less sustainable conditions. This shows that the economic dimension must be more attention to in order to get good results and can run in the long term and be sustainable. To see the sensitivity values that each attribute has that are assessed in the preparation of the index value, rap-salt performs a leverage analysis on each attribute. The graph contains the value "root means square" depicted on the horizontal line. The higher the RMS value of an attribute, the more sensitive an attribute's effect is to changes in the sustainability status index in that dimension (Hidayanto et al. 2009).

Based on the results of sensitive analysis (leverage) as shown in the figure above there are three attributes that are considered important and affect the magnitude of the value of the sustainability index of the economic dimension, namely: first source of business capital, second salt demand and lastly business feasibility. This happens because farmers only use their own capital or costs in the management of salt ponds, without borrowing from any party, therefore sometimes farmers get obstacles about financial income. While the capital or cost to manage salt ponds, farmers mostly rely only on the results of salt production. So that to overcome it requires ease in accessing capital or activating cooperatives engaged in the capital.

The second factor is the demand for salt, high demand for salt by consumers sometimes can not be met by farmers, due to the lack of existing salt supply and the existence of limits to the sale of salt among farmers themselves. According to the results of field surveys, sometimes farmers sell their salt products if the price of salt is high, if the price of salt is low farmers choose to keep it in the field until the price returns to normal.

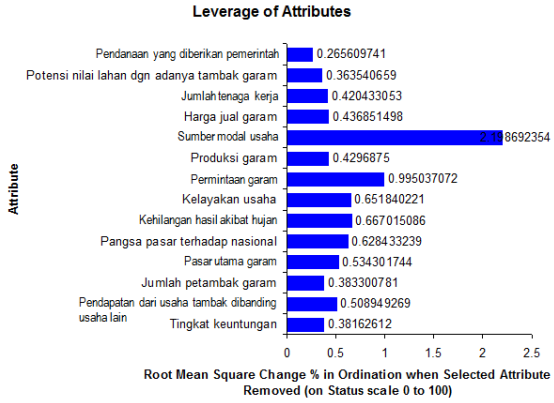

Figure 3. Results of leverage analysis of economic dimensions
(Source: Primary data, processed, 2019)

The ability of the people's salt industry/business to survive in competition is also determined by business feasibility. The statement is in accordance with Pranoto research (2008), where the sustainability index condition of the economic dimensions of the people's salt industry is still categorized as less sustainable. The people's salt industry in the Pamekasan district is still traditionally managed, there is no analysis of the feasibility of the business as it should be. In addition, it is also caused by low demand for salt due to quality that is not in accordance with standards and back information from buyers what should be done based on the quality of the farmers. For some salt farmers, their efforts are considered viable as long as there are still profits obtained, without analyzing their efforts properly.

Sustainability Analysis of Ecological Dimensions

Figure 4 shows a Rap-Salt analysis that shows the sustainability index value of the ecological dimension. Figure 4 shows that the sustainability index value in the people's salt industry obtained from the rap-salt

analysis of 66.09%. The value of 66.09% shows that the management of the people's salt industry based on the ecological dimension in Pamekasan Regency is currently included in sustainable status with a category that is sustainable enough so that it is expected that the sustainability of people's salt business is maintained. The index also showed that the activity in the manufacture of salt carried out decreased slightly due to unstable weather conditions (rain). The attributes that affect the value of ecological sustainability are displayed in the following leverage analysis graph.

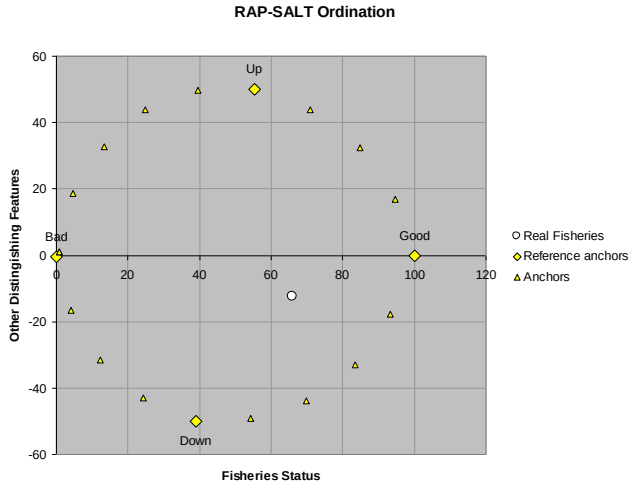

Figure 4. Results of RapSalt ecological dimension analysis
(Source: Primary data, processed, 2019)

Based on the results of leverage analysis, the most sensitive attributes (it should be noted) affect the sustainability value there are 3 factors, namely: first land expansion, the second level of pollution to raw materials, and lastly the presence of waste. The value of leverage analysis for the highest attribute compared to other attributes island expansion, to improve the sustainability status of the ecological dimension, then the aspect of land expansion becomes a top priority in the improvement of this dimension. However, the issue of land expansion will be difficult to fix, because the land owned by farmers has been divided from the beginning and the existence of salt ponds on the land is absolutely irreversible unless taken over or sold to other farmers. This problem becomes very important because farmers cannot expand more with existing land to be able to increase production except with enough capital to be able to rent new land. However, these farmers know exactly how to treat their ponds well so that ecologically they do not damage the ponds they have.

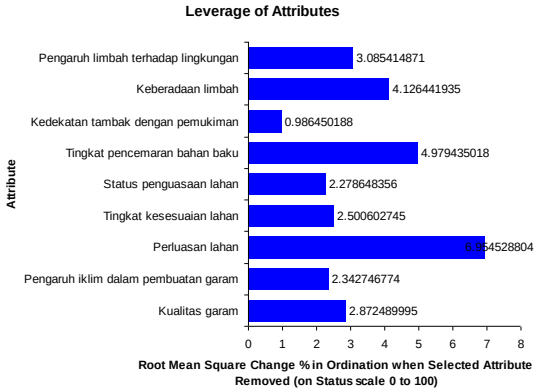

Figure 5. Results of leverage analysis of ecological dimensions
(Source: Primary data, processed, 2019)

The second factor is the level of pollution to raw materials (seawater). Raw materials become the main key to the success of salt production if the raw materials (seawater) polluted with salt produced are of low quality. Anticipating this, before the raw materials (seawater) are accommodated to the salting plot (young water reservoir) must be checked first the levels of microbes or unwanted substances so as not to interfere with the salt treatment process and not affect the quality of salt.
An attribute that affects the sustainability of the people's salt industry in the ecological dimension is the presence of waste. Although in practice in the manufacture of salt does not produce waste, but what needs to be considered is the reprocessing of water that exceeds the limit of salt making. In addition, the built-in waste in the form of plastic, garbage and other pollutants in seawater that enters the farm needs to be taken seriously.

Social Dimension Sustainability Analysis
The results of the MDS analysis in the index and sustainability status of the people's salt industry based on its social dimension can be seen in Figure 6.

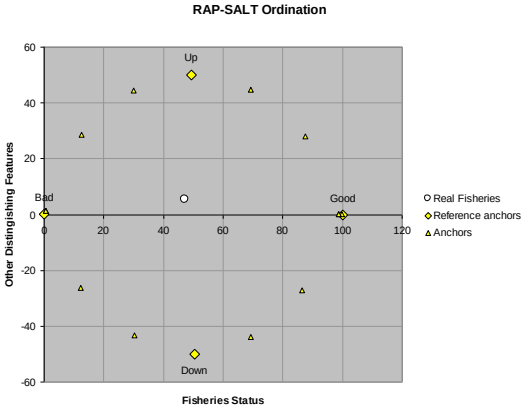

Figure 6. Results of RapSalt social dimensions
(Source: Primary data, processed, 2019)

Based on the figure above, the value of the people's salt industry sustainability index obtained from RapSalt analysis results of 47.06%. The value of 47.06% indicates that the management of the people's salt industry based on the social dimension in Pamekasan Regency is currently categorized in less sustainable conditions. The index value obtained also shows that salt pond business activities are currently in a condition with a high risk towards somewhat bad (index below 50%), so it requires considerable attention for salt farmers and from related agencies. In accordance with the research by Mustakim et al. (2019), social factors seem to indeed decrease or do not support the management of salt businesses. As it has been understood that the real problem in petambak is economic poverty because capital access and low access to technology have an impact on social aspects or dimensions. This condition is caused by the situation of declining salt prices due to the increase in imported salt so socially the status of salt is not the right one. The attributes that affect the sustainability value of the social dimension are shown in the following graph (Figure 7)

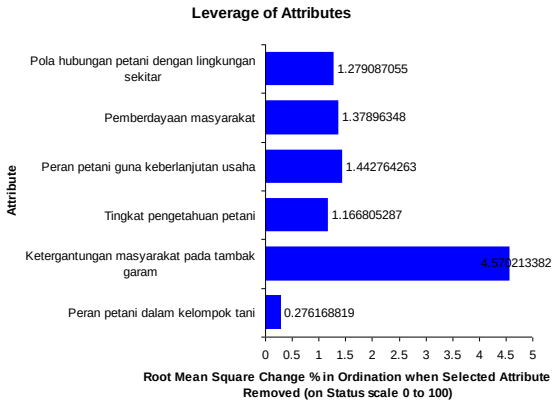

Figure 7. Results of social dimension leverage analysis
(Source: Primary data, processed, 2019)

Some of the results of the above leverage analysis, the most sensitive attributes affect the value of sustainability there are three (3) dominant factors that need to be considered, namely: first the dependence of the community on salt ponds, the second the role of farmers for business sustainability and the last community empowerment. The value of leverage analysis for the highest attribute compared to other attributes is society's reliance on salt ponds. Aspects of people's dependence on salt ponds need to be a top priority in the improvement of this dimension. The high dependence of the community on the processing of salt ponds, because the pond becomes one of the livelihoods of coastal communities in addition to sea and farming. Although being salt farmers for some farmers is relatively promising because it does not require large costs in its management. Ketergantungan But if they fail the harvest the farmers do not get income.

Another attribute that is sensitive enough to influence the sustainability value of the social dimension is the active role of farmers. Because the main factor in the development of the people's salt industry is the performance of farmers and a great desire to manage salt ponds to be more sustainable. The last attribute that is sensitive to the sustainability of the people's salt industry is community empowerment. According to Noor (2011), community empowerment is related to the progress and changes that occur in the future. So that the ability (skill) of the community that is technically and economically low in the management of salt ponds, will be hampering the economic growth of the pond itself. Because of the close relationship between fire and salt, empowerment should be done early on by providing better knowledge and abilities in the management of salt ponds.

Sustainability Analysis of Technological Dimensions

The results of the MDS analysis of the dimensions of index technology and its sustainability statusareshownn in Figure 8. Based on the image, the index value obtained from the results of RapSalt analysis of 43.41%. The value of 43.41% indicates that the management of the people's salt industry in terms of technology is currently in a less sustainable position. This condition is indicated by low productivity (40 - 60 to /ha/year) and NaCl content below 97% (Prasetyo S. W., 2016). So that the seriousness of the government is needed to improve the sustainability of people's salt industry business. The index value obtained also shows that salt pond business activities are currently in a less good condition even the value is close to the bad category , so it requires considerable attention for salt farmers and from related agencies. The low sustainability index according to Pranoto (2008), is also caused by the low level of technology usage that has an impact on the development of technology.

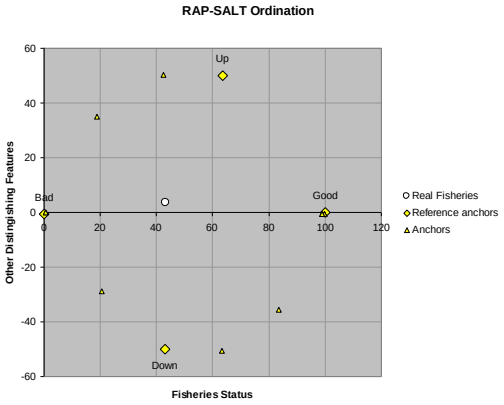

Figure 8. Results of RapSalt analysis of technological dimensions
(Source: Primary data, processed, 2019)

Leverage analysis in Figure 9. Showing weather information technology and efficiency (external comparison and input) in salt production becomes important for farmers. The inaccuracy of weather predictions is often one factor in production failures. Insuffyability occurs because the firecracker has to repeat its production process to get results. Which in turn must repeat the salt-making process that in MDS is done to know the sensitive attributes and interventions or improvements that need to be made.

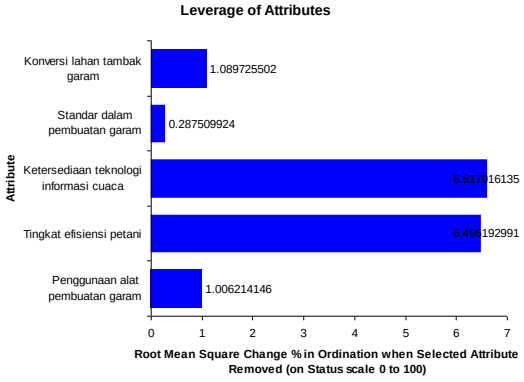

Figure 9. Results of leverage analysis of technological dimensions
(Source: Primary data, processed, 2019)

Some of the results of leverage analysis there are two lever factors that need to be considered, namely the availability of weather information technology and the level of efficiency of farmers. The unavailability of weather information technology for farmers has a major impact on the sustainability status of the people's salt industry in the Pamekasan Regency. This technology is necessary because the salt-making process relies heavily on extremely hot weather for 4 months for evaporation. If a weather information system can be available it will be very helpful for the farmers.

The second factor is the level of efficiency of farmers, especially those related to input and age. According to Maryanto et al. (2018), the level of efficiency of farmers can be seen from the age change, where the older the farmer (getting older) then the workability and technical ability decreases. If farmers are not serious in terms of handling salt management, it will produce a salt that is not good. Because in the process of making salt must be careful in calculating the days (from the beginning of the treatment of the salting plot to draining water for the crystallization process).

Sustainability Analysis of Institutional and Policy Dimensions The results of MDS analysis of institutional and policy dimensions towards the people's salt industry are shown by Figure 10.

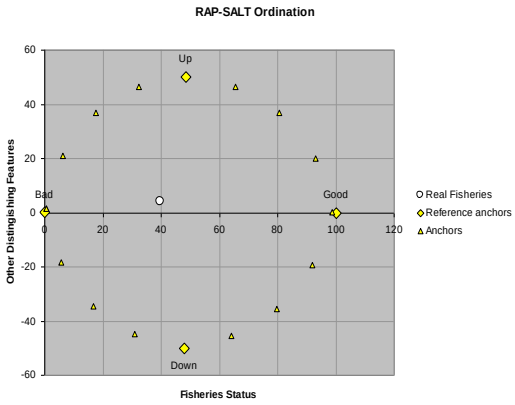

Figure 10. Results of RapSalt analysis of Institutional and Policy Dimensions
(Source: Primary data, processed, 2019)

Based on the figure above the index value obtained from the rap-salt analysis resulted in 39.73%. The value of 39.73% indicates that the management of the people's salt industry based on institutional and policy dimensions is categorized under less sustainable conditions. This dimension has the lowest index value of the other four dimensions. Institutions and policies have the lowest index because generally, the management handled as conventional institutional is not effective so its role tends to be less included in policymaking. Showing the index value obtained also shows that the business activities of salt ponds are currently at even less notice.

This dimension assesses the sustainability of an industry based on the relationship of cooperation carried out by industry both with suppliers, investors, distributors, or marketers of goods and with industries in other sectors (cross-sector cooperation) (Pranoto 2008). Not only about cooperation but also about the role of the government in helping smooth the business of the people's salt industry in Pamekasan Regency. The attributes that affect the sustainability value of the technology are displayed in the following leverage analysis graph.

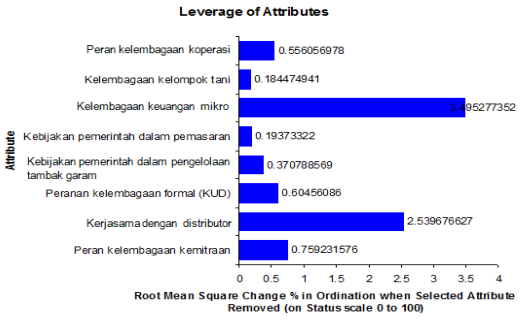

Figure 11. Results of leverage analysis of institutional dimensions and Policy
(Source: Primary data, processed, 2019)

Some of the results of leverage analysis there are 3 lever factors that need to be considered, namely: first

microfinance institutions, the second cooperation with distributors, and the institutional role of partnerships. The most sensitive attribute in influencing the sustainability index of institutional dimensions and policies is microfinance institutions especially to gain access to capital. Another important factor is the absence of relationships between farmers in building a group so it is necessary to revitalize associations related to salting while if there are microfinance institutions will help farmers to overcome the scarcity of business capital and consumption needs (Nurdiani 2013).

The next factor is cooperation with distributors. Cooperation with distributors becomes an attribute that needs to be improved in improving the sustainability status of this dimension. Currently, only some industries or people's salt businesses have cooperated with distributors and their salt marketers. According to Pranoto (2008), these factors can facilitate the process of providing factors of production and provision of capital. The last factor that influences the sustainability of institutional and policy dimensions is an institutional partnership. Purnaningsih (2006) stated that the partnering needs that farmers expect can be met through partnership patterns, especially marketing needs, capital lending and coaching needs. While the situation that occurs in salt farmers today is the lack of support or contribution from institutional partnerships to salt farmers. In fact, if there is support from institutional partnerships will increase agricultural income which can be used as one of the indicators of the success of a partnership relationship (Nurdiani 2013).

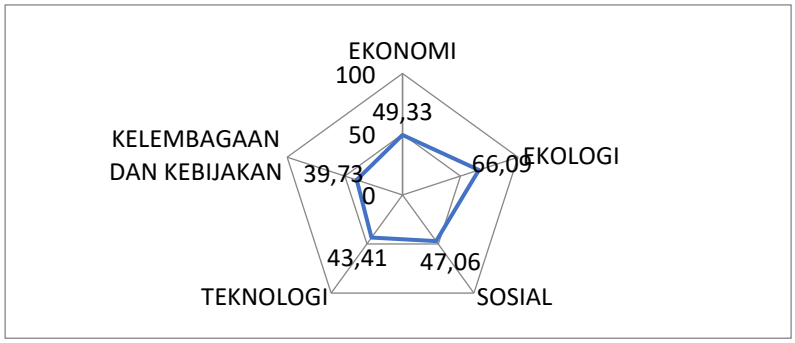

Figure 12. Kite diagram of the sustainability index of the people's salt industry in Pamekasan Regency (Source: Primary data, processed, 2019)

The results of the sustainability index analysis of the people's salt industry in Pamekasan Regency in the form of kite diagrams are shown by Figure 12. Analysis of sustainability index on the people's salt industry in Pamekasan Regency is dominated by ecological dimensions. The kite diagram illustrates the factual conditions regarding the sustainability of the management of the people's salt industry in the Pamekasan Regency. The dimension with the best sustainability index value is the ecological dimension with a score of 66.09%. This value reflects that the development of the people's salt industry to date still maintains its environmental conditions. The existence of salt pond business in the community is also a means of community empowerment by absorbing labor from the surrounding community and outside communities, and also salt pond businesses do not produce waste that affects the surrounding community, although salt farmland is quite close to settlements.

Multidimensional Analysis of Sustainability and Monte Carlo

As a test of how much eligibility for the results of studies conducted using the RapSalt technique is seen from the value of stress and R2. Table 2 presents the "stress" and R2 (coefficient of determination) values for each dimension. The value serves to determine the need for the addition of attributes to reflect the dimensions studied accurately (close to the actual condition) (Hidayanto et al. 2009).

Table 2. Of People's Salt Industry Sustainability Index in Pamekasan Regency

No	Dimension	Stress	R^2	Iteration
1	Ekonomi	0,21	0,95	3.00
2	Ekologi	0,21	0,95	2.00
3	Sosial	0,21	0,95	3.00
4	Teknologi	0,19	0,95	3.00
5	Kelembagaan dan Kebijakan	0,22	0,95	3.00

Source: Primary data, processed, 2019.

Monte Carlo analysis is used to estimate the effect of errors on the 95% confidence interval. The value of the Monte Carlo index is compared to the MDS index. The stress value and coefficient of determination (R2) serve to determine the need to add attributes and reflect the accuracy of the dimensions studied with the actual state. According to Fauzi and Anna (2005), a low S-Stress value indicates a good fit, while a high S-Stress value indicates the opposite. A good model (analysis results are good enough) if the S-Stress value is less than 0.25 and R2 is close to 1 (100%).

Based on Table 2 on each dimension, it appears to have a much smaller "stress" value of 0.25 so that the use of the MDS method is sufficient (Fauzi and Anna 2008). Thus from both parameters (the values "stress" and R2 show that all the attributes used in the sustainability analysis of the people's salt industry in Pamekasan Regency are good enough to explain the 5 dimensions of development in the analysis).

To test the confidence level of total index values as well as dimensions, Monte Carlo analysis is used. The mechanism for obtaining the solution covers repeated calculations (Pranoto 2008). Therefore, according to Edwarsyah (2008), the calculation process will be faster and more efficient if using a computer. Monte Carlo analysis is very helpful in Rap-Salt analysis to look at the effect of score-making errors on each attribute in dimensions caused by procedural errors or problems with attributes, variations in scoring due to differences in opinion or judgment by different researchers, stability of the MDS analysis process, errors in entering data or assessments or missing data, The "stress" is too high. The final results of RapSalt's analysis of the sustainability index of the people's salt industry at the research site showed a high level of confidence, as seen in the figure below.

The results of the analysis obtained did not contain many errors so it did not change the total index value or dimensions. Based on Table 3, it can be seen that the status value of the People's Salt Industry Sustainability Index in Pamekasan Regency at a confidence interval of 90% obtained results that did not have much difference between MDS results and Monte Carlo analysis. According to Edwarsyah (2008) the small difference in sustainability index values between the results of MDS method analysis and Monte Carlo analysis indicates the following:

1. Errors in making each attribute score are relatively small.
2. The variation in scoring due to differences in opinion is relatively small.
3. The analysis process that is done repeatedly is stable.
4. Errors entering lost data can be avoided

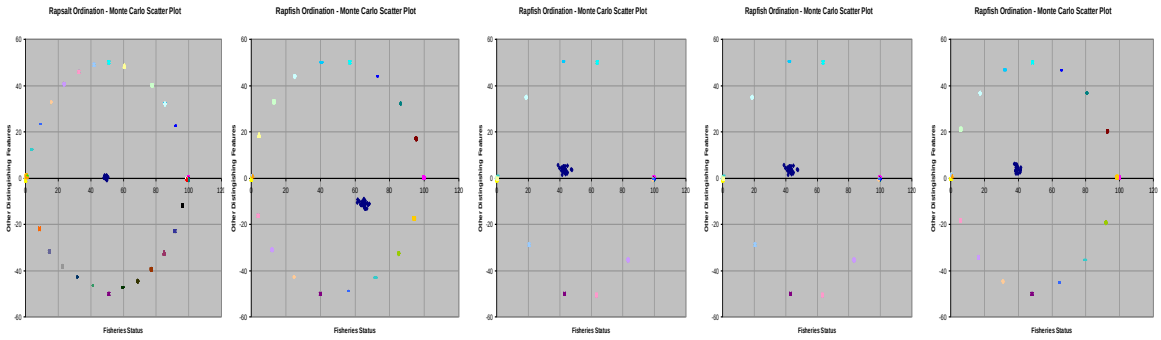

Figure 13. Dimensions of Economics, Ecology, Social, Technology and Institutional and Policy (Source: Primary data, processed, 2019)

Table 3. Monte Carlo analysis results for index values in each dimension

No	Dimension	Sustainability Index		
		MDS	Monte Carlo	Difference
1	Economics	49,33	49,20	0,13
2	Ecology	66,09	65,02	1,07
3	Social	47,06	46,17	0,89
4	Technology	43,41	43,34	0,07
5	Institutional and Policy	39,73	39,25	0,48

Source: Primarly data, processed, 2019

To find out how accurate the results of MDS analysis can be seen in the concentration of data as shown in Figure 13. It can also be measured by the difference in the Monte Carlo test in Table 3.The difference in the smaller analysis results shows that the Rap-Salt analysis using the MDS method to determine the sustainability of the management studied has a high level of confidence and at the same time it can be concluded that the Rap-Salt analysis method conducted in the study can be used as one of the evaluation tools to quickly assess the sustainability of the people's salt industry in a region.

5. Conclusion

Based on the results of research analysis of the sustainability index of the people's salt industry in Pamekasan Regency with Rap-Salt techniques, it can be concluded that the value of the economic dimension is 49.33%, the ecological dimension is 66.09%, the social dimension is 47,065, the technological dimension is 43.41% and the institutional and policy dimension is 39.73%. The dimension with the best sustainability index value is the ecological dimension with a score of 66.09%, where the ecological dimension is already said to be quite sustainable. This reflects that the development of the people's salt industry has been running in accordance with the development of environmental conditions in the Pamekasan Regency. While the dimension that has the lowest sustainability value is the institutional and policy dimension, where the sustainability index value is 39.73%. This happens because of the lack of support or contributions from institutions or governments / related institutions to salt farmers, for the sustainability of an industrial business.

To improve the sustainability status of the people's salt industry in Pamekasan Regency, improvements to the institutional and policy dimensions should be a top priority in the management of the people's salt industry in Pamekasan Regency. The priority of improvement is also determined by the value of the leverage analysis results. Attributes with the highest value in leverage analysis, become the first attributes

that must be improved, so the priority of improvement needs to be focused on community dependence on salt farming businesses, the role of farmers for business sustainability and community empowerment.

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