The sustainability analysis of red chili farming in Taraju District, Tasikmalaya Regency

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The sustainability analysis of red chili farming in Taraju District, Tasikmalaya Regency

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Abstract. The sustainability status of red chili farming and the level of factors or sensitive attributes that affect the sustainability dimension in red chili farming were examined in this research. The research was conducted in Taraju District with a purposive side technique. The fundamental consideration is that Taraji District is one of the areas with the highest production level in Tasikmalaya Regency. The number of samples was 37 consisting of farmers. The RAP-Fish method was implemented to assess the sustainability status of farming. The test used to scale the index of sustainability was Leverage Analysis and Multidimensional Scaling (MDS). The research defined ecological, economic, and social dimensions that were entirely sustainable. The Sustainability index of red chili farming was based on social and ecological dimensions; it obtained values of 47.36 and 43.00, so it was categorized in the less sustainable category.While the sustainable index of red chili farming from the economic dimension obtained is 24.45, it was classified as unsustainable.

Keywords: Sustainable index, red chili farming, Multidimensional Scaling

1. Introduction

Horticulture is one of the agricultural sub-sectors that provide a high enough contribution to the national economy. One of the horticultural commodities is red Chili (Capsicum annum variorum). Chili is one of the horticultural commodities that have high economic value. The benefits of red chili are used to fulfill daily needs as supporting material for food or raw material for processed food and the pharmaceutical industry. On the other hand, chili can be consumed as a mixture of cooking spices, and it can also be preserved in suggestion: as chili sauce, sauce, pickled paste, dried fruit, and flour.

Tasikmalaya Regency is one of the five largest red chili-producing regions in West Java Province, namely Garut, Sukabumi, Cianjur, Bandung, and Tasikmalaya Regencies. However, based on BPS data.[2] it is explained that Tasikmalaya Regency has decreased production while the other four regions haveincreased. This condition will be related to business sustainability. Sustainable farming is the implementation of sustainable development.

Sustainable agriculture is agriculture that seeks to improve the local community's economy from the results of farming and to maintain the condition of biological resources. At least seven kinds of activities are needed to achieve the goals of sustainable agriculture consisting of 1) Economic Development; 2) Food sufficiency and food security; 3) Human resource development; 4) Farmers' self-esteem; 5) Farmer community empowerment; 6) Environmental stability and safety and; 7) Long-

term productivity [8].

Sustainable agriculture is an effort to guarantee social, cultural, and economic life in the plant production system. The sustainability of preservation and formation also requires comprehensive technical assessment and analysis. The approach used for sustainability assessment covers four. Dimensions cover the ecology, economy, and society of that system and disclose information regarding intervention conditions. This research was done to analyze the sustainability perception of red chili farming and to analyze the level factors regarding sensitive attributes that affect the sustainability dimension of chili farming applied in Taraju District, Tasikmalaya.

2. Research methods

The research method implemented in this study was a survey method to collect information from farmers. The location determination uses a purposive sampling technique, namely Banyuasih District, Tasikmalaya Regency. The research location was in a chili farming center in Bojong District. The data assessed were primary data and secondary data. The total population of red chili farmers in Banyuasih District was 64 people. Determining the number of samples used the solving formula so that 39 chili farmers were obtained. The analytical method used in this research was used the RAP-Fish (Rapid Appraisal for Fisheries Analysis) approach used [4][5]. This technique refers to the ordination technique through the Multidimensional Scaling(MDS) approach. Leverage Analysis and Multidimensional Scaling (MDS) were employed to define the estimation of the scale of the sustainability index [2].

Leverage Analysis provided the various attributes of the sustainability status of chili farming. This analysis explained that the attributes positively and negatively affect the sustainability status. Meanwhile, the effects of attributes on the sustainability of farming were depicted in the order of priority, consisting of the value of Root Mean Square. The criteria ofdecision-making used in this activity are that the greater the RMS value, the more significant the influence of the role of these attributes on the sustainability status of chili farming. Multidimensional Scaling (MDS) was conducted to determine the position of sustainability based on the sustainability index scale in chili farming, with a value range between 0-100. The sustainability criteria were divided into several categories, such as thesustainability category, with a sustainability index of 0.00-25.00 (poor), 25.00-50.00 (less), 50.00-75.00 (enough), and 75.00-100 (good) [6]. In addition, it was also known that the value of estimation and the coefficient of determination (R2) for the stress value requirement were below 0.25. [7]

3. Results and discussion

3.1. Sustainability Analysis in Red Chili Farming

To encourage the sustainable production of food crops and horticulture, conduct a sustainability analysis on red chili farming. The analysis of chili farming sustainability represented ecology, economic, and social dimensions so that it can be used as a basis for developing red chili farming in the next generation. The results of the multidimensional RAP-Fish estimation with the MDS method have resulted in the sustainability index value. In addition to the sustainability index value, the stress value and R2 value are also obtained. The value of R2 (coefficient of determination) shows the relationship between the system and the attributes used.

3.2. Sustainability status from the aspect of the Social Dimension

According to the results of the multidimensional aspects of RAP-Farm, the condition of sustainability for the social dimension in red chili farming is presented in Figure 1.

The sustainability index of red chili farming was calculated at 47.36. The analysis results describe that the social dimension of red chili farming is concluded to be less sustainable because the index value range is 25-50. The analysis result also shows a stress value of 0.13, and this value is below 0.25.

So it means that the results of thisanalysis are pretty excellent or feasible.

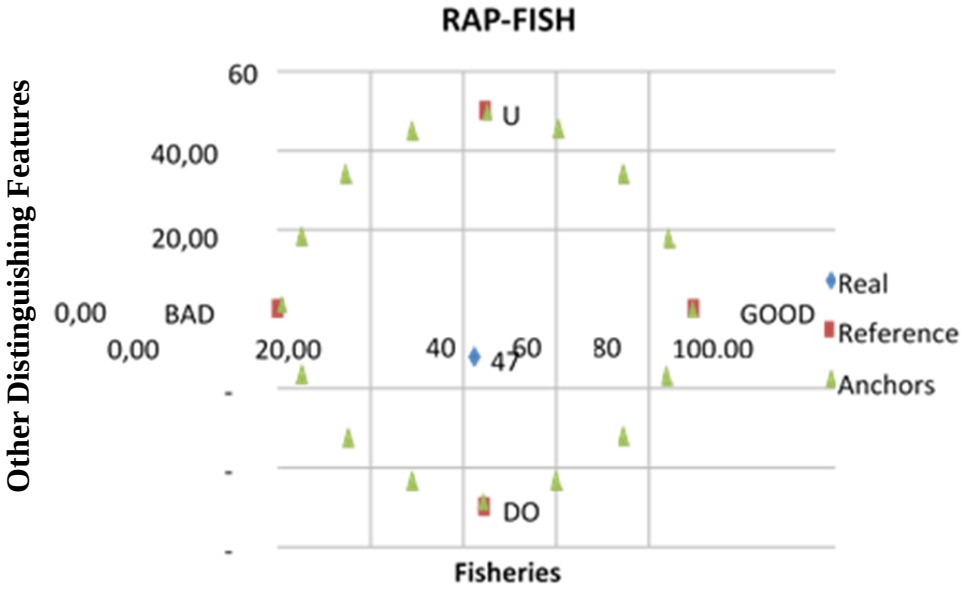

Figure 1. The Sustainability Index of Social Dimension Aspect of RAP-FISH

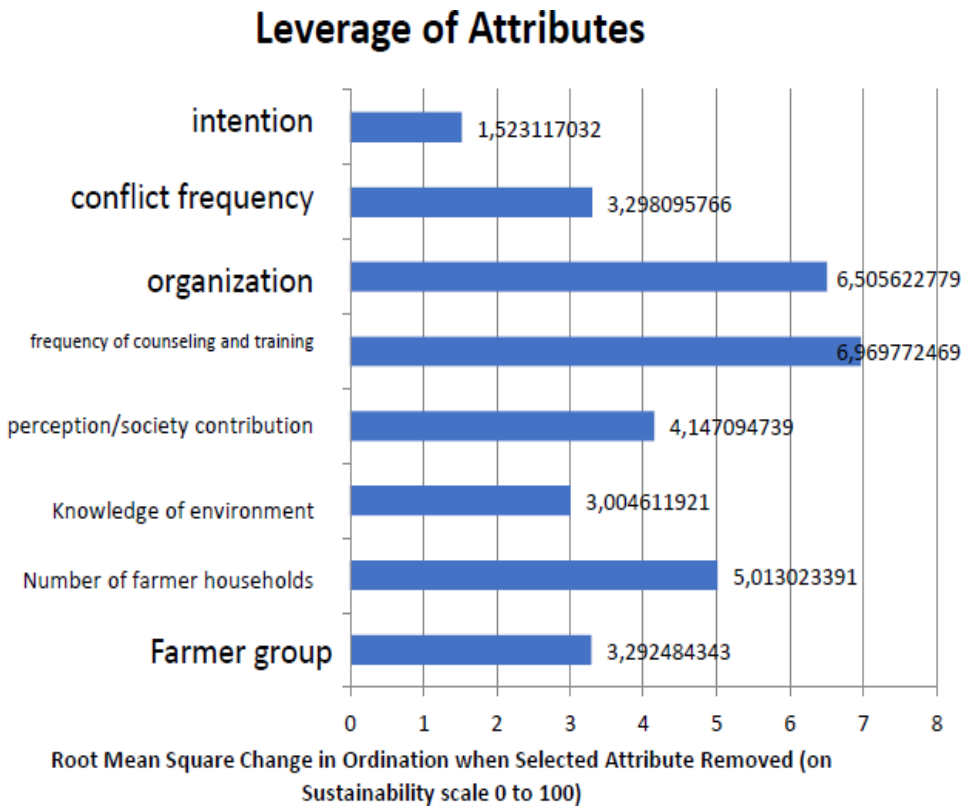

Figure 2. The Attribute of Social Dimension

The RSQ value obtained by sustainability analysis is 0.946. It shows that the system uses attributes

(farmers' interests, frequency of conflicts, farmer institutions/groups, frequency of counseling and training, community roles, knowledge of the environment, and the number of farmer households).

Explanation behavior in the red chili farming system rises by 94.60% of the existing system. Thus, the attributes of the social dimension discussed in explaining the current condition of the red chili farming system are pretty good. The details of the value of each point are described in Figure 2.

Based on the results of the sensitivity analysis from the social dimension, it is stated that the most sensitive attribute is the frequency of counseling and training in red chili farming.This impact is because the increasing intensity of counseling and exercise can increase knowledge, skills, and attitude. So it can affect increasing farmer performance and productivity.

Meanwhile, the other attributes that can be used as levers to elevate the value of sustainabilityare institutions or farmer communities and the number of farmer households. Farming institutions can potentially increase productivity and scale up the income and welfare of farmers [10].

3.3. Sustainability Index of Ecological dimension

The multidimensional analysis of the RAP-Farm sustainability status for the ecological dimensions of red chili farming is displayed in Figure 3.

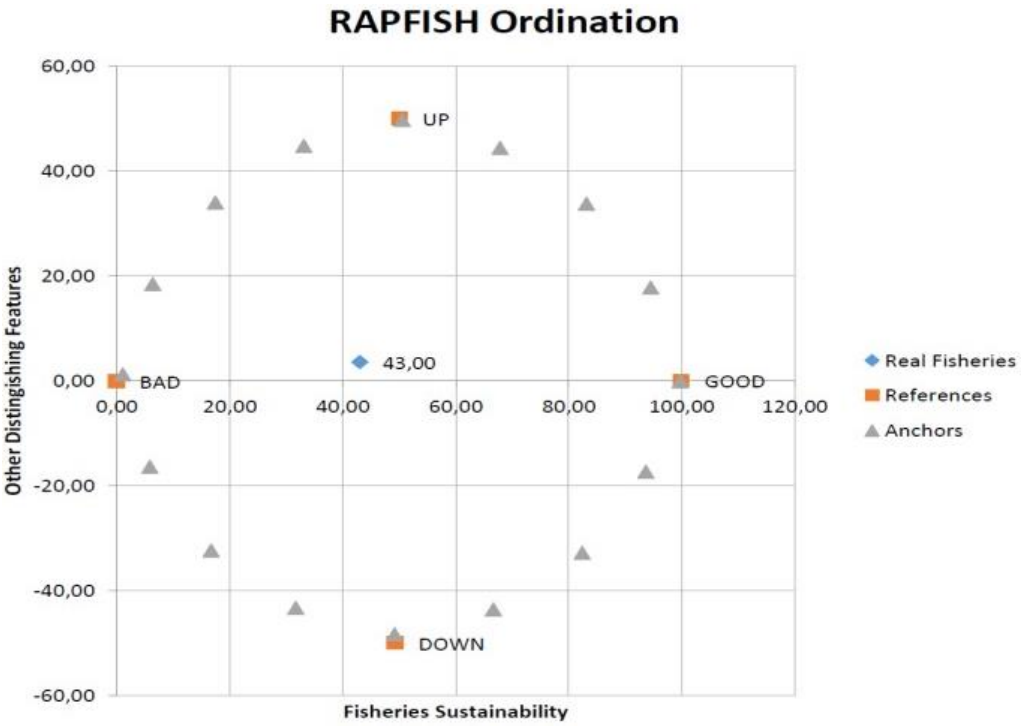

Figure 3. The Sustainability Index of Ecological Dimension of RAP-FISH

The index of red chili farming sustainability is 43.00.It describes that the ecological dimension of red chili farming is claimed as less sustainable because the index value reaches 25-50. However, the stress value based on analysis is 0.15, it stated below 0.25. A value below 0.25 means that the results of this analysis are good enough or feasible.

The RSQ value was obtained at 0.943. Thus, the current attributes (crop rotation, biological pesticides and herbicides, pests and diseases, support from climatic conditions, process of waste for feed, technology adoption of fertilizers and pesticides measurement, the utilization rate of land for chili, and land suitability for chili) used in the system have explained the behavior of the red chili farming system by 94.60% of the existing system. Thus, all the attributes of the ecological dimension

assessed in explaining the current condition of the red chili farming system are slightly good. The sensitivity analysis of ecological dimensions is presented in Figure 4.

The sensitivity analysis of the ecological dimension depicted that the most sensitive attributes were pests and plant diseases. Pests and plant diseases caused the low production of chili. The losses caused by problems and conditions depend on the type and intensity of the irritation. Damage from pests and diseases caused a loss of production from 25 percent to 100 percent [1].

Meanwhile, another attribute that can be used as a level-increased value of the sustainability index is the carrying capacity of the climate. The condition of the weather is closely related to climate change [11], [12]. Climate change caused by global warming is one of the most critical challenges in agriculture, especially in the food crops and horticultural sub-sectors. So those sub-sectors are the most vulnerable to climate change [13],[14]. Technically, the vulnerability is closely related to land utilization systems and soil contents, cropping patterns systems, soil structure, water availability, plant management technology, and a variety of plants [15].

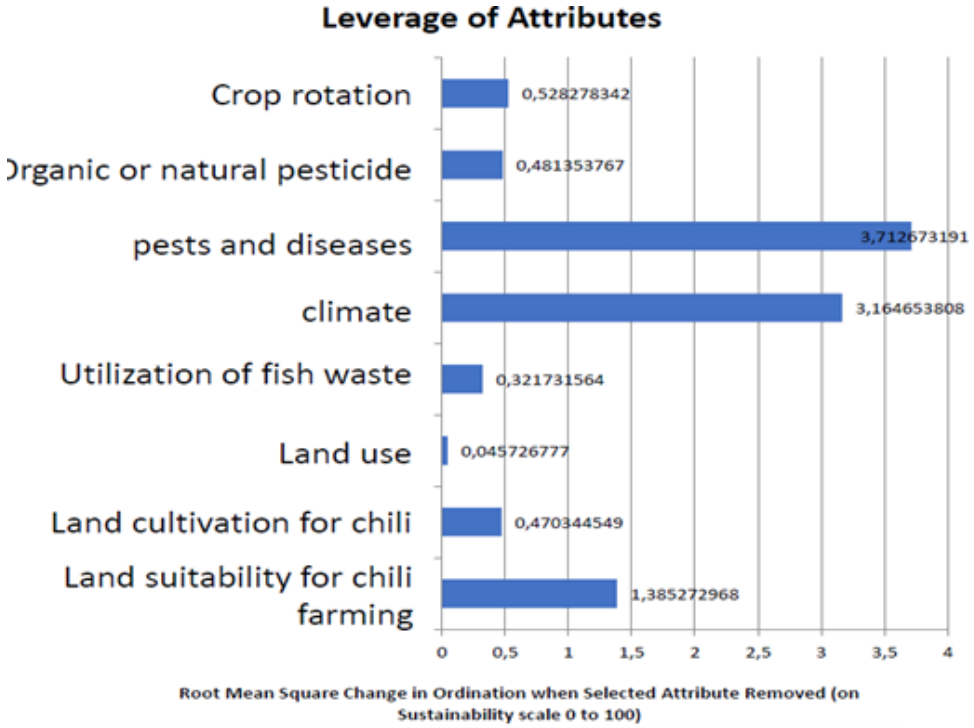

Figure 4. The Attribute of Ecological Dimension

3.4 Sustainability Index of Economic Dimension

The multidimensional analysis of the sustainability status of the RAP-Fish method for the economic dimension of Red Chili Fishing is presented in Figure 5.

The index of red chili farming sustainability index was 24.5. It describes that the economic dimension status of red chili farming is in the unsustainable category because the index value range is 0 - 25. The stress value is 0.15, and thisvalue is below 0.25. It means that the results of this analysis are pretty or feasible. The RSQ value obtained is 0.943 and is close to the value of 1 (one). It explains that the system uses the current attributes. Have presented the behavior of the red chili farming system by 94.60% of the existing system. Thus, all the characteristics of the economic dimension used in explaining the current condition of the red chili farming system are pretty good. The sensitivity observation of the economic size of farming sustainability is presented in Figure 6.

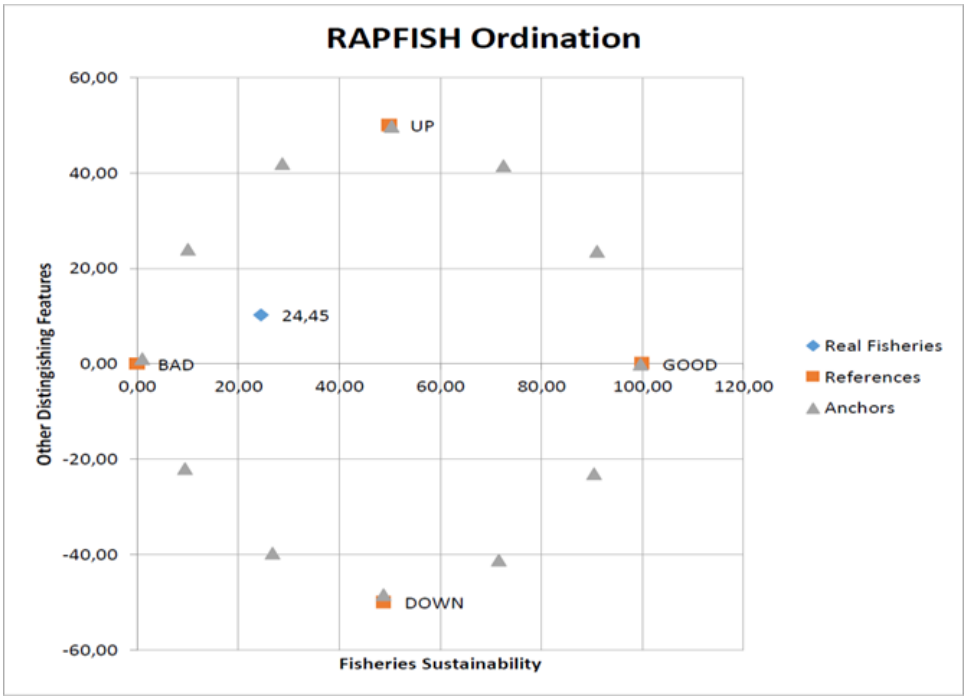

Figure 5. The Sustainability Index of the Economic Dimension Aspect of RAP-FISH

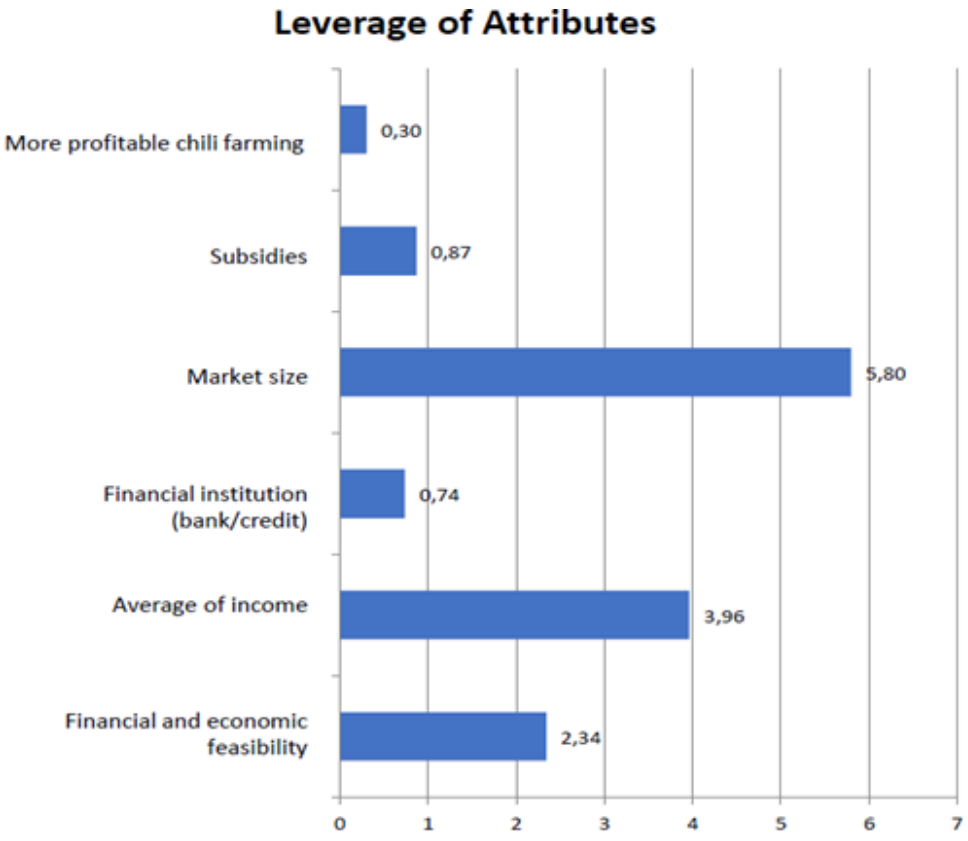

Figure 6. The Attribute of Economic Dimension

The sensitivity analysis of the economic dimension estimates that the most sensitive attribute in chili farming is the opportunity for the market size that can accommodate the results of red chili farming. The available markets are the local market and the national market. Meanwhile, other attributes that can be used as leverage attributes to increase the value of the sustainability index are the average income of farmers and the financial and economic feasibility of farming.

4. Conclusion

Chili farming sustainability index, in terms of social and ecological dimensions, obtained values of 47.36and 43.00, so they are in the less sustainable category. On the other hand, the economic dimension of sustainability analysis obtained a value of 24.45. Therefore, that value stated that the dimension was not sustainable.

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