Policy Scenario of Sustainable Local Soybean Development in Banyuwangi Regency

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Abstract. Banyuwangi Regency is the largest soybean producer in East Java with an average harvest area of 29,149 ha / year in the 2008-2018 period. The fluctuation of soybean production in Banyuwangi Regency, which tends to decline by an average of 6% / year and a decrease in harvested area by an average of 7% / year in the 2008-2018 period, encourages the need for a study of soybean performance. The decline in soybean production and harvested area was caused by several factors, including fluctuations in soybean prices, a very good perception of imported soybeans and trade offs with rice cultivation. To overcome the management of agricultural resources that are increasingly threatening the aspects of sustainability, this research tries to find a solution by finding the leveraging attributes and formulating development policy scenarios as the basis for a sustainable increase in local soybean production and harvest area in Banyuwangi Regency. With the development of policy scenarios, it is hoped that the agricultural sector will remain strong in providing food for the community, especially in the current Covid-19 pandemic conditions. The data analysis technique used is multidimensional analysis followed by Leverage analysis and Monte Carlo analysis. The results showed that the sustainability status of local soybean development in Banyuwangi Regency was 55.10 (the social dimension was quite sustainable), 49.17 (the economic dimension was less sustainable), and 46.90 (the quality dimension was less sustainable). The local soybean development policy scenario includes: changing the food management system. become corporate farming, expand marketing access, and conduct periodic analysis and evaluation.

1. Introduction

Indonesia has been experiencing a deficit in soybean production for many years. Based on data from [1] and [2], in 2017 the production deficit reached 2.67 million tons, which was fulfilled by imported soybeans.

East Java is a production center that has contributed greatly to fulfilling Indonesia's soybean needs, which is an average of 29% / year during the 1993-2015 period. East Java's contribution is the largest compared to 34 other provinces. However, another fact [2], shows that the harvested area of East Java soybean decreased from 433,530 ha (1993) to 208,067 ha (2015).

Banyuwangi Regency is the largest soybean production center in East Java with a harvest area of 25,214 ha in 2017 [3]. Like at the provincial level, at the regency level there was also a decline in harvested area by an average of 4.9% per year in the 2009-2015 period. The fluctuation of soybean

production in Banyuwangi Regency also decreased by an average of 3.8% per year [4], on the other hand there was an increase in average demand of 2.84% per year [2]. This is what drives the need for a study on soybean performance. With the increasingly intense competition with imported soybeans, a policy scenario for the development of local soybeans in Banyuwangi Regency is needed, so that the threat to the sustainability of Banyuwangi as the largest local soybean production center in East Java can be eliminated.

The decline in soybean production and harvested area was caused by several things, including fluctuation in soybean prices [5], the perception of imported soybeans was very good [6] and trade offs with rice cultivation [7]. In order to increase the planting area, the central government has demanded that Banyuwangi district have a planted area of up to 38,000 hectares, while currently it is still 27,373 hectares [8]. This effort is aimed at keeping the agricultural sector strong, especially in the current covid-19 pandemic conditions. The effort taken is to increase the planting area of soybeans by cooperating with Perhutani. However, this method has not yet touched the root of the problem, therefore it is necessary to develop holistic and structured efforts both in the short and long term in a sustainable manner. A sustainable development approach can be carried out by integrating economic, social, environmental, infrastructure / technology, legal / institutional aspects [9] in various fields / sub-sectors, including the food sub-sector [10], the forestry sub-sector [11], and the agriculture sub-sector [12] and [13]. To overcome the management of agricultural resources that increasingly threaten aspects of sustainability, this research tries to find a solution by finding leveraging attributes and formulating policy scenarios for sustainable local soybean commodity development.

The objectives of this study are: analyzing and assessing the status and condition of local soybean land sustainability in terms of social, economic and quality system aspects; and formulating a development policy scenario as a basis for increasing local soybean production and harvest area in Banyuwangi Regency.

2. Literature review

The sustainable economic approach is based on the concept of maximization by caring and maintaining the reserve of resources that can generate profits. The concept of social sustainability is human-oriented and the relationship between the preservation of social stability and cultural systems. The review of sustainable environmental aspects focuses on efforts to maintain the stability of biological systems and the physical environment. According to [14], sustainable agriculture is the best and integrated solution for the problems of worsening soil conditions, pollution, farmer debt, and health problems due to intensive use of pesticides.

Besides these aspects / dimensions, there is one other dimension that affects a sustainable agricultural system, namely the quality dimension. The adoption of a quality management system is a strategic decision for any organization to improve overall performance and provide a foundation for continuous development. The relationship between these three dimensions and the quality dimension is that increasing income and marketing access are in line with improving the quality of products and services (economic-quality dimension), increasing participation and empowerment in order to better understand the organization's suppliers and customers (socio-quality dimension), and the level of water pollution and use of superior seeds can be evaluated through internal audits (environment-quality dimension) [15].

Multidimensional Scaling (MDS) is a statistical analysis to determine the similarity and dissimilarity of variables depicted in geometric space. Furthermore [16] argued that MDS analysis was used to assess each attribute in an ordinal scale based on sustainability criteria. The ordination analysis based on the MDS method is used to compile the index and status of sustainability, both in general and in each dimension. The score of each attribute on each dimension is analyzed multidimensional to determine the points that reflect the position of sustainability. The sustainability index value has a range of 0%-100%. Index scores of 0-25% are categorized as 'poor' (unsustainable), 25-50% are categorized as 'less' (less sustainable), 50-75% are categorized as ' moderately' (quite sustainable)', and 75-100% are categorized as 'good' (very sustainable).

To evaluate the effect of random errors, the Montecarlo analysis is used, which is useful for learning several things, namely: the effect of the error in attribute scoring due to imperfect understanding of the conditions of the research location; the effect of scoring variations due to differences in the opinion of the researchers; the stability of the iterative MDS analysis process; data entry errors or missing data; and the high value of "stress" resulting from the sustainability analysis, the value of "stress" is acceptable if <25% [17].

3. Research method

This type of research used in this research is quantitative descriptive method. The location of the research was determined purposively based on the consideration that Banyuwangi Regency is the region that provides the largest contribution to soybean production in East Java Province. The research was conducted in 2 sub-districts of Banyuwangi Regency. The instrument in this study was a questionnaire, namely a list of questions that had been prepared to conduct unstructured or open interviews. The technique of taking respondents used in this research is purposive sampling. The research was conducted in Banyuwangi Regency, East Java with a sample of 20 experts in the fields of agricultural development, government, academics and farmers. Attributes are determined through three approaches, namely dimensions (social, economic, and quality system). The assessment of each attribute that affects the sustainability of soybean availability in Banyuwangi Regency, East Java Province is carried out on an ordinal scale (scoring).

3.1. Research Stage

1. Analyze the condition of the sustainability status of local soybean commodities.
2. Identify the attributes of levers as the basis for determining the solution to the problem.
3. Develop strategic scenarios for the development of local soybean sustainability policies.

3.2. Data Analysis Technique

- Detecting the level of sustainability using Multidimensional Scaling (MDS) analysis. Through the MDS method, with the help of the RapFood for, the sustainability index value of each dimension (social, economic, and quality system) can be visualized in the form of a kite diagram.
- Furthermore, a leverage analysis (sensitivity) in MDS was carried out to determine sensitive attributes that affect the sustainability of soybean availability in Banyuwangi Regency, East Java Province. Sensitive attributes can be seen in the change in Root Mean Square (RMS) ordination on ijthe X axis. The greater the change in RMS, the more sensitive the e of these attributes will be to the increase in sustainability status [18]. The next stage is Monte Carlo analysis. This analysis is used to estimate the effect of error at the 95% confidence interval. This Monte Carlo index value is compared with the MDS index value to take into account the uncertainty dimension. The difference or difference between the MDS and Monte Carlo sustainability indexes is good, namely < 1.
- Develop strategic scenarios for the development of local soybean sustainability policies. This scenario is a combination of key variables that may occur in the future. In this study the scenarios are grouped into three clusters, namely the pessimistic, moderate, and optimistic scenarios.

4. Result and discussion

The results of data analysis based on data processing using Rapfood are presented in the form of a kite diagram in Figure 4.1 (left). Based on the conditions of the key factors and possible future changes in the management of sustainable soybean commodities, the kite diagram will develop as shown in Figure 1.

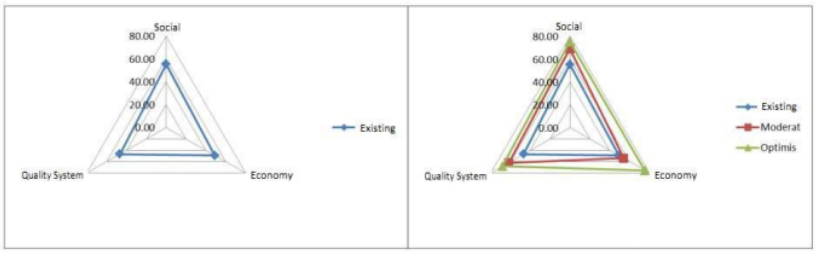

Figure 1. Kite Diagrams for Sustainability Index in Existing, Moderate and Optimistic Scenarios.

The research results achieved are the status of sustainability and leverage factors on the dimensions of social, economic and quality system.

4.1. Social Dimension

Based on data processing using RapFood, the social dimension sustainability status was obtained for 55.10 (Figure 2). A value of this size indicates that the development of local soybeans in Banyuwangi Regency from a social point of view is "quite sustainable".

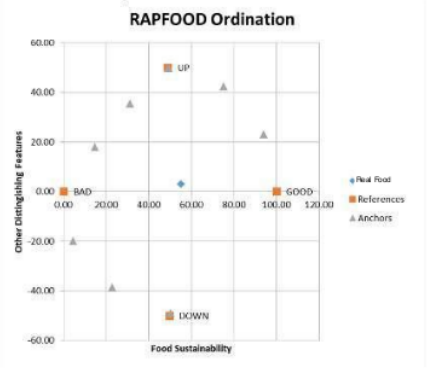

Figure 2. Social Dimension Sustainability Status

The social dimension sustainability status is obtained with a stress value of 0.1435525 and a Montecarlo value of 54.56913. The Leverage attributes show that the greatest value is obtained for the attributes of the Land Management System and Mutual Cooperation (Figure 3). In the social dimension, land management patterns and mutual corporation are important leveraging factors that can be intervened to improve sustainability. Land management patterns are important for the value of food agriculture in the long term, namely that they can regulate the optimal use of agricultural land resources, obtain maximum agricultural food products, and can maintain the sustainability of land resources. Not a few farmers who still manage land individually and do not work lead to mutual corporations. This shows a lack of coordination between farmers which can result in poor agricultural yields.

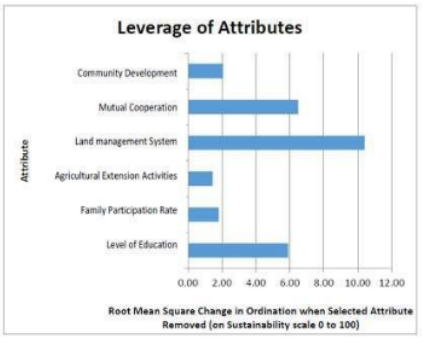

Figure 3. Attributes of Social Dimension Leverages

4.2. Economic Dimensions

The figure for the sustainability status of local soybean commodity development in Banyuwangi Regency shows a figure of 49.17 (Figure 4), meaning that from an economic dimension, its sustainability status is considered "less sustainable". Of course, this is a job that must be addressed immediately.

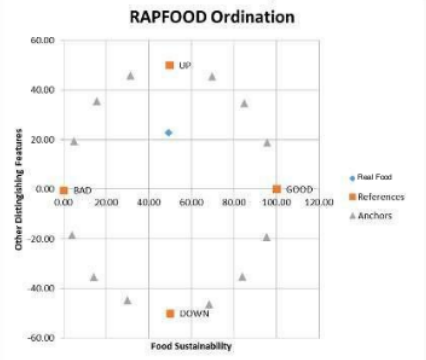

Figure 4. Value of Status of Sustainability in Economic Dimensions

The stress value obtained is 0.1340016 and the Montecarlo value is 48.97. Leverage attributes that are important in the economic dimension consist of Marketing and Land Ownership (Figure 5).

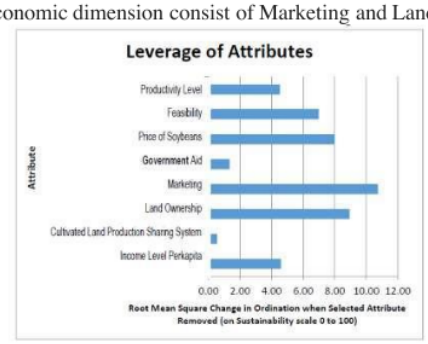

Figure 5. Economic Dimension Leverage Attributes

The market is a challenge for farmers and how to manage these challenges into opportunities. For this reason, it is imperative that farmers join a farmer group in order to share with each other how to penetrate the market and in order to improve their bargaining position. The second leveraging factor in the economic dimension is land ownership. The average land ownership of farmers in Banyuwangi district is 0.3 ha, indicating that farmers must join a farmer group, with more land, there will be many benefits.

4.3. Quality System Dimensions

The sustainability status of local soybean commodity development in Banyuwangi Regency in terms of quality system dimensions shows the number 46.90 (Figure 6), this value indicates a status that is "less sustainable".

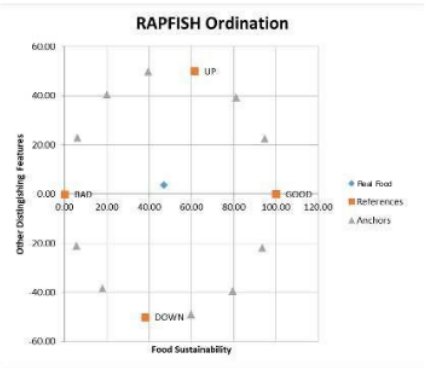

Figure 6. Sustainability Status of Quality System Dimensions

The resulting stress value is 0.16 and the Montecarlo value is 46.98. Important leverage attributes in the quality system dimension consist of Analysis and Evaluation and Understanding of Customer Suppliers (Figure 7).

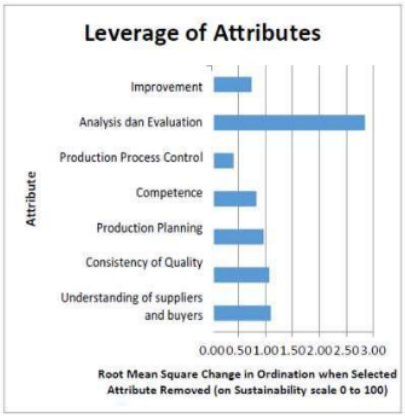

Figure 7. Leverage Attribute in Quality Sistem Dimensions

Evaluation activity is an effort to determine the success or failure of an effort based on the achievement of the criteria set from the start. The most important thing for soybean farmers is the analysis and evaluation efforts related to suppliers and customers. Based on the answers to the questionnaire, it can be seen that the farmers did not perform analysis and evaluation, everything went without evaluation. It is not known exactly how much farmers know about where to get superior seeds and fertilizers and to whom they sell their produce profitably.

Overall, The Monte Carlo of validity indicates that the differences of average value of the two analyses are 0.25. This means that the MDS analysis model is adequate for estimating the sustainability index value of local soybeans in Banyuwangi Regency.

The stress value of 0.13 to 0.16, with a difference of 0.03, indicates the results obtained from MDS analysis is highly accurate (good and fit) and sufficient for assessing the local soybeans development sustainability index in Banyuwangi Regency.

5. Conclusion

5.1. The status of the sustainability of local soybean commodity development in Banyuwangi Regency is as follows

- The Social Dimension is quite sustainable
- The Economic Dimension is less sustainable
- The Quality System dimension is less sustainable

5.2. The leverage attribute consists of:

- Social Dimension: Land Management System and Mutual Cooperation
- Economic Dimensions: Marketing and Land Ownership
- Quality System Dimensions: Analysis and Evaluation and Understanding of Customer Suppliers

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