Development of Agroindustry Based on Region Superiority in The Efforts to Accelerate Economic Growth in Arjasa District

D E Putra[1] and A M Ismail[2]

[12] Agribusiness Management Department, Politeknik Negeri Jember, Mastrip PO Box 164 Jember, 68101, East Java, Indonesia

Email : dhanangeka@polije.ac.id

Abstract. This research attempts to analyze the condition of agroindustry in Arjasa District. Agroindustry index (I_A) is used to determine the superior agroindustry based on its raw material. Thus, the purpose of this study is the application of a strategic management model with the concept of integration between agroindustry and the potential resources. The Agroindustry Index Model (I_A) uses quantitative data on variable land area and production. Data were obtained from Department of Industry and Commerce, Central Bureau of Statistics, Food Crop Agriculture Service, Horticulture and Plantation in Jember Regency. Whereas, the exponential comparison method (MPE) to determine the superiority of the product is based on the assessment of three agro-industry experts, namely from Department of Industry and Commerce, Office of Cooperatives and Micro Enterprises and a lecturer of the agroindustry management study program, Politeknik Negeri Jember. Based on the results that agroindustry made from corn became the superior agroindustry in Arjasa District. Analysis of superior products using the exponential comparison method (MPE) shows that products corn flour is the top seed followed by corn rice, corn cake, emping, and animal feed.

1. Introduction

The added value of agricultural products is closely related to agro-industry, agro-industry is a cornerstone of hope for success in the agricultural sector. As an industry that processes agricultural products, the sustainability of agribusiness ultimately depends on agro-industry. Resources owned by a region can be optimized thanks to business touches from agro-industry, which can make less valuable products economically very expensive so that this is what determines that agro-industry is a pillar in the success of revitalization of agriculture which was launched in the dream of the President of the Republic of Indonesia.

Agricultural problems that are general in nature, namely products that are seasonal and quickly damaged; less or no innovation; very long marketing chain; the welfare of farmers who are concerned, need an appropriate strategy to get a solution to the existing problems. How to maximize the potential of existing resources, to later be used as an agro-industry that can develop economically well.

Based on data from the Central Bureau of Statistics in 2017 [1], in Jember Regency there was one village that was very lagging, 46 villages were underdeveloped, 114 villages were developing, and 60 villages were developed. The number of poor people in Jember Regency in 2017 has increased compared to the previous year. If in 2016 the number of poor people in Jember was 265,100, 2017 rose to 266,900. There was an increase of 0.03 percent. The number of underdeveloped villages and

underprivileged families in Jember is an indication that economic development so far, has not touched the people of the lower layers so that with the existence of the crisis causes remote rural areas to become vulnerable so that they fall into poor areas.

The sub-district where many of the poor people are in Arjasa Subdistrict, the Central Bureau of Statistics data in 2017 states that the total poor population in 2011 was 17,387 and this number increased substantially with time and population growth. This poverty can also be seen from the indicator of the level of education of the community, from 39,463 inhabitants in the Subdistrict of Arjasa, as many as 18,213 people are residents who have never attended school and did not complete elementary school. This can also be seen from the number of villages left behind, as many as 6 out of 6 villages in Arjasa Sub-district are included in 46 underdeveloped villages in Jember Regency.

Although classified as underdeveloped areas, in general, the regions in Arjasa Subdistrict have economic potential that is feasible to be developed, this can be seen from economically to be developed as an agricultural and agribusiness area. Often these potentials do not develop optimally due to limited human resource capabilities, for example in processing, marketing, and capital ownership. Agroindustry is expected to be the economic generator of the community in Arjasa Subdistrict.

Rural development must be carried out with an approach that is appropriate to nature and characteristics. Rural development should follow the four great effort, another one interrelated and constitute the principal strategy of rural development, namely: First, the economic empowerment of rural communities. In this effort capital input and guidance on the use of technology and marketing are needed to enable and make the village community independent; Second, improving the quality of rural human resources in order to have an adequate basis for improving and strengthening productivity and competitiveness; Third, infrastructure development in rural areas. For rural areas, transportation infrastructure is an absolute necessity, because the transportation infrastructure will spur the backwardness of rural communities; and fourth, building rural institutions both formal and informal. Institutions needed by the countryside are the creation of good services especially to spur the rural economy such as financial institutions [2].

This research is very important because it is closely related to the establishment of agro-industry development strategies that optimize the potential of disadvantaged areas based on local resources so that the agro-industry can play a role in contributing to the value of the economy in Jember Regency. One of the hopes of regional autonomy is to increase and equal the welfare of its people, thus the regional government must formulate appropriate and directed development policies [3]. Referring to the things mentioned above, the purpose of this study are (1) designing an agroindustry index model to determine the superiority agroindustry (2) analysis of superiority products based on superiority agorindustry.

2. Method

Research on "Development of Agroindustry Based on Region Superiority in The Efforts to Accelerate Economic Growth in District Arjasa", is a type of descriptive research, using survey methods, data that has been collected is then compiled, analyzed, and explained so as to provide an overview of the phenomena that occur, explain the relationship, test the hypotheses and draw conclusions from the results of the analysis obtained.

Determination of regional superior agroindustry using Agroindustrial Index Method (I_A), which is a quantitative method designed to obtain a comparative value between the variables assumed as determinants of the agroindustry development system in a region. The index is defined as a numerical scale used to compare variables with other variables or with a number of reference numbers. The index is also defined as the number obtained and a formula, which is used to classify a data set [4]. The variables used as input models are (1) Land area, as an indicator of land availability in the preparation of raw material development strategies; (2) Total Production, as an indicator of raw material availability which is a consideration in industrial installed capacity planning;

The Exponential Comparison Method (MPE) is one method for determining the priority sequence of decision alternatives with multiple criteria. Exponential In using the Exponential Comparison Method there are several steps that must be carried out, namely: preparing decision alternatives to be chosen, determining criteria or comparisons of important decisions to be evaluated, determining the importance of each decision criterion, evaluating all alternatives on each criterion, calculating the total score or value of each alternative, and determining the priority order of the decision based on the score or the total value of each alternative [5].

Determining the importance of criteria is done by interviewing experts or through brainstorming agreements. Whereas the determination of alternative scores on certain criteria is done by giving the value of each alternative based on the value of the criteria. The greater the alternative value, the greater the alternative score. The total score for each decision alternative will be relatively different significantly because of the exponential function. The exponential function is one of the most important functions in mathematics, the function functions as a comparison material to make a decision.

3. Result and Discussion

To see the potential of industrial raw materials based on food crops, in table 1 through table 5 is presented the area of food crops and the production of each type of plantation commodity in Arjasa District and its development for several years (2014-2016), then detailed in each District Arjasa.

Table 1. Area of various food crop commodities

No	Type of Commodity	Area (Ha)		
		2014	2015	2016
1	Paddy	3339	3149	3270
2	Corn	265	174	541
3	Peanuts	50	33	59
4	Cassava	133	168	154

Source. BPS, 2015-2017

In table 1, it can be seen that the largest area of food crops is paddy commodity followed by corn, it is clear that there is a reduction in the area of food crops in paddy, corn and other crops. This is most likely due to a shift in land use, from plantation land to residential land, transportation and so on. follow the pace of population growth and the development of a variety of community activities or also due to policy changes. Next in table 2 is a description of the production of each type of food crop commodity.

Table 2. Production of various types of food crop commodities

No	Type of Commodity	Production (quintal)		
		2014	2015	2016
1	Paddy	180000	176520	184830
2	Corn	17260	11460	33220
3	Peanuts	650	430	910
4	Cassava	27050	29980	20840

Source. BPS, 2015-2017

All types of food crop commodities are spread throughout the village area although in varying amounts as shown in the next table.

Table 3. Area and production of food crops in each village in Arjasa District
Plant type: Paddy

No	Village	Plant Area Produce (Ha)	Production (ton)
1	Kemuning Lor	621	3150
2	Darsono	682	3470
3	Arjasa	476	2190
4	Biting	358	1780
5	Candijati	469	2460
6	Kamal	446	2050

Sumber. BPS Arjasa, 2017

Table 4. Area and production of food crops in each village in Arjasa District
Plant type: Corn

No	Village	Plant Area Produce (Ha)	Production (ton)
1	Kemuning Lor	44	278
2	Darsono	42	256
3	Arjasa	31	187
4	Biting	24	132
5	Candijati	22	118
6	Kamal	24	124

Source. BPS Arjasa, 2017

Table 5. Area and production of food crops in each village in Arjasa District
Plant type: Cassava

No	Village	Plant Area Produce (Ha)	Production (ton)
1	Kemuning Lor	5	86
2	Darsono	2	41
3	Arjasa	2	38
4	Biting	-	-
5	Candijati	-	-
6	Kamal	6	103

Source. BPS Arjasa, 2017

Paddy commodity is the most dominant of all, but because of the demand and consumption aspects that do not require added value processing, which is directly processed into rice. hence, rice is not included in food commodities that are analyzed in the determination of superior agro-industries. Determination of Agroindustry and products superiority

This study uses the type of raw material for food commodities as a superior commodity in Arjasa District. The types of agro-industries recorded were agro-industries made from corn, peanuts, and cassava. This analysis is carried out using the agroindustrial index (I_A) method. The variables used are land area and production, data obtained from the Central Bureau of Statistics of the Arjasa Subdistrict [6]. The superior agroindustry ranking for each variable is the rating potential mapping on the logarithm of the variable, the rating potential value used is 1 for the lowest up to 9 for the highest.

The land area variable is shown in table 6. Land area index (I_{LL}) index based on Pr value mapping on the logarithm of the land area value range, so that the leading rank is obtained based on land area index.

Table 6. Land area index of food commodities for agro-industrial raw materials

No	Material	Area (Ha)	**Log**	I_{LL} **(Pr/** land area**)**	**Ranking**
1	corn	541	2,73	9	1
2	peanuts	59	1,77	6	3
3	cassava	154	2,19	7	2

Source. Data processed, 2018

In table 6 it can be seen that the highest I_{LL} is in agro-industries based corn, followed by agro-industries based on raw materials for cassava and peanuts. The next analysis is the production variable as shown in table 7. The raw material production index (I_{PR}) is based on the calculation of the Pr value on the logarithm of the range of production quantities. Superior rankings based on the production index are agro-industries based corn.

Table 7. Index of land area for food commodities for agro-industrial raw materials

No	Raw Material	**Area (Ha)**	**Log**	**I_{LL} (Pr/land area)**	**Ranking**
1	corn	33220	4,52	9	1
2	peanuts	910	2,96	6	3
3	cassava	20840	4,32	8	2

Source. Data processed, 2018

Prioritized Ranking of agro-industry superiority

Based on the analysis that has been done, it can be seen that the value of the agroindustry index for each of the superior agroindustry in Arjasa Subdistrict is presented in table 8. It is known that agroindustry based corn, occupies the highest priority although the difference with cassava-based agroindustry is relatively close, which means that agroindustry based cassava can be used as an alternative of agro-industry.

Table 8. Sequence of superior ranking of agro-industry in Kecamatan Arjasa

Raw Material	Total index (I_{LL}+I_{PR})	Ranking
corn	18	1
peanuts	12	3
cassava	15	2

Source. Data processed, 2018

Determination of superiority Products

The steps in determining the superior agro-industry products are selected from several existing products, namely products that are made from corn as superior. The determination technique used uses the exponential comparison method (MPE), which is one method for determining the priority of decision alternatives with multiple criteria. Previously field observations and expert surveys were conducted to determine product alternatives and their weighting. In table 9 is the result of in-depth interviews with experts[7].

Table 9. Alternative superior agro-industry products

Code	Product Alternative
A	Corn rice
B	Corn cake
C	Corn Emping
D	Cornflour
E	Marning
F	Animal feed

Table 10. Alternative assessment of superior products

No	criteria	Weight	Alternative product value					
			A	B	C	D	E	F
1	Market potential	9	7	6	6	8	6	6
2	Availability of raw materials	7	8	6	7	8	6	7
3	Value-added	6	9	8	6	9	4	5
4	Labor absorption	5	7	5	5	6	5	4
5	Existing technology	8	7	8	8	7	8	8
6	Profit	7	8	8	7	9	7	5
7	Environmental impact	6	7	7	7	7	8	9

Priority ranking of superior products

Based on the calculation of the alternative value of the product with the MPE technique, a superior product sequence is based on the highest value as shown in table 11.

Table 11. Calculation results with exponential comparison method (MPE)

Priority	Selected alternative	MPE value
Superior Product 1	Corn rice	147519516
Superior Product 2	Corn cake	50978609
Superior Product 3	Corn Emping	29614918
Superior Product 4	Cornflour	28669428
Superior Product 5	Marning	28304670

Source. Data processed, 2018

Calculations using the exponential comparison method (MPE) produce five superior products, namely, respectively; 1) corn flour; 2) corn rice; 3) corn cake; 4) corn chips and 5) animal feed.

4. Conclusion

The agroindustrial index method (IA) which utilizes quantitative data types can be used to determine the superior rank of agroindustry although the results are strongly influenced by the number of variables identified as model input. Based on the variables of land area and production from the entire identified agro-industry, placing agro-industries based on corn as the top seed. The superior product analysis using the Exponential Comparison Method (MPE) showed that corn flour products occupy the top seed followed by corn rice, corn cake, emping, and animal feed.

5. Acknowledges

The author would like to thank to Politeknik Negeri Jember in this case the Center for Research and Community Service (P3M) which has provided financial support to this research.

6. References

[1] Central Bureau of Statistics, "Provinsi Jawa Timur Dalam Angka." BPS Jawa Timur, 2017.
[2] A. Agarwal, R. Shankar, and M. K. Tiwari, "Modeling agility of supply chain," *Ind. Mark. Manag.*, vol. 36, no. 4, pp. 443–457, May 2007.
[3] G. Kannan, S. Pokharel, and P. Sasi Kumar, "A hybrid approach using ISM and fuzzy TOPSIS for the selection of reverse logistics provider," *Resour. Conserv. Recycl.*, vol. 54, no. 1, pp. 28–36, Nov. 2009.
[4] S.-P. Chen and W.-Y. Wu, "A systematic procedure to evaluate an automobile manufacturer–distributor partnership," *Eur. J. Oper. Res.*, vol. 205, no. 3, pp. 687–698, Sep. 2010.
[5] K. Kusrini, *Konsep dan Aplikasi Sistem Pendukung Keputusan*. Yogyakarta: Andi, 2009.
[6] M. Kuncoro, *Ekonomi Pembangunan*. Jakarta: Salemba Empat, 2006.
[7] G. B. C. Backus, G. T. Timmer, A. A. Dijkhuizen, V. R. Eidman, and R. P. King, "The impact of a decision support system for strategic pig farm planning on the advice of extension officers," *Comput. Electron. Agric.*, vol. 12, no. 1, pp. 51–64, Jan. 1995.