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Regional Superior Products as The Key to Sustainable Food Security in Jember Regency, Indonesia

Budi Hariono^{1*}, Mokhamad Fatoni Kurnianto², Rizza Wijaya³, Aulia Brilliantina⁴, Andarula Galushasti⁵, Mochamat Bintoro⁶

¹ Department of Agricultural Technology, Politeknik Negeri Jember, Indonesia, budi_hariono@polije.ac.id

² Department of Agricultural Technology, Politeknik Negeri Jember, Indonesia, m_fatoni_k@polije.ac.id

³ Atmospheric Environmental Science Laboratory, Prefectural University of Hiroshima, Japan & Department of Agricultural Technology, Politeknik Negeri Jember, Indonesia, r331007tc@ed.pu-hiroshima.ac.jp

⁴ Department of Agricultural Technology, Politeknik Negeri Jember, Indonesia, b_aulia@polije.ac.id

⁵ Department of Agricultural Technology, Politeknik Negeri Jember, Indonesia, andarula@polije.ac.id

⁶ Department of Agricultural Technology Politeknik Negeri Jember, Indonesia, mochamatb@gmail.com

*Correspondence: budi_hariono@polije.ac.id

Abstract: Understanding the development planning priorities and commodity sub-sector in Jember Regency, it is necessary to acknowledge the prime sub-sector and the primary commodity sector in Jember Regency. Regional products should be able to prioritize the sub-sector and the preferred crop, prime and which is considered a sub-sector basis to optimize the food security in the region. The research was conducted from 2016 to 2021 by several analysis methods: Location Quotient, Analytical Hierarchy Process, and Exponential Comparative Method. The criteria used are based on seven normative criteria. The results showed that plantation and horticultural crops were the basis of sectors in the 2016-2020 survey, with values of 2,1036 and 1,3879. Based on the analytical hierarchy process and exponential comparative method analysis, it is seen that there are many leading commodities in the agriculture sector. These commodities are orange fruit, durian, banana, mushrooms, chili, coffee, and sugarcane.

Keywords: agricultural sector; sustainable; food security; regional development

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1. Introduction

Regional development has a primary goal of improving its desired level of development. One approach that needs to be considered for regional development is sector development (1). A region can develop by developing a leading sector in the region which can encourage the development of other sectors (2). One sector that often gets considerable attention from the government due to its significant role in economic development is the agricultural sector (3). The agricultural sector can be the basis for describing rural economic activities through agriculture-based businesses, namely agribusiness (4). Agribusiness is an activity related to the handling of agricultural commodities in a broad sense covering one or the whole of the production chain (5). Processing inputs and outputs of production, marketing, and institutional supporting activities (6); (7).

Product development excellence in Jember Regency has not yet run optimally. SMEs or MSMEs generally develop superior products. According to (8), the results of sub-district identification as the center of SME in Jember Regency are: Kaliwates, Summersari, and Patrang reach 40.24% or about 101 units, while the remaining 59.76% are in several other sub-districts with the category of 94% industry processing.

According to (9), the determination of regional superior product development is based on the strategic master plan and regional medium-term development plan.

This research aims to develop the potential of superior regional commodities that will spearhead the development of the economic sector in Jember Regency. To spur the low economic growth towards the higher one requires investment. In order to attract investors to Jember Regency, there must be a database on products to be a reference in the development process through the study of priority commodities, potential, reliability, and growth. Therefore, this study is expected to be a reference material to support the development of the leading sector to contribute significantly to the regional economic development, progressive and competitive growth rate of Jember Regency.

2. Materials and Methods

This study used a mixed-method. Qualitative methods give an idea of the territory's potential (10); (11); (12). In comparison, the quantitative method uses 3 (three) analysis methods. The data is in the form of secondary data and primary data. Secondary data is taken from various Government Agencies in Jember Regency and published. Furthermore, the research will be conducted in the form of primary data from stakeholders related to the research objectives. Extraction of primary data information is done by structured interviews using questionnaires. The research location is in Jember Regency. The research time spends from June to August 2021. The data that has been collected is researched and analyzed using the following analytical tools:

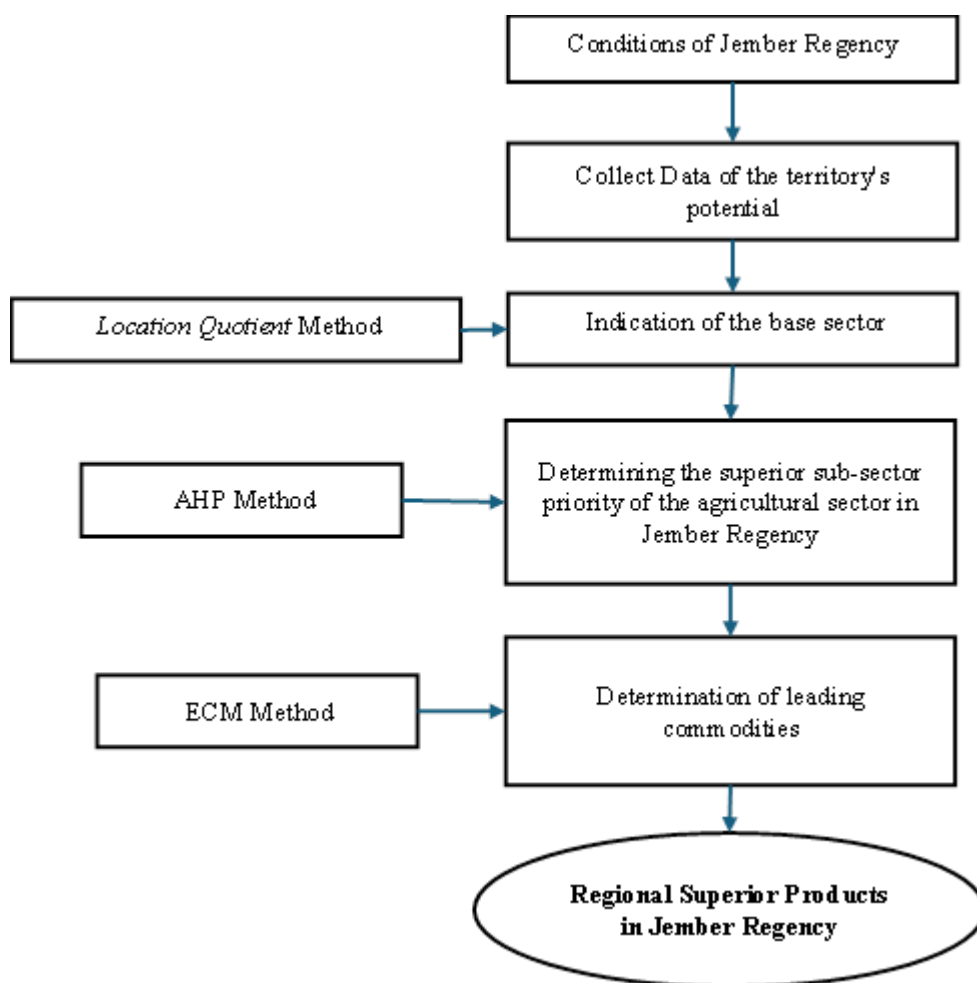


Figure 1. Research flow chart of Regional Superior Products in Jember Regency

2.1. Location Quotient

The Location Quotient (LQ) method is a method that is often used as an indication of the base sector which is then used as an indication of the leading sector. The location quotient method is used to compare the role of a regional sector with the national sector (13). According to (14), LQ is a simple and easy economic analysis tool with all its advantages and limitations (15); (16). It is to find out the only agricultural commodity in Jember Regency that was compared with East Java Province is carried out using the following equation.

Information:

- a. V_i = GDP value of sector i at the lower regional level
- b. V_t = Total GRDP at the lower regional level
- c. Y_i = GRDP value of sector i at the higher regional level
- d. Y_t = Total GRDP at the higher regional level

2.2. The Measurement Criteria of LQ Value Resulting As Follows:

- a. If $LQ > 1$, the sector becomes the base sector or a sector that can be used as a regional power to export its products outside the region concerned.
- b. If $LQ < 1$, then the sector becomes an importer or a non-basic sector as it does not have power, the sector cannot meet its own needs, so it needs supply or imports from outside.
- c. If $LQ = 1$, this sector tends to be closed because it does not conduct transactions outside the region.

Various basic measures in using LQ must be adjusted to research interests and the availability of data sources. Suppose the research is intended to look for sectors/sub-sectors whose economic activities are contributed by the sector (17). In case, the value of GRDP is used as the essential measurement. In contrast, for the primary commodity, the number of production results of the selected commodity can be used as the basis.

2.3. Scoring Method

This method uses 2 (two) stages, and for each stage, the identification method consists of various decision-making tools. These are the Analytical Hierarchy Process (AHP) and the Exponential Comparison Method (ECM). For each stage of observation, the results of each stage as follows:

2.4. Analytical Hierarchy Process

In everyday life, people face making decisions from various alternatives. In a priority setting, it is necessary to test the consistency of the choices that have been made (18); (19). Prof. Thomas Lorie Saaty developed the AHP method at Wharton Business School in the early 1970s, which is used to find the ranking or priority order of various alternatives in solving a problem (20). There are seven normative criteria used as benchmarks in determining superior commodities, namely: Labor absorption; Contribution to the economy; Social culture; Market availability; Capital; Production facilities and infrastructure; Product added value. The criterion with the most significant weight and score will be determined using the AHP. The hierarchy to determine the priority scale for superior commodities is arranged in three levels. The first level is the ultimate goal as the primary goal, which is the only commodity of the agricultural sector in the form of an agricultural sub-sector that can be relied upon to become the prime mover for the regional economy. Then the second level is the criteria for superior commodities that can be used to develop only commodities. Finally, the third level is the intermediate goal, which is a choice of the agricultural sector which consists of 3 sub-

sectors; 1) food crops sub-sector, 2) plantation sub-sector, and 3) horticulture sub-sector (21).

The hierarchy above will be evaluated by those who have been selected or considered experts, academics, and community leaders. Each expert will translate perceptions and information available in a set of questionnaires in pairs based on the scale. Since many experts are involved in giving the fundamental values of this AHP, while each level and criteria need a comparison matrix only, the contents of the comparison matrix cells are calculated based on the average value of all experts.

Table 1. Basic scale in the AHP method

Score	Information	Explanation
1	Both elements are equally important	Two elements have the same effect on the goal
3	One element is slightly more important than the other	Experience and assessment slightly support one element over the other
5	One element is more important than the other	Experience and assessment strongly support one element over the other
7	One element is more important than the other	One vital element is supported and seems dominant in practice
9	One element is absolute important than the other	Evidence in supporting one element has the highest possible affirmation level for the other
2, 4, 6, 8	Values between two close consideration values	Value is given when there are two compromises between the two choice
Invert	If activity i get one point compared to activity j, then j has the inverse value compared to i	

Note: 1 indicates no potential; 2 shows potential but very small; 3 shows potential but slightly small; 4 indicates potential exists but is small; 5 shows enough potential; 6 shows a more than enough; 7 shows a considerable enough potential; 8 shows excellent potential; 9 shows considerable potential.

2.5. Exponential comparison method

Based on the criteria of only commodities that have been weighted through the AHP assessment, it will be determined which commodities are selected by development policymakers as a superior commodity in the local area. There is a reason why at this stage, only policymakers are involved. It is intended to determine whether they can understand and know well about the potential of their area (22). To process perception, a set of questionnaires has been prepared. Each proposed commodity will give a number from 1 to 9 in each criterion prepared in the questionnaire.

The data collected from the perception survey results will then be processed using ECM to calculate the score for each commodity submitted by all informants (23). The commodities that get the highest score are declared as the selected only commodity by policymakers. To calculate the score for each decision choice using ECM: R_{kij} is the relative importance of the criteria for the i -th people's superior commodity in the i -th decision, which is expressed by an ordinal scale (1,2,3); TKK_j is the degree of decision criteria importance, expressed by weight (obtained from AHP); n is the number of decision choices; m is the number of decision criteria.

3. Results and Discussion

3.1. Location Quotient (LQ)

One of the indicators that can illustrate the existence of the primary sector in the Jember Regency is the LQ index. The simple indicator can show the strength or size of the sector's role in an area compared to the region above it or, in this study, East Java Province. Based on the primary sector during the research period from 2016 to 2020, at

the time of the study, from the agricultural sector, the plantation subsector is a subsector that is classified as primary with an average LQ value coefficient of 2,10 or $LQ > 1$, followed by the horticulture subsector with an average LQ value coefficient of 1,39 or $LQ > 1$. In comparison, the other sub-sectors are not classified as primary or non-basic, with each food crops sub-sector having an average value of 0.6558 or $LQ < 1$, livestock sub-sector 0,77, or $LQ < 1$.

The illustration that the sub-sector of plantations and horticultural crops is the strength of Jember Regency area to export its products outside the area concerned. Several commodities have a reasonably large production in this subsector, such as rice and corn in the food crop subsector and the livestock subsector in broiler commodities. Furthermore, each of these subsectors has an average coefficient of $LQ < 1$ or is not classified as the primary subsector.

Based on the results of LQ calculations for selected commodities, it was found that coconut, sugarcane, coffee, Siamese oranges, bananas, durian, chile, mushrooms, broilers, and layer chickens, were essential commodities with an LQ value of > 1 . It can be explained by referring to the definition of LQ, which is a division between shares and shares. A high LQ value does not reflect large production but is a reflection of the relative value of the commodity share within the district.

Referring to the value of the LQ coefficient, the seven essential commodities are the most superior commodities because siamese orange production has a more significant LQ coefficient criterion than other essential commodities, namely 1,75. It is followed by mushroom commodities, horticultural commodities with an LQ of 1,58, chilies at 1,32, sugarcane at 1,25, durian at 1,17, bananas at 1,15, and coffee at 1,00. Considering the range of values, the LQ coefficient values range has commodities with relatively high LQ values, even though empirically, the total land and total production are relatively small and not dominant compared to other commodities. A high LQ value does not reflect large production but the relative value of commodity shares within the district. It can be explained by referring to LQ, the division between shares and shares.

3.2. Analytical hierarchy process

In problem decomposition, a step is taken where a predetermined goal will be systematically described into a structure that composes a series of systems until the goals can be achieved rationally. The decomposition of the problem in determining the superior sub-sector priority of the agricultural sector in Jember Regency is as follows:

3.2.1. Hierarchy 1

Hierarchy 1 contains the goals or objectives to be achieved or solve the problems studied, namely the superior commodities of the agricultural sector.

3.2.2. Hierarchy 2

Hierarchy 2 contains what criteria must be met by all alternatives to be eligible for the ideal choice in determining the priority of the only sub-sector of the agricultural sector and the only commodity of the agricultural sector. Seven normative criteria are used to determine the priority of sub-sectors and only commodities. The criteria are based on the interviews results with experts, which consist of; (1) Employment Absorption, (2) Contribution to the economy, (3) Social Culture, (4) Market Availability, (5) Capital, (6) Production Facilities and Infrastructure, (7) Product Added Value.

3.2.3. Hierarchy 3

It determines subsectors and superior commodities in Jember Regency with an eigenvalue of 0,33. It contains alternative problem-solving options consisting of 3 agricultural sub-sectors, which are; (1) Foodstuff Crops subsector, (2) Horticulture subsector, and (3) Plantation subsector. Based on the results of determining priorities, it

is known that the criterion of market availability is the top priority. Employment is the second priority with an eigenvalue of 0,24. The criteria for contribution to the economy are 0,14, the socio-cultural element is 0,11, the facilities and infrastructure element is 0,10, the value-added element is 0,08, and the last one is 0,01 for capital. The last step in the AHP calculation process is to determine the best alternative by combining the weighting result on the criteria and the alternative weighting based on the criteria (14). These calculation results have produced the best alternative: a superior subsector priority. The plantation sub-sector is the primary sub-sector in the Jember Regency, based on the choice of respondents/experts with an eigenvalue/priority weight of 0,63. Next is the horticulture sub-sector as an alternative to the second superior sub-sector with a priority weight value of 0,24. The food crops sub-sector ranks third with a value of 0,14.

Table 2. Alternative calculation result

Priority Criteria	Eigen value	Sequence Priority
Crop Subsector of Food Material	0,14	2
Plantation Subsector	0,63	1
Horticulture Subsector	0,14	4

The plantation sub-sector is the most prioritized sub-sector to be the superior sub-sector of Jember Regency. To make this plantation sub-sector the most superior, raw materials and contributions to the economy are the most important criteria that must be met. The determination of the superior sub-sector ranking is influenced by the value of the normalized eigenvalues on the seven criteria and the alternative weighting result (respondent's choice).

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3.3. Exponential comparison method

The Exponential comparison method (ECM) can reduce bias in the analysis. In the exponential comparison method, several steps must be done. The step namely compiling alternatives to the various kinds of decisions to be selected, determining the criteria or comparison of essential decision criteria to be evaluated, determining the level of importance of each decision criterion or various consideration criteria, evaluating all alternatives on each criterion, calculating the score or total value on each alternative, and determining the order of priority decisions based on score or the total value of each alternative.

The essential criteria are determined based on seven normative criteria used to determine the priority of sub-sector and only commodities. While the alternatives used are several commodities from 3 sub-sectors in the agricultural sector. Considering the alternative weight value (ECM score), ranking is carried out to determine which commodity is the most superior. Coffee is an essential commodity to be seeded based on the assessment of policymakers and experts with an alternative weight value of 155.276.448 followed by the Siam orange commodity, which received an alternative weight value of 29.263.177. Mushroom commodity became the third superior commodity with a value of 14.179.040.

Table 3. Result of calculation of determination of leading commodities based on ECM

Priority Criteria	Alternate Weights	Priority Order
Coffee	13,14	1
Siam Orange	13,11	2
Mushroom	13,06	3

Plantation commodities are trade crops that are pretty strategic in Jember Regency since they are a source of foreign exchange income in the agricultural sector and, more importantly, the series of production activities, including cultivation and marketing. The horticulture sub-sector dominates the assessment result of 7 superior commodities choices in Jember Regency. It is in line with the LQ calculation results. The determination of superior commodities ranking is influenced by the magnitude of ECM weight values generated from the AHP normalization (Eigen) results on seven criteria and the weighting results of the respondents' choices. After collecting the results of the questionnaire distribution and then looking at the score values on the alternative weights of each commodity, finally, three only commodities are found as chosen by policymakers and experts as the flagship of the Jember Regency Government, that is: 1) Coffee, as the most superior commodity, 2) Siam orange as the second priority, the last one is 3) Mushroom. This is in accordance with the results of research (24), which states that coffee is the leading product of Jember Regency through the application of clean production.

3.4. Discussion

Agribusiness is one of the main activities contributing significantly to the economy (25). Coffee commodities have great potential to absorb labor, contribute to the economy, and have the socio-cultural element, market availability, and significant added value (26); (27). However, the coffee commodity only has sufficient potential to be developed as a regional superior in the Jember Regency, considering the use of production capital and the availability of production facilities and infrastructure (28).

Based on calculation results and discussions above, three criteria become the weakness of agricultural commodities to be used as a superior commodity in Jember Regency, involving capital criteria, product added value, and lack of availability of facilities and infrastructure (29); (30); (31). Improvement of the weaknesses in the three criteria can be made by increasing the competitiveness of only commodities by taking into account the conditions of production factors, market demand conditions, company strategies, and the role of the government (32).

The available land area and the geographical location of Jember Regency as a comparative advantage must be used as a competitive advantage. It is in line with several studies that have been carried out (33); (34); (35). If looking at the price index farmers pay, farmers' production process and transportation costs are pretty high. Farmers in Jember Regency need the assistance of production facilities and infrastructure as well as equalization of capital. Providing transportation facilities and infrastructure for production distribution to commodity markets is expected to reduce production costs. Agricultural development in Jember Regency is expected to increase the quantity, quality of management, and the ability to do business independently and take advantage of market opportunities from agroindustry players.

4. Conclusions

The plantation sub-sector is the only sub-sector of the agricultural sector in the Jember Regency based on the Analytical Hierarchy Process result analysis chosen by

policymakers/experts in the Jember Regency with an eigenvalue/priority weight of 0.2927. The position of the plantation subsector is considered a superior subsector compared to other agricultural subsectors. It has potential in the criteria for contribution to the economy, regional economic base sectors, renewable energy, raw materials, capital, technology, and price criteria. The Location Quotient analysis in 2016 – 2020 also shows that the plantation sub-sector is the only basic sub-sector and has become the regional strength of Jember Regency to export its products outside the area concerned.

Jember Regency Government is expected to increase the superiority of agricultural sector commodities by considering the conditions of production factors, market demand conditions, supporting industries and related industries, company strategies, structure and competition, opportunities, and the role of the government itself.

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