

Clustering of Leading Food Products in the South Sumatra Region

¹Muhamad Rezky Putra Pratama, ²Yanti Pasmawati, ³Christofora Desi Kusmindari, ⁴Muji Gunarto

¹Department of Industrial Engineering, Faculty of Science and Technology, Bina Darma University Palembang, Indonesia

^{2,3}Industrial Engineering Study Program, Faculty of Science and Technology, Bina Darma University Palembang, Indonesia

²Management Study Program, Faculty of Social Humanities, Bina Darma University Palembang, Indonesia

Abstract

This research aims to identify and cluster regional superior food products in the South Sumatra region based on the agricultural, plantation and fisheries sectors using the Location Quotient (LQ) method and a descriptive quantitative approach. South Sumatra agricultural, plantation and fisheries production data starting from 2020-2022 is compared to total production in Indonesia to assess the LQ of each commodity. Policy recommendations include: developing location-specific agricultural infrastructure and technology, increasing added value and standardizing quality, as well as promoting cluster-based products to increase the competitiveness of South Sumatra's superior food products. The research results show 3 main clusters, namely rice (agriculture) producing a total production of 2.7 million tons, production based in Banyuasin Regency, oil palm (plantation) producing a total production of 2.4 million tons, production based in Musi Banyuasin Regency, fisheries which resulted in total production reaching 236 thousand tons of production based in Musi Rawas Regency.

Key words: clusterization, food products, location quotient, superior commodities, South Sumatra

Introduction

Indonesia is a country that has abundant natural wealth. One of them is the South Sumatra region which has a land area of 8,701,741 hectares and is famous for its high quality food.(Hestuningtias et al., 2023; Suparta et al., 2022). Regional superior food products are products that are produced from the natural potential of a region and have superior quality. However, there are still many superior regional food products that are not yet widely known by the public, so the existing market potential has not been utilized optimally(Pasmawati et al., 2016).

Clustering is the process of partitioning a set of data objects into subsets called clusters(Munandar et al., 2017). One way to improve marketing of regional superior food products is to cluster products. Product clustering is a grouping of similar products based on type, quality and other relevant factors(Wulandari et al., 2017). By clustering products, it is hoped that it will make it easier for producers to market their products and increase the competitiveness of regional superior food products in the market(Marvin et al., 2022)(Puspita, 2022)(Sari et al., 2020). in each sector that is grouped, there is still a tendency for one sector to approach other sectors based on the GDP value achieved by that sector. For example, even though sectors are grouped by group ($LQ > 1$), we can group the sectors by looking back at their GRDP values to see how close each development outcome is to each other(Munandar et al., 2017).

Leading sectors are usually the mainstay sectors of a region, whether small or large in scope(Iswahyudi, 2023). Leading sectors are often used as part of comparisons between regions. In the international scope, a sector can be said to be superior if the sector can compete with the same sectors found in other

countries.(Amaliah et al., 2020). Meanwhile, in the national or regional scope, it is not much different from the international scope.

In this case, the leading sector also provides added value in improving the economy, so that economic growth will increase by itself. According to(Nurtia et al., 2022)There are several superior commodities that can become regional criteria and also become drivers of development in other regions, for example (1) Superior commodities must be able to become pioneers in driving the economy. In this case, superior commodities are expected to provide added value to the region so that the region can maximize its expenditure, production and income. (2) Leading commodities are in a strong linkage, both forward and backward linkages. (3) Superior commodities are able to compete with similar products from other regions, both in national and international contexts covering all aspects. (4) Leading commodities from a region have links with other regions.

South Sumatra Province is known as a potential agricultural and maritime area. According to(Winna et al., 2023)Economic strength is determined by the region's leading sectors. South Sumatra has abundant and varied agricultural resources, ranging from food crops, plantations to fishery products. In the agricultural sector, South Sumatra is one of the national food baskets producing rice, corn, soybeans, peanuts, green beans, sweet potatoes and cassava with a harvest area of more than 513.38 thousand ha in 2022(BPS South Sumatra, 2022). In the plantation sector, South Sumatra's mainstay commodity is oil palm with an area of 1.1 million hectares which produces more than 26% of total national palm oil production compared to palm oil industry production in 2022 which will decrease by 10%(GAPKI, 2022).

Literature review

Leading agricultural commodities in South Sumatra

South Sumatra is known as a national food basket with a variety of superior agricultural sector commodities. Some of the main food crops produced include rice, corn, soybeans, peanuts, green beans and cocoa. Agricultural productivity in South Sumatra is above the national average productivity(BPS South Sumatra, 2022). Rice production centers are found in Ogan Komering Ulu, Ogan Komering Ilir, Ogan Ilir and Banyuasin districts. Meanwhile, many chilies, shallots and pineapples are produced from Prabumulih City and Pagar Alam City(Erawati, 2023)(Prasnowo et al., 2017)(Tyas et al., 2022).

The contribution of the agricultural sector to developing countries like Indonesia has always been very important. The choice of the agricultural sector as a pillar of national development is supported by at least 3 reasons. First, the majority of Indonesia's population is still engaged in the agricultural sector or depends on activities that are directly or indirectly related to the agricultural sector. Second, Indonesia is still facing food problems now and in the future, where as a political good, food often has strategic value. Third, Indonesia has not been able to catch up with competition with developed countries in producing industrial products on the international market(Hartono, 2003).

Apart from that, the province of South Sumatra is also known as a national food barn with a significant contribution of food crops. The rice harvest area in South Sumatra ranks 5th largest nationally with a productivity of 6.8 tons/hectare, exceeding the national average of 5.7 tons/hectare. Apart from rice, South Sumatra is also an important producer of other food commodities such as corn, soybeans, peanuts, green beans, cassava and sweet potatoes.(Suparta et al., 2022).

The development of production centers in each district/city is the key to increasing agricultural productivity in South Sumatra. Implementing a cluster system is needed to optimize the supply chain so that it is able to provide sufficient, quality and affordable food(Efriandii et al., 2022). Indonesia is an agricultural country and the agricultural sector plays an important role in the national economy and the survival of society,

especially in its contribution to Gross Domestic Product (GDP), providing employment opportunities and providing domestic food.(Perwitasari, 2013).

Plantation Commodities in South Sumatra

In the plantation sector, South Sumatra's leading commodities include palm oil, rubber, coconut, cocoa and coffee. Palm oil and rubber plantations are being developed in Musi Banyuasin, Banyuasin, Musi Rawas and Ogan Ilir districts.(Giacomin, 2018). Meanwhile, cocoa is mostly produced in Ogan Komering Ilir and Ogan Komering Ulu Regencies. Various derivative products such as CPO, coffee, etc. are also the favorite exports of South Sumatra(Directorate General of Plantations, 2022).

Palm oil is the main plantation commodity and South Sumatra's largest foreign exchange earner. Apart from that, palm oil is one of the plantations whose products have the influence of becoming one of Indonesia's main export commodities(Haryadi, 2021). The total area of oil palm plantations in South Sumatra is 1.3 million hectares with an average productivity of 4 tons of CPO/hectare. The South Sumatra provincial plantation service (2020) noted that South Sumatra CPO production continued to increase from 4.5 million tonnes in 2015 to 5.8 million tonnes in 2020.

Apart from palm oil, rubber, coffee, cocoa, mango, durian, oranges, papaya, pineapple, snake fruit are also mainstays of South Sumatra. To increase added value, implementing plantation clusters is vital through integration between core companies and plasma farmers as well as developing downstream industries(Herdhiansyah et al., 2013).

Based on research(Nurtia et al., 2022)Previously, the results of the Location Quotient (LQ) analysis showed that all plantation subsector commodities in the Riau Province region were base (superior) commodities even though they were only base commodities in certain districts.

Apart from that, the obstacle faced is that there are not many studies that have carried out specific clustering of leading plantation commodities in South Sumatra. In fact, clustering can be the basis for developing superior regional products in South Sumatra(Hestuningtias et al., 2023).

Leading Fishery Commodities in South Sumatra

The fisheries sector in South Sumatra Province is a leading sector. Apart from providing a source of food, namely animal protein, this sector also provides employment opportunities(Heirina, 2023). Issues related to the level of production of fisheries cultivation in each province in Indonesia, especially those which are the main commodities in the marine and fisheries sector, South Sumatra's leading commodities include tiger prawns, milkfish, tuna, snapper, catfish and tilapia(Maulana et al., 2021). Analyzing the contribution of the fisheries sector. Shrimp are widely caught in the waters of Banyuasin Regency, Ogan Ilir and Palembang City. Meanwhile, milkfish and tilapia are widely cultivated in ponds in Banyuasin and Musi Banyuasin districts. Apart from that, various processed products such as nuggets, shredded meatballs, fish balls, crackers and others are regional favorites.(Diah et al., 2021).

In the fisheries sector, South Sumatra is known as a producer of shrimp and milkfish commodities. Shrimp ponds in South Sumatra reach an area of 22.5 thousand hectares with a production of 102 thousand tons in 2020 or around 30% of total national shrimp production. Meanwhile, milkfish production reached 161 thousand tons with an added value of 1.6 trillion rupiah (DKP South Sumatra, 2022).

Based on research results from(Pradana, 2019)So the calculation results obtained using the Location Quotient (LQ) method show that mackerel, tuna and kwee are the main fisheries catches in most sub-districts in Aceh Jaya Regency. Apart from that, the value of the proportional shift component provides

information that all marine capture fishery products except the shrimp group have experienced rapid growth and have become regional specialties in every Aceh Jaya District.

Apart from that, the problem is that there is still a lack of specific clustering research on superior fisheries commodities in South Sumatra. However, it is important as a basis for developing superior regional products (Adam, 2018; Heirina, 2023)

Location Quotient Analysis

Location Quotient (LQ) is a location analysis method to see the level of specialization or concentration of economic activity in an area relative to a wider area. Combination analysis of Location Quotient (LQ) and Dynamic Location Quotient (DLQ) can be used to map superior and potential commodity clusters in an area (Astasari et al., 2018).

Location Quotient (LQ) analysis is useful for determining the level of specialization (basic or non-basic) of a food commodity in the South Sumatra region compared to the wider region. Apart from that, by using Location Quotient (LQ) analysis we can map production centers superior food commodities in each Regency/City region in South Sumatra (Ahdan et al., 2015). Study (Selatan et al., 2017) carried out Location Quotient (LQ) and Dynamic Location Quotient (DLQ) calculations for South Sumatra's leading export commodities for the 2010-2014 period. The results show that the plantation sector with palm oil, rubber and cocoa commodities has a Location Quotient (LQ) and Dynamic Location Quotient (DLQ) value of > 1 , which means it is a superior export commodity.

Temporary (Marvin et al., 2022) conducted a Dynamic Location Quotient (DLQ) analysis of the fisheries sector in South Sumatra. The results showed that shrimp and fish commodities are the leading commodities in South Sumatra because they have the highest Dynamic Location Quotient (DLQ) compared to other fishery commodities.

Research methods

The method used in this research is a literature study of regional superior food products in the South Sumatra region. Data obtained using secondary data will be analyzed using clustering techniques to group similar products based on type, quality and other relevant factors based on official South Sumatra BPS data.

This type of research uses quantitative descriptive methods with Location Quotient (LQ) analysis techniques to map South Sumatra's superior commodities in the agricultural, plantation and fisheries sectors. (Astasari et al., 2018).

The type of data used is secondary data, time series, production values of several agricultural commodities (rice, corn, cassava, peanuts, soybeans), plantations (oil palm, rubber, coconut, cocoa, mango, orange, banana, coffee, durian, pineapple, papaya and salak) and fish (fisheries) in South Sumatra over the last 3 years. Data comes from the official publication of the South Sumatra Central Statistics Agency.

The data collection method was carried out through literature studies of scientific journals, annual reports from the South Sumatra Agriculture and Fisheries Service, and the official BPS South Sumatra website to obtain data on selected commodity production from 2020-2022.

Data analysis method

Data on agricultural, plantation and fisheries production values are processed and analyzed using the Location Quotient (LQ) technique, to see whether basic or non-basic commodities at the regional level. To see shifts in basic or non-basic status between periods, the Location Quotient (LQ) formula and the

interpretation of the results have been explained in CHAPTER 2 of the Literature Review. Data analysis using Microsoft Excel software.

The conclusion drawing method is drawn inductively based on the results of the Location Quotient (LQ) analysis and the formulation of the implications of the research results for the development of leading commodity cluster policies in South Sumatra. By using quantitative methods and Location Quotient (LQ) techniques, it is hoped that mapping of superior agricultural, plantation and fishery commodities that have high competitiveness in South Sumatra can be obtained, making it useful as a recommendation for industrial cluster development for the government.

Discussion

Based on the results of the clustering of the main agricultural, plantation and fishery products in South Sumatra, several main clusters were collected for each commodity as follows:

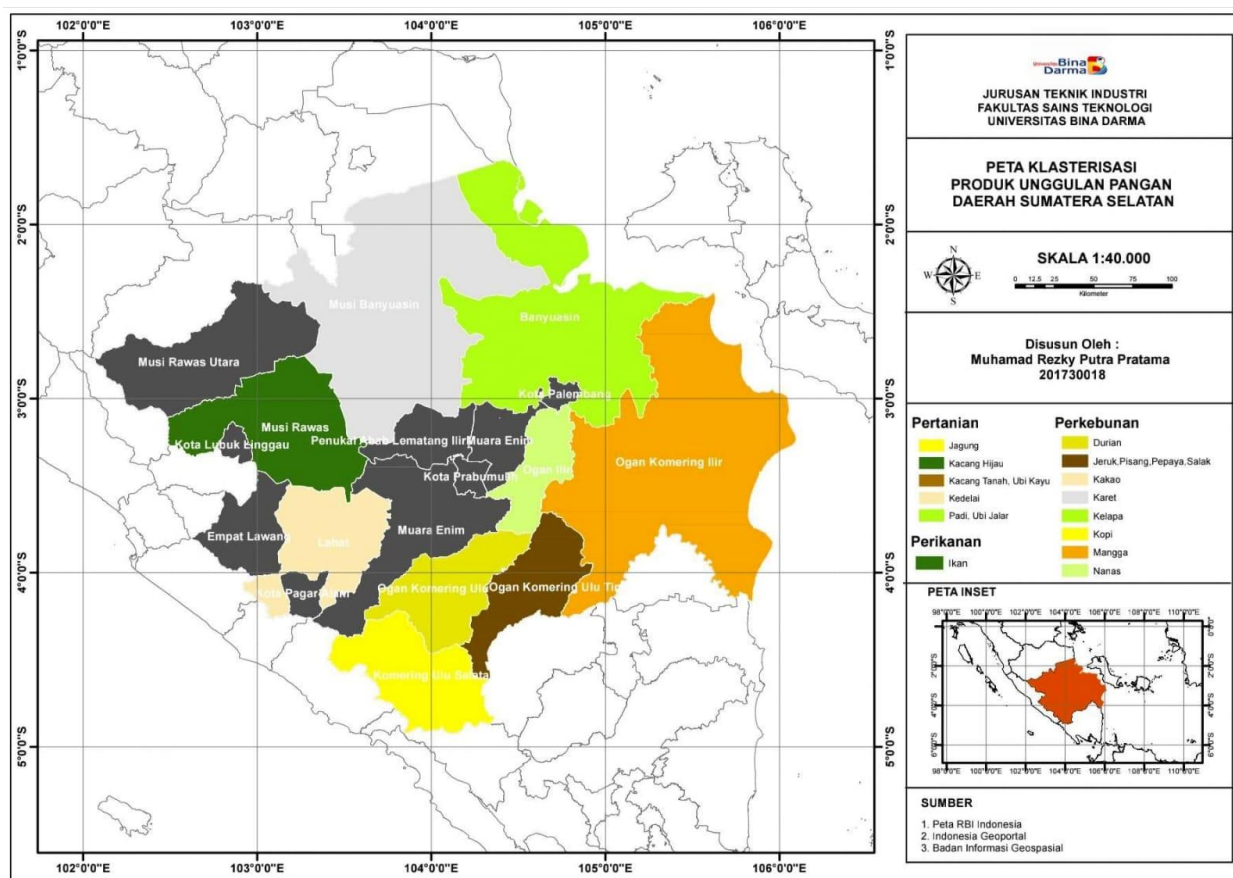


Figure 1. map of the main cluster areas for agriculture, plantations and fisheries in South Sumatra

Leading Agricultural Commodity Cluster

South Sumatra is known as a national food basket with a variety of superior agricultural commodities. Based on cluster analysis carried out on 7 main food crop commodities, 3 leading agricultural clusters were formed in South Sumatra.

Rice Cluster

Rice is the main food commodity in South Sumatra with total production reaching 2.7 million tons. The rice production center is in Banyuasin Regency which contributes around 21% of South Sumatra's total rice production. Rice productivity in Banyuasin reached an average of 5.2 tonnes/ha, higher than the provincial average of 4.9 tonnes/ha. The comparative advantage of Banyuasin Regency for rice development is supported by the availability of extensive technical irrigated rice fields. The results of the Location Quotient

(LQ) analysis of rice in Banyuasin Regency were 1.21 (>1) indicating that Banyuasin is the rice base in South Sumatra.

Corn Cluster

Corn is the largest secondary crop commodity in South Sumatra with production reaching 1.15 million tons. The corn production base is in South Ogan Komering Ulu Regency with a contribution of 16% to total production. The average corn productivity in South OKU reaches 4.3 tonnes/ha. Corn development is supported by the suitability of dry land and climate as well as technological support for superior hybrid corn varieties. The results of the Location Quotient (LQ) analysis of corn in South OKU Regency were 1.15 (>1) confirming South OKU as a corn base.

Soybean Cluster

Soybean production in South Sumatra reached 502 tons. Lahat Regency is a center for soybean production, contributing 30% of total production. The average soybean productivity in Lahat reaches 1.5 tonnes/ha. Soybean development is supported by the availability of dry land and superior soybean variety technology. The results of the Location Quotient (LQ) analysis for soybeans in Lahat Regency were 1.52 (>1), confirming that Lahat is a soybean center.

Peanut Cluster

Total peanut production in South Sumatra reached 825 tons. The production base is in East Ogan Komering Ulu Regency with a contribution of 32% to South Sumatra's production. Average productivity is 0.9 tons/ha, supported by superior varieties and integrated pest control. The results of the Location Quotient (LQ) analysis for peanuts in East OKU Regency were 1.28 (>1), proving that East OKU is the base for peanuts.

Green Bean Clusters

South Sumatra's green bean production reaches 250 tons. The production center is in Musi Rawas Regency with a share of 42% of total production. The average productivity is 0.75 tons/ha supported by the superior Galur green bean variety. The results of the Location Quotient (LQ) analysis of green beans in Musi Rawas Regency were 1.75 (>1) indicating that Musi Rawas is a center for green beans.

Cassava Cluster

South Sumatra's total cassava production reached 167 thousand tons. The production base is in East OKU Regency with a contribution of 25% of South Sumatra's production. The average productivity is 16 tons/ha supported by superior disease-resistant varieties and the best cultivation techniques. The results of the Location Quotient (LQ) analysis of cassava in East OKU Regency of 1.33 (>1) identified East OKU as a base for cassava.

Sweet Potato Clusters

South Sumatra's sweet potato production reaches 14 thousand tons. The production center is in Banyuasin Regency with a contribution of 30% of South Sumatra's total production. The average productivity of sweet potatoes reaches 12 tonnes/ha. The results of the Location Quotient (LQ) analysis of sweet potatoes in Banyuasin Regency were 1.15 (>1) confirming Banyuasin as a center for sweet potatoes.

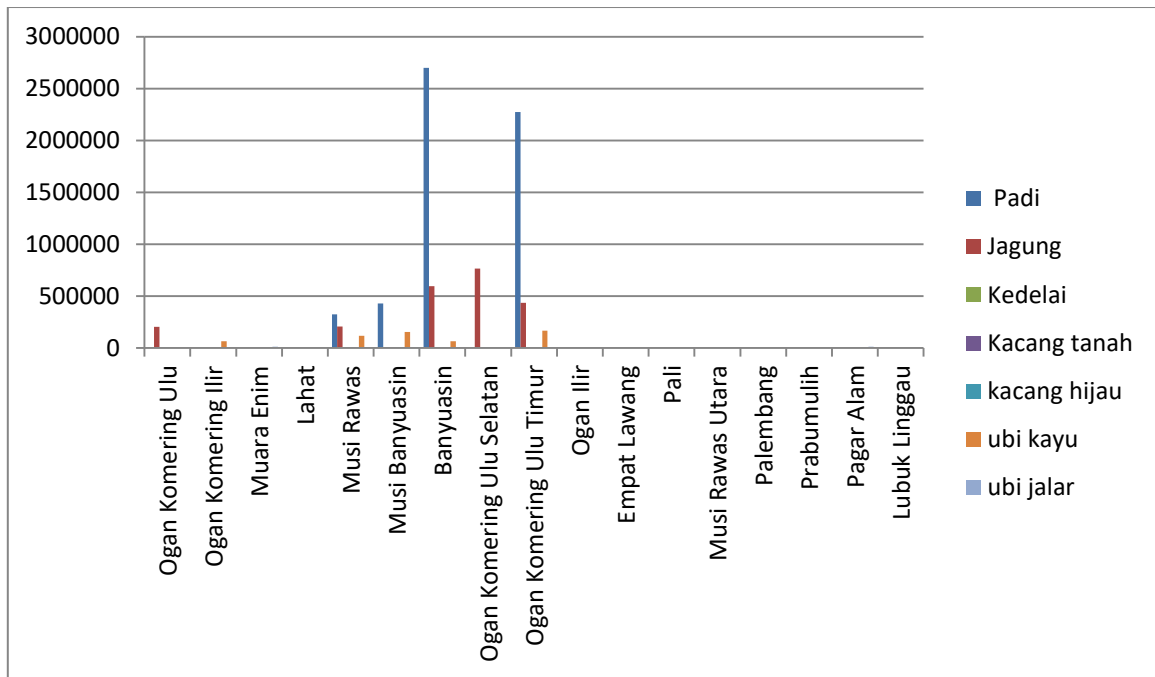


Figure 2. 5 ranking of agricultural commodity production results within 3 years

Leading plantation commodity cluster

Plantation is South Sumatra's mainstay sector. There are 4 main clusters of plantation commodities in this province, namely palm oil, rubber, coffee, coconut.

Palm Oil Cluster

Palm oil is the main plantation commodity in South Sumatra with a total area of 665 thousand hectares and production of 2.416 million tons. The oil palm center is in Musi Banyuasin Regency, with a contribution of 56% to the total area and palm oil production of South Sumatra. The average productivity of palm oil in Musi Banyuasin reaches 22 tons of FFB/ha. The land and climate of Musi Banyuasin are very suitable for oil palm development. The results of the Location Quotient (LQ) analysis for oil palm in Musi Banyuasin Regency were 1.32 (>1), confirming Musi Banyuasin as a base for oil palm.

Rubber Cluster

Total natural rubber production in South Sumatra reaches 640 thousand tons. The rubber production base is in Musi Banyuasin Regency, contributing 51% of South Sumatra's rubber production. Average productivity reaches 0.9 tons/ha/year. Rubber is widely developed as an intercrop between oil palm. The results of the Location Quotient (LQ) analysis of rubber in Musi Banyuasin Regency were 1.21 (>1), confirming that Musi Banyuasin is a rubber center.

Coffee Cluster

Coffee production in South Sumatra reached 164 thousand tons. The coffee center is in South Ogan Komering Ulu Regency, contributing 42% of South Sumatra's total coffee production. Average productivity of 0.8 tons/ha is supported by the development of superior varieties and the application of good agricultural practices. The results of the Location Quotient (LQ) analysis of coffee in South OKU Regency were 1.46 (>1), proving that South OKU is a coffee base.

Coconut Cluster

Total coconut production in the form of copra in South Sumatra reached 691 thousand tons. The production base is in Banyuasin Regency with a contribution of 30% of South Sumatra's production. Average productivity is 1 ton of copra/ha. Processing into copra is mostly carried out by small and medium

industries. The results of the Location Quotient (LQ) analysis for coconuts in Banyuasin Regency were 1.18 (>1), identifying Banyuasin as a coconut center.

Cocoa Cluster

Cocoa production in South Sumatra reaches 6 thousand tons. The cocoa center is in Lahat Regency, contributing 67% of South Sumatra's total cocoa production. Average productivity is 0.5 tons/ha supported by superior cocoa varieties and integrated pest control. The results of the Location Quotient (LQ) analysis of cocoa in Lahat Regency were 2.22 (>1), indicating that Lahat is the basis for cocoa.

Fruit Cluster

Some of the leading fruit commodities in South Sumatra include mangoes in OKI, durian in OKU, oranges in East OKU, bananas in East OKU, papaya in East OKU, pineapple in Ogan Ilir, and snake fruit in East OKU. Productivity ranges from 5-30 tons/ha depending on the type of fruit. The results of the Location Quotient LQ analysis of fruits such as mango, durian, orange, banana, papaya, pineapple and salak in several districts are >1, confirming the fruit production base in each of these regions.

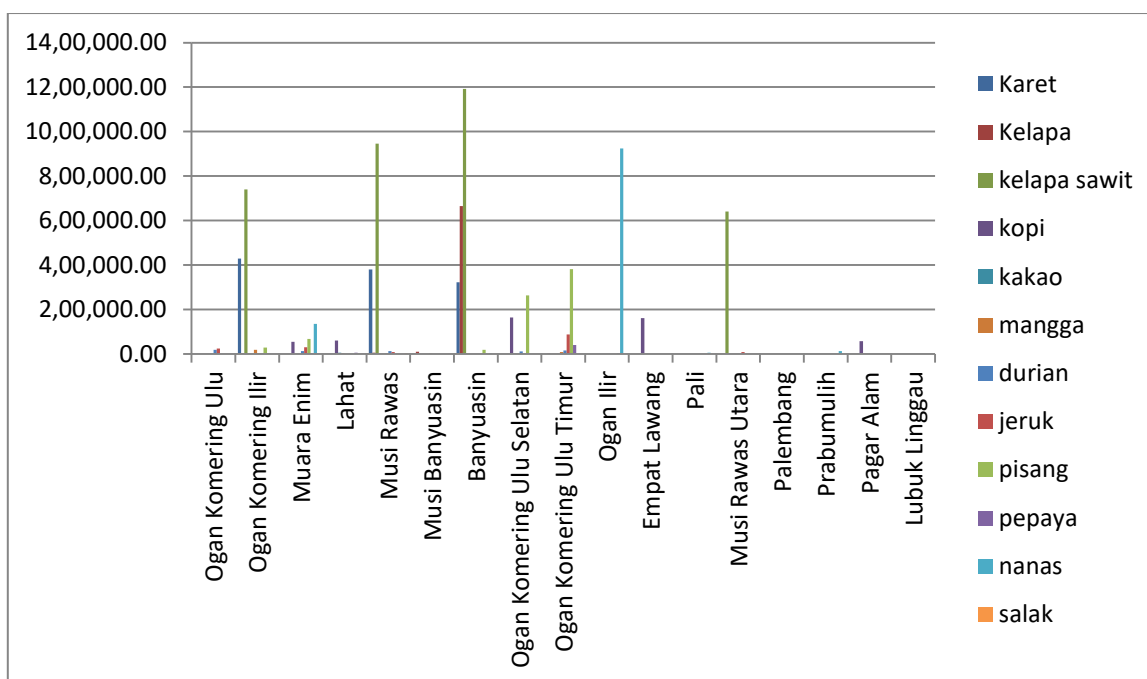


Figure 3.5 ranking of plantation commodity production results within 3 years

Leading fisheries commodity cluster

Based on analysis of capture fisheries production data for 3 years in South Sumatra, several main production centers are known, namely:

Capture Fisheries Cluster

Total capture fisheries production in South Sumatra for 3 years reached 987 thousand tons. The largest production center is in Musi Rawas Regency with a contribution of 24% to the total capture fisheries production of South Sumatra. Musi Rawas capture fisheries production reached 236 thousand tons over 3 years. The main types of fish caught are baung, catfish, tilapia and snakehead fish. Musi Rawas has many rivers such as the Musi River which have potential for developing capture fisheries.

The second center for capture fisheries is in Ogan Komering Ilir Regency with production over 3 years reaching 201 thousand tons or around 20% of South Sumatra's total production. The main catch is shrimp

and sea fish such as mackerel, tuna and mackerel. OKI has access to the Java Sea which is rich in fish resources.

Palembang City occupies the third center with capture fisheries production of 124 thousand tons (13%) over 3 years. The catch is dominated by river fish such as catfish, baung, tilapia, catfish and snakehead. Apart from that, there are also shrimp and crab.

The fourth center is in East Ogan Komerling Ulu Regency with production of 102 thousand tons (10%). The main types of catch are tilapia, tilapia, goldfish and snakehead. East OKU is crossed by the Lematang River which is rich in fishing potential.

Banyuasin Regency occupies the fifth center with production of 97 thousand tons (10%) for 3 years. The dominant catches are shrimp, crab, pomfret, snapper and grouper. Banyuasin is close to the Java Sea so it has potential for marine fisheries.

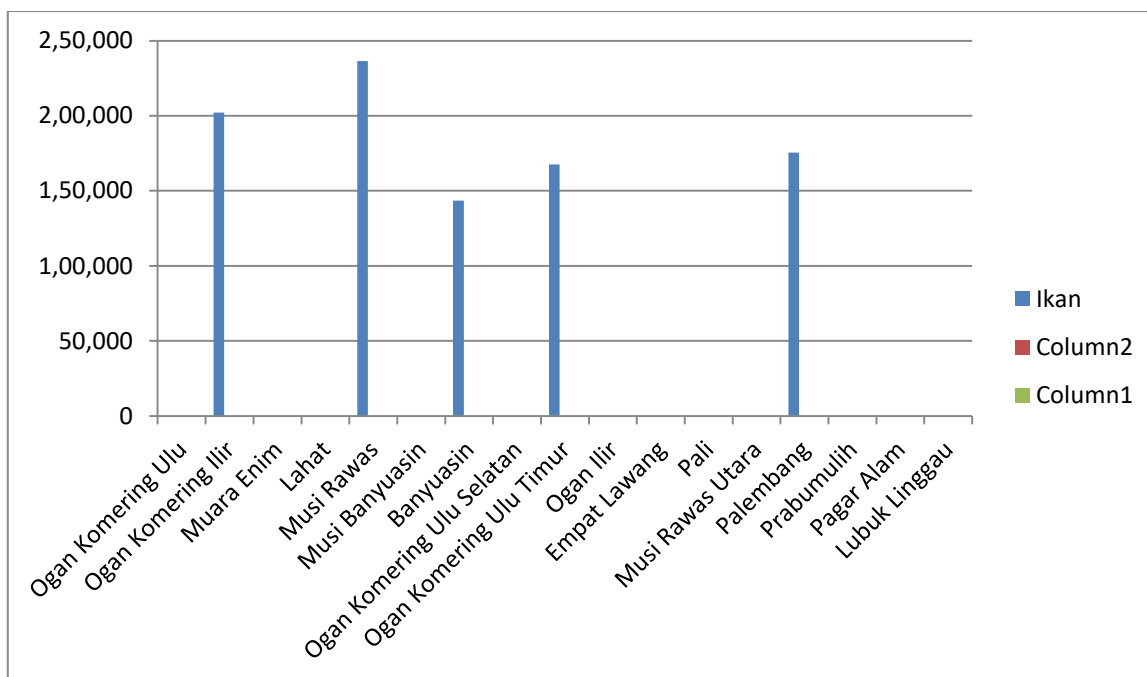


Figure 4.5 ranking of fishery commodity production results within 3 years

Conclusion

Based on the results of analysis of agricultural, plantation and fishery commodity production data in South Sumatra for 3 years using the Location Quotient (LQ) method, several things can be concluded as follows:

Several major food crop production centers were identified in South Sumatra based on LQ values >1, including: rice in Banyuasin Regency, corn in South OKU Regency, soybeans in Lahat Regency, peanuts in East OKU Regency, green beans in Musi Rawas Regency, cassava in East OKU Regency, and sweet potatoes in Banyuasin Regency.

Validated plantation production centers based on LQ values >1 include: oil palm in Musi Banyuasin Regency, rubber in Musi Banyuasin Regency, coffee in South OKU Regency, coconut in Banyuasin Regency, cocoa in Lahat Regency, and several fruit commodities in several regency.

The capture fisheries production base areas based on the highest to lowest LQ values are: Musi Rawas Regency, OKI Regency, Palembang City, East OKU Regency, and Banyuasin Regency.

LQ analysis is in line with and strengthens the identification of production center clusters based on production data, so that it can be used as a reference for policies to accelerate agricultural, plantation and fisheries development in South Sumatra in specific locations.

Apart from that, the limitation of this research is that the number of commodities analyzed is limited and does not take into account market aspects and competitiveness. And it is recommended for further research, namely expanding the scope of agricultural, plantation and fishery commodities analyzed, then using additional analysis such as market and competitiveness analysis to validate superior commodities, carrying out in-depth studies related to product development for each cluster formed.

Thus, this research has succeeded in identifying the main food production centers in South Sumatra based on the LQ analysis approach. The research results can be used to formulate policies and programs to increase productivity in the agricultural, plantation and fisheries sectors that are more focused and in line with the potential of the region in South Sumatra.

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Author profile

Muhammad Rezky Putra Pratama, was born in Palembang on March 14, 2002. The first of two children is currently pursuing a bachelor of Industrial Engineering at Bina Darma University, Palembang. Mbkm alumni of Industrial Engineering laboratory work practice internship program in 2023.

Chirsofora Desi Kusmindari, born in Jakarta, December 19 1972. The child of 1 of 3 siblings completed Bachelor's Degree in Industrial Engineering at Atma Jaya University Yogyakarta in 1996 and continued his Master's Degree at the Bandung Institute of Technology and Industrial management study program in 2001. Worked as a lecturer in the Industrial Engineering study program starting in 1997 at STT MUSI Palembang. In 2008 he moved home-based and became a permanent lecturer at Bina Darma University until now. Apart from being a permanent lecturer, Desi Ch also serves as editor in chief of the TEKNO journal which has been accredited by SINTA 5. Currently he serves as Head of the Industrial Engineering Study Program at Bina Darma University, Palembang.

Yanti Pasmawati, born in Palembang, January 5 1985, started his career as a lecturer at Bina Darma University, Palembang in 2006, giving the author the opportunity to continue developing his knowledge in the field of industrial engineering. This industrial engineering expertise begins with obtaining a bachelor's and master's degree in industrial engineering at the National Development University "veteran" Yogyakarta. Furthermore, efforts to develop knowledge are also continuing by continuing with a PhD in industrial engineering at Gadjah Mada University with expertise in Product Management.

Muji Gunarto Assoc. Prof. At the Faculty of Social Sciences and Humanities, Bina Darma University, Palembang, Indonesia. His current position is Functional Head of Management. His undergraduate degree was obtained from the Faculty of Statistics, Padjadjaran University, Palembang, Indonesia. The Doctoral degree is obtained from the Doctoral Program, University of Education Indonesia. Several books and scientific works have been published in Scopus and Sinta-Indexed journals.