

Leading Commodities for Food Crops in Kulon Progo Regency

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Abstract. This study aims to determine the leading commodities in Kulon Progo Regency and provide directions for the development of food crop commodities in Kulon Progo Regency. This analysis is carried out by comparing food crop commodity data at the sub-district level with food crop commodity data at the district level. This research is based on data taken from the Central Statistics Agency (BPS) with a period of 2012-2021. The analytical tools used in this research are Location Quotient, Shift Share, Klasen Typology dan Scalogram. Cropsresults of this analysis can create a cluster to determine the direction of the development of food crops sub-sector commodities in Kulon Progo Regency.

1 Introduction

Development is a series of changes that lead to progress. Basically development is aimed at economic growth and improving the quality of people's lives in a better direction [1, 2]. As a developing country, Indonesia always strives to improve the standard of living of its people through development in all fields. As an agrarian country, economic development must be in line with the competence of superior products in each region [3], especially agricultural products. Indonesia's agricultural development is considered important for national development as a whole [4] because most of the population in developing countries, including Indonesia, depends on the agricultural sector [5]. Agricultural development refers to the strategic management and utilization of agricultural ecosystems with the aim of preserving and enhancing their biological diversity, productivity, regenerative capacity, vitality, and overall functionality [6]. Agricultural development aims to increase the yield and quality of production, increase the income and standard of living of the community. The goal of agricultural development is considered a top priority for achieving self-sufficiency in food [7]. Agricultural development aims to develop existing economic potential, namely through optimal utilization of natural resources [8].

There are several factors that underlie the importance of the role of agricultural development in Indonesia, including:

- a) The resource potential is large and varied;
- b) The share of national income is quite large;
- c) The size of the share of national exports;

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- d) The number of people who depend on the agricultural sector for their livelihood;
- e) Its role in providing food for the community;
- f) Become a growth base in the countryside.

Efforts to achieve the goals of agricultural development must be carried out from the smallest area first in each region. The regional approach to agricultural commodities is an effort made to achieve better productivity of agricultural products by taking into account the characteristics of the land [9]. If the implementation of regional development priorities is not in accordance with the potential possessed by each region, this will result in a slow growth process in the region concerned. The selection of crops planted on agricultural land has a crucial role in determining the income of farmers and the overall success of economic growth in the respective region [3].

Several studies that have been the same as the research conducted are: Nasikh et al., [9] entitled "Agricultural land resource allocation to develop food crop commodities: lesson from Indonesia" with the result of the basic scenario suggest commodities in East Java province: corn, peanut, and rice; South Sulawesi province: corn and rice; West Nusa Tenggara province: corn, peanut, and rice; and Central Java province: soybean and mungbean.

Based on the research by [3], it can be inferred that the Probolinggo regency experiences a deficit in the self-sufficiency of its food supply, particularly in commodities such as soybeans, meat, eggs, and fish. Consequently, the current production levels fail to meet the consumption demands of the local population within a given year. In contrast, it can be observed that the food supply and demand in Jombang regency exhibit a state of self-sufficiency, with the exception of soybeans. Various commodities, including rice, grain, meat, eggs, milk, and fish, have effectively fulfilled the demands of the populace. In order to attain sustainable food self-sufficiency, the local administrations in Probolinggo and Jombang regencies have the potential to enact a range of policies. These policies may encompass bolstering food reserves, establishing food storage infrastructure, and advocating for food diversification.

Based on this background, the objectives of this study were formulated, including: 1) Identify which food crop commodities have comparative and competitive advantages in each sub-district in Kulon Progo Regency. 2) To develop a planning strategy for the development of the food crops sub-sector in Kulon Progo Regency based on the completeness of existing infrastructure in each sub-district in Kulon Progo Regency.

2 Material and method

2.1 Agricultural Sector

Agriculture is the largest sector in almost all developing countries. In some developing countries, agriculture often functions as the primary source of individuals' livelihoods [10]. The agricultural sector is a sector that has received considerable attention from the government considering the role of the agricultural sector is very important in the framework of long-term economic development or in the framework of the nation's economic recovery. Agriculture itself as a provider of employment, producer of raw materials, needs to be known that the agricultural sector is an important part of life which in everyday life naturally requires basic needs such as clothing, food and shelter to be fulfilled. The agricultural sector is able to meet the most important human needs, namely in terms of fulfilling needs.

The agricultural sector plays an important role in economic development, especially in an agrarian country like Indonesia [5], which has a tropical climate and is located in the equatorial region. If the government is serious about planning development and managing

the existing natural potential, then progress in agriculture will be achieved and the welfare of the community, especially agricultural managers, can be increased [11]. The support needed is not only from the government but also from private sector stakeholders in order to actively participate in initiatives aimed at empowering farmers [5].

There are three stages in agricultural development. The stages needed in agricultural development are:

- a. Traditional farming (subsistence farming). Traditional agriculture, where some of the output produced will be consumed by the farming family. In this traditional agriculture production and consumption are the same and the mainstay product is staple food grains.
- b. From traditional agriculture to modern agriculture. The second stage is the stage of diversification of agricultural products or can also be referred to as mixed farming. This stage is a transitional stage in the transition process from traditional agriculture to modern agriculture.
- c. Modern agriculture. The third stage is the stage that describes the most advanced level of modern agriculture or also known as specialization agriculture.

According to Mosher there are 5 absolute requirements in agricultural development. If one of these conditions is not met, agricultural development will stop, agriculture will run but is static. These absolute conditions are:

- a. There is a market for agricultural products;
- b. Technology that is constantly evolving;
- c. Availability of materials and production equipment locally;
- d. There is additional production for farmers;
- e. Availability of smooth and continuous transportation;

In addition to these five factors, there are five more conditions which are not absolute but if any will facilitate agricultural development, these conditions are:

- a) Development education;
- b) Production credit;
- c) Which provides production credit to farmers;
- d) Farmers' cooperative activities;
- e) Improvement and expansion of agricultural land;
- f) National planning for agricultural development.

2.2 Service Center Theory

The service center theory was first put forward by Christaller and is known as the urban growth theory which states that the growth of a city depends on its specialization in urban service functions, while the level of demand for urban services by the surrounding area will determine the acceleration of urban growth (concentration). Service center theories, originating from Christaller and Lösch, explain service location in market towns and cities. They align with von Thünen and Weber's theories, but consider economies of scale, where production costs decrease as production increases, ensuring fixed costs [12]. Factors that lead to the emergence of service centers are economic location factor [13], resource availability factors [14], agglomeration strength [15], government investment factors [16].

Identification of service centers has several objectives, namely identifying service centers and service areas at different levels, determining basic infrastructure facilities to meet the needs of various sectors, and integrating or grouping services at different levels and determining linkages or road networks to improve accessibility and efficiency [17].

The service center theory is based on the idea that urban areas provide various services to their hinterlands, such as trade, education, health, administration, etc. These services are not evenly distributed but tend to cluster in certain locations that have higher accessibility,

centrality, and market potential. These locations are called service centers, and they can be classified into different levels according to their size, function, and range of influence. The higher-level service centers offer more specialized and diversified services, while the lower-level service centers offer more basic and common services. The service centers are interconnected by a hierarchical network of transportation and communication links, forming a regional urban system [18].

Identification of service centers is an important task for urban planning and regional development. It can help to understand the spatial structure and functional differentiation of urban areas, as well as the demand and supply of various services. It can also help to allocate resources and infrastructure more efficiently and effectively, and to promote the integration and coordination of different levels of service centers. There are different methods and criteria for identifying service centers, such as population size, number and type of services, employment structure, centrality index, accessibility index, etc. [11,13].

2.3 Leading Sector/leading commodity

The concept of a leading sector is commonly associated with making comparisons, whether on a regional, national, or international scale. On an international level, a sector is considered exemplary when it can rival equivalent sectors in other countries. Meanwhile, on a national scale, a sector qualifies as a dominant one if it can compete with identical sectors produced in other regions, both in the domestic and national markets. A region is deemed to possess a leading sector if it can outperform other regions in the same sector, thereby enabling the production of exports.

A leading sector/leading commodity is a sector or commodity that has the most significant contribution to the economic growth and development of a region or country. A leading sector/leading commodity can be identified by various criteria, such as the share of GDP, employment, exports, value added, etc. A leading sector/leading commodity can have positive effects on the rest of the economy, such as stimulating demand, creating linkages, generating income, attracting investment, etc. A leading sector/leading commodity can also face challenges, such as competition, volatility, dependency, environmental impact, etc. [11 - 13].

2.4 Regional Development

Regional development is a term that refers to the process of improving the economic, social, and environmental conditions of a specific region or area. Regional development aims to reduce regional disparities, promote regional competitiveness, enhance regional integration, and foster regional identity and culture. Regional development involves various actors, such as governments, businesses, civil society, and international organizations, and various policies, such as infrastructure, innovation, education, health, and environment. Regional development can be influenced by various factors, such as geography, history, culture, politics, and globalization [15, 16].

2.5 Location Quotation

This location quotient (LQ) technique is used to identify the internal potential of an area in order to find out which sectors are basic sectors and which sectors are not non-basic sectors. LQ analysis [21–23] formula:

$$LQ = \frac{vi/vt}{vi/vt} \quad (1)$$

2.6 Esteban Marquillas Shift Share

According to dynamic shift share analysis or Esteban Marquillas shift share analysis. This analysis is different from the classical shift share analysis in which in the classic shift share analysis it is assumed that there are three components, namely the national growth component, the proportional growth component, and the regional share growth component. This modification of Esteban Marquillas' shift share analysis contains new elements, namely homothetic employment, and allocation effect.

Esteban Marquillas modifications to shift share analysis:

$$D_{ij} = E_{ij}(rn) + E_{ij}(r_{ij} - rn) + E^{\wedge}ij(r_{ij} - rin) + (E_{ij} - E^{\wedge}ij)(r_{ij} - rin) \quad (2)$$

Information:

- D_{ij} : Which decomposes the regional employment growth in sector I (D_{ij}).
- $E_{ij}(rn)$: The national growth effect, which is the employment growth that would occur if the region had the same growth rate as the nation (rn).
- $E_{ij}(r_{ij}-rn)$: The differential growth effect, which is the employment growth that results from the difference between the regional and national growth rates in sector I ($r_{ij}-rn$).
- $E^{\wedge}ij(r_{ij}-rin)$: The competitive effect, which is the employment growth that results from the difference between the regional and national growth rates in sector I ($r_{ij}-rin$), weighted by the homothetic employment in sector I of region j ($E^{\wedge}ij$), which is defined as the employment that sector I of region j would have if it had the same structure as the nation.
- $E_{ij}-E^{\wedge}ij(r_{ij}-rin)$: The allocation effect, which is the employment growth that results from the difference between the actual and homothetic employment in sector I of region j ($E_{ij}-E^{\wedge}ij$), weighted by difference between the regional and national growth rates in sector o ($r_{ij}-rin$).

The Klassen typology [24, 25] is an analytical tool in the regional economy that can be used to determine the agricultural sub-sector of the economy in Kulon Progo Regency. Classification typology analysis can produce four sector classifications with different characteristics as follows.

According to [27] Schalogram analysis is an analytical tool used to determine the ability of an area in order to provide services to the community. In this case the service in question is the availability of existing facilities in the urban area [28], such as facilities related to economic activity, social activity, government and agricultural production facilities. Based on the calculation of the scalogram obtained, it can be assumed that sub-districts that have complete facilities will be used as growth centers, while sub-districts with inadequate facilities will be used as hinterlands.

Table 1. Klassen Typology Analysis Classification

1st Quadrant An advanced and rapidly growing sector (<i>developed sector's</i>)	2nd Quadrant Potential sector / can still develop. (<i>developing sector's</i>)
3rd Quadrant The sector is advancing but depressed. (<i>stagnant sector's</i>)	4th Quadrant lagging sector (<i>underdeveloped sector's</i>)

Feasibility testing of scalogram analysis used with the formula:

$$COR = \frac{1-a}{b \times c} \tag{3}$$

Determine the number of classes with the formula:

$$K = 1 + 3.3 \text{ Log } n \tag{4}$$

To calculate the class interval length, use the formula:

$$I = \frac{T-t}{K} \tag{5}$$

3 Results and Discussions

3.1 Location Quotation Analysis

Based on the LQ analysis [29], [30], we can see the comparative advantage of each sub-district in Kulon Progo district. This comparative advantage is based on LQ analysis which has a value of > 1. Rice plants that have a comparative advantage are found in Temon, Wates, Panjatan, Galur, Nanggulan, and Samigaluh sub-districts. The comparative advantage of upland rice commodities is found in the Panjatan, Galur, Pengasih, and Samigaluh sub-districts. The comparative advantage of maize commodities is found in Lendah, Sentolo, Pengasih, and Samigaluh sub-districts. Soybean commodities are found in Galur, Lendah, and Nanggulan sub-districts. Peanuts are found in Temon, Panjatan, Pengasih and Kokap sub-districts. The green bean commodity is found in the Sentolo, Pengasih, Kokap, Girimulyo and Kalibawang sub-districts. The cassava commodity is found in Pengasih, Kokap, Girimulyo, and Kalibawang sub-districts. The sweet potato commodity is found in Temon, Pengasih, Kokap, Girimulyo, and Samigaluh sub-districts.

Table 2. The comparative advantage of each sub-district in Kulon Progo

No	Sub-Districts	Rice	Upland Rice	Corn	Soybean	Peanut	Green Bean	Cassava	Sweet Potato
1	Temon	1.57	0.24	0.28	0.01	1.70	0.16	0.14	1.15
2	Wates	1.58	0.42	0.43	0.04	0.73	0.05	0.06	<i>0.14</i>
3	Panjatan	1.36	1.39	0.86	0.39	1.02	-	0.31	<i>0.97</i>
4	Galur	1.46	3.82	0.04	3.77	0.12	0.04	0.33	<i>0.21</i>
5	Lendah	0.94	-	1.62	2.06	0.98	0.33	0.78	<i>0.31</i>
6	Sentolo	0.89	0.76	2.77	0.44	0.10	1.65	0.42	-
7	Pengasih	0.57	1.38	1.77	0.22	2.62	1.51	1.53	2.33
8	Kokap	0.17	0.36	0.39	0.08	3.92	0.91	3.20	3.26
9	Girimulyo	0.49	0.30	0.37	0.15	0.68	1.96	3.20	2.57
10	Nanggulan	1.31	-	0.55	2.98	0.00	1.29	0.44	<i>0.08</i>
11	Kalibawang	0.76	0.89	0.37	0.67	0.91	1.87	1.92	<i>0.69</i>
12	Samigaluh	1.35	3.13	1.04	<i>0.00</i>	<i>0.60</i>	<i>0.02</i>	<i>0.25</i>	1.09

3.2 Shift Share of Esteban Marquillas Analysis

After doing the Shift Share analysis, we can find out the competitive advantages of the sub-districts in Kulon Progo in producing food crops. The competitive advantage of rice plants is owned by Temon, Wates, Galur, Lendah, Pengasih, Kokap, and Samigaluh sub-districts.

Table 3. The competitive advantages of the sub-districts in Kulon Progo

No	Sub-Districts	Rice	Upland Rice	Corn	Soybean	Peanut	Green Bean	Cassava	Sweet Potato
1	Temon	896.606	-166.955	537.145	-7.844	-173.994	-5.887	415.154	-25.744
2	Wates	2,384.540	-65.553	143.442	-26.671	-31.26377	-	-	-
3	Panjatan	-5,933.089	-346.202	1,849.051	11.237	-16.78047	-	1,365.634	-
4	Galur	1,435.029	-58.938	-257.164	631.318	-7.805942	-3.551	3,617.656	-51.488
5	Lendah	570.704	-	-587.168	-310.924	1.149641	-9.342	-2,525.182	-
6	Sentolo	-2,856.724	-199.732	-8,930.708	-361.810	-9.02505	-54.872	-1,467.067	-
7	Pengasih	980.017	-1,161.520	1,640.377	-263.942	-165.055	-72.242	5,814.957	128.093
8	Kokap	325.586	-80.917	305.922	-34.515	-417.258	-2.642	-9,614.672	177.051
9	Girimulyo	-3,936.148	-48.140	-404.507	-179.402	-72.453	38.087	-9,975.590	-208.527
10	Nanggulan	-6,753.558	-	395.050	-876.583	-	-	-4,772.569903	-
11	Kalibawang	-6,135.630	-	-3,323.636	-775.652	361.302	95.292	9,523.442	-

For upland rice, there are no districts that have a competitive advantage in producing it. Districts that have a competitive advantage in producing corn are Temon, Wates, Panjatan, Pengasih, Kokap, and Samigaluh sub-districts. Soybean plants are found in the Panjatan and Galur sub-districts. Mung bean commodity is found in Girimulyo and Kalibawang sub-districts. Cassava plants are found in Temon, Panjatan, Pengasih and Kalibawang sub-districts. Sweet potato plants are only found in the Kokap sub-district.

4 Conclusion

It can be concluded that sub-districts that have comparative advantage, competitive advantage and are also in quadrant I (advanced sector) in producing rice commodities are Temon, Wates, Galur, and Samigaluh sub-districts. Corn crop commodities are found in Pengasih and Samigaluh sub-districts. Soybean commodity is found in Galur sub-district. The green bean commodity is found in the Girimulyo and Kalibawang sub-districts. The cassava commodity is found in Pengasih and Kalibawang sub-districts. Sweet potato commodity is found in Pengasih and Kokap sub-districts. As for upland rice and peanuts, there are no sub-districts that have comparative advantage and competitive advantage in each sub-district, but only have one advantage.

Those that can be used as a development direction to become processing centers for rice commodities are Temon sub-district, Wates sub-district, Galur sub-district and Samigaluh sub-district. Commodities of upland rice plants are Galur sub-district and Samigaluh sub-district. Corn crop

commodities are Temon sub-district, Wates sub-district, and Samigaluh sub-district. The soybean crop commodity is Galur sub-district. The peanut crop commodity is the Temon sub-district. Commodities of cassava plants are Temon sub-district and Galur sub-district. The sweet potato commodity is Temon sub-district and Samigaluh sub-district. While other regions that have competitive advantage / comparative advantage but do not have complete service facilities will be used as supporting areas and will function as input providers for the processing industry.

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