

Development Strategy of Leading Agricultural Commodities: Findings From LQ, GRM, and Shift-Share Analysis

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ABSTRACT

This research aims to develop the potential of food crops as a first step in the development planning process. This research was conducted in Majalengka Regency and has resulted in three main studies. First, it identifies staple and non-staple food crops in the region. The data source used consists of time series data from 2018-2022, and primary data with sample determination using the Proportional Random Sampling method. The results of the analysis show that staple food crops in Kabupaten M consist of rice, corn, soybeans, peanuts and green beans, while non-staple food crops include cassava and sweet potatoes. Secondly, the study also indicated that rice is the main food crop in the region. Finally, maize and groundnuts were identified as priority crops for further development. These findings provide valuable information for agricultural development planning, focusing on the development of potential commodities.

Keywords: *Development Priority, Growth, Lq, Mrp, Food Crops.*

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INTRODUCTION

Agriculture plays an important role in economic development and food security in many countries, including Indonesia. In an effort to achieve sustainable economic growth and address food security challenges, the development of high-potential food crop commodities is highly relevant. Most districts in Indonesia have rich natural resources that support the agricultural sector. With considerable agricultural potential, they have the opportunity to become important contributors to the fulfillment of food needs and economic development at the local and national levels (Swinnen et al., 2016).

In addition, most of the regions are known to have fertile land and a diversity of soil types that allow for the growth of various types of food crops. As population growth continues to increase, the need for adequate food production is also increasingly urgent. Therefore, developing and increasing the productivity of food crop commodities becomes very important to meet these needs (FAO, 2019).

Identifying commodities that have high potential and prioritizing their development is an important first step in planning sustainable agricultural development in Majalengka Regency. Understanding which commodities are most suitable for development in the region will help achieve several key objectives. This research focuses on the development of food crop commodities, such as rice, corn, soybeans, peanuts, and



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green beans, to increase farmers' income, the contribution of the agricultural sector to regional GRDP, and achieve local food security in Majalengka Regency. The World Economic Forum (2018) reveals that the development of leading or potential sectors is the first step in the development planning process. In the context of regional economic development, diverse statistical data is needed as a basis for determining strategic policies to accurately achieve development goals.

Economic sectors that have gained competitiveness in recent years have promising prospects in the future (World Bank, 2021). On the other hand, while some economic sectors currently lack competitiveness, they have the potential to grow in the future. By identifying these potentials, development policies can be formulated based on efforts to increase economic growth (Humaidi et al., 2021; Todaro & Smith, 2014).

Majalengka Regency is one of the regencies located in West Java Province, Indonesia. Over the past five years, from 2018 to 2022, the district's economy has shown dominance from several business sectors, with agriculture as one of the most important sectors. Sustainable economic growth and improved community welfare in this area are strongly linked to the development of the agricultural sector (DP3K Kabupaten Majalengka, 2022).

In the midst of global economic dynamics and changing consumer trends, the tropical plant subsector is one of the great potentials that can support economic growth (Pratap & Mamnun, 2017). Tropical plants have high commercial value and are able to compete in both domestic and international markets. This is supported by previous research, as revealed by Nugroho & Setiawan (2021). Tropical plant commodities in this area have shown their ability to support community income, especially in rural areas.

Apart from the economic aspect, agriculture also has a social role. The agricultural sector is the main livelihood for most of the population in rural areas, and agricultural products are a source of food for the local community (Tschirley et al., 2015). Therefore, the strategic role of the agricultural sector in improving community welfare and reducing the level of economic inequality in this kabupaten is very important (Titikpina & Takele, 2015).

Within this framework, further research is needed to find out more about the food crop commodities that can drive the growth of the agricultural sector. The identification of leading commodities is the first step to formulating policies and development plans that can support sustainable economic growth and improved community welfare in the future. By understanding the potential and role of food crop commodities in the regional economy, planning more effective strategies in the development of the agricultural sector and sustainable utilization of natural resources.

RESEARCH METHODS

The research was conducted in Majalengka District, taking into account the potential of the agricultural sector, which remains a source of income for the community. The data sources used consisted of time series data from 2018-2022 obtained from the Agricultural Office of Majalengka District and West Java Province, as well as primary data from 98 respondents selected using the Proportional Random Sampling method, which were divided into 3 central sub-districts. The analysis methods used include:

- 1) Location Quotient (LQ) Analysis: Used to determine the base and non-base commodities of a region. The classification criteria use $LQ > 1$ for base commodities, $LQ = 0$ for the same commodity specialization level at the district and provincial levels, and $LQ < 1$ for non-base commodities (CIA, 20116).
- 2) Growth Ratio Model (GRM) Analysis: Used to compare the development of commodities in the study area with reference areas. The results of the GRM analysis yield four classifications of leading commodities based on the combination of the Reference Region Growth Ratio (RPr) and the Study Region Growth Ratio (RPs) (Haines-Young & Potschin, 2018).

- 3) Overlay Analysis: This method is used to depict commodities with potential based on growth ratios and comparative advantages. The classification criteria for commodities use the results of the Location Quotient (LQ) analysis and Growth Ratio Model (GRM) analysis.
- 4) Shift-Share Analysis: The objective of this analysis is to determine the performance or productivity of commodities in the study area compared to a larger regional area. This analysis uses income based on staple crops as the main variable (Boschma & Fritsch, 2018).

Klassen Typology Analysis: This method is used to describe the patterns and structures of commodities in the study area. There are four classifications of agricultural sectors based on their characteristics (Smith & Johnson, 2012).

RESULTS AND DISCUSSION

1. Commodity Crops: Staple and Non-Staple.

Food crop sub-sectors that have comparative advantage based on LQ value > 1 in Majalengka Regency include rice, corn, soybeans, peanuts, and green beans, indicating that the production of these commodities is supported by local natural resources. In this study, comparative superior commodities of food crops in Majalengka Regency are analyzed based on the potential of the region by sub-district. Rice has a comparative advantage in Kertajati Sub-district with an LQ coefficient of 1.07. Meanwhile, corn, peanuts, and soybeans have comparative advantage in Majalengka Sub-district, and green beans excel in Ligung Sub-district with the highest LQ coefficient of 8.82. The comparative advantage of these food crop commodities is reflected in their larger contributions at the kabupaten level than at the provincial/reference area level. Conversely, commodities that do not have a comparative advantage in the Regency are due to their lower production contribution compared to the reference area/province.

Regional Potential of Rice Commodities. The potential of the rice commodity area in Kertajati Sub-district is very prominent in this study. With an LQ coefficient value of 1.07, the rice commodity in this area has a significant comparative advantage and makes a good contribution to food availability in Majalengka Regency. The growth of the rice commodity in Kertajati Sub-district is very rapid, supported by the results of the calculation of the R/C ratio which reaches a value of 2.5, indicating that the rice farming business in this area is feasible to expand. In detail can be explained in Figure 1.

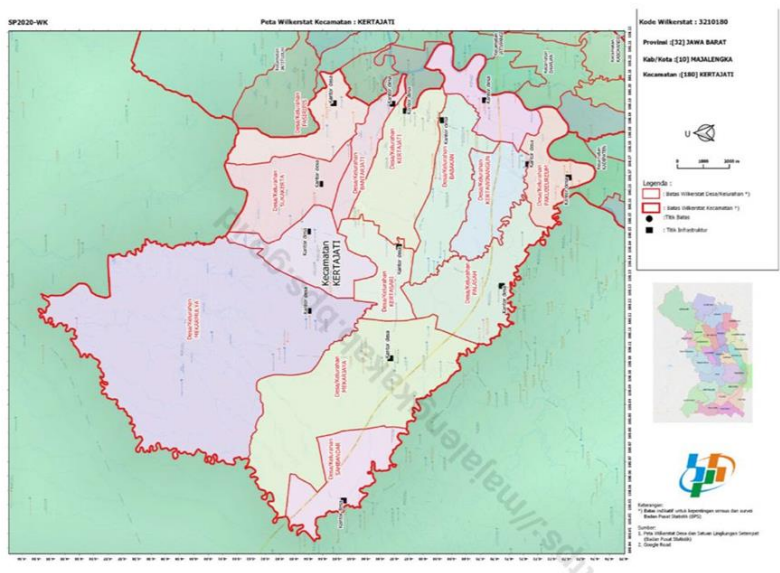


Figure 1. Regional Potential of Rice Commodities

The characteristics of Kertajati Sub-district that support the growth of rice include having a large proportion of paddy fields that rely on rainwater as a source of irrigation. The relatively flat topography of the area with neutral soil acidity (pH 6.0-7.5), a slope of less than 8%, and sandy soil texture contribute to conditions that support rice plant growth. In addition, the low altitude, adequate rainfall between 1,646-2,977 mm with an average number of rainy days of 122 days, as well as good drainage and volcanic ash soil formation, further strengthen the potential of this region in producing quality rice.

Efforts to preserve the land so that it remains productive throughout the year are carried out through appropriate cropping pattern arrangements. Most food crop farming in Kertajati Sub-district is carried out on paddy fields with rotating cropping patterns between rice-rice-rice or rice-palawija-vegetables. This shows that sustainable land management strategies have been implemented to maximize rice farming yields in this region.

Regional Potential of Maize, Soybean, Groundnut Commodities. Majalengka sub-district is an area that has considerable agricultural potential, especially in producing corn, soybean and peanut commodities. This potential comes not only from paddy fields, but also from dry land. The area is divided into two parts, with the northern part being lowland and the southern part being a hilly area. the mapping of the area can be seen in Figure 2.

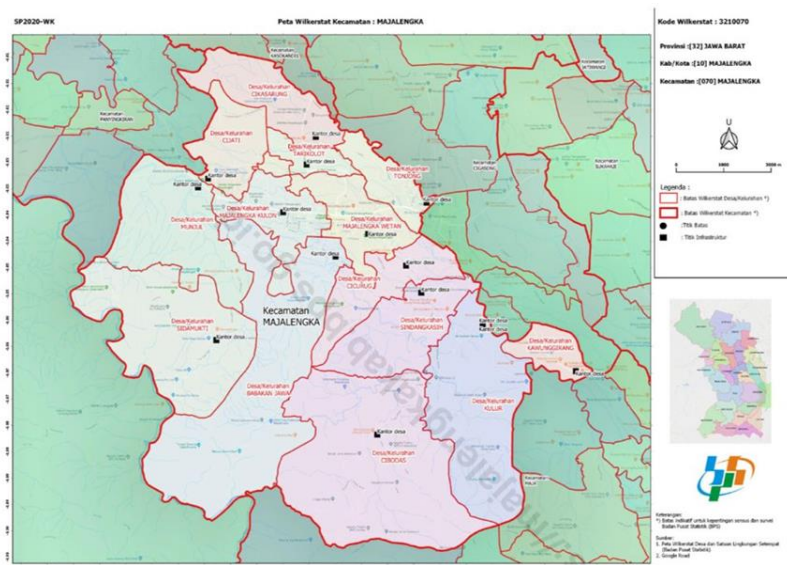


Figure 2. Regional Potential of Maize, Soybean, Groundnut Commodities

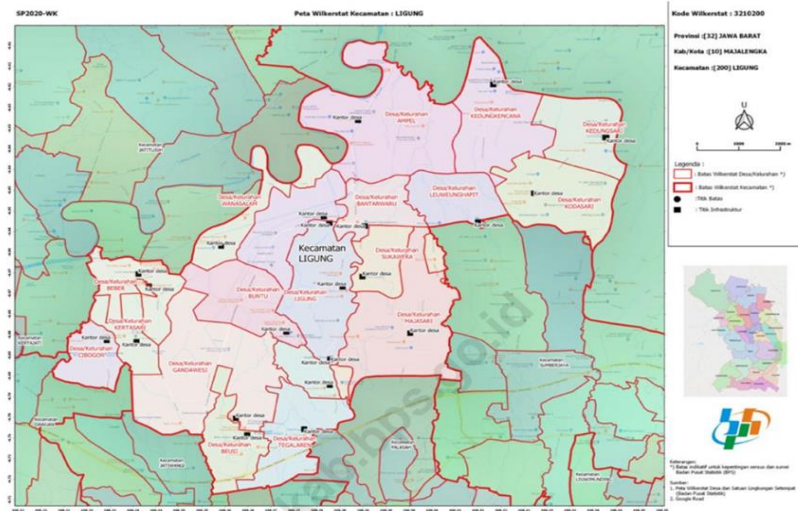
Topographic variations in Majalengka Sub-district include 2-3% slope for flat areas and 5-10% for hill areas, with altitudes between 50-200 meters above sea level. Average rainfall reaches 3,226.3 mm/year. There are three dominant soil types: Latosol, Regosol, and Podsolik Merah Kuning, which have a significant influence on the physical, chemical, and biological properties of the soil and its fertility. Land potential consists of irrigated, rainfed, and land.

The analysis shows that the maize commodity has an important contribution to food security, the food industry, and animal feed in Majalengka Regency, with an LQ coefficient of 1.41, indicating high growth and competitiveness. The soybean commodity also stands out with an LQ coefficient of 2.02, indicating advanced growth and good competitiveness. Meanwhile, groundnuts have an LQ coefficient of 1.18, indicating potential for development due to high competitiveness and rapid growth.

The cropping pattern of these commodities in Majalengka Sub-district is arranged by taking into account the rainfall pattern for one year. The cropping patterns vary from rice-rice-rice, rice-rice-palawija,

rice-rice-vegetables, rice-vegetables-vegetables, rice-rice-bera, rice-palawija-bera, rice-bera, to palawija-bera, reflecting efforts to maximize agricultural yields under various environmental conditions.

Regional Potential of Green Mung Beans Commodity. Ligung sub-district, which is the sample area in the mung bean commodity research, is located in the lowlands with a slope of 0-15% and an altitude of about 47 meters above sea level. Geologically, the area has a tropical climate and diverse soil types, including Latosol, Grumosol, Podsolik, and Gic Association. Mapping of the area can be seen in Figure 3.



Gambar 3. Regional Potential of Green Mung Beans Commodity

Farmland in Kecamatan Ligung includes both wetland and dryland with irrigation water systems. The cropping pattern in paddy fields includes rice-soybean, rice-soybean-crops, rice-soybean, and rice-vegetable-vegetable, while for drylands, the cropping pattern includes rice-soybean-crops, rice-vegetable, and vegetable-vegetable.

Analysis of the commodity coefficient (LQ) value, which reached 8.82 for mung beans in Kecamatan Ligung, shows that this commodity has a very high comparative advantage. An LQ value that exceeds 1 indicates that mung bean production in Kecamatan Ligung is much higher than the average mung bean production in the reference region, which in this case could be the province or other regions. This comparative advantage indicates that Kecamatan Ligung has very favorable conditions for mung bean production, both in terms of natural conditions and other factors such as farmer expertise, infrastructure, or supportive policies. Therefore, mung beans can be considered a superior commodity with great potential for further development in the region (Byerlee et al., 2009).

2. Superior Food Crop Commodities

Analysis Growth Ratio Model (GRM). The Growth Ratio Model (GRM) analysis was conducted to assess the growth trends of food crop commodities in District of Majalengka Regency. The analysis aimed to provide insights into the development potential of various agricultural commodities in the region. Table 1 presents the results of the GRM calculations, detailing the Growth Ratio (RPr) and Potential Ratio (RPs) for each commodity.

Table 1. Results of Growth Ratio Model Calculation of Income Based on Food Crops

Commodity	Rpr		Rps		Description
	rill	nominal	Rill	nominal	
Rice	0.80	-	6.31	+	The growth of rice commodities is not prominent at the provincial level but is prominent at the district level.
Corn	-0.57	-	7.59	+	The growth of Corn commodity is not prominent at the

					Provincial level, but it is prominent at the District level.
Soybeans	11.73	+	0.52	-	The growth of Soybeans commodity is prominent in the province but not prominent in the district.
Peanut	23.38	+	0.00	-	The growth of the Peanut commodity is prominent in the Province but not prominent in the District.
Mung Beans	23.20	+	-0.75	-	The growth of Mung Beans commodity is prominent in the province but not prominent in the district.
Cassava	1.32	+	3.53	+	The growth of the Cassava commodity is prominent both in the Province and in the District
Sweet Potato	-1.20	-	-2.24	-	The growth is not prominent in both the city and the district.

Source: Data processed, 2023

Rice, one of the staple food crops, exhibited a Growth Ratio (RPr) of 0.80, indicating that its growth was not prominent at the provincial level. However, at the district level, rice demonstrated a significant growth rate, with a prominent Growth Ratio (RPs) of 6.31. This suggests that rice production thrived within the boundaries of District, contributing notably to local agricultural activities and potentially serving as a crucial commodity for further development efforts. Conversely, corn, another staple crop, showed a negative Growth Ratio (RPr) of -0.57 at the provincial level, implying limited growth prospects in the broader context. However, at the district level, corn exhibited a positive Growth Ratio (RPs) of 7.59, indicating noteworthy growth within District. This highlights the district's potential for corn cultivation and suggests opportunities for local farmers to capitalize on this commodity. Soybeans displayed a remarkable Growth Ratio (RPr) of 11.73 at the provincial level, indicating significant growth prospects across the province. However, at the district level, soybeans exhibited a relatively low Growth Ratio (RPs) of 0.52, suggesting that their growth was not as prominent within District. This implies a discrepancy in the performance of soybean cultivation between the province and the district, warranting further investigation into local factors influencing soybean production.

Similarly, peanuts demonstrated a substantial Growth Ratio (RPr) of 23.38 at the provincial level, indicating considerable growth potential at the broader scale. However, at the district level, peanuts exhibited a negligible Growth Ratio (RPs) of 0.00, suggesting limited growth within District. This discrepancy underscores the need to examine local factors impacting peanut cultivation and explore strategies to enhance its growth within the district (Meng & Smale, 2018).

Mung beans, despite displaying a notable Growth Ratio (RPr) of 23.20 at the provincial level, exhibited a negative Growth Ratio (RPs) of -0.75 at the district level, indicating a lack of prominence in growth within District. This discrepancy suggests potential challenges or limitations hindering mung bean production at the local level, necessitating further investigation and targeted interventions to address them. Cassava, on the other hand, demonstrated a positive Growth Ratio (RPr) of 1.32 at the provincial level and a relatively high Growth Ratio (RPs) of 3.53 at the district level. This indicates that cassava cultivation experienced prominent growth both provincially and locally, highlighting its potential as a viable commodity for further development efforts within District. Sweet potatoes exhibited negative Growth Ratios (RPr and RPs) at both the provincial and district levels, indicating limited growth prospects for this commodity within the region. This suggests that sweet potatoes may not be a prominent focus for agricultural development initiatives within District.

Overall, the GRM analysis provides valuable insights into the growth dynamics of various food crop commodities in District, highlighting potential opportunities and challenges for agricultural development in the region. These findings can inform strategic decision-making processes and guide the prioritization of commodities for future development efforts, ultimately contributing to the sustainable growth of the agricultural sector in Majalengka Regency (Widodo & Hapsari, 2020).

The classification of commodities can help address food security issues in the area. Focusing on food commodities such as rice, corn, soybeans, and nuts can enhance local food availability, reduce dependence on imports, and help address hunger and malnutrition issues. It is important to consider the holistic classification of commodities in the development planning of a region. Commodity development should be tailored to environmental conditions, sustainability, and the needs of the local community to achieve optimal outcomes in supporting overall regional development (Widodo & Hapsari, 2020).

Analysis Overlay. Based on the data presented in Table 2, commodities such as Rice, Maize, Soybeans, and Groundnuts show competitive advantages in several aspects

Table 2. Results of Income Overlay Calculation Based on Food Crop Prices Years 2018-2022

Commodity	MRP (RPs)	LQ	Description
Rice	6.31	1.07	The sector stands out both in terms of growth ratio and comparative advantage.
Corn	7.59	1.41	The sector stands out both in terms of growth ratio and comparative advantage.
Soybeans	0.52	2.02	The sector has small growth but has a comparative advantage.
Peanut	0.00	1.18	The sector has small growth but has a comparative advantage.
Mung Beans	-0.75	8.82	The sector has small growth but has a comparative advantage.
Cassava	3.53	0.03	The sector has significant growth but lacks comparative advantage. This proves the sector's lack of potential from both analyses.
Sweet Potato	-2.24	0.34	The sector stands out both in terms of growth ratio and comparative advantage.

Source: Data processed, 2023.

Based on the results of the calculation of income overlain based on food crop prices for 2018-2022, it can be seen that Rice, Corn, Soybeans, and Peanuts are the leading commodities that have growth and comparative advantage. Rice stands out with MRP of 6.31 and LQ of 1.07, showing significant growth and comparative advantage in production. Maize also performs well with MRP of 7.59 and LQ of 1.41, showing significant growth and comparative advantage (Hendriyawan & Ratnaningtyas, 2019).

Soybean, although having a smaller growth with MRP of 0.52, has an LQ of 2.02, signifying a significant comparative advantage in production. Groundnuts, although having a small growth with MRP of 0.00, has an LQ of 1.18, indicating a comparative advantage in production. This analysis can be used as a basis for developing effective and efficient agricultural development strategies for the region, with a focus on increasing production and utilizing comparative advantage in the face of existing agricultural challenges (Hakim, 2020).

3. Commodity of Food Crops That Can Be Prioritized for Development

Analysis Shift-Share. Based on the analysis results (Table 3), commodities such as Soybeans, Peanut, and Mung Beans can be prioritized in the development of food crop commodities in the district, as they have rapid growth and good comparative advantages.

Tabel 3. Classification of Commodities According to the Quadrant of Shift Share Analysis, 2018-2022

Growth of Regional Market Share (DS)	Proportional Growth (PS)	
	Positive (+)	Negative (-)
Positive (+)	Quadrant I (Rapid Growth) 1. Soybeans 2. Peanut	Quadrant II (Developing) -

3. Mung Beans		
Negative (-)	Quadrant III (Tending to have potential)	Quadrant IV (Backward)
	1. Rice 2. Corn	1. Sweet Potato

Source: Data processed, 2023

The classification of food crop commodities is based on the Shift-Share analysis quadrant. Commodities in Quadrant I (Rapid Growth) are Soybeans, Peanut, and Mung Beans. Commodities in Quadrant II (Developing) are Rice and Corn. Commodities in Quadrant III (Potentially Promising) are Sweet Potato, while the commodity in Quadrant IV (Backward) is Cassava. Food crop commodities like Soybeans, Peanut, and Mung Beans are in Quadrant I, indicating rapid growth and demonstrating specialization and strong competitiveness based on the shift-share analysis from 2018-2022. Meanwhile, Rice and Corn are classified in Quadrant II, showing positive development. Sweet Potato is classified in Quadrant III, indicating potential for growth. Cassava is in Quadrant IV, indicating a backward condition.

Analysis Tipologi Klassen. Typology Analysis of Klassen, the structure of economic growth combined with the growth rate and contribution is used to determine the categorization of food crop commodities into advanced and rapidly growing, suppressed, potential, and relatively backward. Food crop commodities with advanced and rapid growth (quadrant 1) include rice, corn, peanuts, and mung beans. The distribution of agricultural land for rice commodities is almost evenly spread across every region, while corn production experiences fluctuations. Peanuts and mung beans are considered profitable seasonal crops for farmers. More detailed information can be found in Table 4.

Table 4. Results of Klassen Typology Calculation on Income based on Commodity Crops Years 2018-2022

Commodity	District		Province		Description	Quadrant
	Mean growth (Si)	Mean contribution (Ski)	Mean growth (S)	Mean contribution (Sk)		
Rice	-0.053	0.822	-0.003	0.771	The advanced and rapidly growing sector	I
Corn	0.050	0.138	0.006	0.098	The advanced sector and growing rapidly	I
Soybeans	0.640	0.006	0.515	0.008	The potential / developing sector	III
Peanut	0.008	0.001	-0.342	0.004	The advanced and rapidly growing sector	I
Mung Beans	2.323	0.006	-0.188	0.002	The advanced and rapidly growing sector	I
Cassava	-0.012	0.002	0.007	0.052	The relatively lagging sector	IV
Sweet Potato	1.910	0.025	2.041	0.065	The relatively lagging sector	IV

Source: Data processed, 2023

Commodity Mung Beans has a mean growth rate of 2.323 and a mean contribution of 0.006 at the district level, while at the provincial level, it has a mean growth rate of -0.188 and a mean contribution of 0.002. This indicates that Mung Beans is also included in the advanced and rapidly growing sector (quadrant I).

On the other hand, commodity Cassava has a mean growth rate of -0.012 and a mean contribution of 0.002 at the district level, while at the provincial level, it has a mean growth rate of 0.007 and a mean contribution of 0.052. This indicates that Cassava is included in the relatively lagging sector (quadrant IV).

Commodity Sweet Potato has a mean growth rate of 1.910 and a mean contribution of 0.025 at the district level, while at the provincial level, it has a mean growth rate of 2.041 and a mean contribution of 0.065. This indicates that Sweet Potato is also included in the relatively lagging sector (quadrant IV).

Based on these results, there is a potential for developing the agricultural sector with a focus on Mung Beans and Sweet Potato. Mung Beans show good growth at the district level, while Sweet Potato shows good growth both at the district and provincial levels. Although Cassava is included in the lagging sector, it also provides an opportunity to improve the growth and contribution of that commodity in the district by adopting appropriate development strategies (Mariani & Wardiyanto, 2020).

Taking into account the differences in characteristics and growth potential of these commodities, the district can plan appropriate policies and development measures to promote the growth of the agricultural sector (Kusumawati & Santoso, 2019). This can involve increasing production, developing markets, technological innovation, farmer training, as well as supporting infrastructure and policies that promote agricultural commodity growth (Schlenker, 2019). Therefore, the district can optimize the agricultural potential and contribute to sustainable economic development and the welfare of the community.

CONCLUSIONS

Commodities rice, corn, soybeans, peanuts, and mung beans serve as the basis commodities in District. Mung beans have the highest ratio as the basis commodity, while cassava is a non-basis commodity. Rice is a leading commodity in the district, supported by Overlay analysis results showing positive RPs values and LQ (>1), indicating good growth and comparative advantage. Corn is a priority for development with strong competitiveness in the district based on Shift Share analysis. The Klassen Typology analysis also shows that corn and peanuts have advanced and rapid growth during the period 2016-2021. These findings highlight the important role of rice, corn, soybeans, peanuts, and mung beans in the agricultural sector of the district. In order to develop the agricultural sector, special attention can be given to the development of corn as the primary priority. This research contributes to the understanding of the potential and priority for developing food crop commodities at the district level.

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