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Potential of Vegetable Commodities on Sustainable Agriculture Perspective: Evidence from Kolaka Regency, Indonesia

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Abstract. Regional growth will be optimally driven by commodity development that establishes itself as a base industry and has the potential to grow greatly. One of the most effective ways to boost economic development in a region is through commodity development, and it has good sustainability potential. This study aims to analyse basic vegetable commodities and examine the sustainability of these basic commodities in Kolaka Regency. The data used in this research are time series data on vegetable production for 2019-2023, which were analysed using the location quotient and dynamic location quotient methods. The research results show that the vegetable products that have good development prospects based on LQ and DLQ values greater than 1 are cayenne pepper, chayote and eggplant. The results of this research can be used as reference material for formulating policies in the context of vegetable product development in Kolaka Regency.

Keywords: vegetable; commodity development; regional growth

INTRODUCTION

Regional economic development aims to manage the region's resources and potential in order to boost the growth of economic activity within the area (Saragih et al., 2024) (Warlina et al., 2023). Gross Regional Domestic Product (GRDP) is a measure of regional economic growth and development success (Lee, 2020). A region's development policies can be established using data on development outcomes. Making every effort to guarantee that regional development priorities align with the region's potential is the primary policy that must be implemented in regional economic development. Each region must identify the leading economic sector activities because each region has a very different potential.

One region that depends on horticulture products as a source of local revenue (PAD) and as a possible labour absorber is Kolaka Regency. 797 ha of horticultural commodities have been harvested in Kolaka Regency (Kasmin et al., 2023), and there is a significant amount of land available for development in a number of locations (Soeyatno et al., 2024).

Suboptimal management of local resource potential in economic development hinders the process of economic development (Jafar & Meilvidiri, 2021), which leads to problems in places with oscillations in economic growth. In the meanwhile, regions should decide on their own policies for managing their resources' potential in order to maximize them in order to bring about better economic developments (Surya et al., 2021).

Regional growth will be optimally driven by commodity development that establishes itself as a base industry and has the potential to grow greatly. According to (Irmayadi et al., 2016), this is consistent with the idea of sustainable agricultural growth. Agriculture and the greenhouse effect, water quality, pollination, carbon absorption, food supply, and employment opportunities are closely related. In turn, agricultural practices contribute to ecological degradation, climate change, land damage, and the effects of nitrogen and phosphorus fertilizer pollution

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(Adenle et al., 2019). This is why sustainability is important.

In order to identify which commodities can be utilized as development priority or as the region's basic commodities, the Location Quotient (LQ) approach is employed to establish the region's basic commodities (Mo et al., 2020). Additionally, optimizing the fundamental sectors or commodities will help a region or area's growth run more smoothly (Faqih, 2021). Understanding the fundamental products of the horticulture subsector will help the government create policies that will maximize the growth of these products for the benefit of regional development (Alhowaish et al., 2013).

One of the most effective ways to boost economic development in a region is through commodity development (Hadi Utomo et al., 2022). The type of dominant commodity in a region can be determined by its land fertility, geographic position, people resources, facilities, and infrastructure (Nugraha et al., 2022). The character that is possessed contributes to the creation and application of policies. The requirement for population consumption will rise as economic growth is matched by population growth. Attempts to increase the variety of items required in order to maximize consumption needs. Horticultural products are one of the requirements for community nutrition intake and fulfillment (Rudani et al., 2023).

The development of agricultural products intended to support the economic development of a region, including the horticultural subsector, must be preceded by a study on the product's sustainability (Çakmakçı et al., 2023). One possible indicator is whether or not the product belongs to the commodity category. Commodities are the most promising product groups for development. Kolaka Regency's strong population growth, driven by massive investment in the mining sector, has led to an increase in demand for plant products. Kolaka Regency's generally flat and interconnected geography facilitates the supply of products (Kasmin et al., 2023; Saediman et al., 2019).

Commodity development is one of the best strategies to promote regional economic growth (Kusuma et al., 2024). A region's land fertility, geographic location, human resources, infrastructure, and facilities can all influence the kind of dominating commodity that exists there. The possessed character has a role in the formulation and implementation of policies (Budi et al., 2023). As population expansion equals economic growth, the need for population consumption will increase. aims to maximize consumption demands by increasing the range of items needed (Darmanto et al., 2020). One of the prerequisites for community nutrition intake and fulfilment is horticultural goods. This study aims to analyse basic vegetable commodities and examine the sustainability of these basic commodities in the Kolaka Regency.

METHODS

Time and Location of Research

This research was conducted in Kolaka Regency. The determination of the research location was carried out intentionally with the consideration that vegetable commodities are the largest contributors to the Gross Domestic Regional Product (GDRP) structure for the horticulture sub-sector in Kolaka Regency. This research was conducted in October 2024.

Data Type and Source

Time series data from 2019 to 2023 were used in this investigation. Data about the production of comparable horticultural commodities in Southeast Sulawesi Province and the outcomes of superior horticultural commodity production in Kolaka Regency are included. The Central Statistics Agency and the Food Crops and Horticulture Service are two connected organizations that provided the research data. The research data collection was carried out by directly visiting the BPS office and the Ministry of Agriculture, Food Crops and Horticulture.

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The data used are official publications of both institutions, based on information collected continuously each year. The use of data from the BPS and the Ministry of Agriculture, Food Crops and Horticulture aims to compare and complement the data from both organizations. This is to avoid any bias in the data used. In the event of bias from both organizations, the researcher uses the average value of the data published by them.

Data Analysis

Data analysis techniques used in this study are suitable for the objectives to be achieved in the research. Data analysis techniques used in this research are as follows:

Location Quotient (LQ)

LQ is an analysis that can provide an indication of a region's capacity to produce a product, whether it has the potential to supply other regions, import from other areas or in a state of equilibrium. This method is also used as a basis for determining superior products on the supply (production) side (Khairina & Syahputra, 2023) (Tanjung et al., 2021). Mathematically, the LQ formula is presented in Equation 1 (Darma Putra & Yuli Pratiwi, 2019).

$$LQ = \frac{X_{ir}/X_r}{X_{in}/X_n} \text{ .....1)}$$

Explanation:
X_{ir} = Production of vegetable commodities i in the r area
X_{in} = Production of all vegetable commodities in the region
X_{in} = Production of commodity i in area n, of which area r is a part
X_n = Production of vegetable commodities in the region n.
Criteria:
Jika LQ > 1, these commodities are basic/superior commodities.
Jika LQ < 1, these commodities are non-basic/non-superior commodities.

Dynamic Location Quotient (DLQ)

DLQ is a further development of LQ by using average production growth data over a certain period of time (Putri, 2018). Mathematically, the DLQ formula is presented in Equation 2 (Jafar & Meilvidiri, 2021):

$$DLQ = \{\frac{(1+g_{ir})/(1+g_r)}{(1+g_n)/(1+g)}\}t \text{ .....2)}$$

Explanation:
DLQ = Index Dynamic Location Quotient
Gir = Average growth of commodity i at the district level
gr = Average growth of total production of commodity i at the district level
gn = Average growth of commodity i at the provincial level
g = average growth of the total production of commodity i at the provincial level
t = Analysis period
Criteria:
If DLQ > 1, the commodity can still be expected to be a base in the future
If DLQ < 1, the commodity cannot be expected to be a base in the future.
Location quotient analysis has several weaknesses, including its static nature and its exclusive use to estimate the evolution of leading sectors in a given year. This is why the researchers integrated dynamic location quotient analysis into this study. Another weakness: this analysis tool (QL and QDL) does not integrate political variables or the influences of global markets. The evolution of these variables will therefore require a new analysis or the addition of other analysis tools that take these variables into account.

Combination of LQ and DLQ

This analysis combines the LQ value and the DLQ value, with the following criteria:
LQ > 1 and DLQ > 1, the commodity has not been repositioned, meaning that the commodity that was the base at that time will still be the base in the future.
LQ > 1 and DLQ < 1, the commodity has been repositioned and cannot be expected to become a base commodity in the future.
LQ < 1 and DLQ > 1, the commodity has been repositioned from a non-base commodity to a base commodity.
LQ < 1 and DLQ < 1, the commodity has not been repositioned and remains a non-base

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commodity.

The use of LQ and DLQ in this study is considered most appropriate because it can help understand changes in sectoral specialization in an area or region over time, so that appropriate policies can be determined to increase the desired sectoral specialization.

RESULTS AND DISCUSSION

Vegetable Commodity Analysis Base

Increasing regional competitiveness requires careful planning, which is implicitly understood in development planning (Firmansyah et al., 2020). In order to assist regional competitiveness in implementing development, the planning process must include an analysis that can characterize the potential that exists in the area. Use the location quotient method to identify the fundamental sector (Cosrojas & Eguia, 2021). An analytical method for identifying the fundamental economic sectors of a regional economy is the location quotient. The following are the terms of this method: Sector i is categorized into sectors if the LQ value is greater than 1. A sector's role in the Kolaka regency economy is greater than in the Southeast Sulawesi province region, as evidenced by the higher income share in sector i and the more export-oriented production of sector i in the Kolaka regency region, as indicated by a LQ value greater than one. Southeast Sulawesi province's economy.

On the other hand, sector i is categorized as a non-base sector if the LQ value is less than 1. A sector's position in the economy of Kolaka Regency is smaller than its role in the economy of Southeast Sulawesi, as indicated by a LQ value less than one, which also indicates that the sector's function in the lower area is smaller than its role in the upper area.

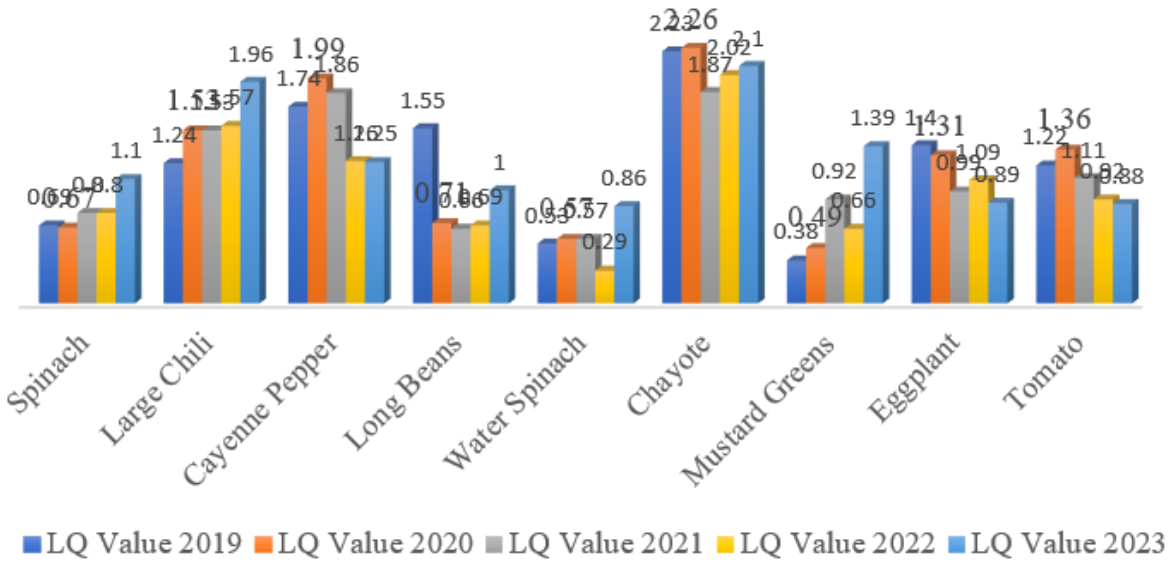

Figure 1. Location quotient analysis of vegetable commodities in Kolaka Regency, 2019-2023

Figure 1 shows the LQ value of plant products in Kolaka Regency between 2019 and 2023. According to this figure, the LQ value of each plant product tends to fluctuate. This fluctuation is due to the fluctuation in the production of each product. However, despite the fluctuations in their production, several plant products in Kolaka Regency can remain commodity products. Figure 2 shows the average LQ value of each crop product over the past five years (2019-2023). Crop products with an average LQ value greater than 1 indicate that they are able to maintain production and become a commodity.

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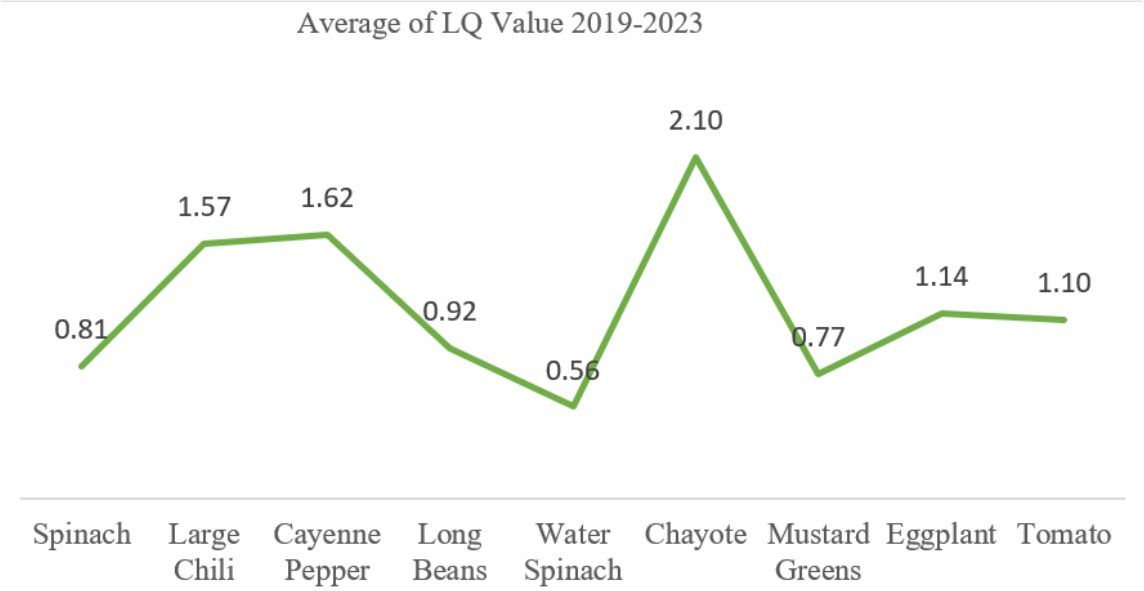

Figure 2. Average of location quotient value of vegetable commodities in Kolaka Regency, 2019-2023

Based on Figure 1 and Figure 2, it can be seen that vegetable products have become the commodity during 2016-2020 in Kolaka Regency, namely big chili peppers, cayenne peppers, long beans, chayote, eggplants and tomatoes with LQ value > 1, which means that the results can not only meet the needs of the region concerned but also can be exported or sold outside the Kolaka Regency area. In Kolaka Regency, the LQ values for exceptional vegetable commodities have been erratic (Ahmad et al., 2021). The conversion of productive land to residential land and the varying level of output are the causes of these variations. Although productivity is one of the factors that determine the LQ value, population expansion in a region will affect the decline in agricultural output (Atallah et al., 2014).

Variations in the demand for plant products at the study site result in variations in the LQ values of those products. According to (Katti et al., 2019), the potential of natural resources and the steadily increasing market demand, particularly in the provincial capital, support the sustainability of basic vegetable products in Southeast Sulawesi. The findings of this study confirm this assertion.

Sustainability of Vegetable Commodities

Commodity development policies in a region, in addition to being based on commodity and non-commodity status, also refer to the sustainability status of the product. The ideal product to develop is a product that is a commodity in a region and is sustainable (still a commodity in the future) or a non-commodity product but has the potential to become a commodity in the future (Cahyadi et al., 2018).

The Dynamic Location Quotient (DLQ) method is a development of LQ by adapting to the growth rate of a product's production over time. DLQ adapts to the economic growth rate of an observed product and the economy as a whole over a certain period. The results of DLQ analysis show the potential of a sector to become the basis of the economy of the future. By combining LQ and DLQ, policy makers can assess the role of an economic sector in the economy, including the future prospects of that sector (Herrero et al., 2013). A detailed comparison of LQ and DLQ values of plant products in Kolaka Regency is presented in the following Table 1.

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Table 1. LQ and DLQ value of vegetable commodities in Kolaka regency, 2024

Vegetable Commodities	LQ Value	DLQ Value	Information
Spinach	0.81	0.21	non-basic, non-prospective
Large Chili	1.57	0.24	basic, non-prospective
Cayenne Pepper	1.62	1.07	basic, prospective
Long Beans	0.92	0.07	non-basic, non-prospective
Water Spinach	0.56	0.32	non-basic, non-prospective
Chayote	2.10	1.12	basic, prospective
Mustard Greens	0.77	0.13	non-basic, non-prospective
Eggplant	1.14	1.36	basic, prospective
Tomato	1.10	0.45	basic, non-prospective

Source: data processed, 2024

Table 1 shows that the vegetable products of Kolaka Regency that have sustainability prospects are cayenne pepper, chayote and eggplant, indicated by LQ and DLQ values greater than 1. These LQ and DLQ values can be taken into account by policy makers to formulate development strategies for vegetable products (Rozaki et al., 2021). Based on the analysis results, vegetable commodities that have the potential to be developed in Kolaka Regency are cayenne pepper, chayote and eggplant.

Based on the results of this research, it would be better to focus on the development of plant products if it was commodity-oriented and had sustainability prospects, since the development potential is quite good in the future (Atallah et al., 2014) (Ali et al., 2020). The potential for development of plant products can be seen from the perspective of high consumer demand for plant products and the existence of opportunities for increasing the planted area in several areas of Kolaka Regency. To increase the contribution of plant products to Kolaka Regency's total GDP, government policies should target products that are currently classified as commodities and will remain so in the future. These products are those with LQ and DLQ values greater than 1. This is in line with the research of (Humaidi et al., 2020) which indicates that there is a need to formulate policies that support premium commodities in each region, especially for commodities, there is a need for assistance and support in the form of information and supporting facilities and infrastructure to optimize chili production, so that this commodity remains a commodity in that region.

Therefore, agricultural management of these commodities must be improved to increase their sustainability and production, and thus their contribution to economic growth and regional development (Kamara et al., 2019). The sustainability of these commodities is inseparable from supportive government policies, including the protection of production areas from the impact of very intense mining activities in most parts of Kolaka Regency.

For non-essential vegetable products, most of the area cultivated by farmers is relatively small as these products are easily damaged. Proper post-harvest management with the help of modern technology will further increase the interest of farmers to increase the area of land planted with vegetables so that the quantity of production produced can increase (Ji et al., 2018) which will ultimately also increase the LQ and DLQ values of each of these commodities.

CONCLUSION

The vegetable products that constitute the staple products of Kolaka Regency are cayenne pepper, chayote and eggplant, while other high-quality products are not yet staple products and have no prospect of sustainability in the future. Limitations of this research include the fact that the labor absorption variable, which is one of the indicators to determine whether a product can

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be considered a premium product (not only using the production value of the product), is not available in the analyzed time series. Therefore, the author suggests the need to study the commodities for horticultural products using labor absorption data. Research recommendation: there is a need to formulate policies that support high-quality commodities, particularly cayenne pepper, chayote, and eggplant. Assistance and support in the form of information and support facilities are needed to optimize production so that these products remain staples in this region.

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