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Analysis of Agricultural Economic Development in East Java Province

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Abstract: This study aims to analyze the development of the agricultural economy in each regency/city in East Java Province using the Location Quotient (LQ), Shift Share (SS), Klassen Typology, and Geographic Information System (GIS) methods. In the context of agricultural economic growth in East Java Province, this study aims to gain a deeper understanding of the contribution and development of the agricultural financial sector at the regency/city level. The LQ method was used to identify the economic, agricultural industry, and the primary economy in each regency/city. In contrast, the SS method analyzes shifts in agricultural economic growth between districts/cities. In addition, Klassen typology provides an overview of the economic quadrant groupings. Finally, GIS is used to visualize spatial analysis results, which helps identify the geographic patterns and distribution of agricultural economic development in Indonesia. This research is expected to provide valuable insights for stakeholders, including government and industry players, in planning more effective agricultural and economic development policies in each region/city. The results of this study can also be a reference for further research in East Java Province.

Keywords: agricultural economics, location quotient, shift share, Klassen typology, geographic information system.

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1. Introduction

Economic development is a multidimensional process that identifies changes in economic structure and shifts in the development paradigm (Raqib & Rofiuddin, 2018). Changes in economic structure are defined as a series of interrelated changes in terms of demand, foreign trade, production, and use of production factors. At the same time, a paradigm shift is a situation where you have to choose between growth, equity, and sustainability as a non-trade-off option that is a necessity in achieving a balanced development so that the development approach tends to be regional and local (Raqib & Rofiuddin, 2018). Differences in regional conditions affect the development pattern because they have patterns of wisdom that may not necessarily be replicated in other regions. The importance of development planning is a solution to increasing the use of available public resources in an area so that it can unify the economy of the public and private sectors.

The economic basis theory is the magnitude of the economic growth rate, which is determined by export activities in a region. An economic sector can export if it has productivity to meet its region's needs and export to other regions (Rachman, 2018). While leading sectors are often associated with a form of international, regional, or national comparison. The leading sector is also interpreted as a region that can win competition in the same sector so that it can carry out export activities (Silalahi, 2011). In other words, the leading sector must grow faster than other sectors (Rachman, 2018).

East Java is a province whose economic performance grew 5.74% (y-o-y) in the 2022 quarter, an increase of 5.24% (y-o-y) compared to the previous quarter. This made the East Java economy rank higher than the average economic growth in the Java region of 5.66% (y-o-y) and the national average of 5.44% (y-o-y). Economic growth occurred from the demand side, driven by higher household consumption, investment, and net exports between regions. Then, from the supply side, there have been improvements in most business fields in East Java, such as the processing industry, trade, construction, provision of food and drink accommodations, transportation, and warehousing (Kantor Perwakilan Bank Indonesia Provinsi Jawa Timur, 2022). Meanwhile, in the third and fourth quarters, economic growth decreased by 5.59% (y-o-y) to 4.76% (y-o-y). The reason is that there has been a slowdown in domestic and external demand due to global uncertainties, adjustments to the price of fuel oil in September 2022, and the completion of government incentives (Kantor Perwakilan Bank Indonesia Provinsi Jawa Timur, 2023).

Despite economic growth, East Java will continue to experience inflation in the second quarter of 2022 with a Consumer Price Index (CPI) of 4.92% (y-o-y), which is higher than the first quarter of the same year of 3.04% (y-o-y). The increase in CPI was due to the high supply side in line with rising global commodity prices and horticultural disturbances. Meanwhile, the increase in inflation from the demand side was maintained at a level that supports the achievement of the CPI inflation target. Based on spatial analysis, the highest annual inflation was in the City of Sumenep at 5.79% (y-o-y), while the lowest was in the City of Kediri at 4.02% (y-o-y). The cause of high inflation in Sumenep City is due to food supply disruptions in line with the high increase in public demand. The geographical conditions in the Madura Islands exacerbate this. The lack of transportation infrastructure and its location far from production centers has resulted in high distribution costs, which has implications for commodity prices. In contrast, the City of Kediri has anticipated the Inter-Regional Cooperation (IRC) between the City of Kediri and the Kediri Regency so that horticultural prices tend to be more moderate due to maintained food supply (East Java BI, 2022). Then, in the

third and fourth quarters of 2022, it was recorded at 6.80% (y-o-y) and 6.52% (y-o-y), which experienced an increase from the previous quarter. The reasons for this are high horticultural inflation due to anthracnose pests, high intensity of rainfall, and fuel price adjustments (Kantor Perwakilan Bank Indonesia Provinsi Jawa Timur, 2023).

Agricultural economics studies the distribution, allocation, and utilization of resources used with agricultural commodities. The role of the agricultural economy is very important in development economics because the surplus rate is more sustainable, so it has implications for technological and commercial growth (Johnson, 2023). In addition, the agricultural economy has contributed to Indonesia's micro, macro, and economic development when change occurs (Arifin, 2023). Through the agricultural economy, it can create sustainable economic patterns to increase food production, open employment opportunities, and agricultural labor productivity, and develop exports of agricultural products (Arifin, 2015).

National economic policies aim to strengthen several economic sectors. One sector that is of concern to the Indonesian government is the agricultural sector. The Statistics Indonesia report defines agriculture as a combination of agriculture, forestry, and fishing, which is included in category A (Statistics Jawa Timur, 2022a, 2022b). East Java itself recorded that the contribution of agriculture was only an average of 10% of the total GRDP based on its field of business expenditure (Statistics Jawa Timur, 2022a, 2022b). An average of 10% is still considered too small, considering that paddy fields and dry land agriculture still dominate East Java Province. Not only agricultural land, the male and female population in 2023 will be 41,416,407 people (Statistics Jawa Timur, 2023). The largest labor absorption was in agriculture, forestry, and fishery (34.56%), whose value increased between August 2021 and February 2022. In addition, Micro-Small-Medium Enterprise (MSME) lending occurred in Agriculture, Hunting, Forestry, and Wholesale and Retail Trade, which drives the East Java economy (Kantor Perwakilan Bank Indonesia Provinsi Jawa Timur, 2022). Seeing these potentials, East Java Province should be optimally optimized concerning this agricultural sector.

This research aims to assess and identify agricultural economic growth (category A) in East Java Province. Based on the complexity of the problems and the potential of the agricultural economy in East Java, development economic analysis is very important for regional planning. In principle, the regional development process focuses on three goals: equity, economic growth, and sustainability (Jauhari, 2020). So, regional development is oriented towards optimizing village potential, which can solve regional problems (Muta'ali, 2012). In general, the development of rural areas is related to the agricultural sector, so this is based on basic economic activities (Muta'ali, 2015). The base economic sector is defined as the production volume that can meet the region's needs, both locally and outside the region (exports). The criteria for the base sector are that the leading sector has high economic growth, absorbs many workers, and links with other sectors to create added value (Tarigan, 2005). In addition to basic economic analysis, regional development processes also focus on value growth, progressivity, and comparative advantage (Abidin, 2015). This can be mapped based on predetermined criteria (Jauhari, 2020). Visualization is also very important in the regional development process.

The analysis of the growth and economic contribution of agriculture can be a basis for stakeholders to decide which areas will become the center of food storage in East Java Province. By using visualization, policymakers also know which areas should be focused on in a few years. This is also an update of previous research because this research can assess in detail the basic sectors of the agricultural economy, look at

the status of agricultural economic development, and carry out a classification of the agricultural economy in East Java.

2. Methods

The research conducted in East Java Province has 29 regencies and nine cities with a total area of 47,963 km². East Java is the province that has the most regencies and cities in Indonesia and is divided into two main parts, namely East Java and the Madura Islands. The total area of East Java is 88.70% or 42,541 km², while the Madura Islands are 11.30% or 5,422 km². Based on land cover, East Java Province is still dominated by paddy fields by 26.88% or 1,289,090.32 ha, followed by dry land agriculture by 15.96% or 765,483.07 ha.

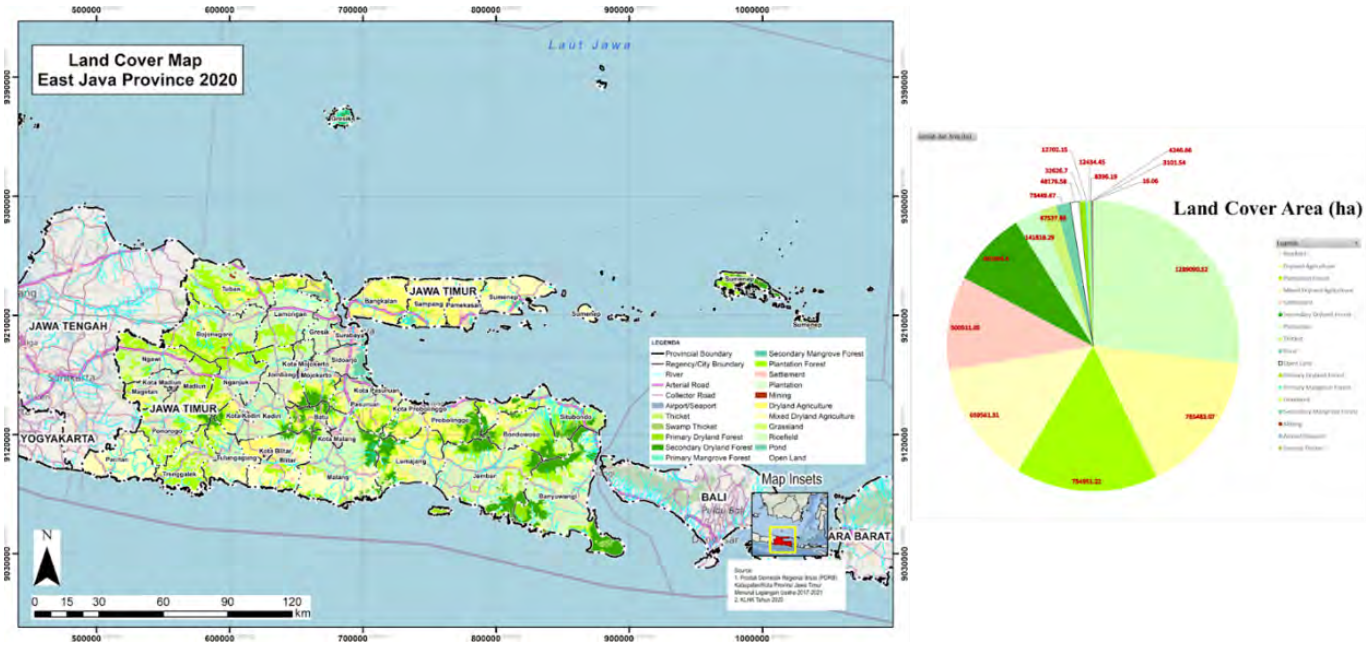

Figure 1. Land Cover Map of East Java Province 2020

Source: *Processed from Bawaslu data*

This study uses secondary data from the Gross Domestic Product (GDP) from the Central Statistics Agency (CBS) in 2017-2021. GDP data is based on constant prices according to the business sector 2010. GDP at constant prices shows the added value of goods and services calculated through prices that apply for one year (Statistics Jawa Timur, 2022a, 2022b). The benefit of this data is that it can measure the growth rate of consumption, investment, and foreign trade and determine the economic growth per capita population in a country. The relevance of using GDP at constant prices is calculating economic growth from year to year by considering the base & non-base sectors, the rate of growth, and the potential for economic development. The data that the authors have processed are described in Table 1.

This study uses the location quotient (LQ) analysis approach, Shift Share, and Klassen Typology and combines spatial processes based on Geographic Information Systems (GIS). Location Quotient (LQ) is a statistical method that uses the characteristics of output/added value or employment opportunities to analyze and determine the diversity of the local economic base (Arsyad, 1999; Bendavid-Val, 1991). The local economic base sector categories are sectors related to income and employment opportunities (Kharisma & Hadiyanto, 2019). LQ analysis is used to identify potential economic categories and subcategories based on GRDP contribution

criteria (Kharisma & Hadiyanto, 2019). The assessment was carried out to identify specializations/bases of economic activity (Rahadiantino & Fathurrohman, 2020).

Table 1. GRDP Data of Sector a (Real GRDP 2010) in East Java Province 2017–2021

GRDP Data of Sector A (Agriculture, Forestry, & Fishing) Regency/Municipality in East Java Constant Price/Real GRDP 2010 (in billion Rupiah)															
Regency/City	2017			2018			2019			2020			2021		
	AG	T	AG/T	AG	T	AG/T	AG	T	AG/T	AG	T	AG/T	AG	T	AG/T
Pacitan	2,595.70	9,962.50	0.26	2,641.50	10,507.37	0.25	2,639.10	11,040.77	0.24	2,739.30	10,837.87	0.25	2,700.70	11,107.40	0.24
Ponorogo	3,381.50	12,933.50	0.26	3,412.80	13,615.23	0.25	3,407.10	14,297.10	0.24	3,492.70	14,168.62	0.25	3,556.90	14,620.00	0.24
Trenggalek	3,067.30	11,579.90	0.26	3,024.70	12,161.86	0.25	3,039.10	12,779.45	0.24	3,042.00	12,502.39	0.24	3,020.00	12,959.00	0.23
Tulungagung	4,536.70	24,637.40	0.18	4,507.90	25,920.20	0.17	4,588.80	27,299.80	0.17	4,551.00	26,455.76	0.17	4,619.50	27,390.40	0.17
Blitar	7,171.00	23,107.50	0.31	7,253.20	24,286.24	0.30	7,371.10	25,530.11	0.29	7,375.20	24,945.46	0.30	7,376.30	25,700.00	0.29
Kediri	6,025.90	26,446.20	0.23	6,028.50	27,786.42	0.22	6,053.70	29,193.72	0.21	6,079.40	28,490.95	0.21	6,130.60	29,361.70	0.21
Malang	9,994.10	61,408.90	0.16	9,799.60	64,819.04	0.15	9,884.70	68,379.67	0.14	9,809.90	66,545.47	0.15	9,728.60	68,619.10	0.14
Lumajang	7,262.20	20,542.90	0.35	7,220.00	21,569.78	0.33	7,269.20	22,563.39	0.32	7,250.70	21,933.79	0.33	7,278.50	22,623.40	0.32
Jember	13,841.70	48,913.00	0.28	13,845.10	51,370.52	0.27	14,046.60	54,200.04	0.26	13,895.90	52,586.56	0.26	13,881.20	54,688.70	0.25
Banyuwangi	15,607.20	49,480.40	0.32	15,493.00	52,367.70	0.30	15,406.90	55,274.03	0.28	14,950.30	53,295.11	0.28	15,205.40	55,471.10	0.27
Bondowoso	3,623.70	12,325.70	0.29	3,635.80	12,951.52	0.28	3,679.90	13,637.36	0.27	3,729.50	13,451.77	0.28	3,818.40	13,921.70	0.27
Situbondo	3,753.20	12,230.50	0.31	3,767.50	12,897.92	0.29	3,826.60	13,599.57	0.28	3,746.70	13,282.84	0.28	3,810.00	13,715.80	0.28
Probolinggo	7,350.30	21,418.30	0.34	7,200.10	22,374.57	0.32	7,278.30	23,395.25	0.31	7,280.00	22,898.24	0.32	7,355.10	23,664.40	0.31
Pasuruan	5,907.00	94,102.00	0.06	5,818.10	99,489.36	0.06	5,866.00	105,289.18	0.06	5,929.40	103,152.80	0.06	5,782.70	107,630.30	0.05
Sidoarjo	2,654.50	125,039.10	0.02	2,551.70	132,552.94	0.02	2,558.30	140,492.94	0.02	2,628.50	135,305.32	0.02	2,626.40	141,000.40	0.02
Mojokerto	3,878.20	52,187.80	0.07	3,829.50	55,256.61	0.07	3,861.90	58,467.15	0.07	3,884.60	57,818.42	0.07	3,924.60	60,198.70	0.07
Jombang	4,430.10	25,497.00	0.17	4,506.80	26,846.15	0.17	4,524.20	28,216.18	0.16	4,509.00	27,657.58	0.16	4,486.20	28,553.50	0.16
Nganjuk	4,885.80	16,485.60	0.30	4,861.80	17,373.26	0.28	4,954.10	18,304.20	0.27	5,032.00	17,990.36	0.28	5,115.80	18,640.70	0.27
Madiun	3,492.70	11,879.30	0.29	3,413.90	12,485.01	0.27	3,489.60	13,161.84	0.27	3,529.20	12,939.58	0.27	3,586.50	13,372.30	0.27
Magetan	3,511.10	11,978.10	0.29	3,501.30	12,602.60	0.28	3,517.30	13,237.47	0.27	3,602.30	13,020.89	0.28	3,599.00	13,417.00	0.27
Ngawi	3,945.00	12,406.40	0.32	4,039.90	13,052.30	0.31	4,117.30	13,710.89	0.30	4,156.10	13,479.74	0.31	4,138.10	13,823.50	0.30
Bojonegoro	6,013.80	63,046.50	0.10	5,953.70	65,815.56	0.09	5,966.60	69,985.68	0.09	6,005.30	69,703.42	0.09	5,932.60	65,839.50	0.09
Tuban	7,315.40	41,027.70	0.18	7,304.00	43,139.69	0.17	7,398.40	45,356.09	0.16	7,295.40	42,705.01	0.17	7,395.20	43,984.70	0.17
Lamongan	8,712.10	24,923.00	0.35	8,509.00	26,279.77	0.32	8,519.40	27,706.16	0.31	8,505.40	26,972.65	0.32	8,388.80	27,896.50	0.30
Gresik	6,174.90	90,855.60	0.07	6,030.00	96,131.61	0.06	6,053.90	101,346.55	0.06	6,004.10	97,616.60	0.06	5,823.50	101,318.70	0.06
Bangkalan	3,693.90	17,618.60	0.21	3,726.60	18,361.44	0.20	3,694.70	18,550.80	0.20	3,746.90	17,514.62	0.21	3,670.20	17,152.80	0.21
Sampang	3,955.10	13,198.50	0.30	3,945.10	13,740.97	0.29	3,900.50	13,994.78	0.28	4,057.70	13,953.74	0.29	4,012.20	13,984.60	0.29
Pamekasan	3,137.60	10,310.20	0.30	3,187.70	10,872.94	0.29	3,191.70	11,407.36	0.28	3,214.60	11,117.62	0.29	3,262.80	11,496.20	0.28
Sumenep	7,682.00	22,949.70	0.33	7,859.00	23,783.32	0.33	7,758.10	23,816.44	0.33	7,818.70	23,546.51	0.33	7,980.60	24,161.40	0.33
Kediri City	189.80	80,946.20	0.00	192.90	85,337.68	0.00	191.90	90,001.52	0.00	197.50	84,374.98	0.00	197.60	86,485.60	0.00
Blitar City	118.70	4,315.00	0.03	119.20	4,566.20	0.03	120.80	4,832.89	0.02	121.00	4,722.55	0.03	123.10	4,924.60	0.02
Malang City	107.50	46,824.80	0.00	108.70	49,500.83	0.00	117.40	52,334.75	0.00	116.80	51,154.53	0.00	118.60	53,309.70	0.00
Probolinggo City	456.00	7,430.60	0.06	452.00	7,871.38	0.06	455.30	8,338.77	0.05	450.80	8,035.27	0.06	430.00	8,361.10	0.05
Pasuruan City	117.00	5,354.10	0.02	116.90	5,650.49	0.02	115.80	5,964.66	0.02	128.60	5,706.60	0.02	124.50	5,914.60	0.02
Mojokerto City	25.40	4,460.40	0.01	25.60	4,718.94	0.01	25.20	4,985.68	0.01	27.20	4,801.46	0.01	26.60	4,976.50	0.01
Madiun City	75.00	9,486.10	0.01	76.40	10,051.29	0.01	75.60	10,623.07	0.01	84.40	10,262.44	0.01	78.30	10,748.10	0.01
Surabaya City	589.90	364,714.80	0.00	581.40	387,303.94	0.00	576.20	410,879.31	0.00	548.00	390,936.43	0.00	554.10	407,726.80	0.00
Batu City	1,469.60	10,390.80	0.14	1,500.10	11,065.99	0.14	1,531.00	11,786.65	0.13	1,557.60	11,025.81	0.14	1,576.10	11,471.40	0.14
East Java	167,360.57	1,482,299.60	0.11	163,799.94	1,563,441.80	0.10	165,951.23	1,649,895.60	0.10	167,631.24	1,611,507.80	0.10	170,592.65	1,669,116.90	0.10

Source: *Statistics Jawa Timur (2022a), processed by authors*

Notes: AG = Agriculture, Forestry, and Fishing (Category A), T = Total GRDP

The formula is:

$$LQ = \frac{\frac{X_i}{\Sigma X_i}}{\frac{N_i}{\Sigma N_i}}.100$$

Where LQ is the location quotient, Xi is the value of agriculture GRDP in area I (regency/city), ∑Xi is the value of the total GRDP in regency/city in all the sub-areas combined, Ni is the value of agriculture GRDP in province area, and ∑Ni is the value of the total GRDP in province area in all the sub-areas combined. If LQ ≥ 1, then the sector has been able to meet the market demand needs within the region and is also sent outside the region (base sector). However, if LQ < 1, then the sector can only meet demand within its territory (non-base sector).

Shift share analysis is an economic analysis method to find out developments in a region based on the conditions of the economic structure, shifts in leading sectors, and the position of the regional economic sector with the wider area (Kasikoen, 2017). The shift-share method is often used to identify trends in the regional economic transformation, which is divided into three components, namely provincial growth (regional share), sectoral growth (proportionally shift), and regional competitiveness

growth (different shift) (Abidin, 2015). The provincial growth component looks at a region's structure or relative position concerning economic growth so that it describes changes in output caused by changes in general and changes in overall monetary policy uniformly. Then, sectoral growth is used to measure the level of production growth in a region so that it knows whether the growth rate is faster or slower than the national production growth. In addition the last component is regional competitiveness, which measures regional competitiveness compared to the growth of the same sector in other regions. Different shifts can occur if there is an increase or decrease in output in an area due to comparative advantage, access to input and output markets, and economic infrastructure (Abidin, 2015).

The formula is:

$$\text{Shift-Share} = \text{NGC} + \text{PGC} + \text{RSGC}$$

$$\text{Net Shift (NS)} = \text{PGC} + \text{RSGC}$$

Where NGC (National Growth Component) is the national share, PGC (Proportional Growth Component) is the proportional shift and deviation from the national share, RSGC (Regional Share Growth Component) is a differential shift or locational or regional component that describes the comparative advantage of the sector (RSGC > 0), and NS is a description of the sector moving progressively (NS ≥ 0) or regressively (NS < 0).

The Klassen typology analysis tool provides an overview of research results in four different economic growth and economic contributions. Aswandi and Kuncoro (2002) explain the four quadrants as follows:

1. I Quadrant: fast-growing and great contribution/income
2. II Quadrant: fast-growing and small contribution/income
3. III Quadrant: slow-growing and great contribution/income
4. IV Quadrant: slow-growing and small contribution/income

The fast-growing indicator (r sub-sector> r GRDP) indicates significant moving sector growth. Meanwhile, the great contribution/income indicator (GRDP sub-sector contribution > GRDP contribution) explains the sector's very high contribution to GRDP. This analysis tool is illustrated by a quadrant diagram (Figure 2).

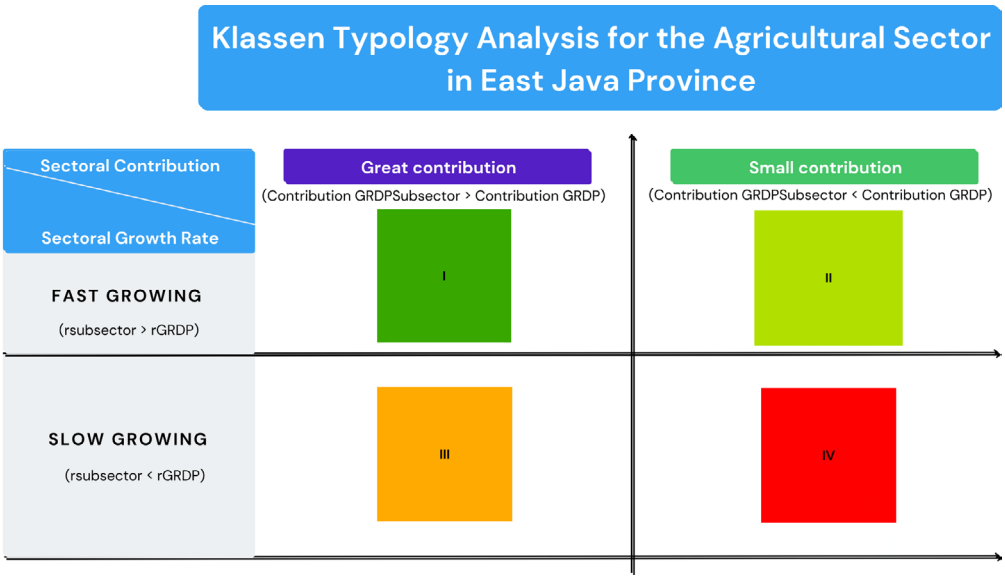

Figure 2. Framework Analysis of Klassen Typology

Geographic Information System (GIS) is a database system that handles spatially referenced data, such as graphical data and georeferenced linked text data (Chang et al., 2018). GIS components include hardware, software, and brainware (implementers in collecting, analyzing, and publishing geographic data). GIS can form precise and accurate spatial information because it combines and organizes data to become a tool in spatial-based decision-making (Chang et al., 2018). The advantages of GIS are also supported by the ability to function statistics, spatial interactions, and location modeling to be used as spatial analysis in various fields, such as economic and social (Jauhari, 2020). GIS capabilities for spatial analysis make it easy to group areas with characteristics or striking differences from other regions. From a spatial perspective, the economic sector can utilize GIS in determining prime commodity areas and local economic development, thereby supporting economic development.

3. Results and Discussion

The results of the LQ analysis show the dominance of East Java Province as the agricultural base sector. Lumajang Regency is the highest agricultural-producing region, so it is used as a food barn in East Java Province. LQ analysis provides an overview of areas that have the potential to become self-sufficient in food. So that non-base areas can meet food needs, and economic equality arises, especially in the agricultural, forestry, and fisheries sectors.

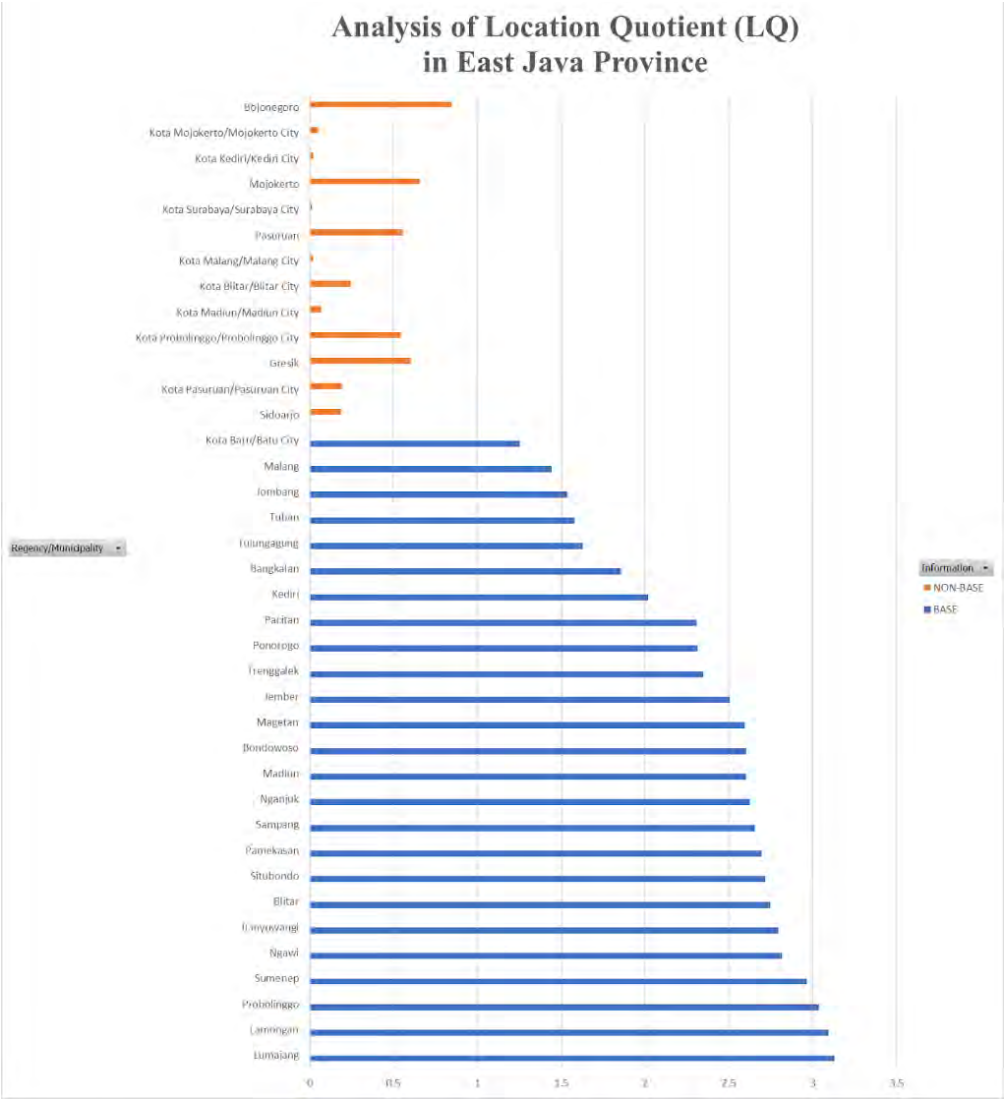

Figure 3. LQ Analysis of Regency/City in East Java Province

It is spatially illustrated that the non-base sector is located in the region, such as Surabaya City, Pasuruan City, Mojokerto City, Madiun City, Kediri City, Malang City, Probolinggo City, Blitar City, Pasuruan Regency, Mojokerto Regency, Gresik Regency, Sidoarjo Regency, and Bojonegoro. The non-base sector in East Java is growing rapidly in areas that are mostly the center of government and the economy. Livelihoods that develop in the region are trade, the processing industry, and the service sector. To meet the people's food needs, the region will indirectly depend on the base area to create supply and demand to drive the East Java economy. Visualization of the distribution of base and non-base areas can be seen in Figure 4.

Figure 4. Base and Non-Base Map in Agricultural Sector in East Java Province 2021

Furthermore, shift-share analysis can explain how big the sector's contribution is to GRDP. The results of the shift-share analysis using data from 2017 to 2021 look at measurements of the agricultural sector in regencies/cities in East Java, which are explained as follows:

1. NGC

   NGC calculation results are obtained at 0.126032, which indicates that the East Java economy (GRDP) only grew 12.6% in the period 2017 to 2021 (real GRDP 2010).

2. PGC

   PGC calculation results are obtained at -0.11 which indicates the level of agricultural production in East Java is 11% slower than the national production level.

3. RSGC

   RSGC calculation results are obtained varied. The HIGH indicator (RSGC > 0) means that the regency/city has a competitive and comparative advantage in the agricultural sector. There are at least 17 out of 38 regencies/cities in East Java that have competitive and comparative advantages in the agricultural sector, with the top three RSGC scores located in Malang City (0.08), Batu City (0.05), and Pasuruan City (0.04). Meanwhile, the LOW indicator (RSGC < 0) was recorded in 21 regencies/

cities in East Java. The lowest three RSGC scores were in Gresik, Probolinggo City, and Surabaya City, with a value of 0.08. This is a challenge for East Java to increase competitive and comparative advantage in the agricultural sector for 21 regencies/ cities.

4. NS

NS value is obtained from the PGC calculation plus the RSGC. All regencies/cities in East Java experienced a regressive aspect in the agricultural sector. The lowest three NS values were obtained by the City of Surabaya (0.19), the City of Probolinggo (0.18), and Gresik (0.18). The top three lowest are also in line with the RSGC score. Apart from that, the government of East Java has a hard job overcoming the decline of this agricultural sector, considering that this province has a large land area and a large population.

To clarify a comprehensive picture, the calculation of the shift-share results for 38 regencies/cities in East Java is described in Table 2 and the GIS visualization of the shift-share analysis is depicted in Figure 5.

Table 2. Shift Share Analysis of Regency/ City in East Java Province

SHIFT-SHARE CALCULATION FOR AGRICULTURE SECTOR													
Regency/City	GRDP 2017	GRDP 2021	ri	Ri	Ra	NGC	PGC	RSGC		Economic Growth (EG)		Net Shift (NS)	
	yio	yit	(yit/yio)	(Yit/Yio) AG	(Yt/Yo) T	Ra - 1	Ri - Ra	ri - Ri	Information	Shift-Share	Manual	PGC+RSGC	Information
Pacitan	2,595.70	2,700.70	1.040451516	1.02	1.126032079	0.126032	(0.11)	0.02	HIGH	0.04	0.04	(0.09)	REGRESSIVE
Ponorogo	3,381.50	3,556.90	1.051870472	1.02	1.126032079	0.126032	(0.11)	0.03	HIGH	0.05	0.05	(0.07)	REGRESSIVE
Trenggalek	3,067.30	3,020.00	0.984579272	1.02	1.126032079	0.126032	(0.11)	(0.03)	LOW	(0.02)	(0.02)	(0.14)	REGRESSIVE
Tulungagung	4,536.70	4,619.50	1.018251152	1.02	1.126032079	0.126032	(0.11)	(0.00)	LOW	0.02	0.02	(0.11)	REGRESSIVE
Blitar	7,171.00	7,376.30	1.028629201	1.02	1.126032079	0.126032	(0.11)	0.01	HIGH	0.03	0.03	(0.10)	REGRESSIVE
Kediri	6,025.90	6,130.60	1.017374998	1.02	1.126032079	0.126032	(0.11)	(0.00)	LOW	0.02	0.02	(0.11)	REGRESSIVE
Malang	9,994.10	9,728.60	0.973434326	1.02	1.126032079	0.126032	(0.11)	(0.05)	LOW	(0.03)	(0.03)	(0.15)	REGRESSIVE
Lumajang	7,262.20	7,278.50	1.002244499	1.02	1.126032079	0.126032	(0.11)	(0.02)	LOW	0.00	0.00	(0.12)	REGRESSIVE
Jember	13,841.70	13,881.20	1.002853696	1.02	1.126032079	0.126032	(0.11)	(0.02)	LOW	0.00	0.00	(0.12)	REGRESSIVE
Banyuwangi	15,607.20	15,205.40	0.974255472	1.02	1.126032079	0.126032	(0.11)	(0.05)	LOW	(0.03)	(0.03)	(0.15)	REGRESSIVE
Bondowoso	3,623.70	3,818.40	1.053729613	1.02	1.126032079	0.126032	(0.11)	0.03	HIGH	0.05	0.05	(0.07)	REGRESSIVE
Situbondo	3,753.20	3,810.00	1.015133753	1.02	1.126032079	0.126032	(0.11)	(0.00)	LOW	0.02	0.02	(0.11)	REGRESSIVE
Probolinggo	7,350.30	7,355.10	1.000653035	1.02	1.126032079	0.126032	(0.11)	(0.02)	LOW	0.00	0.00	(0.13)	REGRESSIVE
Pasuruan	5,907.00	5,782.70	0.978957169	1.02	1.126032079	0.126032	(0.11)	(0.04)	LOW	(0.02)	(0.02)	(0.15)	REGRESSIVE
Sidoarjo	2,654.50	2,626.40	0.989414202	1.02	1.126032079	0.126032	(0.11)	(0.03)	LOW	(0.01)	(0.01)	(0.14)	REGRESSIVE
Mojokerto	3,878.20	3,924.60	1.011964313	1.02	1.126032079	0.126032	(0.11)	(0.01)	LOW	0.01	0.01	(0.11)	REGRESSIVE
Jombang	4,430.10	4,486.20	1.012663371	1.02	1.126032079	0.126032	(0.11)	(0.01)	LOW	0.01	0.01	(0.11)	REGRESSIVE
Nganjuk	4,885.80	5,115.80	1.047075198	1.02	1.126032079	0.126032	(0.11)	0.03	HIGH	0.05	0.05	(0.08)	REGRESSIVE
Madiun	3,492.70	3,586.50	1.026856014	1.02	1.126032079	0.126032	(0.11)	0.01	HIGH	0.03	0.03	(0.10)	REGRESSIVE
Magetan	3,511.10	3,599.00	1.025034889	1.02	1.126032079	0.126032	(0.11)	0.01	HIGH	0.03	0.03	(0.10)	REGRESSIVE
Ngawi	3,945.00	4,138.10	1.048948035	1.02	1.126032079	0.126032	(0.11)	0.03	HIGH	0.05	0.05	(0.08)	REGRESSIVE
Bojonegoro	6,013.80	5,932.60	0.986497722	1.02	1.126032079	0.126032	(0.11)	(0.03)	LOW	(0.01)	(0.01)	(0.14)	REGRESSIVE
Tuban	7,315.40	7,395.20	1.010908494	1.02	1.126032079	0.126032	(0.11)	(0.01)	LOW	0.01	0.01	(0.12)	REGRESSIVE
Lamongan	8,712.10	8,388.80	0.962890692	1.02	1.126032079	0.126032	(0.11)	(0.06)	LOW	(0.04)	(0.04)	(0.16)	REGRESSIVE
Gresik	6,174.90	5,823.50	0.943092196	1.02	1.126032079	0.126032	(0.11)	(0.08)	LOW	(0.06)	(0.06)	(0.18)	REGRESSIVE
Bangkalan	3,693.90	3,670.20	0.993584017	1.02	1.126032079	0.126032	(0.11)	(0.03)	LOW	(0.01)	(0.01)	(0.13)	REGRESSIVE
Sampang	3,955.10	4,012.20	1.014437056	1.02	1.126032079	0.126032	(0.11)	(0.00)	LOW	0.01	0.01	(0.11)	REGRESSIVE
Pamekasan	3,137.60	3,262.80	1.039903111	1.02	1.126032079	0.126032	(0.11)	0.02	HIGH	0.04	0.04	(0.09)	REGRESSIVE
Sumenep	7,682.00	7,980.60	1.038870086	1.02	1.126032079	0.126032	(0.11)	0.02	HIGH	0.04	0.04	(0.09)	REGRESSIVE
Kediri City	189.80	197.60	1.04109589	1.02	1.126032079	0.126032	(0.11)	0.02	HIGH	0.04	0.04	(0.08)	REGRESSIVE
Blitar City	118.70	123.10	1.037068239	1.02	1.126032079	0.126032	(0.11)	0.02	HIGH	0.04	0.04	(0.09)	REGRESSIVE
Malang City	107.50	118.60	1.103255814	1.02	1.126032079	0.126032	(0.11)	0.08	HIGH	0.10	0.10	(0.02)	REGRESSIVE
Probolinggo City	456.00	430.00	0.942982456	1.02	1.126032079	0.126032	(0.11)	(0.08)	LOW	(0.06)	(0.06)	(0.18)	REGRESSIVE
Pasuruan City	117.00	124.50	1.064102564	1.02	1.126032079	0.126032	(0.11)	0.04	HIGH	0.06	0.06	(0.06)	REGRESSIVE
Mojokerto City	25.40	26.60	1.047244094	1.02	1.126032079	0.126032	(0.11)	0.03	HIGH	0.05	0.05	(0.08)	REGRESSIVE
Madiun City	75.00	78.30	1.044	1.02	1.126032079	0.126032	(0.11)	0.02	HIGH	0.04	0.04	(0.08)	REGRESSIVE
Surabaya City	589.90	554.10	0.939311748	1.02	1.126032079	0.126032	(0.11)	(0.08)	LOW	(0.06)	(0.06)	(0.19)	REGRESSIVE
Batu City	1,469.60	1,576.10	1.072468699	1.02	1.126032079	0.126032	(0.11)	0.05	HIGH	0.07	0.07	(0.05)	REGRESSIVE
	Yo	Yt											
East Java **AG**	167,360.57	170,592.65											
East Java **T**	1,482,299.60	1,669,116.90											

Finally, the Klassen typology analysis results describe the agricultural sector of 38 regencies/cities in East Java in four quadrants. In quadrant I, Batu City is one of the areas that is growing rapidly and has a major contribution to the agricultural sector in East Java. One area that is growing slowly but has a large contribution to the agricultural sector is Malang City (quadrant III). Some areas are growing rapidly but have a small contribution to the agricultural sector. One of them is Banyuwangi (quadrant II).

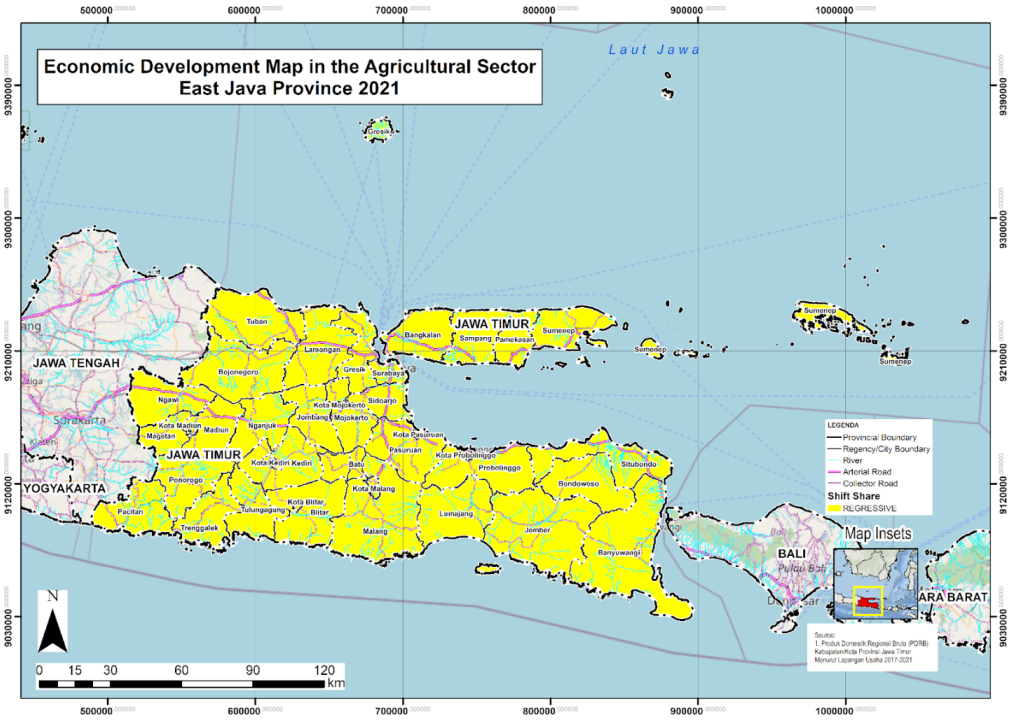

Figure 5. Economic Development Map in Agricultural Sector in East Java Province 2021

Without minimizing the previous three quadrants, the East Java government must be able to see quadrant IV, which is a relatively underdeveloped region with a low growth rate and low contribution rate to the agricultural sector. They are Bojonegoro, Gresik, Pasuruan, Mojokerto, Sidoarjo, Surabaya City and Probolinggo City. To see the regions and quadrants in more detail, the Klassen typology analysis is described in Figure 6, and the GIS visualization of the Klassen typology analysis is depicted in Figure 7.

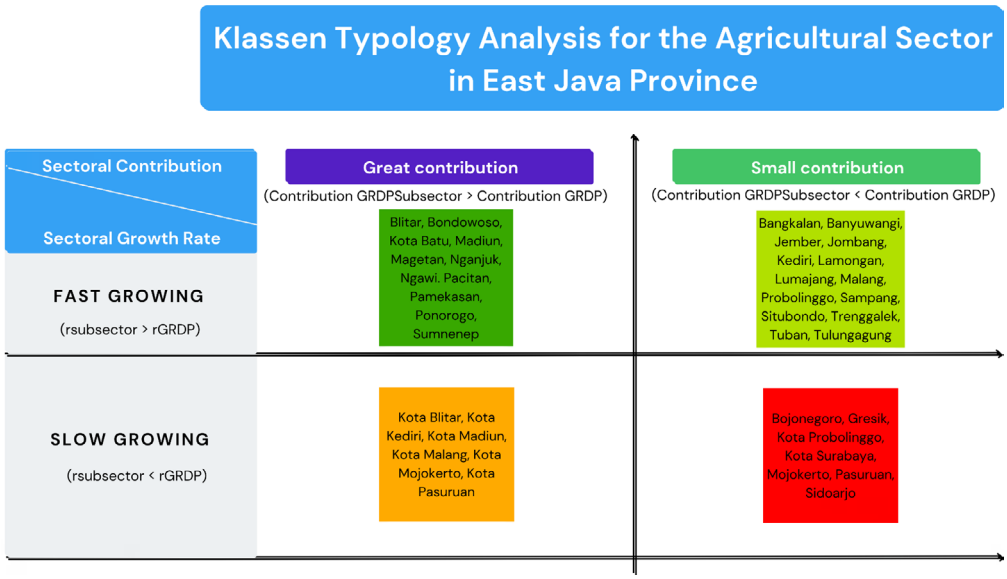

Figure 6. Klassen Typology of Regency/ City in East Java Province

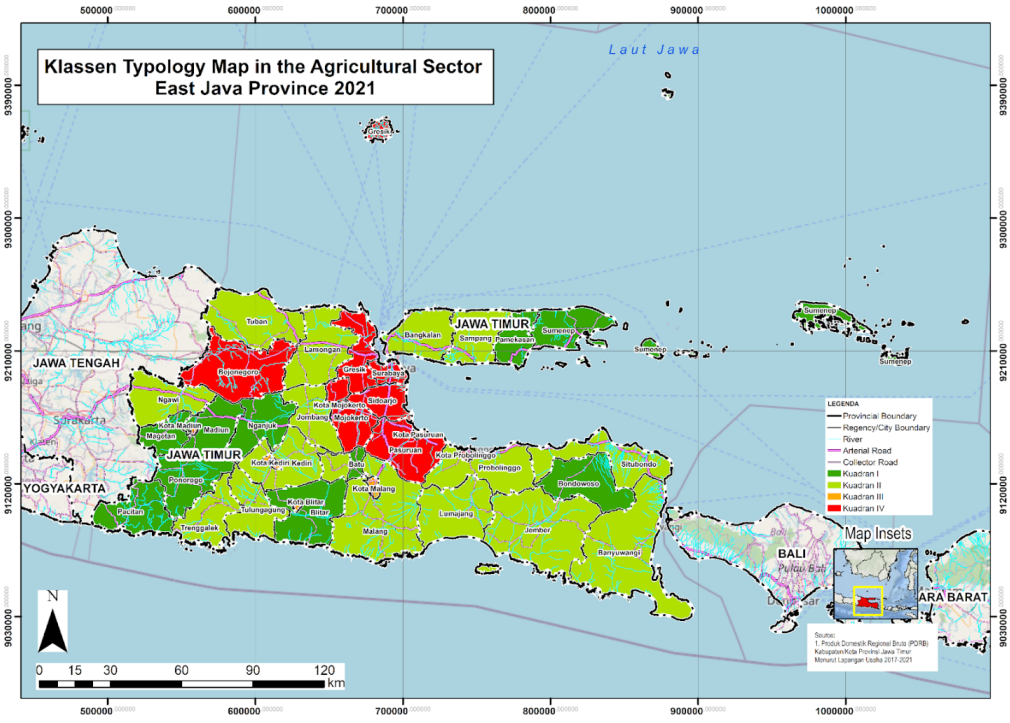

Figure 7. Klassen Typology Map in Agricultural Sector in East Java Province 2021

4. Conclusion

Based on the research results, it can be concluded that East Java Province has the potential to improve the economy in the agricultural sector. Agricultural base areas can be optimized to create space for movement and economy with non-base areas, resulting in supply and demand between cooperating regions. Then, the shift-share analysis shows that it is still classified as regressive, so it is necessary to formulate policies in the agricultural sector. In addition, in the Klassen typology analysis, areas in quadrant IV are still found, so special attention is needed to maintain the community's food needs. Regions that are included in quadrants II and III also need to be optimized so that they can progress and develop rapidly. They can also help provide food for underdeveloped areas. The combination of the three previous methods and GIS visualization can help policymakers formulate further steps so that the agricultural economy in East Java becomes more advanced.

However, this research only assesses and identifies the global potential growth of the agricultural economic sector in East Java. In this research, researchers have not been able to analyze agricultural economic growth based on gender, labor, and MSMEs. This is due to the large area studied. Further research could involve these three topics so that the analysis can be comprehensive to improve community approaches at the village level. This analysis can be carried out by taking one district/city in East Java based on these findings so the scope of the description is more in-depth.

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