Economic Analysis of Corn Plantation Factors Using Geographic Information System Through Location Quotient and Shift Share Method in East Java Province

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Abstract—Agriculture is the largest sector in almost every developing country economy, such as a corn plantation. This sector provides food for the majority of its population, provides employment for almost all of the existing workforce, produces raw materials, or aids for the industry and becomes the largest source of foreign exchange earnings comparison between cities and another. So that agriculture is needed in a region one of them is East Java Province. In the development of the Area, especially in fulfilling the food needs through agriculture and plantation, it needs analysis based on region and its production. One method through Location Quotient (LQ) analysis through this method can be known base sector in a region compared to other regions. After that to know the growth of agricultural production of a sector used Shift Share analysis method. The data used are by BPS on agriculture and plantation category in East Java in 2012 until 2016.

Index Terms—Agriculture, Gross Regional Domestic Product, Shift Share, Geographic Information System, Location Quotient Analysis.

I. INTRODUCTION

AGRICULTURE is the largest sector in almost every developing country economy especially Corn. Corn is one of the most widely-planted crops in the world. It is grown in more than 170 regions globally [1]. This sector provides food for most of its population, provides employment for almost all of the existing workforce, produces raw materials, raw materials or aids for the industry and becomes the largest source of foreign exchange earnings [2].

In the development of the Area, especially in fulfilling the food needs through agriculture and plantation, it needs analysis based on region and its production with Location Quotient analysis (LQ). The location quotient, a ratio of ratios, is a widely used geographic index. It is used to measure and map relative distributions or relative concentrations of a subarea to the area as a whole [3]. After that to know the growth of agricultural production of a sector used Shift Share analysis method. After having the data then required analysis and presentation of information spatially using Geographic

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Information System (GIS) that serves to collect, store, recall, change and display spatial data from the real world for a particular purpose. [4].

Based on this background, this thesis will analyze the corn plantation factors using Location Quotient and Shift Share in East Java Province spatially through GIS.

II. LITERATURE

Location Quotient analysis is used to determine the leading subsector or economic base of a regional economy (Billings, 2012). Well-developed superior subsectors certainly have a significant influence on regional economic growth that ultimately can increase the regional income optimally (Kuncoro, 2002).

$$LQ_{ij} = \frac{X_{ij}/X_{i.}}{X_{.j}/X_{..}} \qquad (1)$$

LQ is Index Location Quotient agricultural commodity i at city level in East Java Province. X_{ij} is Production of agricultural commodity in city j in East Java Province. X_i is Agricultural and Plantation Products in city j in East Java Province. $X.j$ is Value of agricultural commodity production i East Java Province. $X..$ is Production of all Agriculture and Plantation in East Java Province.

Shift Share Analysis is an analysis that aims to determine the performance or productivity of regional economic work by comparing it with larger regions (regional or national) first created by Daniel Creamer. (Lahr, 2020)

$$SS = \left[\frac{Y^*}{Y} - 1\right] + \left[\frac{Y'i}{Yi} - \frac{Y^*}{Y}\right] + \left[\frac{y'i}{yi} - \frac{Y'i}{Yi}\right] \qquad (2)$$

Y^* is Economic indicators of the year end of the study. Y is Reference economic indicator at the beginning of the year. $Y'i$ is Economic indicators of the sector i at the end of the year. Yi is Economic indicators of the first sector of the year i survey. $y'i$ is the Local (local) economic indicator sector i at the end of the year. yi is the Regional economic indicator (local) sector i beginning of year of study.

Agricultural Commodity Basis The analysis used in prioritizing the development of agricultural commodity base in East Java Province is a combined analysis of Location Quotient and Shift Share (Growth of Regency Economics) with the following criteria:

With the total price of coconut Rp 478,680 / qw can be seen the total production of district/town generated in 2016

TABLE I
PRIORITY DETERMINATION METHOD

Criteria	$LQ > 1$	$LQ < 1$
$SS > 1$	Superior	Mainstay
$SS < 1$	Prospective	Preserved

TABLE II
TOTAL RESULT OF CORN PLANTATION PRODUCTION IN BILLION

Number	District	2016	2014
1	Pacitan	558	434
2	Ponorogo	1106	826
3	Trenggalek	322	325
4	Tulungagung	1264	1092
5	Blitar	1389	1411
6	Kediri	1338	1380
7	Malang	1469	1220
8	Lumajang	480	578
9	Jember	1714	1666
10	Banyuwangi	912	584
11	Bondowoso	488	660
12	Situbondo	1159	1133
13	Probolinggo	1295	1115
14	Pasuruan	1163	96
15	Sidoarjo	2	0.9
16	Mojokerto	559	465
17	Jombang	1029	995
18	Nganjuk	703	908
19	Madiun	174	130
20	Magetan	444	337
21	Ngawi	895	721
22	Bojonegoro	957	812
23	Tuban	2245	1939
24	Lamongan	1615	1350
25	Gresik	494	513
26	Bangkalan	617	582
27	Sampang	337	406
28	Pamekasan	579	482
29	Sumenep	1446	1382
30	Surabaya	1.1	1.3
31	Batu	4	6
	East Java	26765	24464

Fig. 1. Location Quotient Corn Plantation in East Java.

through corn production amounting to Rp26,770,517,696.- with the largest production amount is Tuban Regency with total Rp2,245,059,960.-

With a total price of Rp 4,264/kg of Corn produced in 2014 through corn production amounting to Rp24,464,196,848,000.- with the largest production amount is Tuban Regency with a total of Rp 2,050,225,008,000.-

Through the analysis of 2012 to 2016 growth in agricultural commodities from each city / district for the corn plantation sub-sector in East Java province are as follows: a)

1) Corn plantation sub-sector in East Java province that experienced constant growth from 2011 until 2016 amounting to eten districts / cities
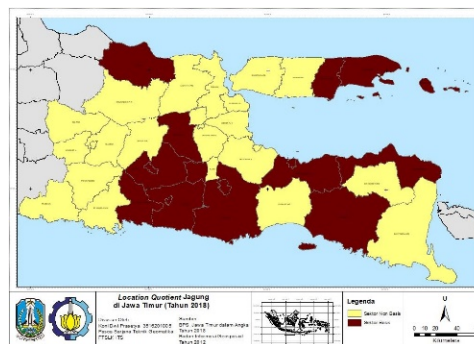2) Corn plantation sector in East Java province that expe-

rienced growth from 2011 to 2014 but decreased when 2014 to 2016 a number of four regencies / cities
3) Corn plantation sub-sector in East Java province which decreased from 2011 until 2014 but increased when 2014 to 2016 a number of 11 regencies / cities
4) In contrast, Corn plantation sub-sector in East Java Province has 6 districts / cities decreasing from 2011 to 2016.
5) Banyuwangi experienced the highest growth in the corn plantation sub sector with a total of Rp327,807,792,000.- from Rp584,300,184,000. - up to Rp912,107,976,000.-
6) While Batu Regency experienced a significant decrease in the corn plantation sub-sector with a number of Rp1,974,232,000.- from Rp6,050,616.000.- to Rp4,076,384,000.-
7) Total growth of con sub sector in East Java province in 2014 to 2016 is Rp2,306,448,768,000.

Location Quotient Coconut Plantations in East Java Analysis of Corn Location Quotient in East Java can be seen in the following analysis can be seen on Fig. 1 on the below.

Through the analysis based on location quotient method of 2011 to 2016 on agricultural commodities each city / district for the coconut sub sector in East Java province are as follows: a)

1) The corn sub-sector in East Java province consistently becomes the base sector ($LQ > 1$) are 10 districts / cities.
2) Corn sub-sector in East Java province consistent to non-base sector ($LQ < 1$) are four districts / cities.

Analysis Shift Share Corn Plantations in East Java Through analysis based on the Shift Share method (can be seen on Fig. 2) on agricultural commodities each city / district for the coconut sub sector in East Java province are as follows:

a)

1) The corn plantation sub-sector in East Java province has a national growth coefficient *(KPN)* of 0.094
2) The corn plantation sub-sector in East Java province has a Propositional Growth Coefficient *(KPP)* of 0.039
3) The corn plantation sub-sector in East Java province with regency / city economic growth ($PEK > 0$) of 25 districts / cities.
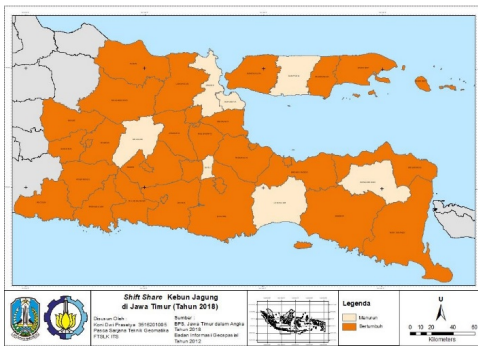
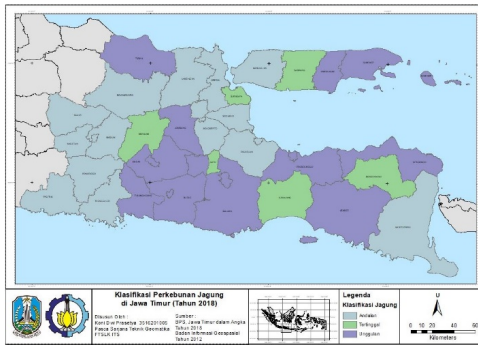Fig. 2. Analysis of Shift Share Corn Plantation in East Java.

Fig. 3. Classification of Corn Plantations in East Java.

4) Corn plantation sub-sector in East Java province experiencing degradation of regency / city economy ($PEK < 0$) of 6 regencies / cities.

5) The corn plantation sub-sector in East Java province has the highest economic growth is Sidoarjo of 2.177

Classification of Corn Plantations in East Java Through analysis based on location quotient and Shift Share can be seen on Fig. 3 on the below.

On agricultural commodities each city / district for coconut sub sector in East Java province are as follows:

1) The corn plantation sub-sector in East Java province that includes the leading sector of ten districts / cities.

2) Corn plantation sub-sector in East Java province including prospective sector of zero regencies / cities.

3) Corn plantation sub-sector in East Java province which includes mainstay sector of 17 regencies / cities.

4) Corn plantation sub-sector in East Java province which includes lagging sector of six districts / cities.

III. CONCLUSIONS

1) Total growth of corn plantation sub sector in East Java province in 2014 to 2016 is Rp2,306,448,768,000.

2) The corn plantation sub-sector in East Java province which includes the leading sector of ten districts / cities.

3) There is no prospective sector of Corn plantation sub-sector in East Java province including

4) Corn plantation sub-sector in East Java province which includes mainstay sector of 17 regencies / cities.

5) Corn sub-sector in East Java province which includes lagging sector of six districts / cities.

TABLE III
CLASSIFICATION OF CORN PLANTATIONS IN EAST JAVA

Corn Plantation		
Criteria	$LQ > 1$	$LQ < 1$
$SS > 1$	*Leading Pamekasan Tulungagung Blitar Kediri Malang Sumenep Jember Situbondo Probolinggo Jombang	*Mainstay Pacitan Ponorogo Trenggalek Banyuwangi Pasuruan Gresik Pamekasan Sidoarjo Mojokerto Madiun Magetan Bangkalan Ngawi Sumenep Bojonegoro Tuban Lamongan
$SS < 1$	*Prospective -	*Preserved Lumajang Bondowoso Nganjuk Sampang Surabaya Batu

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