ANALYSIS OF SUPERIOR CROPS LOCATION IN EAST JAVA, INDONESIA

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Abstract: Regional development is an important aspect in improving the regional economy, and its relationship with the national economy. East Java Province is one of the regions with the most potential agricultural sector and is the highest national granary area in Indonesia. Maximizing the potential of the resources owned by East Java will accelerate the development process and increase the regional and national economy. For the economic growth, this study aims to examine the crops performance to estimate the pattern of regional economic growth in East Java. The time series data of East Java Central Bureau of Statistics from 2008 to 2017 are adopted. The location quotient analysis and shift-share analysis with three indicators, namely regional economic growth, proportional shift growth, and differential shift, are used. The results showed that crops such as corn, green beans, peanuts, soybeans, rice, sweet potatoes, and cassava in 29 districts and 9 cities of East Java have crucial performance and economic growth patterns. As the results, to consider and identify priority policy plans to accelerate regional economic development and growth are suggested.

Keywords: *Crops, Economic Growth, Regional Development, Shift-Share*

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INTRODUCTION

Law of Republic Indonesia No. 23 of 2014, it was stated that local governments have the authority and obligation to regulate and manage their own government affairs and the interests of local communities. The implementation of regional autonomy is a form of government support to local governments in managing and developing their regions in accordance with the conditions and potential of each region. The success of the development of an area is directly affected by the participation of the regional government because the government as a policy holder has full rights and authority in regulating and delivering policies to the community. Regional development can encourage increased equity, stability, growth, and community welfare as the main actors of development (Wulandari, 2010).

Regional development that can be pursued by the government can be through potential sectors, one of which is the agricultural sector in East Java. East Java is the second largest contributor to the Indonesian economy with a growth rate similar to the national level (World Bank, 2011), has the largest number of agricultural households 7,212.12 households (Inter-Census Agriculture Survey, 2018),

and also one of the main granaries with large amounts of land used for crops, especially rice (Ministry of Agriculture, 2018). Crops are the biggest contributor to East Java's GRDP compared to other sub-sectors which tend to increase every year. In 2013 to 2016 the contribution has always been increasing, but in 2017 it decreased from 4.39 to 3.90, but this contribution remains the biggest contribution among other agricultural sub-sectors (BPS East Java, 2017). High contribution of food crops has become an opportunity for East Java Province to continue to develop the sub sector.

To continue improve the prosperity and regional economy of East java, local governments need to improve competitiveness through the concept of development that relies on local characteristics and potentials in the form of the agricultural sector as the focus of development. Therefore, this study aims to examine the crops performance to estimate the pattern of regional economic growth in East Java so it can be used as a reference for local governments to develop regional economic improvement strategies.

Isserman (1977), explained that in planning to estimate regional economic impacts can be done with a location-quotient approach. This LQ analysis is used to determine the pre-eminent subsector or

economic basis of a regional economy. The technique is frequently used with economic data where it is a short-cut technique to determine where industries are concentrated and which economic sectors produce for the export market. LQ analysis can be used to determine superior commodities based on basic economic theory, especially from the aspect of supply (production or population).

To identify developing sectors or commodities and to show the reasons for growth, a shift-share analysis was carried out (Kerna & Harris, 2009), which was the analysis first developed by Dunn (1960). According to Fernandez, Lopez, and Perez (2007). An important component of this statistical technique is the calculation of geographical changes in economic trends (Fernandez, Lopez, and Perez, 2007). In addition, shift-share also using for export analysis such as to identify the export opportunities of Malaysia's palm oil (Asfaranjan and Moayyed, 2012), to identify the potential country for rubber export from Malaysia (Rahman, et.al, 2014), and to examine the export performance of china electronics (Wilson, et.al, 2005). Another studies was conducted by Shi and Yang (2008) using the shift-share to tourism industry, and also the spatial shift share to identify the electricity consumption changes across italian regions (Grossi and Mussini, 2018).

In this research using the LQ to identify the basic and non-basic crops, as well as using shift-share for regional economic analysis, concurred by Reynolds (1980) use the shift share for analyzing the growth of sectoral and regional productivity in contemporary Mexico, and also by Hassan, et.al (2011) to examine the new development ECER in Malaysia from the perspective of regional. Other than that, Fothergill and Gudgin (1979) proved that the shift-share technique is an appropriate tool to analyze regional growth in the United Kingdom. This is also concurred by Tervo and Okko (1983), who opined that shift share analysis can be used for analyzing regional growth. In addition, Khusaini (2015) probing into the spatial competitiveness of economic sectors in Banyuwangi by applying a shift share model.

RESEARCH METHODS

The study was purposively conducted, namely in the East Java Province of Indonesia, with the consideration that the East Java Province was designated as a national food barn, and the agricultural sector in East Java Province was one of the largest foreign exchange contributors to the Indonesian State. The study was conducted using secondary data obtained from several sources, namely from the East Java Agriculture Service, East Java Central Statistics Agency (BPS), and the Indonesian Central Bureau of Statistics (BPS). The data used are production time series data of seven crops at 38 regions (29 districts and 9 cities) in East Java Province during 2008-2017. The seven crops, including corn, green beans, peanuts, soy, rice, sweet

potato, and cassava, are the major crops in East Java Province

Data Analysis

Location Quotient (LQ) Analysis

LQ analysis used to determine the superior sub sector of the regional economy. In this study uses the Production Location Quotient (PLQ) to identify superior crops in each region of East Java Province by the formula (Isserman, 1977):

$$PLQ_i = \frac{E_{ij}}{E_j} \bigg/ \frac{E_{in}}{E_n} \quad (1)$$

Where:

E_{ij} = the production of crop i in region j

E_j = total crops production in region j

E_{in} = the production of crop i in East Java Province

E_n = total crops production in East Java Province

The LQ criteria are:

- $LQ > 1$ means that the crop has a comparative advantage, become superior or become a source of growth in the region. Superior commodities can not only meet the needs in the area concerned but can also be exported outside the region.
- $LQ = 1$ means that the crop in question is classified as non-superior, because it does not have a comparative advantage. the commodity is only able to meet its own regional needs and is unable to be exported.
- $LQ < 1$ means that the crop is non-superior commodity. The commodity in the area requires import from the outside because it cannot meet the needs of the region it self.

Shift Share Analysis

To examine the crops performance in relation to regional economic performance in East Java using shift-share analysis. This analysis can be used to explain economic change as a combination of three influential factors, namely:

- Regional economic growth
- Proportional shift
- Differential shift

The shift-share analysis method chosen in this study is due to its clarity and simplicity, so this method is suitable for use in regional economic growth analysis (Goschin, 2014). The following formula is used:

$$D_{ij} = N_{ij} + M_{ij} + C_{ij} \quad (2)$$

$$D_{ij} = Y^*_{ij} - Y_{ij} \quad (3)$$

$$N_{ij} = Y_{ij} r_n \quad (4)$$

$$M_{ij} = Y_{ij} (r_{in} - r_n) \quad (5)$$

$$C_{ij} = Y_{ij}(r_{ij} - r_{in}) \quad (6)$$

Where:

D_{ij} = Production changes of crop i of district j from the early year to the final year

N_{ij} = Regional economic growth of crop i of district j

M_{ij} = Proportional shift of crop i of district j

C_{ij} = Differential shift of crop i of district j

Y_{ij}^* = Production of crop i of district j in the final year

Y_{ij} = Production of crop i of district j in the early year

r_n = Agregate production growth rate of East Java Province

r_{in} = Production growth rate of crop i of East Java Province

r_{ij} = Production growth rate of crop i of district j

Base on the Shift-Share Analysis, the criteria are (Hardiani and Lubis, 2017):

- If $M_{ij} > 0$, the production of crop i of district j grows competitively because East Java provincial level grows faster. Conversely, if $M_{ij} < 0$, the production of crop i of district j declines because East Java provincial level grows slowly.
- If $C_{ij} > 0$, the production of crop i of district j grows faster than the provincial level. Conversely, $C_{ij} < 0$ means the production growth of crop i of district j is relatively slower than the crop i production growth in East Java Province.

RESULTS AND DISCUSSION

Superior Crops Production in East java

The concept of regional competitiveness (Khusaini, 2015) can be referred to as the ability of a region to produce goods and services that are in accordance with the needs of the international market, as well as being able to provide and maintain high and sustainable incomes. Widyantoro (2005) states that a commodity in the regional or local become superior if the commodity is not only sold in the local market, but also sold outside the region, thus showing that the commodity has a strong competitiveness in the regional market and outside the region. Location-quotient analysis in this study is adopted to determine if the crops are superior or non-superior at region of East Java Province. Based on the analysis, the LQ values of seven crops, corn, green beams, peanuts, soybeans, rice, sweet potato, and cassava, at 38 regions in East Java Province are shown in Table 1.

The crops with LQ values greater than one are the superior commodities at the region. In Pacitan district, peanut, soy, and cassava are the superior commodities because in the LQ analysis these commodities have a value more than one. Whereas in Ponorogo, the superior commodities are soy and cassava. Likewise with other regions in accordance with the result shown in Table 1. The results shows that the different regions have different superior commodities.

Table 1. The Result of Location Quotient of Crops Production in East Java Province

District	Commodities						
	Corn	Green Beans	Peanuts	Soy	Rice	Sweet Potato	Cassava
Pacitan	0.69	0.03	1.54	2.84	0.49	0.20	4.22
Ponorogo	0.63	0.35	0.27	3.11	0.61	0.04	3.68
Trenggalek	0.52	0.03	0.42	3.21	0.63	0.04	3.96
Tulungagung	1.13	0.04	0.42	1.74	0.80	0.28	1.89
Blitar	1.49	0.12	0.99	1.57	0.79	0.30	1.16
Kediri	1.54	0.01	0.62	1.20	0.74	0.58	1.23
Malang	0.97	0.01	0.32	1.82	0.68	1.79	2.59
Lumajang	1.02	0.03	0.82	0.90	1.11	1.49	0.56
Jember	1.05	0.04	0.32	1.06	1.20	0.64	0.29
Banyuwangi	0.62	1.03	0.18	2.94	1.34	0.94	0.33
Bondowoso	0.97	0.04	0.07	1.03	1.01	0.27	1.37
Situbondo	1.82	0.13	0.13	0.11	0.92	0.03	0.07
Probolinggo	1.53	0.20	0.45	0.95	0.77	0.08	1.13
Pasuruan	0.79	0.48	0.77	1.45	1.16	0.33	0.91
Sidoarjo	0.01	2.32	-	0.43	1.78	0.01	-
Mojokerto	1.00	1.20	0.48	1.15	0.98	8.58	0.35
Jombang	1.20	0.07	0.18	0.84	1.14	0.18	0.31
Nganjuk	0.96	0.33	0.26	2.11	1.04	0.45	1.08
Madiun	0.25	1.42	0.21	1.31	1.44	0.46	0.87
Magetan	0.58	0.04	2.01	1.18	1.03	6.88	1.38
Ngawi	0.50	0.08	1.04	1.88	1.21	2.14	1.04
Bojonegoro	0.67	1.78	0.33	1.55	1.31	0.31	0.51
Tuban	1.53	1.46	4.06	0.67	0.79	0.60	0.81
Lamongan	0.95	1.94	0.77	1.30	1.24	0.15	0.30
Gresik	0.87	1.22	0.69	0.38	1.30	0.60	0.26
Bangkalan	0.99	1.82	7.02	1.33	0.93	2.62	0.91
Sampang	0.78	5.19	4.66	4.79	0.73	2.08	1.99
Pamekasan	1.46	0.81	0.81	0.93	0.89	0.32	0.74
Sumenep	1.94	5.21	0.90	1.41	0.49	0.17	1.41
Kediri City	1.17	0.01	0.19	0.25	1.17	0.17	0.27
Blitar City	1.67	-	0.53	-	1.01	0.02	-
Malang City	0.22	-	0.23	0.90	1.42	0.25	1.11
Probolinggo City	2.53	0.01	0.05	-	0.60	-	-

Pasuruan City	-	-	-	0.07	1.81	-
Mojokerto City	0.01	1.43	-	6.23	1.63	-
Madiun City	-	0.63	0.01	0.50	1.80	-
Surabaya City	0.13	0.23	0.03	0.21	1.69	0.11
Batu City	0.68	-	0.66	0.47	0.87	15.73

Source: This Study (2019)

Crop Growth Pattern and Growth Components in East Java

The results of the shift-share analysis in Table 2 show that the crops in each region in East Java has a different performance and different pattern. The growth patterns of crops in the southern sub-regional namely Pacitan, Ponorogo, Trenggalek, Tulungagung, Blitar, Blitar City, Kediri, Kediri City, Malang and Malang City show that commodities that have increased production growth rates during the period 2008 to 2017 are cassava, corn and rice, so it can be stated that the three commodities can be developed to improve the economy of the southern sub-regional. Cassava in general can adapt widely from the lowlands to the highlands, on fertile and marginal lands, so that these plants can grow in almost all regions of Indonesia (Saleh, et al., 2016). While commodities which tend to have low production growth in the southern sub-regional is soybean.

Growth pattern in the far-southeast sub-regional consisting of Lumajang, Jember, Banyuwangi, Bondowoso, Situbondo, Probolinggo, and Probolinggo City, commodities with a production growth rate that tends to increase from 2008 to 2017 are rice and corn. It can be concluded that in the far-southeast sub-regional is a production centers of rice and corn, and both of these commodities that can be developed to improve the regional economy.

Similar to the far-southeast sub-regional, in Surabaya sub-regional (Pasuruan, Pasuruan City, Surabaya, Sidoarjo, Mojokerto, Mojokerto City, Lamongan and Gresik) and Northwest sub-regional (Jombang, Nganjuk, Madiun, Madiun City, Magetan, Ngawi, Tuban, and Bojonegoro) commodities that have increased production growth are rice and corn commodities. The high production of corn and rice in some of these areas is related to the UPSUS (Special Efforts) program to increase rice, corn and soybean production organized by the government in order to achieve food self-sufficiency. The sub-regional madura consists of corn, cassava and peanuts with an increased production growth rate.

The first component in the shift-share analysis is regional economic growth. The highest value in the regional economic growth it's mean the commodity growing faster than other crops, while the least significant commodities it's mean this commodity has the lowest growth rate among other crops

The second component of shift-share analysis is proportional shift, which measures the relative changes in the economic growth or decline of each region compared to the economy of East Java Province. This measurement shows whether the economy in the region is concentrated in a sector that is growing faster than the economy of East Java Province.

Table 2. The Change of Crop Production in East Java

District	Commodities						
	Corn	Green Beans	Peanuts	Soy	Rice	Sweet Potato	Cassava
Pacitan	-3,247	-15	-482	-311	5,261	-121	34,526
Ponorogo	7,024	-107	18	-65,974	4,161	-5	11,028
Trenggalek	2,079	19	-398	-34,659	4,933	-16	-2,045
Tulungagung	16,664	-9	-575	-19,863	5,692	-240	-241
Blitar	7,169	-50	-620	-8,959	8,635	368	5,262
Kediri	8,678	-13	-183	-19,575	-4,011	680	4,670
Malang	-2,067	-18	-86	-53,076	2,061	1,655	-6,053
Lumajang	2,085	-16	-557	-7,988	8,346	1,005	-3,073
Jember	24,867	-34	-668	-6,721	15,709	213	-3,436
Banyuwangi	6,823	-1,088	203	-2,673	14,618	31	-2,127
Bondowoso	-2,402	-13	-70	-11,945	14,630	-26	2,069
Situbondo	1,078	-41	-55	-524	12,596	-6	285
Probolinggo	1,194	-47	-285	-10,554	979	-126	-13,692
Pasuruan	16,959	-367	-1,491	-9,918	26,677	243	-7,101
Sidoarjo	138	-140	-4	-367	3,173	-31	-16
Mojokerto	5,891	-298	-218	-6,209	5,651	4,775	40
Jombang	8,261	-24	-158	-1,473	4,414	68	-99
Nganjuk	6,092	-104	-145	-12,753	9,386	290	-924
Madiun	1,596	-449	-11	-5,807	15,370	1,122	-1,989
Magetan	1,876	-7	-871	-9,011	13,470	2,344	2,980
Ngawi	13,405	-50	-1,824	-16,497	18,573	465	-903
Bojonegoro	-1,069	-698	638	-9,089	17,633	292	4,724
Tuban	14,568	-1,208	-4,504	-11,139	14,772	-15	-4,722
Lamongan	11,479	-787	343	-2,579	14,026	73	989
Gresik	4,485	-169	-334	-1,389	15,976	327	-1,219
Bangkalan	-746	-347	-4,673	-4,993	12,198	192	-3,443
Sampang	-8,607	-1,635	-1,019	-15,017	9,801	-299	-15,328
Pamekasan	-1,376	-63	-23	-4,262	2,816	-82	-938
Sumenep	-1,399	-1,142	8	-8,883	9,478	-49	-16,328
City of Kediri	359	0	-9	-59	-109	-6	-45
City of Blitar	167	0	-10	0	-461	-3	0
City of Malang	-112	0	-8	-303	411	-16	49
City of Probolinggo	611	-1	-6	0	539	0	-4
City of Pasuruan	-18	0	0	-9	35	0	0

City of Mojokerto	-5	-4	0	-4	56	0
City of Madiun	-4	-2	-2	-17	10	0
City of Surabaya	14	-1	-4	-37	255	-19
City of Batu	-178	0	-3	-65	-457	112

Source: This Study (2019)

The last component is a component of competitive advantage or differential shift. The calculation shows how far the competitiveness of a sector in region is compared to the same sector in East Java Province. For the differential shift some sectors in the region had positive competitive shares, and others had negative shares. Those with positive competitive share components were of two categories: (1) those with growth rates above the national average growth rate; and (2) those sectors with growth rates below the national average. Those sectors that experienced above national average growth rates were favored due to the local comparative advantage. The sectors with negative competitive-components are affected by sub optimal comparative local advantage and their growth rates are generally below the national average (Akpadock, 1996).

Based on the value of differential shift (C_{ij}) and proportional shift (M_{ij}), the sectors in the District of East Java Province can be divided into four quadrants (Hardiani & Lubis, 2017):

- Quadrant I (M_{ij} and C_{ij} are positive): The sector has a fast growth rate and is also able to compete with other sectors of the economy from other regions.
- Quadrant II (M_{ij} is negative, C_{ij} is positive): This sector group has a strong level of competitiveness but the rate of growth is slow. In general, the sector has the potential to be developed.
- Quadrant III (M_{ij} is positive, C_{ij} is negative): This sector is categorized as an economic sector that has a fast growth rate, but the sector is not able to compete with the economic sectors of other regions because of its weak competitiveness.
- Quadrant IV (C_{ij} and M_{ij} are negatives): This sector is categorized as a sector whose growth rate is slow and competitiveness is weak.

An interesting phenomenon that occurs in all regions in East Java based on the results of this shift share analysis is that crops in each region are only divided into 2 groups, namely quadrant II and quadrant IV because the value of the proportional shift of all commodities is negative in all regions.

Research Finding and Policy Implication

In determining the area of crops production centers in each region in East Java should be directed

to the region that do have the potential for developing these commodities. The existence of the production center area becomes important as a reference location for the government to make investments and regional development, and in particular in an effort to achieve efficiency, effectiveness and added value. In addition, the existence of the production center area is expected to also be one of the efforts in optimizing the empowerment of the existing spatial structure and can facilitate the formulation of support for the construction of facilities and infrastructure to support agricultural activities. Based on the results of the Location Quotient and Shift Share analysis, each region can be classified with its superior crops as shown in Table 3. it can be seen that each region in East Java has different potential crops, therefore the government should also set regulations and provide different facilities in each region according to their potential respectively.

From Table 3 we can find, there is some superior commodities that have strong competitiveness, but the growth rate is low. For example in the Pacitan region, the main commodities are peanuts, soy, and cassava. These three commodities have strong competitiveness in Pacitan, but the soybean commodity has a low growth rate so that the development prospects are slower than peanuts and cassava. Likewise with other leading commodities in other regions.

Table 3. Superior Crops in Each Region of East Java

Regional	Sub-Regional	List by Crops	List by Different Crop Item
Southern	Pacitan	Peanuts, soy, and cassava	Soy
	Ponorogo	Soy and cassava	-
	Trenggalek	Soy and cassava	-
	Tulungagung	Corn, soy, and cassava	Corn
	Blitar	Corn, soy, and cassava	Corn
	Blitar City	Corn, and rice	-
	Kediri	Corn, soy, and cassava	Corn
	Kediry City	Corn, and rice	Corn
	Malang	Soy, sweet potato, and cassava	Sweet potato
	Malang City	Rice, and cassava	Rice
Far-Southeast	Batu City	Sweet potato, and cassava	-
	Lumajang	Corn, rice, and sweet potato	Sweet potato
	Jember	Corn, and soy	Corn
	Banyuwangi	Green bean, soy, and rice	-
	Bondowoso	Soy, rice and cassava	Rice
	Situbondo	Corn	-
	Probolinggo	Cassava	-

Surabaya	Probolinggo City	Corn	Corn
	Pasuruan	Soy, and rice	Rice
	Pasuruan City	Rice	-
	Surabaya City	Rice	-
	Sidoarjo	Green bean, and rice	-
	Mojokerto	Corn, green bean, soy, and sweet potato	Corn, and sweet potato
Northwest	Mojokerto City	Green bean, soy, and rice	-
	Lamongan	Green bean, soy, and rice	-
	Gresik	Green bean, and rice	Rice
	Jombang	Corn, and rice	Corn
	Nganjuk	Soy, rice, and cassava	-
	Madiun	Green bean, soy, and rice	Rice
	Madiun City	Rice	-

Table 3. Continue

Regional	Sub-Regional	List by Crops	List by Different Crop Item
Madura	Ngawi	Peanut, soy, rice, sweet potato, and cassava	Rice
	Bojonegoro	Green bean, soy, and rice	-
	Tuban	Corn, green bean, and peanut	Corn
	Bangkalan	Green bean, peanut, soy, and sweet potato	-
	Sampang	Green bean, peanut, soy, sweet potato, and cassava	-
	Pamekasan	Corn	-
	Sumenep	Corn, green bean, soy, and cassava	Soy

Source: This Study (2019)

Based on superior crops and competitive advantages in the competitiveness mentioned in each of the regions above, it can be taken into consideration by the government in making regional policies in order to accelerate economic growth in the area of East Java. Policy implications that can be carried out by the government include:

- Increasing the productivity of crops through commercial farming supported by the local market that can guarantee a fair and stable price of yields

- Efforts to increase production are prioritized in areas of production centers supported by the high demand for the food industry.
- Guaranteed the availability of adequate land, irrigation, and other inputs in each region of crops development, and the existence of agricultural extension in each region of the production center according to its potential.
- Improve the marketing system through a partnership pattern between supplier farmers and industry
- Enhancing the status of other crops than rice and corn, such as cassava and sweet potato as foodstuffs, in order to strengthen the bargaining position of producer farmers, and increase the household income of producer farmers.
- Easy procedures for accessing working capital for farmers and the private sector doing business in the field of agribusiness, especially the crops.
- Accelerating technology dissemination of research results and accelerating the application of technology at the farm level through revitalization of agricultural extension workers
- Easy to provide fertilizer for farmers, by simplifying the consumer distribution system
- Encourage the development of small businesses / households in the downstream subsystem to produce high-quality processed products in accordance with consumer demands
- Improvement and development of agricultural infrastructure in general
- The adequate resource allocation (HR, budget) policy in research and development (R&D) activities in order to produce appropriate technology, especially new high yielding varieties.

CONCLUSION

According to this study finding then it can conclude as follows:

- The result of the location quotient evidence that superior crops in each region of East Java are diverse, with the most commodities being soybeans and rice, while the least commodities are peanuts and sweet potatoes. Among the 38 regions in East Java, the highest number of superior crops are Magetan, Ngawi and Sampang. Whereas the regions that have the least amount of superior crops are Situbondo, Probolinggo, Pamekasan, Probolinggo City, Pasuruan City, Madiun City, and Surabaya City.
- The results of the shift share analysis indicate that crops in 38 regions in East Java have varied values that include positive and negative values. This value is influenced by three factors in the form of regional economic growth, proportional shift and differential shift. However, more attention should be given to proportional shift values, where all values are negative. This indicates that the level of economic growth throughout the region when viewed from the

agricultural sector tends to be slower than the economic growth of East Java Province. This phenomenon shows that the need for improvement of the agricultural sector in order to increase and accelerate regional economic growth in East Java.

- The results of the shift share analysis also show the patterns of crops growth in each region. The growth patterns of crops in the southern sub-regional show that cassava, corn and rice have increased production growth rates. Growth pattern in the far-southeast sub-regional, Surabaya sub-regional, and Northwest sub-regional show that rice and corn that have increased production growth. The sub-regional madura consists of corn, cassava and peanuts with an increased production growth rate.

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