WHAT CONTRIBUTES TO FOOD SECURITY? ANALYSIS OF AGRICULTURE, FORESTRY AND FISHERIES IN REALIZING FOOD SECURITY: A CASE STUDY OF SUMENEP DISTRICT, INDONESIA

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ABSTRACT

The agriculture, forestry and fisheries sectors, as basic and sustainable sectors, are sectors that can provide food continuously and will never run out of time. However, this sector has never been studied quantitatively, whether the sector is a basic and sustainable sector or not. This research was conducted in Sumenep Regency, East Java Province, Indonesia. The problem in this research is that the agriculture, forestry, and fishery sectors in Indonesia have experienced damage and land conversion which can cause food security to not be realized. The research objectives are (1) to analyze whether the agriculture, forestry, and fishery sectors are the basic sectors or not, (2) to analyze whether the agriculture, forestry, and fisheries is a sustainable sector or not; (3) whether the agriculture, forestry, and fishery sectors are developed and fast-growing sectors; or fast growing sector; or advanced and slow growing sectors; or relatively lagging sectors. The analytical method used for the first purpose is Location Quotient (LQ) analysis, for the second purpose, a comparison analysis of the results of LQ and Dynamic Location Quotient (DLQ) analysis is used and the third research objective is Klassen Typology analysis. The results showed that the value of LQ = 1.16 which means that the agricultural, forestry and fisheries sectors are the basic sectors. DLQ value = 1.90. The comparison of the LQ and DLQ values shows that the agriculture, forestry and fisheries sectors are the leading or sustainable sectors. By using the Klassen typology analysis, it shows that the agriculture, forestry and fisheries sectors are developed sectors but their growth is slow. From all the analyses used, it can be concluded that the agriculture, forestry and fisheries sectors can achieve food security.

KEY WORDS

Sector, analysis, food, agriculture.

In 2010 FAO data showed a prediction of 925 million people experiencing malnutrition and representing almost 16% of the population of developing countries. Promoting agriculture, forestry and fisheries in developing countries is the key to achieving food security (Ruan & Sonnino, 2011). Topics related to the basis and sustainability of the agriculture, forestry and fisheries sectors, show that the sector is a sector that is able to provide sufficient food over time and will never run out as long as it is managed properly. However, no research has been conducted on whether the sector is a basic and sustainable sector. The agriculture, forestry and fishery sectors are one of the sectors in determining the economy of a region.Lee & Yoo, 2014). The sector must be managed properly by the government to achieve the welfare of a country. ((Patiung, 2018). In Macedonia this sector is one of the most promising sectors in the country's economy, the average share of agriculture in Macedonia in GDP is 30% and accounts for 17.87% of total employment (Ciglovska, 2018). In ASEAN countries the agricultural sector is an important sector, in Indonesia the agriculture, forestry and fishery sectors produce the second largest Gross Domestic Product (GDP) after the industrial sector where agriculture, forestry and fishery sectors contribute 13.41%, Industry 21.31%, trading 13.37, mining 11.05% and others 40.85% (Nugrahini et al., 2019).

A country that does not plan and manage its potential well will fail, this is shown from the results of Nong's research (2019) which shows that the Philippines, Thailand, Malaysia, Indonesia, Ecuador and Peru experienced a fairly large adverse impact on the economy,

food and household industries. Vietnam is experiencing an economic decline because marine fish resources are not managed properly, so there is a shortage of fish in the international market which will endanger international trade, wild catch and aquaculture, as well as global food security (Nong, 2019).

The development of the national economy of a country can be increased by developing economic activities that are the foundation of the economic life of the majority of its people.Lall, 2001). The main jobs (29.59%) of the Indonesian population are in the agriculture, forestry and fisheries sectors (BPS, 2021). Therefore, the agricultural, forestry and fishery sectors must become the benchmark/backbone of the national economy. This is the basis for formulating an industrialization strategy that must be developed by a country to maintain the sustainability of food security.

Most of the potential of the agricultural, forestry and fishery sectors were damaged due to the lack of awareness of the government and the community towards their potential. For example, Indonesia's forests have been damaged and have never been reforested. Too many productive lands have been converted into non-agricultural land (Fauziyah & Muh Iman, 2020). Many fishermen use explosive bombs in fishing or use tiger trawls (Syaputra & Siregar, 2021).Government policies on the agricultural, forestry and fishery sectors are very low, it is proven that the agriculture, forestry and fisheries sectors are not the main choices in development, making it difficult to develop in realizing food security. Therefore, this study tries to analyze (1) whether the agriculture, forestry and fisheries sector is a basic sector or not and (2) whether the agriculture, forestry and fisheries sector is a sustainable sector or not, and (3) how is the growth of the agriculture, forestry and fisheries sector? So that it can provide input to local governments, especially Sumenap Regency in making policies.

The research objectives are (1) to analyze whether the agriculture, forestry and fishery sector is a basic sector or not, (2) to analyze whether the agriculture, forestry and fishery sector is a sustainable sector or not; (3) whether the agriculture, forestry and fishery sectors are developed and fast-growing sectors; or fast growing sector; or advanced and slow growing sectors; or relatively lagging sectors.

Fast and impressive economic progress before the economic crisis, Indonesia's agricultural sector driven by the activities of small-scale farmers (smallholders) and fishermen is able to support overall economic growth through strong forward and backward linkages and also through the growth in demand created by the agricultural sector (demand creation from agriculture).

Gross regional domestic product is the total gross value added arising from all economic sectors in the area. Calculating GRDP aims to help make regional policies or plans, evaluate development results, and provide information that can describe regional economic performance.

GRDP data is very important information to determine output in the economic sector and see growth in a certain area (Province/District/City). With the help of GRDP data, it is possible to determine the leading sector in an area/region. The leading sector is a sector/sub-sector that is able to encourage economic activity and create prosperity in an area, especially through production, exports and job creation. The higher the value of GRDP per capita means the higher the regional wealth (regional prosperity), in other words the value of GRDP per capita is considered to reflect the level of regional wealth (Tadjoedin, Suharyo, & S, 2001).

METHODS OF RESEARCH

This research was conducted in Sumenap Regency, East Java Province, Indonesia, with the consideration that Sumenap Regency is a district with potential for the agricultural, forestry, and fisheries sectors. The data used in this study is secondary data, namely data on the Gross Regional Domestic Product of Sumenap Regency and the Gross Regional Domestic Product of East Java Province for the last five years.

In this study, the method used to analyze whether the agricultural, forestry and fishery sectors are the basic sectors or not is used to calculate LQ (Budiharsono, 2001).

$$LQ = \frac{V1R / VR}{V1 / V}$$

Where:

- V1R: Value of agriculture, forestry, and fisheries sectors on regional domestic products of Sumenep district gross;
- VR: The value of all sectors in the gross regional domestic product of Sumenep Regency;
- V1: Value of agriculture, forestry, and fisheries sectors on regional domestic products gross of East Java Province;
- V: The value of all sectors in the gross regional domestic product of East Java Province.
- If the LQ value > 1 means that the agriculture, forestry and fisheries sectors are the basic sectors;
- If the value of LQ < 1, it means that the agriculture, forestry and fishery sectors are classified as non-basic sectors;
- If the value of LQ = 1, it means that the agriculture, forestry and fishery sectors are classified as not having an advantage.

The higher the LQ value, the higher the comparative advantage(Cahyono, S Andy and Wijaya, 2014).

Economic changes in Sumenap Regency at a certain time can be tested through one of the analytical tools, namely Dynamic Location Quotient (DLQ) so that sectoral changes can be known. DLQ is a modified form of LQ by accommodating the magnitude of the gross regional domestic product from the production value of each sector from time to time. The ups and downs of DLQ can be seen for certain sectors in different time dimensions with the following formulation(Nazipati, 2007):

$$DLQ \, ij = \frac{(1+gij)/(1+gj)}{(1+Gi)/(1+G)}$$

Where:

- $DLQij$: sector potential indexagriculture, forestry, and fisheries on products Sumenap Regency gross regional domestic;
- gij: The growth rate of sector value addedagriculture, forestry and fisheries on the gross regional domestic product of Sumenap Regency;
- gj: Average growth rate of regional gross domestic product for districts Sumenep;
- Gi: The growth rate of sector value addedagriculture, forestry and fisheries on regional domestic products. gross of East Java Province;
- G: Average growth of domestic products of East Java Province;
- if DLQ > 1, then the potential for the development of the agricultural, forestry and fisheries sectors in the Sumenap Regency gross regional domestic product is faster than the same sector in the East Java Province gross regional domestic product scope. Otherwise, if DLQ < 1, then the potential for the development of the agricultural, forestry, and fisheries sectors in the Sumenap Regency gross regional domestic product is lower than the overall gross regional domestic product in East Java Province.

Comparison between LQ and DLQ values can be used as criteria in determining whether the agriculture, forestry, and fishery sectors are classified as leading sectors, or prospective sectors, or leading sectors, or underdeveloped sectors. The criteria are as follows(Suyatno, 2007):

a. If the value of LQ and DLQ > 1, sectoragriculture, forestry, and fisheries are the leading sectors, meaning that the agriculture, forestry and fishery sectors will remain the basis for both now and in the future (sustainable);

b. If the value of LQ > 1 and DLQ < 1, sectoragriculture, forestry, and fisheries are prospective sectors, meaning that the agriculture, forestry, and fishery sectors will shift from the current base sector to the non-basic sector in the future (unsustainable);

c. If the value of LQ < 1 and DLQ > 1, sectoragriculture, forestry, and fisheries are the mainstay sectors, meaning that the agriculture, forestry, and fishery sectors will shift from the current non-base sector to the basic sector in the future (sustainable);

d. If the value of LQ and DLQ < 1, serctoragriculture, forestry, and fisheries are underdeveloped sectors, meaning that the agriculture, forestry and fisheries sectors will continue to be non-basic both now and in the future (unsustainable).

$$rick = \frac{Pikt - Pik0}{Pik0} \times 100\%$$

Where:
- rik = Growth rate of production value in agriculture, forestry, and fishery sectors on the gross regional domestic product of Sumenap Regency;
- Pict = Production value of agriculture, forestry, and fishery sectors in product gross regional domestic East Java Province year t;
- Pik0 = Production value of agriculture, forestry, and fishery sectors in product Gross regional domestic Sumenep Regency at the beginning of the year (t-1).

$$ri = \frac{Pit - Pi0}{Pi0} \times 100\%$$

Where:
- ri = Growth rate of production value in agriculture, forestry, and fishery sectors on the gross regional domestic product of East Java Province;
- Pit = Production value of agriculture, forestry, and fishery sectors in product gross regional domestic East Java Province year t;
- Pio = Production value of agriculture, forestry, and fishery sectors in product gross regional domestic East Java Province at the beginning of the year (t-1).

$$yik = \frac{Pik}{Ptk} \times 100\%$$

Where:
- yik = Contribution of agriculture, forestry and fishery sectors to the total value of production in the gross regional domestic product of Sumenap Regency;
- Pik = Production value of agriculture, forestry, and fishery sectors in product Sumenap Regency gross regional domestic;
- Ptk = Total production value in the gross regional domestic product of the Sumenep Regency.

$$yi = \frac{Pi}{Pt} \times 100\%$$

Where:

- yi = Contribution of agriculture, forestry, and fishery sectors to the total value production on the gross regional domestic product of East Java Province;
- Pi = Production value of agriculture, forestry, and fishery sectors in product East Java gross regional domestic;
- Pt = Total production value in the gross regional domestic product of East Java Province.

Table 1 – Typology of Sector Growth According to Klassen

Contribution Growth Rate	Yik > yi	Yik < yi
Rik > ri	Advanced and fast-growing sector	Fast growing sector
Rik < ri	Advanced and slow growing sector	Relatively lagging sector

Source: Sjafrizal, 2008.
Note:
- rik = Growth rate of production value in agriculture, forestry, and fishery sectors in the gross regional domestic product of Sumenap Regency;
- ri = Growth rate of production value in agriculture, forestry, and fishery sectors in East Java Province gross regional domestic product;
- yik = Contribution of agriculture, forestry, and fishery sector to total production value Sumenap Regency gross regional domestic product;
- yi = Contribution of agriculture, forestry, and fishery sector to total production value Gross Regional Domestic Product of East Java Province.

RESULTS AND DISCUSSION

The results of the study indicate that the value of LQ = 1.16, this indicates that the Agriculture, Forestry and Fisheries sector (agribusiness sector) in Sumenep Regency is the base sector, meaning that the production of the Agriculture, Forestry and Fisheries sector (agribusiness sector) in Sumenep Regency has experienced surplus so that the resulting production is not only able to meet the needs of the people in Sumenep Regency but can also be exported to other regions within the country or exported to foreign countries. This also shows that the Agriculture, Forestry, and Fisheries (agribusiness sector) sector is a sector that can achieve food security if it is maintained and managed properly. The results of the LQ calculation are as in table 2.

Table 2 – Calculation of LQ Sumenep

Business field	Year	V1r	VR	V1	V	V1r/VR	V1/V	LQ
Agriculture, Forestry and Fisheries Sector	2015	8,399,20	48,606,70	230942.46	1,691,477.06	0.17	0.14	1.27
	2016	9,012,30	55,581.40	249,453.63	1,855,738.43	0.16	0.13	1.21
	2017	9,361.10	64,866.20	258,454.42	2,012,917.99	0.14	0.13	1.12
	2018	9,604.60	73232,30	260,513.83	2,189,823.64	0.13	0.12	1.10
	2019	9,819,90	78.047.20	268,772.16	2,352,425,22	0.13	0.11	1.10
	Amount							1.16

Source: Data Analysis 2015-2019.

The results of the study using DLQ analysis showed a value of 1.90, which means that the Agriculture, Forestry and Fisheries sector in Sumenep Regency is a sector whose development/growth is faster than the same sector in the area around Sumenep Regency or in the East Java Province. The results of the DLQ calculation are as in table 3.

Table 3 – Calculation of DLQ Sumenep

Business Field	Year	gij	gj	Gi	G	(gij/gj)	(Gi/G)	DLQ
Agriculture, Forestry and Fisheries Sector (agribusiness sector)	2015	3.25	7.38	3.38	5.30	0.44	0.64	0.69
	2016	2.89	7.76	2.99	5.64	0.37	0.53	0.70
	2017	0.90	6.60	1.19	5.37	0.14	0.22	0.61
	2018	-1.00	6.36	-0.12	5.36	-0.16	-0.02	7.19
	2019	0.22	5.94	0.63	5.08	0.04	0.12	0.30
	Amount							1.90

Source: Data Analysis 2015-2019.

The results of the comparison analysis between LQ and DLQ show that LQ > 1 and DLQ > 1, so that the agriculture, forestry, and fisheries sectors are the leading sectors, meaning that these sectors are currently the base sector and will continue to be the base sector in the future. This shows that the agriculture, forestry and fisheries sectors are sustainable sectors. A sustainable sector means that it will continue to provide sufficient food today for the future, or in other words until the apocalypse as long as it keeps its sustainability. The results of the comparison of LQ and DLQ are as in table 4.

Table 4 – Results of Comparison of LQ and DLQ Sumenep

Business field	LQ	DLQ	Criteria
Agriculture, Forestry and Fisheries Sector (agribusiness sector)	1.16	1.90	Superior

Source: Data Analysis 2015-2019.

The results of the analysis show that LQ > 1 means that the sector's productagriculture, forestry and fisheriesIn Sumenep Regency, there is a surplus, which means that the agribusiness sector, apart from being able to meet the food needs of the Sumenep Regency community, can also be exported to other regions within the country or exported to foreign countries. On the other hand, the pattern of economic growth in Sumenep Regency through the Klassen typology analysis shows that the Klassen Typology Results $rki = 0.02$; $ri = 2.77$ ($rik < ri$) and $yik = 0.34$ and $yi = 0.13$ ($yik > yi$) indicating that the agriculture, forestry and fishery sectors (agribusiness sector) are developed and slow growing sectors.

Sectoragriculture, forestry and fisherieswhich is a developed sector but its growth is slow. Slow growth can be overcome by various things, for example restoring the sectoragriculture, forestry and fisheriesbecome the main sector in national development planning, maintain fertile natural resources such as rice fields, agricultural land is not converted into non-agricultural land, the use of tiger trawls in fishing is avoided, funding for the agricultural sector is the main because it is the potential of the Indonesian nation. The results of the calculation of the Klassen typology are as in table 5.

Table 5 – Classification Typology Analysis

Business field	rik	ri	Growth rate	yik	yi	Contribution	Criteria
Agriculture, Forestry, Fisheries Sector	0.02	2.77	rik < ri	0.34	0.13	yik > yi	Advanced and Slow-Growing Sector

Source: Data Analysis 2015-2019.

The Sumenep district government should pay attention toagriculture, forestry and fisheries sectorsboth in terms of maintaining its natural resources and the funding sector. If all this time the sectoragriculture, forestry and fisheriesconsidered not as the main sector, then it should be returned as the main sector in development planning. The conversion of fertile agricultural land to the non-agricultural sector was immediately stopped. Nationally, the conversion of land from the agricultural sector to the non-agricultural sector is 1 million hectares per year, so how much does the Sumenep Regency contribute to the conversion of land nationally, avoiding the use of tiger trawls in fishing, avoiding the use of fish bombs and so on. The hope is that the above can be overcome by the Sumenep district government because this sector is a basic and sustainable sector.

Thus, the agriculture, forestry and fishery sectors in Sumenep Regency are sectors that are relied upon in food security, both regionally and nationally. So that with food support from Sumenap Regency for the national level, it is hoped that it can contribute to the world's food supply. Where currently there are about 7 billion people in the world who need food.

Of the 17 sectors that contribute to the GRDP of Sumenep Regency, the sectors classified as potential sectors are (1) agriculture, forestry and fishery sectors; (2) Mining and quarrying sector; (3) Information and communication sector, (4) Government administration, defense and compulsory social security sector; while the other 13 sectors are not basic/potential sectors.

The sectors that experienced faster growth or development compared to the same sector in the surrounding area or in the region within the East Java Province were only the agriculture, forestry and fisheries sectors, while the other 16 sectors were slow-growing sectors compared to the same sector in the surrounding areas, or within the province.

On the other hand, the agriculture, forestry, and fishery sectors are the only sectors out of 17 sectors that contribute to GRDP in Sumenep Regency which are the leading sectors; while the prospective sector (only the mining & quarrying sector, information and communication sector; and the government administration sector, defense and mandatory social security), the remaining 13 other sectors are lagging sectors.

CONCLUSION AND RECOMMENDATIONS

Sectoragriculture, forestry and fisheriesin Sumenap Regency, it is a basic sector, meaning that the resulting production is in surplus, in addition to being able to meet the needs of the people in Sumenep Regency, it can also provide food for other regions or can be exported to foreign countries. Sectoragriculture, forestry and fisheriesin Sumenep Regency is a leading sector which means that the sector is the basis both now and in the future, this shows that the sectoragriculture, forestry and fisheriesis a sustainable sector. Sectoragriculture, forestry and fisheriesSumenep Regency is a developed sector but its growth is slow.

The Sumenep Regency Government should pay attention to the sectoragriculture, forestry and fisheriesboth in terms of maintaining its natural resources and funding.

Make sectoragriculture, forestry and fisheriesas the main sector in development planning, agricultural land is not converted into non-agricultural land, does not use tiger trawls or fish bombs to catch fish, and so on. So that the agricultural, forestry and fisheries sectors as the potential of the Indonesian people can contribute to the world's food supply.

It is hoped that the analysis model carried out in this study can provide an overview for all districts/cities and provinces in Indonesia, to be able to calculate whether the agriculture, forestry and fisheries sectors in each district/city and province are basic and sustainable sectors or not, because so far it has never been calculated quantitatively, only qualitatively.

REFERENCES

1. Budiharsono, S. (2001). Teknik analisis pembangunan wilayah pesisir dan lautan. Pradnya Paramita.
2. Cahyono, S Andy and Wijaya, W. W. (2014). Pendapatan Antar Kabupaten di Sub DAS Bengawan Solo Hulu (Identification of the Leading Economic Sectors and Income Disparity among Regencies in Upper Bengawan Solo Sub Watershed). Jurnal Penelitian Sosial Dan Ekonomi Kehutanan, 11(1), 32–43.
3. Ciglovska, B. (2018). Developing Sustainable Agricultural Sector, as an Impetus for Macedonia`s Economic Growth. European Journal of Sustainable Development, 7(4). https://doi.org/10.14207/ejsd.2018.v7n4p545.
4. Nazipati. (2007). Aplikasi Model Static Dan Dynamic Location Quotients Dan Shift-Share Dalam Perencanaan Ekonomi Regional (Studi Kasus Kabupaten Ogan Komering Ulu Propinsi Sumatera Selatan). Eko-Regional, 2.
5. Nugrahini, W., Endang, S., Koesriwulandari, Markus, P., & Bin Bon, A. T. (2019). Effort toward the sustainable agricultural development within the territory the ASEAN. International Journal of Engineering and Advanced Technology.
6. Patiung, M. (2018). Penyusunan Masterplan Pengembangan Kawasan Agropolitan Kabupaten Probolinggo Tahun 2017 Markus. Jurnal Sosio Agribisnis, 18. https://doi.org/10.1017/CBO9781107415324.004.
7. Suyatno, S. (2007). Analisa Economic Base Terhadap Pertumbuhan Ekonomi Daerah Tingkat Ii Wonogiri: Menghadapiimplementasi Uu No. 22/1999 Dan Uu No. 5/1999. In Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan (Vol. 1, Issue 2, p. 144). https://doi.org/10.23917/jep.v1i2.3899.