IDENTIFICATION OF CORN COMMODITY TO MAINTAIN SUSTAINABILITY OF FOOD SECURITY: STUDY OF CORN COMMODITIES IN JEMBER REGENCY

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Abstract. Food security is one of the important concepts of sustainable development which is currently one of the global development vision and mission. Food problems become a consequence for the country (Erwandari, 2017). One sector that is the cornerstone for maintaining food security is the agricultural sector which is the primary sector providing food needs for the Indonesian people who also supports the performance of economic growth. Therefore it is necessary to identify local food commodities with the aim of being able to address and simulate the best strategy to find out local food commodities and maintain their sustainability. Jember is one of the regencies that has an advantage in the agricultural sector, especially for corn. Corn is the second largest commodity after rice in Jember Regency. The purpose of this study is to identify the best strategy for the sustainability of corn commodity food security in Jember with a case study in Arjasa District. The research method used is descriptive analysis using trend analysis, qualitative analysis using Forum Group Discussion (FGD) and AHP method. Based on the results of the analysis it was found that the yield of corn commodity in Arjasa 4,000 tons contributed an average of 9.8% to the Gross Regional Domestic Product (GRDP) of Jember which amounted to 43,000 tons in the last 8 years. In connection with the harvested area of corn commodity each year is quite volatile where this condition is caused by internal factors related to the production process of corn such as planting areas and external factors related to fluctuating corn prices so there is a concern of loss when planting corn. Maize productivity in Arjasa sub-district in the last 8 years on average reached 7.58% higher compared to other districts in Jember. Based on these results collaboration between various parties including farmers, middlemen, government and other parties is needed to strengthen institutions for the creation of food security amid market uncertainty.

Keyword: Food Security, Sustainable Development Goal (SDG's), Productivity

1. Introduction

SDG's concept, which is one of the global development agendas, outlines several development indicators, one of which is related to hunger, which is an important issue to be discussed. To respond to this issue, several studies have also focused on food security as a component in encouraging and maintaining food sustainability. Food security is an important issue because it involves a large consequence for the country's security and prosperity (Erwandari, 2017). Some innovations to carry out food security strategies can be through product diversification especially agricultural food products that have local potential in an area (Satmalawati and Falo, 2016). This is because the agricultural sector is the main sector of the spear of food security as well as the main sector in contributing to the

structure of Indonesia's gross domestic product (GDP). National GDP performance in 2018, amounting to 14.6% is dominated by East Java Province GRDP (Warta Ekonomi, 22 November 2018). One of the major contributors to the GRDP of regencies and cities in East Java is the agriculture, plantation, fisheries and livestock sectors.

Jember Regency is one of the regions that has great agricultural potential supported by the available agricultural land area. This sector contributed 31.21% in 2018 (BPS, 2018) to the GRDP. One form of contribution from this sector is reflected in the results of food crop production based on commodity types in Jember Regency which are dominated by rice and corn commodities. Besides rice which is generally the main commodity, maize also has a dominant contribution to people's food needs. So from this, it is necessary to have a strategy to optimize the potential of corn as a diversification of products in the form of substitutions and product combinations. The empirical phenomenon that occurred in Jember, maize commodity became one of the alternative substitutes for staple foods other than rice. Besides, this product diversification can also be done in the form of a combination of products such as soybean management which can be combined with corn. This combination is to avoid production costs, especially in the high component of soybean raw materials due to the limitations of local soybean products so it has to be imported. This condition also has an impact on increasing market demand for corn products. So this article wants to identify more deeply the potential of local commodities, namely corn in Jember Regency, to become a regional superior commodity.

2. Methodology

To identify the potential of local food in Jember Regency, a descriptive analysis method was used by looking at the histology and dynamics of data on agricultural products, especially food products. Descriptive analysis characterizes an analysis of phenomena and answers a question about what, how and to what extent the phenomenon experiences the dynamics seen in the upward and downward trends (Loeb, et al., 2017). Descriptive analysis can also be used to identify and describe trends and variations of data to see the changing phenomena that occur. In this study, this descriptive analysis was carried out to identify the local potential of agro-industrial agriculture, especially on the corn commodity in Jember Regency. The analysis was carried out by analyzing trends in the results of agricultural commodity production in particular corn commodities each year which were sourced from the Central Bureau of Statistics of Jember in the publication of Jember in Figures during the last period from 2009 to 2018. Besides looking at the graphic trends shown by the data, this analysis also was done by calculating descriptive statistics on the data used so that it can be known as vulnerable and fluctuating data. In this analysis, the object of research is used in Arjasa Subdistrict because it is one of several areas in Jember Regency with extensive land and corn production.

3. Results and Discussion

Corn (*Zea mays ssp. Mays*) is one of the most important carbohydrate-producing food plants in the world, besides wheat and rice. Because in the nutritional content, corn can be a substitute for staple foods in rice and wheat. From a physiological point of view, this corn plant is referred to as C4 plant because it is efficient in utilizing sunlight especially in tropical regions such as Indonesia. Corn commodity is Indonesia's leading commodity besides rice which has a multipurpose function. The use of corn in addition to being a food requirement is also needed for many industries, especially the food industry and also functions as animal feed. Corn commodity is also a goal of the government in achieving self-sufficiency and export of corn to encourage national economic growth. Based on the background of maize commodity that has multifunctionality and has the potential to develop rapidly, especially food security and encourage sustainable economic growth, this study aims to identify local potentials based on agro-industry on corn commodities in Jember Regency, East Java.

Table 1. Result of Statistic Descriptive

	Jember Regency			Arjasa District		
	Harvested Area	Production	Productivity	Harvested Area	Production	Productivity
Mean	60480.10	65.46375	394802.5	324.8750	2107.563	6.982116
Median	60877.50	65.94000	396395.0	231.0000	1991.750	6.147163
Maximum	64210.80	75.13000	427064.0	751.0000	3936.000	14.05978
Minimum	55654.00	57.78000	360153.0	182.0000	956.0000	5.195652
Std. Dev.	2879.593	5.488005	22718.25	210.8936	1121.202	2.965140
Skewness	-0.506893	0.198818	-0.112234	1.238059	0.429066	1.971915
Kurtosis	2.151602	2.530716	1.939813	3.033828	1.847881	5.364909

Source: Result Process, 2019

Based on the descriptive statistical test results in Table 1, shows that the harvest area in Jember Regency as a whole is the widest in 2017, which is 55654 Ha and the narrowest harvest area is in 2012. Arjasa Jember Subdistrict is a special object of research because it has a high production value that drives income Gross Regional Domestic Product (GRDP) of Jember Regency, so it needs to be analyzed concerning local potential that can encourage food self-sufficiency and sustainable economic growth in the agricultural sector. The total area of corn harvest in Arjasa District with the largest land area occurred in 2017 while the narrow area of harvest occurred in 2015. The phenomenon of the harvest area in Arjasa District, Jember Regency and East Java does not always affect the amount of production and productivity of corn commodities.

The highest corn production in East Java occurred in 2017, thus indicating that corn production in East Java has tended to increase in the last few years. Maize productivity in the scale of the province of East Java is quite volatile in the 8 years of research, with the highest production value occurring in 2016 based on the maximum values in Table 1 of 50.69 kw / ha. On the scale of the district of Jember the amount of corn production is also quite volatile where the smallest amount of production occurred in 2010 and the largest production occurred in 2015. While related to the productivity of the highest value of corn commodities in 2012 amounted to 75.13 and the lowest value in 2017 amounted to 57, 78, so in other words, corn productivity in Jember Regency tends to decrease. Furthermore, the amount of corn production in Arjasa Subdistrict, the largest amount of productivity in 2012 was 14.06. While the smallest production value of Arjasa sub-district occurred in 2013 and 2014.

The yield from the production of corn is not only used as a substitute for rice, but also corn breeding. Usually, some farmers who collaborate or partner with seed companies also deposit their production results to the company and then process the corn seeds. This is also the role of the private sector in turning production so that it is not only as food but also as a seed for *recycling* planting in the coming planting period. Several types of corn have their respective benefits. Some of the corn is used as foodstuffs such as flour and other basic food ingredients. Meanwhile, corn is also used to feed livestock both in the form of whole corn and processed for animal feed, especially in poultry species. On the other hand, corn can also be used as a seed to maintain the continuity of the corn plant itself.
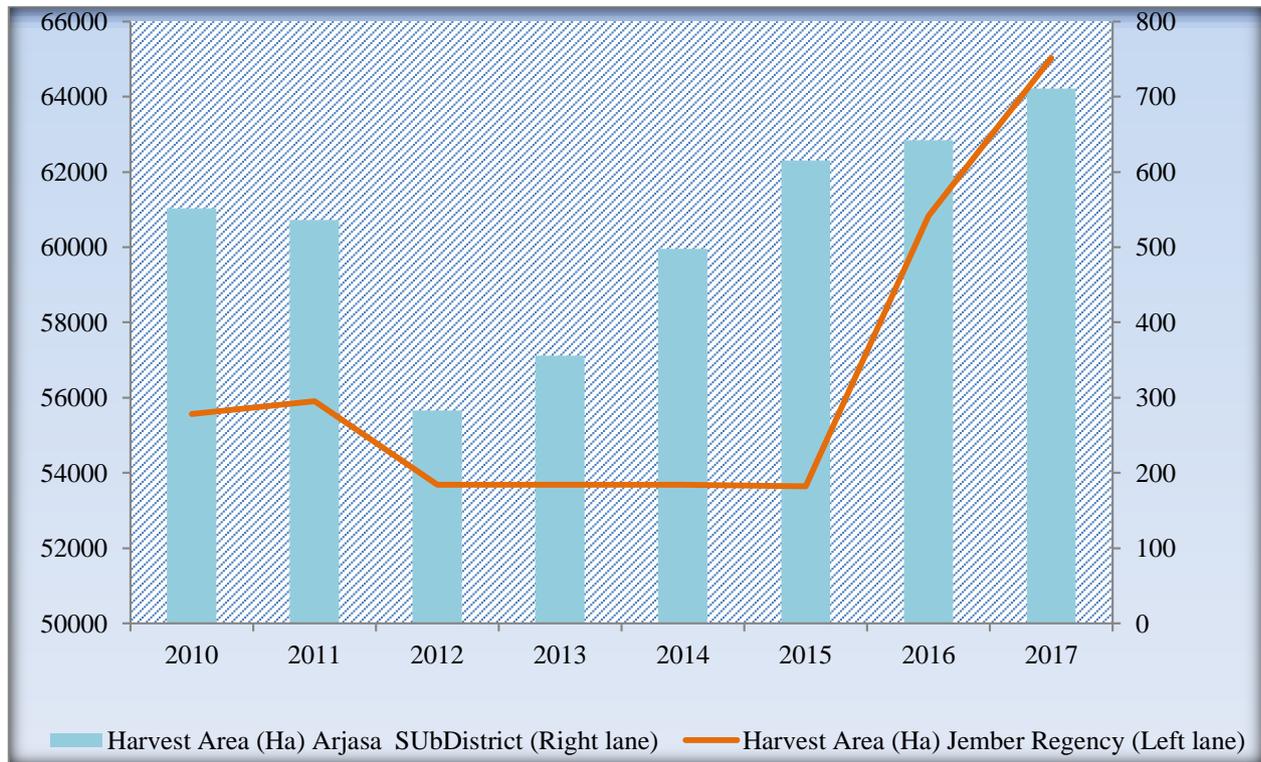
Figure 1. Development of Corn Harvest Area in Arjasa District and Jember Regency
Source: Badan Pusat Statistik (processed, 2019)

Corn which is a seasonal crop so that the planting pattern is not done every time planting is done, but it follows the farmers' planting pattern. In general, corn is planted 2-3 times each year after rice. This is done because the age of planting corn is shorter than rice and other plants and the maintenance process is simpler. Based on Figure 1 shows that the harvested area in Jember Regency and specifically Arjasa sub-district which is the object of research shows a similar pattern. From 2010 to 2017, there was a fluctuation in the area of harvested land in Jember and Arjasa Districts. In 2012, there was a decrease in yields on both of them from 295 ha in Arjasa down to 184 ha in 2012, while in Jember Regency as a whole also experienced a significant decrease from 2011 of 6.0723 ha harvested land area to 5.5654 ha wide harvest land. This condition is caused by several factors, among others due to the condition of the long dry season resulting in some crop failure due to lack of water intake in plants. Besides, rat and planthopper pests also have an impact on crop failure, resulting in a decreasing area of harvested land. Then in the following year, the area of the harvested land gradually improved with time. In 2013 to 2017, there was an increase in the amount of harvested land, which in turn resulted in an increase in corn production in Jember Regency. This was also driven by improved management systems and risk mitigation to climate conditions and diseases in plants.
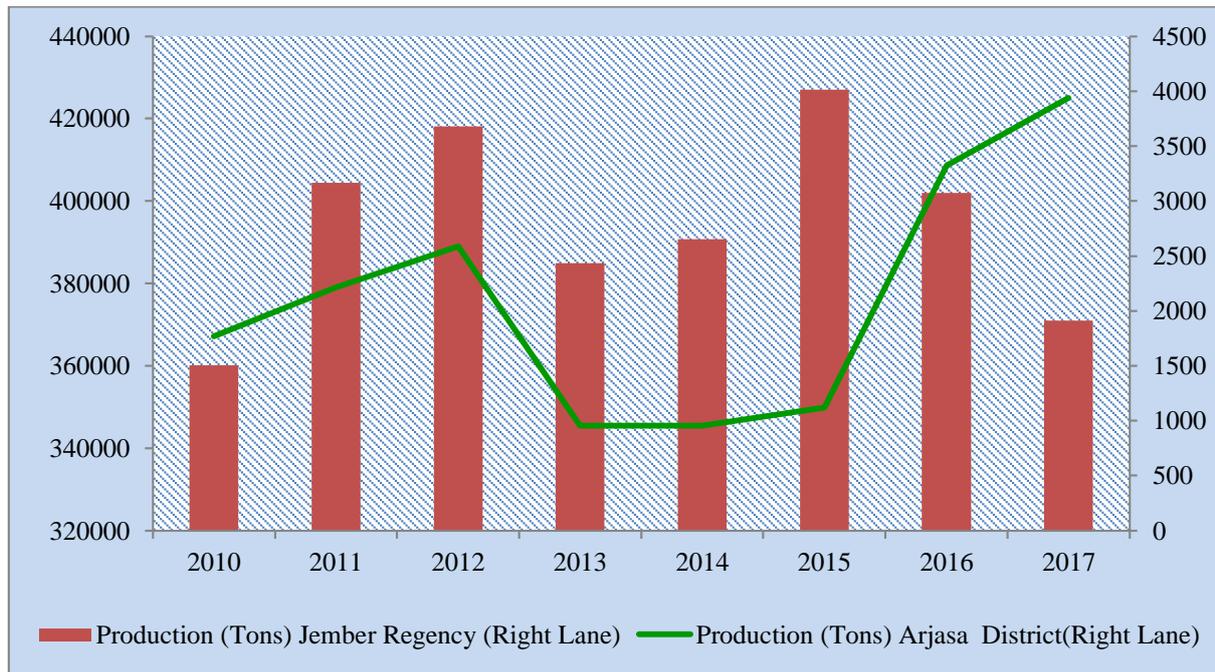
Figure 2. Development of Corn Production in Arjasa District and Jember Regency
Source: Badan Pusat Statistik (processed, 2019)

Meanwhile, in terms of product development, maize plants in Arjasa and Jember districts have experienced significant fluctuations, given that in Figure 1 it was also shown that there was a fluttering in the harvested area that could automatically affect production. Based on Figure 2 shows that the corn production in Jember district increased from 2010 to 2011 and 2012 by 360,153 tons, then in 2011, it reached 404,403 tons and 418,141 tons in 2012. The movement or fluctuation in corn production in Jember was always followed by the movement of corn production in Arjasa District. This is also reflected in the increase in production in 2010 to 2012 in Arjasa Subdistrict with 1771 tons each, in 2011 of 2,212.5 tons and 2012 of 2,587 tons. And decreased from 2013 to 2014 in corn production in Arjasa Subdistrict with a total of 956 tons each. Then experiencing an upward trend such as production in Jember Regency. Furthermore, in 2016, there was a different trend wherein Jember's production output decreased from 427,064 tons in 2015 to 402,031 tons and continued to decline in 2017 to reach 370,973 tons. Meanwhile, in 2015 to 2017, precisely in Arjasa sub-district there was an increase in corn production which was quite stable, amounting to 1,120 tons each; 3,322 tons and in 2017 it increased dramatically to 3,936 tons.

Besides, the results of identification of the potential of local commodities in Jember Regency are also supported by the level of productivity of corn each year which is quite experienced a difference with the area of harvested land and production results.
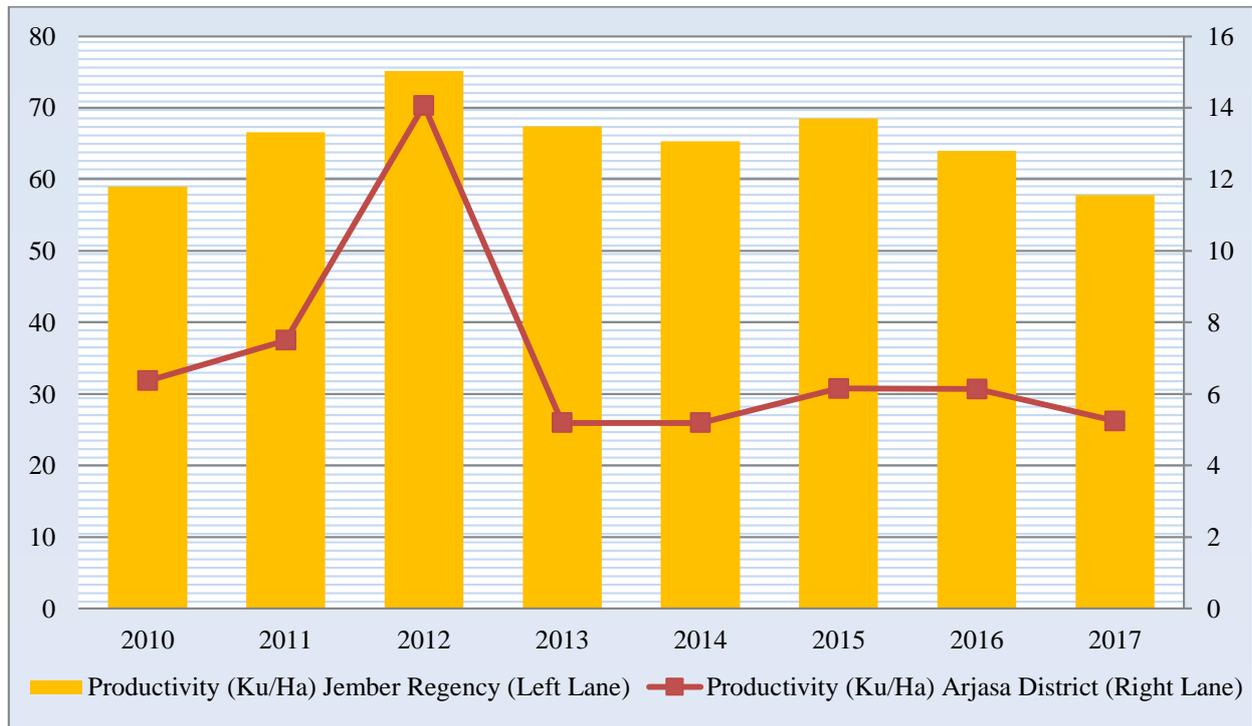
Figure 3. Development of Corn Productivity in Arjasa District and Jember Regency
Source: Badan Pusat Statistik (processed, 2019)

Figure 3 shows fluctuations in corn productivity in Jember and Arjasa Districts. This is indicated by a fluctuating trend in which there was a significant increase in 2012 in productivity in Jember Regency. The increase was respectively 59.01 kw / ha; 66.6 kw / ha and 75.13 kw / ha before finally a very significant decrease in 2013 and 2014 to 67.39 tons and 65.28 kw / ha. Then gradually experiencing a steady increase until 2015 amounted to 68.54 kw / ha and then decreased to 2017 amounted to 57.78 kw / ha. Meanwhile in Arjasa Subdistrict also experienced a pattern of fluctuations similar to productivity fluctuations in Jember Regency. In 2010 to 2012 there was an increase in productivity with each of 6.3 kw / ha; 7.5 kw / ha and in 2012 amounted to 14.05 kw / ha before then experiencing a very significant decrease in productivity of 5.19 kw / ha in 2013.

4. Conclusions

Based on the results of identification and analysis shows that corn has the potential to be developed to become an agro-industry in the agricultural area of Jember Regency, especially Arjasa District. This was driven by the performance of corn commodity production results which experienced a steady increase even though productivity was still experiencing fluctuations that were not yet stable. In this case, the importance of government integration in bridging cooperation between farmers and investors to encourage investment in the agricultural sector to foster innovations and creativity in the processing of agricultural products, especially corn, to increase higher selling values. This investment can be directed to create an innovative agricultural product from upstream to downstream while continuing to promote the concept of sustainability in the agricultural sector.

5. Acknowledgments

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