ANALYSIS OF DEMAND OF CPO AS ALTERNATIVE ENERGY TO EMPLOYMENT AND GROSS DOMESTIC PRODUCT IN SOUTH SUMATRA

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Abstract. This research analysed employment in palm oil plantation sector, its contribution to Gross Domestic Product (GDP) in South Sumatra and the influence of CPO demand to employment and GDP in South Sumatra. This research employed both qualitative and quantitative methods. Qualitative analysis was carried out using secondary data, whereas quantitative analysis employed simple regression analysis with Ordinary Least Square (OLS). Research results showed that employment in palm plantation sector increased from 264,871 in 2013 to 291,716 in 2015. South Sumatra CPO export improved from US $ 13.20 million in 2014 to US $ 14.74 million in 2015, shared of about 11.64 percent of South Sumatra non-oil and gas export. The results of regression test indicated that growing demand of CPO significantly influenced employment and GDP in South Sumatra. It was suggested to the government to support the expansion of palm oil plantation for CPO production in order to achieve higher employment level and greater contribution to GDP in South Sumatra. Research result also showed that palm plant production from local farmers were still low. Government must provide more seeds and subsidized fertilizer, and set more supporting policies. Beside that farmers also must be educated about the potential of Palm plant as alternative energy.

Keywords: Crude Palm Oil, Renewable Energy, Employment, and Gross Domestic Product

I. INTRODUCTION

Palm is one of Indonesian main export commodities which has increased continuously up to 9.92 percent per year. The total area of palm oil plantations in Indonesia is 8.04 million acres with palm oil or crude palm oil (CPO) production of 19.76 million tons a year (Directorate General of Estate, 2014).

According to Djajadiningrat and Famiola (2004), the process of production from fresh fruit bunches (FFB) into crude palm oil (CPO) produces liquid waste which can be processed and produces biogas or bioreactor as a source of methane gas. One ton of liquid waste could potentially produce 3.136 m^3 biogas that can be used as LPG gas around 6,530 tons. The rest of utilization of liquid waste can be used for cattle feeding materials.

Naibaho (1996) stated that in addition to producing liquid waste, in production and processing of fresh fruit bunches, Palm also produces solid waste in the form of empty bunches, fibre and shell. Palm can be classified as an eco-friendly plant because Palm can contribute to absorb carbon and greenhouse gas emissions. Beside that the liquid waste and solid waste also can be used to substitute a low-emission energy and prevent environmental pollution. One acre of oil palm plantations can absorb 24.64 tons of CO2 per year. A ton of fresh fruit bunches can produce 3.136 m^3 which is equivalent to 6,530 tons of LPG gas. The solid waste of fresh fruit bunches which is generated from an empty bunch can be processed into 600 to 650 kg of compost, and if it is hydrolysed, it can produce around 120 litters of bioethanol.

Based on the description above, it is clear that palm has great role as alternative energy and its derivative products create opportunities that can boost revenues in the economy. South Sumatra Province is one of the largest palm producers in Indonesia with extensive plantations of palm oil reached 866,763 acres with a total production of fresh fruit bunches (FFB) and produces approximately 2.11 million tons (Plantation Department of South Sumatera, 2013). 55.14% of total palm plant in South Sumatera is managed by the estate owned company, 29.52 % by local farmers who are the members of Plasma Program for palm oil plantations, and as much as 15.34 % by common people.

In South Sumatra, Palm Oil Mill Effluent / POME has already processed into electricity by biogas power plant with capacity of 4 megawatts located in the Regency of Ogan Komering Ilir. Utilization of liquid waste to electricity becomes a solution for the areas that have not got enough electricity from State Electricity Company (Ferial, 2015).

The contribution of Palm plants and their derivatives as alternative energy sources then of course is expected to absorb more labours in both the palm plantation sector as well as its derivatives such as Crude Palm Oil. It is expected to reduce unemployment and boost GDP for South Sumatra Province. Based on the description above, the object of this research is to analyse the demand of crude palm oil (CPO) as alternative energy to employment and gross domestic product (GDP) in South Sumatra.

II. Literature Review

Palm oil is the main raw material for making cooking oil, margarine, soaps, cosmetics even the pharmaceutical industry. This is caused by the superiority of its resistance to oxidation with high pressure and its ability to dissolve chemicals insoluble by other solvent materials. The most interesting is that not only there is no waste in the production process of palm oil but also the disposal of production including fibers, shells, trunks, bunches and stem can be processed into compost and used as a source of renewable energy, namely Biodiesel.

In brief, the process of oil palm business is divided into two, the upstream process where business process includes planting the seeds later become fresh fruit Bunches (FFB) and the downstream process which includes the processing of FFB into crude palm oil and its derivatives as well as cooking oil, cosmetics and others.

The world palm oil crop need always shows an increasing trend. This is due to several advantages of palm oil, i.e. (Sardjono, 2014):

1. The productivity of palm plant is high, 3.74 tons/acre/year compared to the main competitor such as soybean oil 0.38 tons/acre/year or sunflower oil 0.48 tons/acre/year.
2. Palm oil dominates the vegetable oil in the world as the safest oil. CODEX Alimentarius Commission (http://www.codexalimentarius.org) has published a Standard for Named Vegetables Oil where palm oil dominates nearly 52%.
3. Palm oil has a very wide potential application. The around 82 percent of products produced by the CPO and its derivatives has usefulness as food. This is not owned by other vegetable oils.
4. Palm oil has two main fractions: liquid fraction (Olein) and solid fraction (Stearin). Olein is used as a base material of cooking oil or peanut oil. While Stearin is used as a base material of butter or margarine because it is solid in room temperature. In Europe, Stearin is used generally as a base material of butter or cheese mixture. In Europe, with advanced processing, palm oil is used as a blend of chocolate because it contains special fat. This characteristic is not owned by other vegetable oils.
5. Crude palm oil and its derivatives are bio-diesel generator. This absolutely makes the CPO as future sources of energy.
6. Palm oil is the source of special vitamin E.

The extra value generated from palm plants and their derivatives is certainly a distinctive advantage for economy, especially to the gross domestic product. The commodity of palm plant and the production of its derivatives played important roles towards economic growth, the provision of employment, reduction of poverty, and equitable regional development. To find out the rate of economic growth of a region in a given period, one of the indicators is Gross Domestic Product (GDP).

According to Mankiw (2006), gross domestic product figures summarize a country's economic activity in the currency at a certain period. Calculating GDP can be done by three approaches: (1) production approach, where the gross domestic product is calculated by summing the entire path of output (production) of goods and services produced in a given period; (2) expenditure approach, where gross domestic product is defined as the total expenditure against the goods and services produced domestically; and (3) income approach, where the gross domestic product is calculated by calculating the total income earned by domestic factors of production. Thing that must be considered in the calculation of gross domestic product is the definition that the gross domestic product is the market value of the entire the end/final goods and service produced in an economy in a given period.

This final goods are goods and services that are sold directly to end users. Goods and services produced by an enterprise, and then used as production inputs to other companies are not counted in gross domestic product because it will cause the occurrence of double reckoning (double counting). Besides that, gross domestic product also calculate the value added of goods and services, the difference resulted from the value of output sold by the company and the value of intermediate goods that are used as input for the company for producing the final goods. This means, it can also be inferred that gross domestic product is also a total value added of enterprises in the economy.

The sensitivity of the economy's response to the growing demand for crude palm oil is the importance of crude palm oil as renewable alternative energy which is efficient and environmentally friendly. In addition, the export of crude palm oil contributes to the increase of income. The law of supply explains the relationship between the amount of the requested items and the price. Law of supply in fact is an hypothesis which states that in cateris paribus state, the higher the demand for an item, the higher the price of goods requested, and vice versa. The increase in demand suggests that buyers need a product generated so that pricing is not an obstacle. But people must be aware also that in the production of palm plant crops and their derivatives, Indonesia has competitors such as Malaysia and other countries. For that, to increase the income of the gross domestic product, Indonesia must increase the area of palm plantations and industries to manage the derivatives. The more the palm plantation area and processing industries, the more demand for labor in this sector is expected.

Labour is human-driven effort to transform raw materials originating from the factors of production into goods and services. Labour in the economic sense includes all human sacrifice that was used in the production process. Labour is any person who is able to do the job, both inside and outside of work to produce goods and services to meet the needs of the community (Undang-Undang No. 13 Tahun 2003 Pasal 1). Labours are the workers who are hired to carry out the activities in the production process (Maimun, 2007). But in fact, the problem of employment in Indonesia particularly in the agricultural sector is that it does not have the effectiveness ratio of the use of labour so that determination of workload and waging structure were separate issue.

According to Courpasson et.al., (2012), labor is the aggregate of all human physical and mental effort used in creation of goods and services. Labor is a primary factor of production. The size of a nation's labor force is determined by

the size of its adult population, and the extent to which the adults are either working or are prepared to offer their labour for wages.

III. Methodology

The data used in this research were the reports in Plantation Department and Central Bureau of Statistics that includes data on palm plantation labour, industrial management of crude palm oil (CPO) and gross domestic product (GDP) of South Sumatra. Both primary and secondary data were used for this study. Primary data was obtained by observation. Observation was used to collect data by conducting observation of the phenomena in accordance to the purpose of this research.

Analysis methods used in this research were qualitative and quantitative. The qualitative method was by looking at the data about the increasing of GDP of South Sumatra and absorption of labour in the sector of palm oil plantations and industries that manage the results of CPO. The other type of analyses used in this research was regression analysis. Multiple regression analysis was for seeing the level of significance of the influence of the increased demand for CPO toward employment and GDP of South Sumatra.
The linear regression equation is as follows:

$$Y = {}_0 + {}_1X_1 + {}_2X_2 + £$$

Where:
Y = Crude Palm Oil
X 1 = Demand of Labor
X2 = Gross Domestic Product
ε = Residual term
β = Regression coefficient

The measurement of the demand of Crude Palm Oil (Y) was the quantity of Crude Palm Oil export. Labor (X1) was data employment in the Crude Palm Oil sector from 2012 to 2015. Whereas the measurement of Gross Domestic Product (X2) was the rate of Gross Domestic Product of South Sumatra from CPO exports from 2012 to 2015.

IV. Analysis and Discussion

The total area of palm oil plantations reached 10.78 percent of total area of Indonesia palm oil plantation with a total area of 8.04 million acres (Central Bureau for Statistics, 2005). The total area of palm oil plantations in South Sumatra in 2011 was 866,763.52 and increased to 1,161,043 acres in 2015 with the average growth rate of 7.67 percent in a year (Central Bureau for Statistic, 2005). Employment in Palm oil plantation sector increased from 264,871 in 2013 to 291,716 in 2015. That data showed that there was the increasing of employment along with the growing breadth of palm plantations in South Sumatra. But ideally, the employment in palm plantation sector should look at the ratio of labor demand per acre. It was aimed at analysing the workload in Palm plantation sector. If the workload is too much then the impact to the fatigue, but too little workload can create inefficient for agro-industries sector of palm plantations. Palm oil plantation sector has two types, i.e. Palm plantations which are maintained by the people (called palm smallholder) and palm plantations maintained by large companies, such as state-owned enterprises and private company.

For the sector of palm plantation of the people, labours were more dominated by families which at least could empower and reduced unemployment. But the problem occurred when small plantation was managed by large number of family members. The impact was the high dependence on family-owned land. Based on the data of directorate General of Plantations or Direktorat Jenderal Perkebunan (2014), seventy percent of the land in South Sumatra used for the cultivation of palm consisted of smallholdings and the remaining 30 percent were large plantations. The result of observation of this research, the farmers did not use good management such as recommended seedlings, fertilizer and so on which could increase the production of palm.

Different conditions occured in palm plantations which were maintained by large companies. The fact that fresh bunches of fruit picker workers always moved from one land to the other, it was difficult to determine the ratio of labour demand per acre. The same thing happened to the employee for administration including working in palm plantation management sector such as staff in bookkeeping, foreman field and others who were recruited based on the company's ability, not the demand ratio. Based on the data of Central Bureau of Statistics (2005), the ratio of labour demand in the oil palm plantation sector was one person per acre, as for the results of its derivatives absorbed an average of five people per acre per year. Overall, the employment in South Sumatra reached approximately 4.3 million people who got in touch with Palm commodity directly or indirectly (Central Bureau of Statistics, 2005). Crude palm oil price fluctuations caused derivative products of CPO like biodiesel was not able to compete economically with subsidized fuel oil. It became one of the causes of careful CPO industry employment. If it was seen from the average growth of palm plantations and the South Sumatra export of CPO which reached 7.67 percent per year, the increasing of employment in palm plantations and its derivatives industries sectors such as CPO were increasing along with the rate of growth of the palm plantation area.

Based on the data of Directorate General of Estate (2014), the export of CPO of South Sumatra showed significant increase in which the production of CPO from 2012 to 2014 was more than 4.5 million tons on average and in excess of the target of 2.2 million per year. The data showed that South Sumatra CPO export improved from US $ 13.20 million in 2014 to US $ 14.74 million in 2015, shared of about 11.64 percent of South Sumatra non-oil and gas export (Central Bureau for Statistics, 2015). Based the result of data analysis the growing area of palm plantations the more increase on the number of the production of CPO, the more increase of export and employment in this sector. The result of regression by using ordinary least square is as follows:

$$Y = 7{,}538.334 + 776.857\,X_1 + 5{,}830.832\,X_2$$

TABLE I
REGRESSION MODEL

Model	Non-standardized Coefficients		Stand. Coefficient	t-statistic	P-value
	B	Std. Error	Beta		
(Constant)	7,538.334	68.540		.954	.375
X1= Emp.	776.857	45.877	.328	10.393	.000
X2 = GDP	5,830	57.646	.322	12.684	.000

Adjusted $R^2 = 0.885$

With 95 percent confidence level ($\alpha = 5\%$), the independent variables (explanatory variables) i.e. employment and GDP affected the dependent variable (Y) significantly. The amount of contribution of all independent variables in explaining the variation in the Y (demand of CPO) was as much as 88.5 percent given the value of adjusted $R^2 = 0.885$, the remaining 11.5 percent was determined by other variables that were not taken into account in the model.

V. Conclusion and Suggestions

Crude Palm Oil is derivative product of palm which can be processed into alternative energy. The increasing of demand for crude palm oil in the world gives contribution to the increasing of employment and gross domestic product (GDP) of South Sumatra. For that, The Government should support expansion program of palm plantations by creating policies which support the creation of expansion in palm plantation sector.

In addition, it needs Government intervention in the effort to fight for the welfare of palm plantations workers by issuing clear rules. It is suggested to the government to support the expansion of palm oil plantation for crude palm oil (CPO) production in order to achieve higher employment level and greater contribution to GDP in South Sumatra.

Research result also showed that palm plant production from small holder farmers were still low. Government must provide more seeds and subsidize fertilizer, and set more supporting policies. Beside that farmers also must be educated about the potential of Palm plant as alternative energy.

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