Analysis of prospects of crude palm oil (CPO) in west sumatera province

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Abstract. Crude Palm oil (CPO) exports in West Sumatra have a high potential for competitiveness both in the domestic market and in the international market, as world demand for CPO is still quite high supported by the availability of oil palm, the availability of relatively human resources and the low cost of palm oil maintenance. On the other hand, it shows the competitiveness of CPO from the quality aspect is still quite low. It can be seen that the quality of fruit palm oil from farmers is still far below the quality standards set by the government and foreign standards so that it has implications for the low quality of CPO produced. The purpose of this study is to analyze the existing condition of the current CPO trade in West Sumatra Province, observed from the competitiveness of quality and quantity and the prediction of world demand for West Sumatra CPO. Data collection techniques with primary data were obtained through direct interviews with several CPO processing plants located in West Sumatra Province and secondary data were obtained through the Plantation, Food Crops and Horticulture Services of West Sumatra province. The method used to analyze CPO export competitiveness using the Trade Specialization Index (TSI). The results of this study stated that the value of TSI of CPO in West Sumatra Province show a value close to one which indicated that West Sumatra CPO production is at the maturation stage, in the sense of being in the industrialization stage to downstream products and the development of CPO commodity trade patterns in West Sumatra Province that able to compete with other plantation commodities, both in the domestic and international markets.

1. Introduction
In the agricultural sector in Indonesia, the production of palm oil (Crude Palm Oil) has contributed to the country's foreign exchange from CPO export activities by 33.6% in 2015 with the value of CPO exports in 2016 amounted to US $ 17.8 billion, up 8 percent over the previous year of US $ 16.5 billion. Based on Word Annual Oil, world palm oil production is dominated by Indonesia and Malaysia. These two countries, in total, produce around 85-90% of the world's total palm oil production. In the long term, world demand for palm oil shows a tendency to increase in line with the growth of world population and therefore increase the consumption of products with palm oil raw materials such as food and cosmetic products. Indonesian crude palm oil must be able to compete with crude palm oil products from other countries. If Indonesian crude palm oil has competitiveness in the International market, it is expected that more countries will buy crude palm oil from Indonesia and entrepreneurs will be even more eager to produce the better quality of crude palm oil and a lower production costs. Thus, prices that occur in the International market can be produced and marketed by producers by earning a profit and maintaining their production continuously.
According to Central Bureau of Statistic (2017), West Sumatera main business is still dominated by the agriculture, forestry and fisheries sectors as the main business field with a contribution to the West Sumatera GRDP of 23.10% in 2016 and for the plantation sub-sector has contributed 6.57%. One of the agro commodities that has very large potential to be developed is oil palm commodity, in which its production is the largest compared to other plantation commodities with total palm oil production in 2015 amounted to 1,161,039 tons, and continue to increase 0.77% from 2014. Besides, this commodity also has a large oil palm plantation area of 390,380 Ha in 2014, and increase to 392,315 Ha in 2015 (West Sumatera, 2015). The results of the processing of Oil Palm Fresh Fruit Bunches (FFB) in the form of Crude Palm Oil (CPO) shows the value of West Sumatera CPO exports is still relatively stable from year to year even though the increase is still relatively small at around 1 billion USD, while the value of Indonesian CPO exports from 2012 until now tends to show a decline.

It can be said that crude Palm oil (CPO) exports in West Sumatera have a high potential for competitiveness both in the domestic market and in the international market, as world demand for CPO is still quite high supported by the availability of oil palm, the availability of relatively human resources and the low cost of palm oil maintenance. On the other hand, it shows the competitiveness of CPO from the quality aspect is still quite low. It can be seen that the quality of fruit palm oil from farmers is still far below the quality standards set by the government and foreign standards, as well as the quality of CPO produced, even though the average has met CPO standards for export but if compared to the production of Malaysia's CPO, the quality of Indonesian CPO, especially in West Sumatera, in addition to the low level of CPO processing technology and due to the government's role which have the effect of reducing the competitiveness of CPO in West Sumatera Province, but on the other increase competitiveness. The government has the role of supervisor and regulator of the operation of the vertical market system mechanism. Arrangements are made to ensure the proportionate fulfillment of rights between actors. Supervision is carried out as an effort to guarantee the implementation of a market system based on the principles of effectiveness, efficiency and proportionality. Based on this background, a study was conducted regarding the current condition of the existing West Sumatera CPO trade, and the prediction of West Sumatera CPO exports in the next five years.

2. Methodology
This research was conducted in West Sumatera which was carried out from January 2018 until July 2018. The population of this study was the production of palm oil processing plants in West Sumatera Province. The sample in the study, which was then used as the unit of analysis in this study, were two factories in West Sumatera. This research was conducted using primary and secondary data. Primary data was obtained through direct interviews with several CPO processing plants located in West Sumatera. Secondary data was obtained from related parties/agencies, i.e. the Plantation Office of West Sumatera Province, the Department of Food Security and Horticulture, the Trade Industry Office and the Cooperative of West Sumatera Province, Bureau Central of Statistic and also through a literature review. The variable of the research were the characteristics of CPO, the value of CPO commodity exports in West Sumatera, the total export value of West Sumatera, the total value of global CPO commodity exports, the value of world total exports, the value of CPO commodity imports from West Sumatera. To answer the research objectives, the analytical method can be used as follows:

1) Analyzing the competitiveness of CPO exports in West Sumatera Province as seen from the aspect of CPO quality and quantitatively using the RCA Index and TSI analysis. Analyze the quality of CPO produced by the factory based on the content characteristics required by the company and compared with the quality standards set by Indonesian National Standard (INS). For this reason, observing one of the CPO factories in West Sumatera Province was carried out. Data retrieval techniques were carried out by interviewing the head of the production. From the results of the sampling, on average, it can be seen whether the CPO produced by the factory has met INS or not. If it meets the INS, it can be said that in quality, CPO in the Province of West Sumatera has competitiveness. Quantitative competitiveness used RCA Index and TSI analysis.

2) Determine the prediction of West Sumatera CPO exports in the future by using regression analysis in the next five years by testing several regression models, i.e.: simple linear
regression model, quadratic regression and exponential regression. Next, determine the best regression model based on the smallest mean square error. The model was used to predict CPO exports in the future.

3. Result and Discussion

3.1 Existing condition of the current CPO trade in West Sumatera

In West Sumatera, there were 13 CPO exporters, in which 12 exporters owned their own palm oil processing factories, 9 exporters owned factories and their own gardens, only 3 exporters did not have factories and gardens (only as exporters). Most of these exporters have a dual role, in addition to exporting CPO abroad, they also produce and process FFB to CPO. While two CPO companies only distributed CPO to domestic to Java and other islands in Indonesia.

The CPO exporter conducted CPO export activities through the Bayur port with the main destination countries to India, China, Singapore and Europe. The CPO exporter sent CPO based on contractual agreements with overseas exporters which includes an agreement on the CPO selling price, the amount of CPO to be sent, specifications, and types of payments. Observed from the company’s ownership status, it turned out that 10 exporters (around 80%) were controlled by the Incasi Raya Group as the largest exporting company in West Sumatera which exported CPO products produced by the company in the range of 75% and only 25% used as raw material for the manufacture of cooking oil for domestic consumption (West Sumatera, Jambi, Bengkulu and Riau), with an unstable number, depending on the remaining CPO exports. This company prioritizes export of CPO rather than making cooking oil because from the interview, they said by exporting abroad, the cash flow quickly, and it can be sold in large parties, thus the larger and faster profits can be obtained.

While other large companies that are members of the Wilmar Group and PT. Musimas prioritized the delivery of domestic CPO as raw material for processing CPO derivative products which are still incorporated into one group of companies located in Medan and Dumai. In addition, the Wilmar and PT. Musimas also produced olein (cooking oil) which is sent to a cooking oil packaging factory that is still incorporated in a group outside West Sumatera. From the interview, it was obtained the characteristics of each company starting from the process of supplying FFB to distributing CPO and kernel into or outside the country.

PT. Incasi Raya has 12 palm oil processing factory units in West Sumatera, one of which is in West Pasaman. FFB obtained 2/3 of the company’s plantations and 1/3 of them were from plasma plantations and farmers’ gardens. The yield of CPO is 1600 Ton-2400 Ton/day (80-20 trucks per day, 1 truck = 20 Ton). The current CPO price is Rp. 1,105,000/Ton in 24% yield. CPO produced by PT. Incasi of a large portion (75% of the total CPO produced) is exported abroad (90% to India and the rest to Singapore and Europe) through foreign brokers who have agreed to buy and sell CPO prices, CPO quantities, CPO specifications and types of payments. While the rest (25% of the total CPO produced) is processed into olein (packaged cooking oil and bulk) and second products in the form of stearin (23%) and PFAD (6%). The company processes more cooking oil in bulk form (by 70%) while 30% in packaged form (Sari Murni and Gurih). Packaged cooking oil is then distributed to domestic consumers (West Sumatera and outside West Sumatera) while bulk cooking oil is distributed only around West Sumatera. The selling price of packaged cooking oil at the factory is Rp. 141,000 / 12 lt. and is sold by an agent of Rp. 145,000 / 12 lt.

For CPO export to abroad, it is done through a brokerage process, making payments using ELSI to foreign banks and then sending it to an independent bank and an independent bank issuing ELSI to PT. Incasi. The selling price of CPO exports is based on the export price benchmark (averaged), where the average CPO production per month is 35,000 tons (shipped to India 7-8 times shipments). In February, CPO selling price is 735 USD / Ton at an exchange rate Rp. 13,350 and export duty 18 USD /ton. Whereas CPO sold locally with a non-dependent sales volume of the remaining CPO after being exported at the selling price based on the Reuters CPO price (USD) minus the export tax and multiplied by the rupiah exchange rate at that time with domestic production of 1000-2000 Tons / month at a price selling local CPO Rp.10,000 / Kg. By-products from CPO processing, called as stearin, are sold at a
price of Rp 9,000 / kg with a production of 2000 Ton / month and PFAD is produced at 300 Ton / month with a selling price of Rp6000/kg.

PT. Mutiara Agam is one of the subsidiaries of the company from PT. Providen Agro based in Jakarta. In one day, the average FFB processor is 300-400 tons (8 trucks with a capacity of 7 tons / truck) has an installed capacity of 30 tons / hour, FFB comes from the core garden (80%), plasma (15%) and collectors (5%). The output of FFB processing is: 23% CPO (rendemen), Kernel (4.4%), 23% empty bunches, 12% fiber, 5% shells and residual waste. FFB quality that can produce good quality CPO depends on harvest criteria, harvest rotation, transportation. The CPO quality standards set by the company are FFA / ALB content (4.5% mac), moisture / water (0.2%), impurities (0.02%). While other quality standards such as Fe, Dobi, Betacarotin are not included in the quality standards set by the company. Checking FFA from the accumulation of CPO production (every 5 minutes) or 12-13 times per day is sampled. Checking the impurities is done every 2 hours.

CPO and kernels are sold to refinery factories such as PT. Multimas Nabati and palm shells are sold to PT. Jatim Properti through a tender with head office (PT. Providen Agro in Jakarta). The company only receives DO from the center, selling prices are made by marketing in Jakarta. CPO is sent to the buyer by the transporter (through a sales agreement). The company does not bear the risk during the trip (such as shrinkage, reduced volume). In buying and selling CPO, the standard quality content agreement is determined, if the FFA level is> 5%, the buyer can refuse or keep buying with a claim / deduction according to the agreement that has been set. The company has carried out national standard quality certification including the origin of FFB, processing methods, garden maintenance, social community, administration. Whereas the RSPO International Standard has not been applied. PT. Mutiara Agam has set the company's CPO quality standards, including FFA content (4.5% max), moisture / water (0.2%), impurities (0.02%). When compared with Indonesian National standards, the CPO standard set by PT. Mutiara Agam has met the standards set by INS, thus CPO products produced by PT Mutiara Agam can already be marketed for the domestic market.

The development of oil palm plantation is very pronounced for the government as a source of foreign exchange, and also for oil palm farmers who feel their level of welfare increases over time. The development of oil palm plantations has not been followed perfectly with its management system. Management of oil palm plantations in Indonesia is far from ideal, thus damaging the surrounding environment. As a result, many accusations are skewed, especially foreign institutions towards this plantation sector. Because of that, the government through the Ministry of Agriculture is trying to reduce the negative accusations by giving a certificate of Indonesia Sustainable Palm Oil (ISPO). With ISPO, it is expected to avoid and reduce the impact of environmental destruction, greenhouse gas emissions, and the trigger of deforestation. ISPO is a policy taken by the Government of Indonesia through the Ministry of Agriculture. The aim is to increase the competitiveness of Indonesian palm oil in the world market to fulfill the commitment of the President of the Republic of Indonesia to reduce greenhouse gases (GHG) and pay attention to environmental issues. ISPO was formed in 2009 by the Indonesian government to ensure that all palm oil entrepreneurs meet the permitted agricultural standards, in this case including the palm oil industry in West Sumatera. Thus, every palm oil industry is required to have an ISPO certificate. The reason is aimed at protecting Indonesian CPO in the world market both from the competitors of other vegetable oils. Besides, there are several other reasons, including: 1) the development of oil palm farming in Indonesia is extraordinary; 2) the area of Indonesian palm oil land is around 13.5 million hectares and the total production is around 27 million tons (in 2013), in 2014 it is predicted that 28-30 million tons of production needs to be carried out, especially for foreign markets; 3) the emergence of negative negotiations on oil palm farming in Indonesia; 4) government efforts to reduce it by giving a certificate of Indonesia Sustainable Palm Oil (ISPO); and 5) all oil palm plantation companies until the end of 2014 had pocketed ISPO. Before the implementation of ISPO in Indonesia, Europe had imposed a Rounta Sustainable Palm Oil (RSPO). RSPO international certification was voluntary, to meet market demand. Conversely, ISPO is mandatory. Therefore, there are punishment for companies that do not undertake ISPO certification.

Government policy to implement ISPO in palm oil business is very reasonable, among others: First, increasing awareness of Indonesian palm oil entrepreneurs to improve the environment; Second, increasing the competitiveness of Indonesian palm oil abroad; Third, supporting the greenhouse gas
reduction program and becoming the main requirement of the buyer country for palm oil biodiesel. Therefore, ISPO provides benefits for all of us, both those who are directly involved in oil palm activities and are not involved in these activities. More specifically the benefits of ISPO, among others: 1) ISPO certificate is the first step in the form of recognition that oil palm plantations can be managed sustainably; 2) The palm oil company that gets ISPO indicates that the production process has paid attention to the natural, social and economic balance of the local community.

Based on Table 1, the West Sumatera Province RCA CPO index value in the Indonesian market (domestic) is obtained every year from 2000 to 2016 which on average shows the RCA index > 1, meaning that the value of CPO export in West Sumatera Province has a high competitiveness in the domestic market. The highest RCA index in 2006 with a value of 7.83 and the lowest in 2016 with a value of 2.68. Thus, it can be said that the Province of West Sumatera has comparative advantages to be able to compete in the domestic market

| Year | West Sumatera CPO Export Value (USD) | West Sumatera Export Value (USD) | Indonesian CPO Export Value (USD) | Indonesian Export Value (000 USD) | RCA | TSI |
|------|-------------------------------------|---------------------------------|---------------------------------|-----------------------------------|-----|-----|
| 2000 | 26,770,199                          | 229,630.107                     | 1,326,398,000                    | 62,124,000                        | 5.46| 0.99036 |
| 2001 | 26,026,130                          | 208,180.000                     | 1,227,165,000                    | 56,320,900                        | 5.74| 0.995895 |
| 2002 | 86,611,008                          | 307,849.000                     | 2,348,638,000                    | 57,158,800                        | 6.85| 0.995968 |
| 2003 | 130,213,755                         | 377,277.000                     | 2,719,304,000                    | 61,058,200                        | 7.75| 0.99760 |
| 2004 | 219,559,755                         | 594,956.000                     | 3,944,457,000                    | 71,584,600                        | 6.70| 0.99742 |
| 2005 | 278,074,610                         | 731,189.000                     | 4,344,303,000                    | 85,660,000                        | 7.50| 0.996156 |
| 2006 | 345,204,890                         | 1,074,134.000                   | 4,139,286,000                    | 100,798,600                       | 7.83| 0.998796 |
| 2007 | 622,691,326                         | 1,512,799.000                   | 8,866,445,000                    | 114,100,900                       | 5.30| 0.998414 |
| 2008 | 1,068,800,714                       | 2,384,568.000                   | 14,110,229,000                   | 137,020,400                       | 4.35| 0.998732 |
| 2009 | 648,400,180                         | 1,344,257.000                   | 11,605,431,000                   | 116,510,000                       | 4.84| 0.997105 |
| 2010 | 1,024,675,222                       | 2,214,774.000                   | 15,413,639,000                   | 157,779,100                       | 4.74| 0.99438 |
| 2011 | 1,204,095,951                       | 303,181.5000                    | 19,753,190,000                   | 203,496,600                       | 4.09| 0.996986 |
| 2012 | 903,179,353                         | 2,363,583.000                   | 22,451,089,000                   | 190,020,300                       | 3.23| 0.997313 |
| 2013 | 654,718,937                         | 2,209,012.000                   | 17,667,471,000                   | 182,551,800                       | 3.06| 0.993494 |
| 2014 | 696,414,714                         | 2,105,610.000                   | 19,555,633,000                   | 175,980,000                       | 2.98| 0.999125 |
| 2015 | 678,810,248                         | 1,748,010.000                   | 17,360,395,000                   | 150,366,300                       | 3.36| 0.998779 |
| 2016 | 571,498,745                         | 1,708,280.000                   | 18,100,000,000                   | 145,186,200                       | 2.68| 0.99572 |
| Total| 9.185,745,737                       | 24,145,923.107                  | 184,933,073,000                  | 2,067,716,700                     | 0.997301 |
| Average| 540,337,985                         | 1,420,348.418                   | 10,878,416,059                   | 121,630,394                       | 5 | 0.997301 |

The position of CPO competitiveness in West Sumatera can also be seen based on the TSI value. From the calculation, the value of ISP CPO in West Sumatera Province every year from 2000 to 2016 shows a value close to one. This condition shows that West Sumatera CPO production is at the maturation stage. This means that the analysis of the process of the industrialization stage and the development of the CPO commodity trade patterns in the Province of West Sumatera have been able to compete with other plantation commodities, both in the domestic and international markets.

3.2 Prediction of West Sumatera CPO Exports in the Next Five Years

Determination of the prediction of the value of West Sumatera CPO exports for the next 5 years is done by predicting techniques using linear regression models, quadratic models, and exponential models. Formation and analysis of linear, quadratic and exponential regression models will be done with the
software (SPSS and POM for QM). From the results, the output produced by the three models and the best model will be determined. The best model is the model that produces the lowest mean square error (MSE). The value of West Sumatera CPO exports for the next 5 (five) years will be carried out using the best model. The data used in predicting are 16-year time series data from 2000 to 2015. Among the three regression methods used, the best model is obtained based on the smallest Mean Square Error (MSE) value by using the exponential regression model that can be seen in Figure 1.

![Exponential regression model](image)

**Figure 1.** Exponential regression model

Exponential Regression Modeling is obtained as follows:

$$\log y = \log 61840969,780 + x \log 0,190$$

It can be stated that $x$ (years) increases by 1 unit (1 year), so the volume of CPO exports in West Sumatera will increase by $\log 61840969,780$ time. Table 2 shows the predictions of West Sumatera CPO exports for the next 5 (five) years with an exponential trend

| Year | CPO Export Prediction (USD) |
|------|-----------------------------|
| 2017 | 716.442.004                 |
| 2018 | 716.442.002                 |
| 2019 | 716.442.001                 |
| 2020 | 716.442.001                 |
| 2021 | 716.442.001                 |

**Table 2.** CPO Export Prediction in West Sumatera

4. Conclusion

The competitiveness of CPO exports in West Sumatera was analyzed from the aspect of CPO quality and quantitatively by using RCA Index and TSI analysis. CPO quality meets the standards required by the international. The value of the West Sumatera Province CPO of RCA index in the Indonesian market (domestic) every year from 2000 to 2016 which on average shows the RCA index $> 1$, indicating the value of CPO export in West Sumatera Province has high competitiveness in the domestic market. CPO position in West Sumatera Province can also be seen based on the ISP value. From the result, the value of TSI of CPO in West Sumatera Province every year from 2000 to 2016 shows a value close to one. This condition shows that West Sumatera’s CPO production is at the maturation stage. Economic factors, social and cultural factors, including political commitments from the government are needed to be studied in order to get more comprehensive results.
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