

The Influence of Land Area, Production, and Exports on the Growth of the Indonesia Palm Oil Industry

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ABSTRACT

Palm oil is a commodity that has competitiveness in the international market. The growth of the Indonesian palm oil industry can be caused by various factors resulting in changes. This research aims to determine the influence of land area, production and exports of Crude Palm Oil (CPO) on the growth of the Indonesian palm oil industry in 2000-2021. This research uses panel data regression with the Fix Effect Model (FEM) which was chosen as the best model in the research. This research uses secondary data from various government agencies in 12 provinces in Indonesia starting from 2000-2021. The dependent variable in this research is the growth of the Indonesian palm oil industry in 2000-2021. Meanwhile, the independent variables in this research are land area, production and exports. The results of this research show that all variables, namely land area, production and exports, have a significant influence on the growth of the Indonesian palm oil industry.

Keywords: Palm Oil Industry Growth, Land Area, Production and Exports

I. INTRODUCTION

A. Background

CPO affects the Indonesian economy. CPO is the most popular agricultural commodity in the world. Currently, it is estimated that palm oil is the main ingredient in almost half of the products sold in supermarkets. (Asian Agri, 2018).

There are 26 provinces that have oil palm plantations: Sumatra, Kalimantan, West Java, Banten, Central Sulawesi, South Sulawesi, Southeast Sulawesi, West Sulawesi, Gorontalo, Maluku, North Maluku, Papua and West Papua. Covering an area of 2.86 million ha, which is 19.62% of the archipelago's palm oil land area, Riau is still the province producing the largest palm oil in 2020. 8.54 million tonnes of CPO was produced in Riau Province. (KSI Statistics Book, 2020).

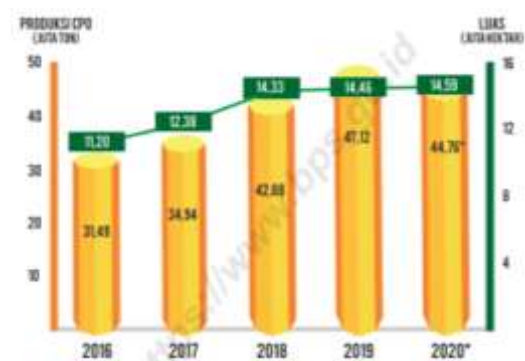


Figure 1. Indonesian Palm Oil Production and Land Area, 2016–2020

Source: BPS, 2020

The area of oil palm plantations based on land used and CPO production in 2018 increased significantly compared to previous years, as shown in Figure 1. This increase resulted in the number of management also increasing in palm oil companies. CPO production and palm oil plantation area increased in 2019 compared to the previous year with 14.46 million hectares and production of 47.12 million tonnes. Furthermore, the area increased by 0.90% in 2020 to 14.59 million ha. (Indonesian Palm Oil Statistics Book 2020)

The Covid-19 pandemic had the impact of decreasing palm oil production in 2020 compared to 2019, increasing 5.01% to 44.76 million tons. Riau Province contributed 8.54 million tons of CPO, or around 19.62 percent of the total production quantity. Central Kalimantan is in second place after Riau with a production volume of 12.89 percent or 7.98 million tons. (Indonesian Palm Oil Statistics 2020)

From 2016 to 2019, palm oil exports tended to increase in terms of volume. However, the volume of CPO exports decreased in 2020. CPO exports increased sharply in 2017, namely 29.07 million tonnes, up 19.45% from 2016.

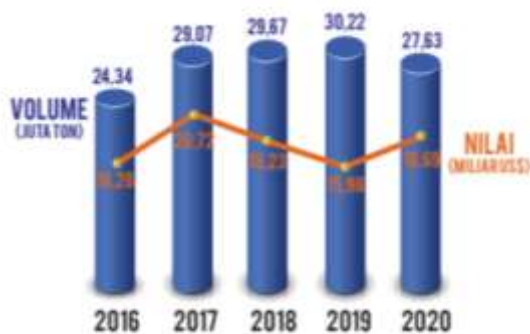


Figure 2. Number of Exports and Value of Palm Oil, 2016–2020
(Source: BPS, 2020)

Most of Indonesia's CPO is sent to countries spanning five continents. CPO exports to these five countries accounted for 86.68% of Indonesia's CPO exports. With a palm oil export volume of 4.39 million tons, or 61.23% of Indonesia's total CPO export volume worth US\$ 2.87 billion, Indonesia exports palm oil to India as its main destination country. Apart from that, CPO is exported most to Spain and Malaysia, accounting for 10.73 percent and 5.22% of total CPO exports. Most of Indonesia's palm oil production is sold domestically. (Source: Indonesian Palm Oil Statistics Book 2020)



Figure 3. CPO Export Volume by Destination Country, 2020
Source: BPS, 2020

Indonesia occupies the top position in palm oil exports, and next is Malaysia. In other words, palm oil has great potential to become the main export commodity in Indonesia. (Wulansari, Yulianto, & Pangestuti, 2016).

B. Problem Identification

1. What is the influence of land area, production, CPO prices, CPO exports, wages, interest rates and consumption together on the growth of the palm oil industry in Indonesia?

2. How does land area influence the growth of the palm oil industry in Indonesia?
3. How does production influence the growth of the palm oil industry in Indonesia?
4. How does CPO exports influence the growth of the palm oil industry in Indonesia?

II. LITERATURE REVIEW

Economic Growth

Todaro (2020) explained that economic growth is a process of increasing production capacity in an economy over time and is unable to generate an increase in national income. Rapannadkk (2017) mentions factors that influence economic growth, including: natural resources, human resources, investment, and technology. There are several theories of economic development in various economics literatures (Deliar Nov 2018, Jhingan 2014, Skousen 2016) or as it is written in the article "Corporate Finance Institute", other:

1. Classical theory.

Developed since the 17th century, with its famous characters, namely, Adam Smith, David Ricardo and Thomas Robert Malthus.

a. Theory Adam Smith.

Adam Smith explained that there are two factors that influence economic growth, total output and population growth factors. The calculation of the total output using three variables, namely, natural resources, human resources, and modal resources. Population growth, is used to determine the area of the market and the rate of economic growth

b. The David Ricardo theory.

David Ricardo said that economic growth will only be achieved if the productivity of the workforce is supported by technological advances and a large amount of capital is accumulated.

c. Theory Thomas Robert Malthus

Malthus in his book "An Essay on the Principle of Population" published in 1798 said that the population growth rate is according to the geometrical series, while the growth rate of food is according to the arithmetic series. The growth in population is much greater than the growth in food, so there will be fish shortages.

2. Neoclassical Theory

There are three well-known figures in the theory of ineoclation, namely Harod-Domar, Joseph A Schumpeter and Robert Solow

a. Harod-Domar theory of growth and economics.

R.F. Harrod and EvseyDomar who introduced this theory. According to them, to achieve strong economic growth, it requires the formation of capital or investment.

b. Joseph A .Schumpeter 's theory of economic growth.

Joseph A. Schumpeter in his book "The theory of economic development", says that economic growth is an innovation process that is carried out by innovators and entrepreneurs.

c. Robert Solow's theory of economic growth.

Economic growth according to Robert Solow is a series of activities that depend on four main factors, namely human, capital accumulation, modern technology and the result (output).

3. Historical Economic Growth Theory.

The economists who came up with this theory include:

a. Theory of economic growth Friedrih List.

The list categorizes 4 stages of economic growth, i.e. i: hunting and wandering stage (depending on nature), livestock raising and farming stage, farming and crafting stage, craft stage, industry and commerce

b. Theory of economic growth Werner Sombart

Sombart said that there are three stages of economic growth, namely: the closed economic stage/age, the craft-and-growth stage/age, and the capitalist stage/age.

c. Walt Whitman Rostow's theory of economic growth

W.W. Rostow in his book "The Stages of Economic, A Non Communist Manifesto" growth economic growth and development theory. Rostow said that the economic growth of the society took place through stages, namely : the traditional society or traditional isociety, the preconditions for leaving the ground or the icon consumption

d. Bruno Hildebrand's theory of economic growth.

According to Bruno, the stages of economic growth are the period of exchange for goods (barter), the period of exchange for money, the period of exchange for credit.

e. Theory of economic growth Karl Bucher.

The stages of economic growth according to Karl Bucher are : the people are still subsistence, the barter economy (exchange of products), the international economy, the economy with trade that crosses the borders of a country

4. Keynes theoryJohnMeynard Keynes explained his economic theory in his book, his essay entitled "The General Theory of Employment, Interest and Money". The Keynesian school of economics advocates something that is contrary to the theory of capitalism, namely the interference of the public sector in improving the economy. The theory of capitalism opposes the interference of the public sector and government in the economy. The capitalists believe that an uninterrupted market will achieve its own equilibrium.

Keynes' theory criticizes government for increasing savings but not encouraging consumption. Keynes also supports controlled distribution of wealth when needed.

Keynes' theory then concludes that for the distribution of wealth, the poorer people are given a certain amount of money, they will spend it rather than save it; which then drives economic growth.

5. Neokeynes theory.

In Neokeyney theory, the most important component is about investment capital, namely in the process of determining the success of economic growth.

Agricultural economy

What is meant by agricultural economics is knowledge that can be used to solve economic problems in the agricultural sector. The problem in question is how agricultural economists can deal with production problems and analyze consumer needs.

Land Area

What is meant by land is land used in agriculture. The condition and environment of the land influences land use.

Land functions as a factory for agricultural products as a factor of production, namely the place where production is carried out and where the products come from." (Mubyarto, 1989). "How wide or narrow the land is shows the importance of land production factors. Agricultural land will have an influence on business, which will also influence agricultural efficiency." (Soekartawi, 1995)

Production

To increase the value of a product, a production process is carried out. Assuming that economic resources (production factors) must be combined effectively to achieve the combination of factors with the lowest cost of money (lowest cost combination) conventionally, these benefits can be increased by using materials known as production factors. L is the labor factor and K is the capital production factor. The three main questions related to production are: "What, how, for, whom?". (Soeharno, 2009, p. 4)

Production is the process of processing available resources with the aim of obtaining maximum results with good quality and quantity that can be marketed.

Export

Goods and services sold to others are known as exports, along with services provided to those individuals, such as capital, ship

transportation, and other facilities that support exports. (Todaro, 2000).

III. DATA AND ECONOMETRIC MODELS

A. Population, Sample and Sampling

Time series data on economic variables, namely palm oil industry growth, land area, CPO production and CPO exports from 2000 to 2021. The sample size for this research is 12 provinces x 22 years, or 264 panel data samples.

The samples selected in this study were Riau, Central Kalimantan, North Sumatra, West Kalimantan, South Sumatra, East Kalimantan, Jambi, South Kalimantan, Aceh, West Sumatra, Bengkulu, and Lampung.

B. Research operational variables

The definitions of the variables in this research are:

Table 2. Definition of Research Operational Variables

No	Variable Name	Operational Definition	Measurement Scale
1.	growth of the palm oil industry	Increasing the ability of the palm oil sector to produce CPO and its downstream products	Change in percent units from year t-1 to t
2.	Land area	Land used in plantations and agriculture The total area of oil palm plantations in Indonesia, starting from government plantations, private plantations and community plantations	The total area of land planted with oil palm in hectares (ha).
3.	Production	the ability to produce CPO calculated in a certain period. This is the product of all Indonesian palm oil companies	The amount of CPO produced in tons.
4.	Export	Trade by removing goods from within the country through state customs and complying with applicable regulations is called export. Goods sold by one country to another country are called exports. In this study, the amount of Indonesian palm oil exported to India is represented in tons	number of tonnes of palm oil exported by Indonesia. The export value of palm oil, or crude palm oil, is calculated in thousands of dollars, and is taken from the government's annual export total.

C. Data analysis technique

The data analysis techniques used in this research are as follows:

1. Quantitative Analysis

The steps of the quantitative analysis carried out are:

a. Data input. The multiple linear regression equation model is:

$$Y = f(X_i)$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

The econometric model is changed to the natural logarithm (ln):

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + Y$$

where :

Y = dependent variable = growth of the palm oil industry

A = constant

X₁ = independent variable 1 = land area

X₂ = independent variable 2 = production

X₃ = independent variable 3 = export

2. Classic Assumption Test. Pada linear regression with data time series test assume classic that needs to be done :

a. Normality Test. A good regression model, the residual data is normally distributed, with a p-value >0.05 or a Jarque-Bera value < 2 (Ghozali, 2016)

b. Multicollinearity Test. to see whether there is a high correlation between the independent variables. The tool used is the VIF multicollinearity test. This test value is good if it is less than 10

c. Heteroscedasticity test to determine whether in the regression model there is an inequality of residual variance from one observation to another observation. A good regression model has no symptoms of heteroscedasticity, with a p-value > 0.05.

d. Autocorrelation test to see whether there is a correlation between a period t and the previous period. Autocorrelation can be known by the Breusch-Godfrey Test. If the prob score > 0.05 then there is no autocorrelation

3. Feasibility Test Model Regression

a. F-statistics test. The F-statistical test basically shows whether all independent variables in the model have an overall or joint effect on the independent variable (Kuncoro, 2012). This test was carried out with a confidence level of 5%. This test is carried out in two ways, namely :

i. If the value of F statistic > 0.05, H₀ is accepted or H₁ is rejected, If the value of F-statistic < .05. H₀ is rejected or H₁ is accepted

ii. If the value of F-statistic > F_{table}, H₀ is rejected or H₁ is accepted, If the value of F statistic < F_{table}, H₀ is accepted or H₁ is rejected

H₀ is rejected, which means that all independent variables i as a whole affect the independent variables

b. Test t-statistics. This test was conducted to determine the effect of the independent variables on an individual basis on the dependent variable. To find out the significance of the effect, criterion is used: t-counts > t-table means has an effect

c. Coefficient of Determination (R²). The coefficient of determination is to see how much the ability of the independent variable together gives an explanation of the iterative of the dependent variable. The value of R² ranges from 0 to 1 (0 ≤ R² ≤ 1)

IV. RESULTS AND DISCUSSION

Regression equation for growth of the palm oil industry

$$\hat{Y} = 23.53164 + 0.822724 \ln X_1 + 0.966763 \ln X_2 + 0.685815 \ln X_3$$

The regression equation contains the meaning:

- Constant value = 23.53164, meaning that in statistical calculations if all ceteris paribus variables have constant values, then the growth value of the palm oil industry is 23.53164
- The regression coefficient value b₁ = 0.822724, meaning that the elasticity value of land area on the growth of the palm oil industry is E = 0.822724. An E value < 1 indicates that an increase in land area is inelastic to the growth of the palm oil industry
- The regression coefficient value b₂ = 0.966763, meaning that the elasticity value of CPO production value towards the growth of the palm oil industry is E = 0.966763. An E value < 1 indicates that increasing CPO production is inelastic to the growth of the palm oil industry
- The regression coefficient value b₄ = 0.685815, meaning that the price elasticity value towards the growth of the palm oil industry is E = 0.685815. An E value < 1 indicates that the increase in CPO exports is inelastic to the growth of the palm oil industry

Simultaneous F Test

The relationship between the independent variable and the dependent variable is measured using the F statistical test. The calculation results obtained are a significance value of 0.0000 < 0.05 and an F-Statistic of 12.34230 which means a significant effect, indicating that the variables of land area, CPO production and exports simultaneously have an impact large impact on the growth of the palm oil industry.

Partial test of land area on the growth of the palm oil industry

Statistically it shows that the value of land area has a greater influence on the growth of the palm oil industry than α (0.0338 < 0.05) and t-Statistic 1.736103, so it can be concluded that the land area variable on the growth of the palm oil industry has a significant and positive effect .

Partial test of CPO production on the growth of the palm oil industry

Statistically, the results show that the significance of production value on the growth of

the palm oil industry is smaller than α (0.0103 < 0.05) and the t-statistic is 0.240355, so it can be concluded that the CPO production variable on the growth of the palm oil industry has a significant and positive effect.

Partial export test on the growth of the palm oil industry

Statistically, the results show that the significance of the value of land area on the growth of the palm oil industry is greater than α (0.0255 < 0.05) and the t-statistic is 0.635831, so it can be concluded that the export variable on the growth of the palm oil industry has a significant and positive effect.

V. CONCLUSIONS AND SUGGESTIONS

A. CONCLUSIONS

This research aims to determine the factors that influence the growth of the palm oil industry. Data analysis uses regression with annual time series data from 2000-2021 (22 years). Based on the results of the analysis, the following are obtained:

1. Land area, production and exports together have a significant influence on the growth of the Indonesian palm oil industry
2. Land area has a significant influence on the Indonesian palm oil industry. Land area has a positive relationship with the growth of the palm oil industry.
3. Production has a significant influence on the growth of the Indonesian palm oil industry. Production has a positive relationship with the growth of the Indonesian palm oil industry.
4. Exports have a significant influence on the growth of the Indonesian palm oil industry. Exports have a positive relationship with the growth of the Indonesian palm oil industry.

B. SUGGESTIONS

1. Based on the results of this research, it can be seen that the variables studied together have a significant influence on the growth of the Indonesian palm oil industry, so that if there is a change in the conditions of oil palm plantations both from research variables and external factors. Therefore, the government needs to be careful in making policies so that the growth of the Indonesian palm oil industry can have maximum impact.
2. The relationship between land area and the growth of the Indonesian palm oil industry. The government should make regulations that are used as a basis for granting land tenure permits.

3. The government must be firm against negative campaigns that say that Indonesian CPO production is not environmentally friendly. As part of promotion, advocacy and public campaigns to show the benefits of oil palm development for the community's economy, the government must facilitate useful research and evidence, so that CPO production can be better utilized.
4. CPO exports are good, but it would be even better if the government facilitated the development of downstream products. So what will be exported is not only in the form of CPO or crude oil, but also other products that are more valuable. The issuance of regulations that increased BK for Indonesian CPO since 2010 shows the spirit of downstreaming

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