

## The Effect of Investment and Land Area to Production Palm Oil Pasca Covid-19 Pandemic

Retno Febriyastuti Widayawati<sup>1\*</sup>, Nurul Azzizah Az-Zakiyah<sup>2</sup>, Andi Lopa Ginting<sup>3</sup>,  
Ermatry Hariani<sup>4</sup>

- 1, 4. Development Economics Study Program, Faculty of Economics and Business, Wijaya Kusuma University, Surabaya, Indonesia
2. Development Economics Study Program, Faculty of Economics and Business, Ahmad Dahlan University, Yogyakarta, Indonesia
3. Development Economics Study Program, Faculty of Economics, Open University, Jakarta, Indonesia

\*corresponding author e-mail: [retnofebriyastutiwidayawati@uwks.ac.id](mailto:retnofebriyastutiwidayawati@uwks.ac.id)

---

### Article Info

**Keywords:**  
Production Palm Oil, Investment, Land Area

**JEL Classification:**  
C32, D53, F36

**DOI:**

### Abstract

**Purpose** – Palm oil production contributes to Indonesia's GDP. As the world's largest producer of palm oil, Indonesia naturally has a market for marketing this palm oil both domestically and internationally. The purpose of this study is to examine the impact of investment and land area on palm oil production in the seven provinces that produce the most palm oil in Indonesia.

**Methodology** – With panel data, multiplier linear regression was used. From 2015 to 2021, the seven provinces are: North Sumatera, West Sumatera, Riau, South Sumatera, Central Kalimantan, West Kalimantan, and East Kalimantan. Eviews 9 is being used to analyze panel data. The classical assumption test also includes multicollinearity, normality, and heteroscedasticity.

**Findings** – The findings indicate that investment has a positive but insignificant impact on palm production in North Sumatera, West Sumatera, Riau, South Sumatera, Central Kalimantan, West Kalimantan, and East Kalimantan from 2015 to 2021. Between 2015 and 2021, the area has a positive and significant impact on palm oil production North Sumatera, West Sumatera, Riau, South Sumatera, Central Kalimantan, West Kalimantan, and East Kalimantan.

**Originality** – The findings of this study are new, because palm oil production can contribute to economic growth and recovery during the Covid-19 pandemic. This study is also new in that it was conducted from 2015 to 2021 with the seven largest CPO producing provinces in Indonesia.

---

## 1. Introduction

Indonesia is an agricultural country, and one of its agricultural sectors supports the country's supporting activities. The agriculture industry is important to the economy because of its significant contribution to GDP, which is expected to be around 13.7% in 2020. By 2020, the processing industry will account for 19.88% of the farm sector and be the second largest contributor to GDP (Badan Pusat Statistik, 2021).

The plantation industry is one of many subsectors that comprise the agriculture industry. The plantation industry contributes to the economy in a variety of ways, including increasing the country's foreign exchange reserves (Alatas, 2015). This plantation-related subsector is very appealing because it can conduct export operations to several developed countries. This plantation sector will contribute 3.63 percent of GDP in 2020 and 26.50 percent of Agriculture, Forestry, and Fisheries, making it the sector's largest contributor (Badan Pusat Statistik, 2021). This subsector's products include oil palm, coconut, rubber, coffee, cocoa, and other plantation subsectors. These plantations are the mainstay of Indonesia's exports to the international market, necessitating government assistance as well as farmer and plantation business collaboration.

Crude palm oil (CPO) is a staple of Indonesian agriculture, serving as both a source of cooking oil and an export good. Companies that generate CPOs must operate efficiently in order to maximize profits. Indonesia, the world's largest producer of CPO, produced 30.9 million tons of CPO in 2015. Its value has increased by 5.47% since 2014. (BPS, 2015). Private plantations contributed 56.33%, smallholder plantations contributed 36.56%, and government-owned plantations contributed 7.11% (Rifin, 2017).

Indonesian palm oil production is increasing year after year. The vegetable oil produced from this palm oil may be used or required by the industrial sector. Indonesia, the world's largest producer of palm oil, naturally has a domestic and international market for selling this oil. Oil palm plantations can be found in 26 provinces in Indonesia, including Sumatera Island, Kalimantan Island, Sulawesi Island, Maluku Island, Papua and West Papua, and Java Island. However, only a few provinces in Indonesia have the greatest or highest oil palm production and area. East Kalimantan, West Kalimantan, Riau, South Sumatera, North Sumatera, and West Sumatera are the provinces.

According to Mohamed and Nageye (2021), land area has a positive impact on Somalia's oil palm productivity. According to Rondhi & Hariyanto (2018) the findings of this study, land has an impact on output in Jatimulyo Village, Jember Regency. Edison, (2020) land use has a positive and significant impact on oil palm output. However, Kubitza et al., (2018) shows that land has an insignificant effect on oil palm production. Hasibuan and Nurdelila (2020) show that investment does not have a significant effect on palm oil production. Some results of these studies are the results of different studies, so the researchers examined the effect of investment, and land area to production palm oil in 7 Province Indonesia. The title of this research "The Effect of Investment and Land Area to Production Palm Oil Post Covid-19 Pandemic

## 2. Method

This study makes use of panel data from 2015 to 2021. The unit of analysis is the seven provinces in Indonesia that produce the most palm oil: North Sumatera, West Sumatera, Riau, South Sumatera, Central Kalimantan, West Kalimantan, and East Kalimantan. Secondary data from the Central Bureau of Statistics was used (BPS). Table 1 describes the operational definitions of variables:

**Table 1.** Operational Definition

Variable	Explanation	Hypothesis	Unit
Production	Production is the sum of the harvest received from oil palm plantations	Production can be affected by investment and land area	Ton
Investment	Investment is the amount of rupiah used in producing palm oil	Investment has an effect and no effect on oil palm production	Rupiah (Rp)
Land Area	Land area is amount of land used and plants with oil palm	Land area has an effect and no effect on oil palm production	Hectare (Ha)

Source: Authors (2022)

The panel data method, which combines cross-sectional and time series data and measures the same cross-sectional unit repeatedly, is used by the analyst to determine the direction and amount of influence the independent variable had on the dependent variable. We create tool Eviews 9 in this study. This research model's applications and equations are as follows:

$$\text{Prod}_{it} = \alpha_1 + \beta_1 \text{Inves}_{ij} + \beta_2 \text{LA}_{ij} + \varepsilon_t$$

Production (Prod) in tons is the dependent variable in this study. The first independent variable is investment, which is measured in Rupiah (Rp). The second independent variable is land area, which is expressed in hectares (Ha). The classical assumption test was performed, which included the normality test, multicollinearity test, and heteroskedasticity test (Widyawati et al., 2021).

The panel method analysis tools to be tested are Pooled Least Square (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM) (Gujarati and Dawn, 2009)). The following step determines the statistical determination ( $R^2$ ), t test, and F test. The coefficient of determination ( $R^2$ ) measures the model's ability to explain the dependent variable (Hariani et al., 2022). The F test is used to determine whether the independent variable is concurrently (overall) significant to the dependent variables (Kuncoro, 2011).

### 3. Results And Discussion

Panel data models are: *Pooled Least Square, Fixed Effect Model, Random Effect Model* (Gujarati, 2003)) with chow, hausman and lagrange multiplier in tabel 2.

**Table 2.** Model Testing

Test	Value	Criteria	Result
Chow	0.0000	Prob 0.0000 < 0.05	<i>Fixed Effect Model</i>
Hausman	0.7531	Prob 0.0000 > 0.05	<i>Random Effect Model</i>
Lagrange Multiplier	0.0000	Prob 0.0000 < 0.05	<i>Random Effect Model</i>

Source: data processed, 2022

Table 2 shows that the chow test value of 0.0000 is less than 0.05, indicating that Ho is rejected and Ha is accepted. The Fixed Effect Model was chosen. The hausman test value of 0.7531 is greater than = 0.05, so Ho is accepted and Ha is rejected. The Random Effect Model was chosen. The value of the lagrange multiplier test is 0.0000, which is less than = 0.05. As a result, it is possible to conclude that Ho is rejected and Ha is accepted. The Random Effect Model was chosen. The result of the second of three tests is a random effect model. As a result, the random effect model is the best approach to take.

## Classic Assumption Test

In this study, classical assumption tests, including linearity test, multicollinearity test, heteroscedasticity test, autocorrelation test, and normality tests in Table 3.

Table 3. Classic Assumption Test

Steps	Types of Test	Score	Description
Linearity	Ramsey Reset	> 0.05	Model linear
Multicollonierity	Correlation	< 0.8	There was no multicollonierity
Heteroscedasticity	Breusch Pagan	> 0.05	There was no heteroscedasticity
Normality	Kolmograv Sminov	> 0.05	Normally distributed

Source: data processed, 2022

With Ramsey Reset, the probability of each variable shows that the model is a linear function. The results of the multicollinearity tests with variable correlation are less than 0.8, indicating that there is no multicollinearity. The Breusch Pagan Godfrey test for heteroscedasticity reveals that each variable has a value greater than 0.05, indicating that there is no heteroscedasticity problem. Finally, the Kolmograv-Sminov Z method normality test yields a probability value greater than 0.05, indicating that the research data is normally distributed.

The following steps, R-Squared of 0.768164 and Adjusted R-Squared of 0.758085, lead to the conclusion that the relationship between the variables of investment and area to produce palm oil in 2015-2021 is only 75%, with the remaining 100% - 75% = 25.0% explained by variables not included in this study. F-statistic of 76.2083 and probability of 0.000000 (less than 0.05). Finally, the independent variables of investment and area have a simultaneous and significant effect on the dependent variable, which is palm oil production.

Table 4. Multiple Linear Regression Results (*Random Effect Model*)

Variable	Coefficient	t-Statistic	Probability	$\alpha$	Results
Investment	0.019471	1.2823	0.2062	0.05	Not significant
Land Area	3.558937	10.265	0.0000	0.05	Significant

Source: data processed, 2022

So, after being processed using eviews 9, equation is obtained as a whole, namely:

$$Y_i = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + e_{it}$$

$$= -719.7823 + 0.019471 + 3.558937 + e_{it}$$

The equation shows that  $\beta_0$  or C or the coefficient affects production -719.7823. The result of  $\beta_1 X_{1it}$  or the variable of investment will affect production by 0.019471. The result of  $\beta_2 X_{2it}$  or area variable will affect the production by 3.558937

### **Effect of Investment on Production Palm Oil**

The probability is 0.2062, which is greater than the 5% level of significance (0.05). As a result,  $H_0$  is accepted while  $H_a$  is rejected, indicating that the independent variable of investment has no significant effect on the dependent variable of palm oil production. The investment coefficient is 0.019471, which means that if the value of the X variable (investment) rises by one Rupiah, the value of the Y variable (palm oil production) rises by 0.019471. Thus, investment has a positive but insignificant effect on palm oil production.

The investment has a small but positive impact on palm oil production. According to (Hasibuan, M., Nurdelila, 2020) investment has a positive but insignificant effect on oil palm production. In contrast to the findings of (Kubitza et al., 2018), who found that land area has a negative impact on oil palm production. Investment in this study has a small but positive impact on oil palm production. This is due to the fact that investment is not the primary driver of the increase in palm oil production. If the investment is substantial but not accompanied by a significant amount of land, it does not significantly increase oil palm production.

Increased investment in small-scale oil palm plantations, which contributes to deforestation (Ayompe Lacour M, Nkongho, Raymond M & Egoh, 2021) There is a negative attitude toward the palm oil industry because it is linked to deforestation, the destruction of carbon-rich peat lands, forest fires, toxic haze, and the extinction of wildlife. A significant investment is required not only to increase production capacity, but also to withstand damage caused by continuous production activities. The increase in the investment value of crude palm oil must be balanced by an improvement in the condition of the soil elements, which has a significant impact on agricultural products. The increase in investment value in palm oil production helps the production value to continue, but the effect is negligible because it is not balanced with natural conditions.

### **Effect of Land Area on Production Palm Oil**

The probability is 0.0000, which is less than the significance level of 5%. (0.05). As a result,  $H_0$  is rejected while  $H_a$  is accepted, indicating that the independent variable of area has a significant effect on the dependent variable of palm oil production. The coefficient is 3.558937, which means that increasing the value of the X variable (area) by one hectare (ha) will result in an increase in the value of the Y variable (palm oil production) of 3.558937. As a result, the area has a positive and significant impact on palm oil production.

The land area has a positive and significant impact on palm oil production. According to Yanita & Suandi (2021); Hariani et al. (2022); Rondhi & Hariyanto Adi (2018); Edison (2020) and Koirala et al. (2016) land area has a positive and significant effect on oil palm production. In contrast to the findings of Kubitza et al., (2018) who found that land area has a negative impact on oil palm production. This study's land area has a positive and significant effect on oil palm production. This is due to the fact that land area is an important production input factor in conducting business activities. Typically, increasing land area affects and increases the amount of production, in this case, oil palm production. This massive production of palm oil will have an impact on obtaining profits or production results, allowing farmers, oil palm entrepreneurs, and the government to prosper. The size of the agricultural land will influence the scale of the business, and the size of the business will eventually influence efficiency or at least an agricultural business. The more land used for commercial agriculture, the more efficient the land. It is based on the assumption that the size of the land prompted efforts to take action that led to efficiency will increase. Agricultural land influences the impact of agricultural commodities. In general, it is said

that the larger the area of land (cultivated/planted), the more products that land produces. The effect of land area has an impact not only on farming efficiency but also on efforts to transfer and apply technology in agricultural development. It will be difficult to carry out agricultural development efforts if land ownership is divided into compartments with a narrow area of control (Andrias, 2017)

#### 4. Conclusion

The following are the findings of the research: investment has a positive and insignificant effect on palm oil production in North Sumatera, West Sumatera, Riau, South Sumatera, Central Kalimantan, West Kalimantan, and East Kalimantan from 2015 to 2021. Between 2015 and 2021, the area has a positive and significant impact on palm oil production in North Sumatera, West Sumatera, Riau, South Sumatera, Central Kalimantan, West Kalimantan, and East Kalimantan. As a result, the government should consider using a portion of the investment value in the oil palm plantation sector to ensure sustainable land quality, so that an increase in investment offset by land quality has a greater impact on palm oil production.

#### References

- Alatas, A. (2015). Trend Produksi dan Ekspor Minyak Sawit (CPO) Indonesia. *AGRARIS: Journal of Agribusiness and Rural Development Research*, 1(2), 114–124. <https://doi.org/10.18196/agr.1215>
- Andrias. (2017). The Effect of Land Area on Production and Income of Paddy Paddy Farming (Case Study in Jelat Village, Baregbeg District, Ciamis Regency). *AGROINFO GALUH Student Scientific Journal*, 4(1).
- Ayompe Lacour M, Nkongho, Raymond M & Egoh, B. N. (2021). Does Investment In Palm Oil Trade Alleviate smallholders from Poverty in Africa? Investigating Profitability From A Biodiversity Hotspot, Cameroon. *Journal Plos One*.
- Badan Pusat Statistik. (2021). *Statistika Kelapa Sawit Indonesia*. Badan Pusat Statistik.
- Edison\*. (2020). Impact of Land Conversion on Oil Palm Production and Income. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(6), 337–341. <https://doi.org/10.35940/ijrte.f7408.038620>
- Gujarati, D. dan Dawn C, P. (2009). *Basic Econometric* (5 (ed.)). McGraw-Hill.
- Gujarati, D. (2003). *Basic Econometric* (4th ed.). McGraw-Hill.
- Hariani, E., Widyawati, R. F., & Ginting, A. L. (2022). *Determinants of Carbon Emissions in 10 ASEAN Countries*. 54, 313–320.
- Hasibuan, M., Nurdelila, R. (2020). Determinants of Palm Oil Productivity in North Sumatra Province. *Journal of Chemical Information and Modeling*, 22(3), 239–249. <https://ejournal.borobudur.ac.id/index.php/1/article/view/729>
- Koirala, K. H., Mishra, A., & Mohanty, S. (2016). Impact of land ownership on productivity and efficiency of rice farmers: The case of the Philippines. *Land Use Policy*, 50, 371–378. <https://doi.org/10.1016/j.landusepol.2015.10.001>
- Kubitza, C., Krishna, V. V., Alamsyah, Z., & Qaim, M. (2018). The Economics Behind an Ecological Crisis: Livelihood Effects of Oil Palm Expansion in Sumatra, Indonesia. *Human Ecology*, 46(1), 107–116. <https://doi.org/10.1007/s10745-017-9965-7>
- Kuncoro, M. (2011). *Metode Kuantitatif: Teori dan Aplikasi Untuk Bisnis dan Ekonomi*. Ed.4. YKPN.
- Mohamed, A.A. and Nageye, A. I. (2021). Measuring the effect of land degradation and

- environmental changes on agricultural production in Somalia with two structural breaks. *Management of Environmental Quality*, Vol. 32(2), 160–174. <https://doi.org/https://doi.org/10.1108/MEQ-02-2020-0032>
- Rifin, A. (2017). Efficiency Of Crude Palm Oil (CPO) Companies In Indonesia. *Jurnal Manajemen & Agribisnis*, Vol.14 Jul(2).
- Rondhi, M., & Hariyanto Adi, A. (2018). Pengaruh Pola Pemilikan Lahan Terhadap Produksi, Alokasi Tenaga Kerja, dan Efisiensi Usahatani Padi. *AGRARIS: Journal of Agribusiness and Rural Development Research*, 4(2). <https://doi.org/10.18196/agr.4265>
- Widyawati, R. F., Ermatry, H., & Ginting, Andi Lopa; Nainggolan, E. (2021). Pengaruh pertumbuhan ekonomi, populasi penduduk kota, keterbukaan perdagangan internasional terhadap emisi karbon dioksida (co 2 ) di negara asean. *Jambura Agribusiness Journal*, 3(1), 37–47.
- Yanita, M., & Suandi. (2021). What Factors Determine the Production of Independent Smallholder Oil Palm? *Indonesian Journal of Agricultural Research*, 4(1), 39–46. <https://doi.org/10.32734/injar.v4i1.5379>