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ANALYSIS OF CRUDE PALM OIL (CPO) PRODUCTION VOLUME AND PRICE ON PROFITABILITYAND ITS IMPACT ON STOCK RETURNS

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Abstract:
This study aims to examine and analyze the effect of production volume and crude palm oil (CPO) prices on profitability (proxied by return on assets, ROA) and its impact on stock returns (proxied by capital gains) in plantation industry sector companies listed on the Indonesia Stock Exchange (BEI) 2013 - 2017. The sampling method used was purposive sampling. From the population of 18 plantation industry companies, 12 companies met the criteria to be sampled. The type of data used is panel data, which is collected by documentation techniques. The analytical method used in this study is multiple linear regression using Eviews version 9.0 software. The results showed that CPO production had a positive and not significant effect on ROA. The price of CPO has a negative and not significant effect on ROA. ROA has a positive and not significant effect on stock returns. CPO production has a negative and not significant effect on stock returns. CPO prices have a positive and not significant effect on stock returns. Simultaneously CPO production and prices have no significant effect on ROA and stock returns. CPO production and CPO prices simultaneously contribute more to stock returns than through ROA as an intervening variable.

Keywords: CPO Production; CPO Price; Profitability; Return on Assets; Stock Return; Capital Gain.

1. Introduction

Indonesia is an agricultural country that has a very wide area. The majority of the Indonesian population does a lot of work activities in the agriculture sector. More than 60% of GDP in the plantation sub-sector is oil palm plantations (source: Ministry of Agriculture 2016). The extent of oil palm plantations in Indonesia continues to grow to 12.3 million hectares in 2017.
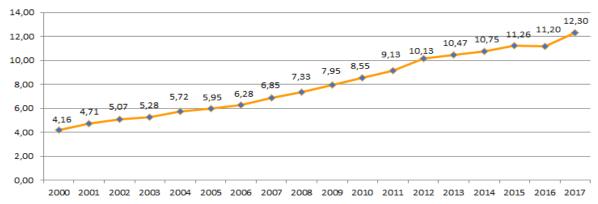
Figure 1: Graph of Indonesian Oil Palm Plantation Area, 2000 - 2017 (Million ha)
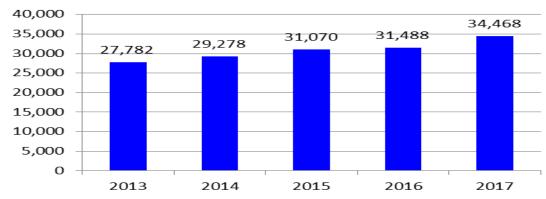Source: 2017 Indonesian BPS Data

Figure 2: Indonesian CPO Production in 2013-2017 (000 tons)
Source: Statistics of Indonesian Palm Oil 2017

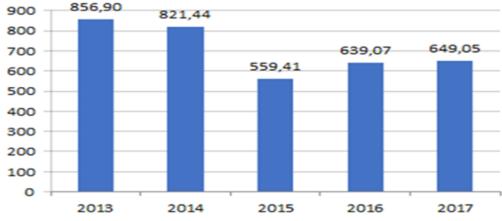Figure 3: CPO Prices in 2013-2017 (USD / Ton)
Source: 2017 Indonesian BPS Data

The plantations that are growing in size produce CPO that continues to increase and prices are quite volatile. but the increase in CPO production did not produce good stock returns (capital gains) as reflected in the capital gains data of 18 plantation industry companies listed on the Indonesia Stock Exchange 2013-2017 below:

Figure 4: Graph of Average Returns of IDX Plantation Company Stock 2013-2017
Source: IDX Annually Statistics 2013-2017, data is processed.

The capital invested by investors in the plantation industry is very large but the stock returns obtained are very fluctuating so it needs to be analyzed how much influence the production volume and CPO prices have on profitability and the impact on stock returns, especially capital gains, according to the purpose of this study.

CPO Production
CPO production is determined by good management of oil palm trees that will produce fresh fruit bunches (FFB) with productivity influenced by environmental factors, genetic factors, and cultivation techniques (Mangunsoekarjo and Semangun 2005). FFB is harvested, transported and processed at the factory to produce CPO, which is influenced by the operational performance of harvesting, transporting and processing. The higher the CPO produced will benefit the company.

Production Growth

$$= \frac{Production\ this\ year - Production\ last\ year}{Production\ last\ year}$$

CPO Price
Price is the amount of money charged on an item or service or the sum of the value of money that consumers exchange for benefits because they own or use the product or service (Kotler and Armstrong, 2013: 151). The price of CPO is determined by supply and demand, but is also a factor in market speculation. The higher the price will benefit the company.

Price Growth $\qquad = \dfrac{Price\ this\ year - Price\ last\ year}{Price\ last\ year}$

Return on Asset (ROA)
Profitability ratio analysis is a ratio analysis that measures a company's ability to generate profits at the level of sales, assets, and certain stock capital of Hanafi (2014). One of the profitability ratios is return on assets. Return on Assets (ROA) is a ratio that shows the return (return) on the total amount of assets used by the company. ROA is also a measure of management effectiveness in managing its investment. The calculation of this ratio is profit after interest and tax (EAIT)

divided by total assets. The lower the ratio, the less good it is and vice versa. This ratio is also used to measure the effectiveness of the company's overall operations.

$$Return\ On\ Assets\ (ROA) = \frac{Earning\ After\ Interest\ and\ Tax\ (EAIT)}{Total\ Assets}$$

Capital Gain

Stock return according to Ang Robert (2010) is the level of profit enjoyed by investors for a stock investment made. Stock return consists of two types, namely dividend and interest (yield) and profit price difference (capital gain / loss). Current income consists of periodic payments, as well as payment of dividends or interest payments. While the advantages of price differences are obtained between the difference between selling and buying prices. For capital investments in the capital market, investors are more interested in stock returns than capital gains.

$$Capital\ Gain = \frac{Stock\ price\ this\ year\ -\ Stock\ price\ last\ year}{Stock\ price\ last\ year}$$

Increasing capital gain of the company makes the company more attractive to investors, because the rate of change will be even greater (Ang Robert, 2010). This will also have an impact that the stock price of the company in the capital market will also increase, in other words ROA will affect the company's stock price.

According to the Shintya study (2014) the growth of production or sales partially has a positive and significant effect on profitability. Badjra (2015), company growth (sales) has a negative and not significant effect on profitability. Pancawati and Indahsari (2016), selling prices do not have a significant effect on profitability. Juliyanti (2015), shows the variable operational costs, selling prices, and sales volumes simultaneously have a significant effect on profitability. Rio (2016), ROA has a positive and insignificant effect on stock returns.

From the above phenomenon, the researcher sees that it is necessary to analyze the influence of the independent variables (CPO production and CPO prices) on the dependent variable that is proxied by Stock Return with ROA as an intervening variable. as illustrated in the conceptual framework below:
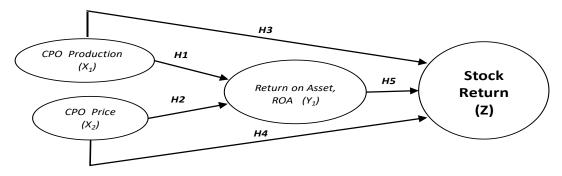

Figure 5: Conceptual Framework

Based on the conceptual framework above, the research hypothesis is determined as follows,
H1: Production Volume of Crude Palm Oil (CPO) has an effect on ROA profitability
H2: The price of Crude Palm Oil (CPO) has an effect on ROA profitability
H3: Profitability of ROA affects stock returns
H4: CPO Production Volume has an effect on stock returns
H5: Price of Crude Palm Oil (CPO) affects stock returns

2. Materials and Methods

Research Design
The design of this study is classified as quantitative causal research which is a causal relationship, so there are exogenous and endogenous variables, Sekaran and Bougie (2009: 56). This research is also empirical which aims to determine the extent to which production volumes and CPO prices affect the issuer's profitability as well as the impact on stock returns of oil palm companies listed on the Indonesia Stock Exchange in the period 2013 - 2017.

Population and Samples
The population of this study are all oil palm plantation companies listed on the Indonesia Stock Exchange (IDX), with a population of 18 companies. The sampling method used in this study was purposive sampling, namely the technique of determining the sample based on certain criteria (Sugiyono, 2012: 117). The criteria in question are:
1) Companies listed on the Stock Exchange from 2013 to 2017
2) The company has never experienced delisting from 2013 to 2017
3) The company publishes financial statements from 2013 to 2017
4) The company informs its official CPO production from 2013 to 2017

Based on the above criteria, the number of research samples is 14 (fourteen) companies.

Types and Data Collection
The type of data used for research is secondary quantitative data, times series, cross section or overall combination of times series data and cross section data called panel data. Panel data consists of several or many objects covering several periods. The data is collected using documentation techniques downloaded through www.idfinancial, www.bps.go.id and www.idx, co.id.

Data Analysis Method
The method for measuring the results of research using expanded multiple regression analysis with path analysis methods to test the hypothesis. In the regression analysis, each regression equation (regression coefficient) and its determination coefficient value will be sought. In path analysis, the direct and indirect effects of the independent variables on the dependent variable will be sought through intervening variables and correlation values between variables. The panel data equation model uses a combination of cross section data and time series data as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_i X_i + \varepsilon_{it}$$

where:
Y   =   Dependent Variable (Endogenous Variable)
$X_{1,2,i}$ =   Independent Variable (Exogenous Variable)

α   =   Constants
$\beta_{1,2,i}$ =   Regression coefficient
ε_{it} =   Error interrupting variable

Descriptive Analysis

Descriptive analysis is a statistical analysis that functions to describe or give an overview of the object under study through sample or population data as it is, Sugiyono (2012: 206). Descriptive statistics are used to show the characteristics of the data from the tested variables, namely the mean, median, maximum, minimum and standard deviation.

Modeling Data Panel Regression

Panel data analysis is known as three types of approach models, namely: 1) Smallest Square Approach (Pooled Least Square / Common Effect), 2) Fixed Effect Approach, 3) Random Effect Approach. (Basuki 2016).

Common Effect Model

This method, also called PLS, is the simplest method. In his estimation it is assumed that each individual unit has the same intercept and slope (there is no difference in the time scale dimension). In other words, the regression panel data generated will apply to each individual. (Juanda and Junaidi, 2012).

Fixed Effect Model

In the Fixed Effect Model (FEM) method, interception in regression can be distinguished between individuals because each individual is considered to have its own characteristics. In distinguishing the intercepts, a dummy variable can be used, so this method is also known as the Least Squares Dummy Variable model (Juanda and Junaidi, 2012).

Random Effect Model

In the Random Effect Model (REM) method, differences in individual characteristics and time are accommodated in the error of the model. Given that there are two components that contribute to error formation, namely individual and time, then random errors in Random Effect Model also need to be parsed into errors for individual components, time component errors and combined errors. Based on this, this random method is also known as the Error Components Model (ECM) (Juanda and Junaidi, 2012).

The test panel data model consists of the Chow Test which aims to determine the PLS or FEM model used in estimating the most appropriate panel data regression model. The Hausman Test, the HausmanTest is conducted to determine the right model between FEM and REM. Lagrange Multiplier test to find out whether the Random Effect Model is better than the Common Effect Model, Widarjono (2010),

Classic Assumption Test

Before performing multiple liner tests, the method requires to test classic assumptions in order to get the best results (Ghozali, 2017) This test is conducted to test the quality of the data so that the data is known for its validity and avoids estimation of bias. Classical Assumption Test consisting of Normality Test, Multicollinearity Test, Heteroscedasticity Test, Autocorrelation Test,

Hypothesis Test

The Hypothesis Test is used to test the validity of temporary statements or assumptions that are made and tested statistically to draw conclusions whether to accept or reject the statement. The Hypothesis Test used consists of F Test, Test of the Coefficient of determination (R2), T Test,

Path Analysis

Path diagrams can be used to calculate the direct and indirect effects of independent variables on a dependent variable. These influences are reflected in what is called the path coefficient, where mathematically path analysis follows structural mode.

3. Results and Discussions

Descriptive Statistics

The results of descriptive statistics are shown in Table 1.

Table 1: Descriptive Statistics Test Results

Indeks Penilaian	Produksi CPO	Harga CPO	ROA	Return Saham
Mean	0.05756	-0.003608	0.023249	-0.006107
Median	0.028665	0.010532	0.028599	-0.035
Maximum	1.333064	0.123702	0.182945	2.26
Minimum	-0.268088	-0.244097	-0.436311	-0.81
Std. Dev.	0.265946	0.133992	0.086337	0.473278

The average value of CPO production is 0.57% so it is at an average ROA of 2.32% and the average stock return is -0.61%. The standard deviation of 26.59% is greater than the average value of 5.76%, which means that CPO production has a high volatile level.

The average value of CPO is -0.36%, with an average ROA of 2.32% and a stock return of -0.61%. The standard deviation of CPO prices is 13.4% higher than the average value of -0.36%, which means that CPO prices have a high level of risk.

Profitability ROA shows that the company is able to generate an average profit of 2.32% and the average stock return is -0.61%. The standard deviation of 8.63% is higher than the average value of 2.32%, which means that ROA has the ability to increase.

Stock return, shows the stock return that will be received by the company reaches an average value of -0.61%. Standard deviation with a value of 47.33% is higher than the average value which means that stock returns have very high yields.

Panel data equation model:
Equation 1: CPO production and CPO prices as independent variables and ROA as variables bound.

$$ROA = b_0 + b_1 \text{ Production of CPO} + b_2 \text{ Price of CPO} + e_1$$

Equation 2: CPO production and CPO prices as independent variables and stock returns as dependent variable.

Stock Return = b0 + b1 Production of CPO + b2 Price of CPO + e2

Equation 3: ROA as an independent variable and Stock Return as a dependent variable
Stock Return = b0 + b1 ROA + e2

Where: b0   : Constant
          b1-2   : Regression Coefficient
          e   : Error (Interrupting variable error)

Dependent Variable: ROA
Method: Panel Least Squares
Date: 04/19/19 Time: 17:04
Sample: 2013 2017
Periods included: 5
Cross-sections included: 12
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.021440	0.011552	1.856013	0.0686
PROD	0.030820	0.043734	0.704731	0.4838
HARGA	-0.009600	0.086802	-0.110596	0.9123

R-squared	0.009820	Mean dependent var	0.023249
Adjusted R-squared	-0.024923	S.D. dependent var	0.086337
S.E. of regression	0.087406	Akaike info criterion	-1.987793
Sum squared resid	0.435472	Schwarz criterion	-1.883076
Log likelihood	62.63380	Hannan-Quinn criter.	-1.946833
F-statistic	0.282646	Durbin-Watson stat	1.128360
Prob(F-statistic)	0.754837		

Dependent Variable: RETURN
Method: Panel Least Squares
Date: 04/20/19 Time: 09:08
Sample: 2013 2017
Periods included: 5
Cross-sections included: 12
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004719	0.062182	0.075887	0.9398
PROD	-0.148436	0.235415	-0.630526	0.5309
HARGA	0.632481	0.467248	1.353631	0.1812

R-squared	0.045199	Mean dependent var	-0.006107
Adjusted R-squared	0.011697	S.D. dependent var	0.473278
S.E. of regression	0.470502	Akaike info criterion	1.378673
Sum squared resid	12.61821	Schwarz criterion	1.483391
Log likelihood	-38.36020	Hannan-Quinn criter.	1.419634
F-statistic	1.349157	Durbin-Watson stat	1.786884
Prob(F-statistic)	0.267617		

Figure 6: Linear Regression Equations Result

Dependent Variable: RETURN
Method: Panel Least Squares
Date: 04/20/19 Time: 10:37
Sample: 2013 2017
Periods included: 5
Cross-sections included: 12
Total panel (balanced) observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.012390	0.063778	-0.194268	0.8466
ROA	0.270249	0.718914	0.375913	0.7084

R-squared	0.002430	Mean dependent var	-0.006107
Adjusted R-squared	-0.014769	S.D. dependent var	0.473278
S.E. of regression	0.476760	Akaike info criterion	1.389159
Sum squared resid	13.18342	Schwarz criterion	1.458971
Log likelihood	-39.67477	Hannan-Quinn criter.	1.416466
F-statistic	0.141310	Durbin-Watson stat	1.911606
Prob(F-statistic)	0.708353		

Linear Regression Equations
Return On Assets = 0.02144 + (0.03082 CPO Production - 0.0096 CPO Prices)
Stock Return = 0.004719 - 0.148436 CPO Production + 0.632481 Price of CPO
Stock Return = -0,012390 + 0,270249 ROA

Modeling Data Panel Test

Table 2: Modeling Data Panel Test Result

	Chow Test			Hausman Test			Lagrange Multiplier Test		
	F_{Count}	F_{Table}	Model	Chi Sq$_{Count}$	Chi Sq$_{Table}$	Model	LM	Chi Sq$_{Table}$	Model
Equation 1	5,619	3,159	Fixed Effect	0	5,991	**Random effect**		-	
Equation 2	0,549	2,004	Common Efect		-		1,561	5,991	**Common Efect**
Equation 3	0,501	4,007	Common Efect		-		1,710	3,841	**Common Efect**

From testing the model, we get a model of each equation:

1) Equation 1:   In the Chow F count > F table, the model is Fixed Effect which must be tested again with the Hausman test and it is obtained that the right model is the Random Effect Model
2) Equation 2:   In the Chow F test <F table, the Common Effect model must be tested again with the Lagrange Multiplier test and the right model is obtained by the Common Effect Model
3) Equation 3:   In the Chow F test <F table, the Common Effect model must be tested again with the Lagrange Multiplier test and it is found that the right model is the Common Effect Model

Classical Assumptions Test

From the classic test test, it is obtained as follows:

Table 3: Classical Assumptions Test Results

		Multicollinearity Test		Heteroscedacity Test		Autocorrelation Test	
		VIF	Occur/ Not Occur	Prob Chi Sq	Occur/ Not Occur	DW	Occur/ Not Occur
Equation 1	CPO Production	1,044681	Not Occur	0,2433	Not Occur	du<DW< 4-du	Not Occur
	CPO Price	1,044681	Not Occur			1,61617 < 2,05264 < 2,38383	
Equation 2	CPO Production	1,044681	Not Occur	0,6905	Not Occur	du<DW< 4-du	Not Occur
	CPO Price	1,044681	Not Occur			1,61617 < 1,78688 < 2,38383	
Equation 3	ROA	1,000000	Not Occur	0,2643	Not Occur	du<DW< 4-du	Not Occur
						1,61617 < 1,91160 < 2,38383	

In the Multicollinearity test, the value of the Variance Inflation Factor (VIF) is less than 10 so that multicollinearity is not found. (Priyatno, 2013). In the heteroscedacity test the Chi Square Probalility value is greater than 0.05, it is known that there is no Heteroskesdasticity problem. In the Autocorrelation test the DW value was at, dU<DW <4 - dU, then Autocorrelation did not occur.

Hypothesis Test

Table 4: Hypothesis Test Results

		t Test				F Test				R Square
		t_{Count}	t_{Table}	Prob	Affecting/ Not Affecting	F_{count}	F_{table}	Prob	Affecting/ Not Affecting	
Equation 1	CPO Production	-0,704731	-2,002	0,4838	Not Affecting	0,282646	3,159	0,7548	Not Affecting	0,009820
	CPO Price	0,110596	-2,002	0,9123	Not Affecting					
Equation 2	CPO Production	-0,630526	-2,002	0,5309	Not Affecting	1,349,157	3,159	0,2676	Not Affecting	0,045199
	CPO Price	1,353,631	-2,002	0,1812	Not Affecting					
Equation 3	ROA	-0,375913	-2002	0,7084	Not Affecting	0,141310	4,007	0,7083	Not Affecting	0,002430

In the t test, the calculated t value is at, -t count $\geq$ -t table or t count $\leq$ t table, then the independent variable partially does not significantly influence the dependent variable. In the F test, the calculated F value $\leq$ F table, then together the independent variables have no significant effect on the dependent variable. From the R square test, the influence of production and CPO prices on stock returns is the highest compared to the others.

Path Analysis

Table 5: Path Analysis Results

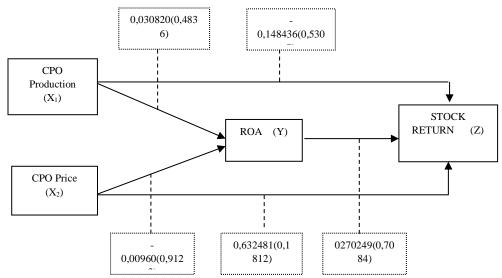| No	Between Variables	Direct Effect	Indirect Effect
1	Pengaruh Produksi CPO (X_1) terhadap ROA (Y)	0.030820 (0.4836)	
2	Pengaruh Harga CPO (X_2) terhadap ROA (Y)	-0.00960 (0.9123)	
3	Pengaruh ROA (Y) terhadap Return Saham (Z)	0.270249 (0.7084)	
4	Pengaruh Produksi CPO (X_1) terhadap Return Saham (Z)	-0.148436 (0.5309)	
5	Pengaruh Harga CPO (X_2) terhadap Return Saham (Z)	0.632481 (0.1812)	
6	Pengaruh Produksi CPO (X_1) melalui ROA (Y) terhadap Return Saham (Z)		0.0083290742
7	Pengaruh Harga CPO (X_2) melalui ROA (Y) terhadap Return Saham (Z)		-0.0025943904

Figure 7: Diagram of Direct and Indirect Effects

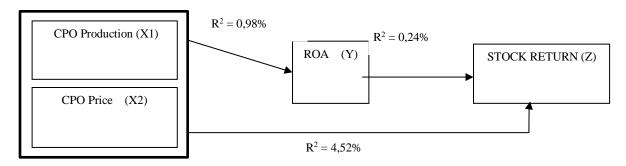
Figure 8: Diagram of Direct and Indirect Effects based on R^2

Hypothesis Testing Results

H1   :   The volume of CPO production has a positive and not significant effect on ROA
The regression coefficient of CPO production on ROA profitability is 0.030820 with a significance level of 0.4836> 0.050.

H2   :   CPO prices have a negative and not significant effect on profitability
The regression coefficient of the company's CPO price on ROA profitability is -0.00960 with a significance level of 0.9123> 0.050.

H3   :   Profitability of ROA has a positive and not significant effect on stock returns
The regression coefficient of company ROA profitability on stock returns is 0.270249 with a significance level of 0.7084> 0.050.

H4   :   CPO production has a negative and not significant effect on stock returns
The regression coefficient of CPO production on company stock returns is -0.148436 with a significance level of 0.5309> 0.050.

H5   :   CPO prices have a positive and not significant effect on stock returns
The regression coefficient of CPO prices on company stock returns is 0.632481 with a significance level of 0.7084> 0.050

Exogenous Variables on Profitability

The results of testing the first hypothesis obtained by the volume of positive and non-significant CPO production on profitability in IDX plantation companies in 2013-2017. The results of this study indicate that the increase and decrease in CPO production of the company is against the direction of profitability but not significant which proves that industrial shareholders do not produce CPO, because the small size of large CPO production does not significantly affect ROA. The results of testing the second hypothesis obtained that CPO prices apply negatively and not significantly to profitability, this means that rising CPO prices do not affect the high and low ROA. The results of this study prove that industrial shareholders do not calculate CPO prices, because the size of CPO prices does not significantly affect changes in ROA.

Effect of Exogenous Factors on Stock Returns

The results of testing the hypothesis obtained by positive and not significant ROA on stock returns which means that the increase and decrease in ROA of the company supports the direction of stock returns but is not significant. The results of this study prove that industrial shareholders do not calculate the value of ROA, because the size of the value of ROA does not affect changes in stock returns by significant.

The results of testing the fourth hypothesis found that CPO production has a negative and not significant effect on stock returns, which means that the increase and decrease in CPO production have an opposite effect on stock returns but are not significant. The results of this study indicate that the plantation industry shareholders do not take into account CPO production, because the size of CPO production does not significantly affect the change in firm value.

The results of testing the fifth hypothesis found that CPO prices have a positive and not significant effect on stock returns, this means that the growth of CPO production affects the high or low stock returns. The results of this study indicate that plantation industry shareholders do not take into account CPO prices, because the size of CPO prices has a positive effect on stock returns but is not significant. This is thought to have happened because prices cannot be fully controlled by the producers. Besides being determined by supply and demand, CPO prices are also influenced by market speculation of CPO players

4. Conclusions and Recommendation

The effect of an increase in CPO production is greater than the effect of an increase in CPO prices on increasing profitability (ROA), therefore company management is advised to make every effort to optimize the assets owned by the company to increase CPO production.

The increase in CPO prices has a very high influence on increasing stock returns. Therefore, the shareholders of plantation companies on the stock market should pay more attention to the rising trend of CPO prices to get an increase in stock returns.

The results show that ROA also has a significant influence on stock returns, so that company management should strive to increase profitability (ROA), because an increase in profitability can improve stock returns of plantation companies.

For investors to pay attention to stock returns, it should be seen in terms of CPO prices and company profitability (ROA), which affects stock returns, especially the influence of CPO prices. For management, the company should try to maximize the production of CPO to increase profitability (ROA).

For further research it is recommended to examine the factors that influence CPO prices, so that the causes of fluctuations in CPO prices are known to influence the stock returns of plantation companies on the IDX.

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