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The Effect of Purchase Price of Oil Palm Fresh Fruit Bunches (FFB) on Fertilization Frequency (Case Study: Mamuju Regency, West Sulawesi)

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ABSTRACT

The purchase price of oil palm has often experienced significant increases and decreases due to several factors including oil palm production, oil palm exports, and the oil palm price. Fertilization is one of the most important and complex technical culture activities in oil palm farming. Fertilization in oil palm plants should be able to guarantee normal vegetative and generative growth to provide optimal Fresh Fruit Bunches (FFB) production and produce high quality and quantity of crude palm oil. This study aims to evaluate how much influence the FFB purchase price has on the frequency of fertilization used by oil palm farmers. This research is a quantitative study with a descriptive analysis design to see the effect of the purchase price of fresh fruit bunches on the frequency of fertilization used by oil palm farmers in the Mamuju Regency. The results of regression analysis data showed that the purchase price of FFB influenced the frequency of oil palm fertilization by 11.3 percent.

Keywords:
Oil palm, Fresh fruit bunch, Fertilization frequency, Purchase price

1. Introduction

Oil palm is one of the vegetable oils consumed by the world community besides coconut oil, soybean oil, olive oil, rapeseed oil, cottonseed oil, sunflower seed oil, corn oil, sesame oil, and peanut oil. It is a plantation commodity which occupies the important role in the Indonesian agricultural sector [1]. Based on its use, oil palm is used as the main ingredient for products of basic community needs, such as margarine cooking oil, detergents, cosmetic soaps, and medicines. Oil palm that is processed into various kinds of products comes from fresh fruit bunches (FFB) which are processed into crude palm oil (CPO). The CPO is exported abroad to become raw material for various industrial products such as butter, soap, cosmetics, textiles, biodiesel, and others. FFB (fresh fruit bunches) are oil palm fruit harvested by farmers to be sold directly to collectors who are then brought to the Oil Palm Company or manufacture for processing. The proceeds from the sale of FFB (fresh fruit bunches) of oil palm by farmers are the main source of income for farmers in some districts in the Mamuju Regency, West Sulawesi.

The purchase price of FFB often fluctuates due to several factors. The factors that affect the increase in FFB prices are oil palm production, oil palm exports, and CPO prices [2]. In April 2018, the price of 3-year-old FFB was IDR 1,007.39 while in December it decreased to IDR 587.83. In January 2019 the price of FFB increased by IDR 100 to IDR 640.01 per kg while in February 2019 the price of FFB increased to Rp.

763.87. Then, in October the FFB decreased slightly to IDR 753.09. In January 2020, the price of oil palm had increased by IDR 352.02 to IDR 1,061.11.

Fertilization is one of the most important and complex technical culture activities of oil palm. Fertilization is important because, without it, oil palm plants cannot produce optimally. However, fertilization can also cause complex problems for the farmers because of the high cost for fertilization, which reaches around 40–60 percent of the total cost of maintaining the plant or around 24 percent of the total production cost [3].

The basic principle in achieving the effectiveness and efficiency of fertilization through several components with the principles of the right type, right dose, right method, right time, and fertilization frequency [4]. These five principles, fertilization frequency is an important factor that is often overlooked in its application due to several factors, one of which is the purchase price of FFB. If the FFB purchase price is decreasing, it will be difficult for oil palm farmers to buy fertilizer because the income from the FFB is not selling. Therefore, the authors want to analyze the influences of the purchase price of FFB is on the fertilization frequency used by oil palm farmers in one of the oil palm production center villages in Mamuju District, West Sulawesi.

2. Methods

The research was conducted from March to August 2020 in Mamuju Regency, West Sulawesi. The population that will be used in this research is oil palm farmers in one of the villages that are the center of oil palm farming, namely in the Rante Mario Village, Tommo District, Mamuju Regency. The population in this study was 261 in which the selected sample was 25 percent to obtain 65 samples.

Data collection techniques by observing and recording systematically the symptoms and phenomena that exist in the object of research. Next is an interview using a questionnaire based on the problem, objective, and research hypothesis with several written questions to be answered systematically.

2.1. Validity Test

Validity is a measure that shows the levels of validity of an instrument. The formula for calculating validity is:

$$R = \frac{N\sum XY - (\Sigma X)(\sum Y)}{\sqrt{\{N\sum x^2 - (\sum X)^2\} x \{N\sum Y^2 - (\Sigma Y)^2\}}} \quad (1)$$

R: The coefficient of the validity of the item
X: Score of respondents for each item
$\sum x$: Total score in the X distribution
$\sum Y$: Total score in the Y distribution
$\sum X^2$: The sum of the squares of each score of X
$\sum Y^2$: Sum of squared
N: Total of respondents

2.2. Reliability Test

Reliability is an instrument to measure the accuracy, reliability, consistency, stability, or dependability of the measuring instrument used. The Alpha formula used is:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum S^2 j}{S^2 x}\right) \quad (2)$$

α: Reliability coefficient alpha
k: Number of items
Sj: Variance of respondents for items I
Sx: The sum of the total score variance

2.3. Simple Linear Regression Test

The statistical analysis used in this research is simple linear regression analysis. The variables to be correlated consist of variable X as the independent variable and variable Y as the dependent variable, as for the formula:

$$Y = a + bX \quad (3)$$

X: FFB price
Y: frequency of fertilization
a: constant-coefficient
b: regression coefficient

2.4. Determination Coefficient Test

The t-test is a test of the individual partial regression coefficient which is used to determine whether the independent variable (X) the FFB price affects the dependent variable (Y) the frequency of fertilization.

The test steps:

Determine the Ho and Ha formulations, hypothesis
Ho = There is no influence between the purchase price of FFB on the frequency of fertilization.
Ha = There is an influence between the purchase price of FFB on the frequency of fertilization.

Conclusion:

a. If sig> 0.05 then Ho is accepted
b. If sig <0.05 then Ho is rejected

3. Results and Discussion

3.1. Validity Test Result

Based on the results of the validity test data on SPSS version 20, the output table shows the r count of the research questionnaire variable buying price for FFB. The calculated r number for the FFB purchase price variable can be seen in Table 1.

Table 1. FFB purchase validity test

Correlations

		X1	X2	X3	X4	X5	X6	TOTAL
X1	Pearson Correlation	1	.061	.042	.199	.159	.023	.449**
	Sig. (2-tailed)		.627	.741	.112	.205	.854	.000
	N	65	65	65	65	65	65	65
X2	Pearson Correlation	.061	1	.063	.014	.081	-.068	.468**
	Sig. (2-tailed)	.627		.615	.910	.519	.592	.000
	N	65	65	65	65	65	65	65
X3	Pearson Correlation	.042	.063	1	-.072	.078	-.070	.552**
	Sig. (2-tailed)	.741	.615		.570	.538	.581	.000
	N	65	65	65	65	65	65	65
X4	Pearson Correlation	.199	.014	-.072	1	.182	.100	.457**
	Sig. (2-tailed)	.112	.910	.570		.146	.428	.000
	N	65	65	65	65	65	65	65
X5	Pearson Correlation	.159	.081	.078	.182	1	.045	.501**
	Sig. (2-tailed)	.205	.519	.538	.146		.724	.000
	N	65	65	65	65	65	65	65
X6	Pearson Correlation	.023	-.068	-.070	.100	.045	1	.273*
	Sig. (2-tailed)	.854	.592	.581	.428	.724		.028
	N	65	65	65	65	65	65	65
TOTAL	Pearson Correlation	.449**	.468**	.552**	.457**	.501**	.273*	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.028	
	N	65	65	65	65	65	65	65

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

Valid means that the instrument (questionnaire) can be used to measure what should be measured. The questionnaire for the purchasing price variable for FFB which amounted to 6 statements was said to be valid because the calculated r-value generated from data processing at SPSS showed that all of the variable numbers were greater than the r table value, namely 0.244, this is under the opinion of Pradiko et al. [5] which states that the test validity is done by comparing the calculated r-value with the r table value for a degree of freedom (df) = n-k, in this case, n is the number of samples and k is the number of items. If r count > r table, then the statement is said to be valid. On the other hand, if r count < r table, then the statement is said to be invalid.

Based on the results of data processing of the validity test on SPSS version 20, an output table shows the r count for 6 questionnaires for the variable frequency of fertilization. The calculated r number for the FFB purchase price variable can be seen in Table 2.

Based on the output above, it is known that the number for the Y_1 variable is 0.602, the Y_2 variable is 0.314, the Y_3 variable is 0.578, the Y_4 variable is 0.358, the Y_5 variable is 0.530 and the Y_6 variable is 0.352. These results indicate that the FFB price variable is valid because the r-value count > r table, where the r table value is 0.244. The questionnaire for the fertilization frequency variable is said to be valid because the calculated r-value generated from data processing at SPSS shows that all the variable

numbers are greater than the r table value of 0.244, this is following the opinion [6] which states that the validity test is carried out by comparing the r count with the value of r table for a degree of freedom (df) = n k, in this case, n is the number of samples and k is the number of items. If r count > r table, then the statement is said to be valid. On the other hand, if r count < r table, then the statement is said to be invalid.

Table 2. Validity test of oil palm fertilization frequency

Correlations

		Y1	Y2	Y3	Y4	Y5	Y6	TOTAL
Y1	Pearson Correlation	1	.211	-.050	.093	.278*	-.087	.602**
	Sig. (2-tailed)		.091	.693	.462	.025	.491	.000
	N	65	65	65	65	65	65	65
Y2	Pearson Correlation	.211	1	-.067	.307*	-.235	-.199	.314*
	Sig. (2-tailed)	.091		.594	.013	.060	.112	,011
	N	65	65	65	65	65	65	65
Y3	Pearson Correlation	-.050	-.067	1	.127	.295*	.307*	.578**
	Sig. (2-tailed)	.693	.594		.312	.017	.013	.000
	N	65	65	65	65	65	65	65
Y4	Pearson Correlation	.093	.307*	.127	1	-.276*	-.178	.358**
	Sig. (2-tailed)	.462	.013	.312		.026	.157	.003
	N	65	65	65	65	65	65	65
Y5	Pearson Correlation	.278*	-.235	.295*	-.276*	1	.201	.530**
	Sig. (2-tailed)	.025	.060	.017	.026		.109	.000
	N	65	65	65	65	65	65	65
Y6	Pearson Correlation	-.087	-.199	.307*	-.178	.201	1	.325**
	Sig. (2-tailed)	.491	.112	.013	.157	.109		.008
	N	65	65	65	65	65	65	65
TOTAL	Pearson Correlation	.602**	.314*	.578**	.358**	.530**	.325**	1
	Sig. (2-tailed)	.000	.011	.000	.003	.000	.008	
	N	65	65	65	65	65	65	65

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

3.2. Reliability Test Result

Based on the results of the data processing reliability test on SPSS version 20, the output table shows the Cronbach Alpha number of the variable FFB purchase price questionnaire. The Cronbach Alpha figure for the FFB purchase price variable can be seen in Table 3.

Table 3. Reliability test of FFB oil palm price

Reliability Statistics

Cronbach's Alpha	N of Items
.211	6

Based on the reliability test of the Cronbach Alpha results, the purchase price of FFB was 0.211. These results indicate that the Cronbach Alpha value is > 0.60 which means

that the questionnaire for the TBS purchase price variable is consistent and reliable. Reliability means how much measurement can be trusted, in this case, the FFB purchase price questionnaire based on the results of the SPSS 20 test is still classified as consistent and reliable because the resulting Cronbach Alpha number is greater than 0.60 and not smaller than the number that has been set to become a standard. The reliability of a questionnaire is 0.60.

Based on the results of the data processing reliability test on SPSS version 20, the output table shows the Cronbach Alpha number of the variable frequency of fertilization questionnaire. The Cronbach Alpha figure for the FFB purchase price variable can be seen in Table 4.

Table 4. Reliability test of oil palm fertilization frequency

Reliability Statistics

Cronbach's Alpha	N of Items
.265	6

Based on the reliability test of the Cronchbach Alpha results, the frequency of fertilization is 0.265. These results indicate that the Cronbach Alpha value is> 0.60, which means that the questionnaire variable fertilization frequency is consistent and reliable, this following the opinion of Sugiyono [7] which states that a variable is said to be reliable if it gives a Cronchbach Alpha value> 0.60. Reliability means how much can be trusted, in this case, the fertilization frequency questionnaire based on the results test is still classified as consistent and reliable because the resulting Cronchbach Alpha number is greater than 0.60 and not smaller than the predetermined number to become the standard of reliability a questionnaire that is 0.60.

3.3. Simple Regression Result

Based on the simple regression analysis test analyzed using SPSS 20, the effect of the FFB purchase price on the frequency of oil palm fertilization is as in Table 5.

Table 5. Simple regression test of FFB price effect to the oil palm fertilization

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.867	3.941		1.743	.086
	Price of FFB	.524	.184	.337	2.839	.006

a. Dependent Variable: fertilization frequency

The results of the coefficient statistical analysis of the Understandardized coefficient section B in the table above, it can be seen that the magnitude of the constant value or a = 6.867 and the regression coefficient X = 0.524 so that, a simple linear regression equation can be made of the purchase price of FFB (X) on the frequency of oil palm fertilization, namely:

Y = a + bx

Y = 6.867 + 0.524 + e

From the simple linear regression equation above, it can be explained that the constant value in the simple regression equation is 6.867. This figure is a constant number which means that if there is no FFB purchase price (X) then the consistent value of the frequency of fertilization (Y) is 6.867. While the regression coefficient value is 0.524, this figure means that every 1 percent addition of the purchase price of FFB (X), the frequency of fertilization shows that the purchase price of FFB is positively related to the frequency of fertilization (Y) will increase by 0.524, this is following the opinion (10)] which states that a is the price of Y if X = 0 and b is the direction number or regression coefficient which shows the number of increases or decreases in the dependent variable based on the independent variable, if b (+) then increases and if b (-) then there is a decrease. Since the regression coefficient is (+), it can be said that the FFB purchase price (X) has a positive effect on the frequency of fertilization (Y). So the regression equation is Y = 6.876 + 0.524.

3.4. Coefficient Determination Test

The correlation coefficient (R) is used to explain the closeness of the relationship between the independent variables and the purchase price of FFB to the frequency of fertilization. While the coefficient of determination (R^2) is used to explain how much influence all variables have on the dependent variable. The acquisition of R and R^2 values can be seen in the Table 6.

Table 6. Determination coefficient test ($R^{2)}$ of FFB price effect to the oil palm fertilization

Model Summary

Model	R	R Square	Adjusted R Square	Std. the Error of the Estimate
1	.337[a]	.113	.099	2.682

a. Predictors: (Constant), FFB price

Based on the results of the table above, it can be explained that the correlation coefficient (R) is 0.337, the correlation coefficient (R) is used to explain the closeness of the relationship between the independent variable (purchase price of FFB) and the dependent variable (frequency of fertilization). The value of R Square in the output table above is 0.113, the coefficient of determination (R^2) is used to explain how much influence all variables have on the dependent variable.

The value of R Square from the table above is 0.113, this figure implies that the effect of the FFB purchase price (X) on the frequency of oil palm fertilization (Y) is 11.3 percent, this is under the opinion of Suandi et al. [8] which states that the coefficient of determination (R^2) is used to measure how far the model's ability to explain the variation in the dependent variable. The purchase price of FFB affects the frequency of coconut fertilization in Rante Mario Village by 11.3 percent because if the FFB price is low, the oil palm farmers will delay fertilizing or reduce the frequency of fertilizing their palm oil because the FFB sales are not enough to buy fertilizer, and vice versa if the FFB purchase price is expensive. then the frequency of fertilizing oil palm will be frequent.

4. Conclusion

It can be concluded that the purchase price of FFB has affected the frequency of fertilization in Mamuju Regency by 11.3 percent. When the FFB purchase price is expensive, the farmers will fertilize their oil palm based on the fertilizer recommendation, 3-4 times a year because the income received from the FFB sales is sufficient to buy fertilizer, whereas if the FFB purchase price is cheap the farmers will reduce the frequency and dose of oil palm fertilization.

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