FRESH FRUIT BUNCH QUALITY EFFECTS FOR OIL LOSS AND CRUDE PALM OIL PRODUCTION WITH SEM PLS ANALYSIS METHOD

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ABSTRACT

CPO productivity is very important for palm oil entrepreneurs, it has been the benchmark in assessing the performance of oil palm plants. If there is a CPO withdrawal that is not being met by the target, this will result in a loss. One of the factors contributing to the low production of CPO is the amount of oil loss and poor quality of the oil palm bunches. The problem is that not all types of quality affect oil losses and CPO production. The analysis used is SEM PLS intelligent PLS software. The analysis results showed that low CPO production was unripe, abnormal fruit, lost oil loss on station and oil loss in final effluent. The results of the CPO production problem analysis using the SEM PLS analysis method with smartPLS version 3.2.8 showed that the quality of FFB was significantly affected (0.705) in the event of oil loss in the unripe and fruit indicators. while oil losses significantly affected (0.980) CPO production

KEYWORDS: FFB Quality, Oil Losses, CPO & SEM-PLS

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INTRODUCTION

The development of the palm oil industry in Indonesia shows a positive trend based on data from the Indonesian Plantation Statistics Book (Perkebunan, 2017), palm oil development in Indonesia between 1980 and 2018 is likely to increase. Likewise, palm oil production (CPO) continued to increase yearly on average 11.50% every year.

However, Indonesia's average national OER level is only 22-23%, although many individual factories have achieved over 23% Oil Production (OER). Palm oil producers have been challenging to improve oil extraction (OER) levels as it is a management tool in assessing plant and plantation performance. The major factors affecting the OER are high yields of fresh fruit bunches and efficient processing of crops. Production costs, yield per hectare and OER are three key factors in assessing the performance of palm oil producers. And in assessing the performance of the oil palm plant which is the standard reference is the achievement of OER (Turner and Gillbanks, 2003).

The duration of formation has the effect on fresh fruit bunch (FFB) being nearly cooked or damaged (defective) resulting in loss of free fatty acid levels and lowering FFB weight. More specifically, this study aims to analyze whether the quality of fresh fruit bunches delivered to the factory affects oil production productivity (OER)

STUDY LITERATURE

The results of the bunches analysis show different oil levels between cooked and crude fruits (Mohanaraj, S & Donough, C, 2016). According to Zulkefli, et al (2017) field study that sends immature and over-cooked fruit to factories contributing significantly to the degradation of CPO plant production, causing oil loss at several stages of

the process and causing low OER.). Handayani. M and Hamidi.W (2015) mentioned that there are several factors affecting the production of palm oil industry, namely capital, raw materials and labor. Rimawan, et al, (2018) in their study found that quality levels have a significant effect on reducing losses.

One analytical method that can be used to detect fruit quality effects with oil loss is PLS structural equation model (Wong, 2013). According to Sarstedt et al (2017) to estimate latent variable relationships, the PLS method can be used. There are two submodels in the PLS structural equation model namely the internal model and the external model (Wong, 2013). The advantage of this model is that the sample size does not need to be large. Partial Least Square can be used to validate the theory as well as to explain whether there is a relationship between latent variables or not.

METHODOLOGY

This study uses SEM-PLS statistical analysis to analyze the impact of FFB on oil loss and CPO production. This method processes data from three variables, such as variable data processing tables, analyzed using smartPLS3 software.

Table 1: Variable Laten

Variable	Code	Indicator
FFB Quality	K1	Unripe
	K2	Ripe
	K3	Over-Ripe
	K4	Brondolan
	K5	Empty Bunch
	K6	Long Stalk
	K7	Abnormal Fruit
Oil Losses	L1	Empty Bunch
	L2	Press Fibre
	L3	Solid Decanter
	L4	Final Effluent
CPO	P1	OER
	P2	Oil Losses On FFB

The hypothesis of this study is to see the effect of FFB quality on oil losses and CPO production. In this case, the investigation hypothesis is as follows:

- H1: FFB quality variables have an impact on the amount of oil losses.
- H2: FFB quality variables have an impact on CPO production
- 3 H3: Oil Loss Variables have an impact on CPO production

Figure 1: SEM PLS Research Model

RESULTS

Evaluation of SEM PLS Method

This study uses a reflective model, so that the assessment level follows the standard reflective model of reflective external validation & internal model validation (Sarstedt et al., 2017). Measurement models are evaluated using reliability and validity. For reliability, you can use Cronbach's Alpha. This value reflects the reliability of all indicators in the model. The minimum value is 0.5, and can also use the pc (composite reliability) value interpreted as the Alpha Cronbach's value.

Evaluation of Measurement Model (Outer Model)

Internal Consistency Reliability

Table 1: Composite Reliability

Variable	CR
CPO	1.000
FFB Quality	0,762
Oil Losses	0,677

Indicator Reliability

Table 2: Indicator Reliability

VaribelLatén	Kode	Outer Loading
FFB Quality	K1	0,736
	K7	0,831
Oil Losses	L1	0,608

	L4	0,815
CPO	P1	1,000

Convergent Validity

Table 3: Average Varian Extracted

Variabel	AVE
Cpo	1.000
FFB QUALITY	0,616
Oil Losses	0,517

Discriminant Validity

Table 4: Fornell-Larcker Criterion

Variable Laten	CPO	FFB Quality	Oil Losses
CPO	1,000		
FFB Quality	0,705	0,785	
Oil Losses	0,991	0,705	0,719

Evaluation of structural measurement (Inner model)

Collinierity Assessment

Table 5: Vif Inner Model

Variable Laten	CPO	FFB Quality	Oil Losses
CPO			
FFB Quality	1,987		
Oil Losses	1,987		1,000

Structural Model Path Coefficient

Table 6: Coefficient and Effect Evaluation of Structural Model

Effect	Co	T Statistic	P Value
CPO -> CPO	0,040	0,356	0,722
FFB Quality -> Oil Losses	0,093	7,573	0,000
Oil Losses -> CPO	0,028	35,618	0,000

Figure 2: Result of Structural Model

Coefficient Determination

Table 7: Determination Coefficient

Variabel Manifest	R-Square
CPO	0.981
Oil Losses	0.500

Effect Size

Table 8: Effect Size

Variabel Manifest	CPO	FFB Quality	Oil Losses
CPO			
FFB Quality	0,705		0,705
Oil Losses	0,980		

CONCLUSIONS

The results of the CPO production problem analysis using SEM PLS analysis method with smartPLS software version 3.2.8 showed that the quality of FFB significantly affected (0.705) on the occurrence of oil loss in the crude and fruit indicators. while oil losses significantly affected (0.980) CPO production.

Recommendations for further research are to look at factors that cause high oil losses at workplaces, particularly the final effluent and empty bunches.

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