Comparative analysis between smallholder and partnership oil palm farming system in Jambi Province

Dompak Napitupulu*, Ernawati HD, Elwamendri, Mirawati Yanita, Gina Fauzia

1Lecturer at Agriculture Faculty, Jambi Province

*E-mail: dompak@unja.ac.id

Abstract. Indonesia is becoming the largest palm oil producer in the world. This commodity estate farm is carried out by smallholder, government, as well as big private companies. As the law rules it, both government and big private companies are urged to run the oil palm plantation in partnership system. This study is aimed to compare the oil palm estate revenue between smallholder and partnership farmer in Jambi Province. Data is analyzed in quantitative descriptive model analysis. The results showed that the average farm income of smallholder is significantly higher than the oil palm partnership farmer. Statistical Analysis also showed that the fresh fruit bunches price (TBS), fertilizer, and labour factors used were significantly affected the oil palm estate benefit.

1. Introduction

Indonesia was still known as an agricultural country. Indonesia's economy is still mostly dependent on the agricultural sector. Compared to eight other economic sectors, the agricultural sector played as a major contributor to Indonesia's GDP. The contribution of agricultural sector to national income (GRDP) in 2014 was 15.40%. Aside from being a major contributor to national income, the agricultural sector also acts as the largest employment provider, with around 40% of Indonesia's population still working as farmers. Plantation sub-sector as one of the sub-sectors of the agricultural sector is also noted as the main contributor to the country's foreign exchange earnings. The Indonesian plantation sub-sector in its management can be differentiated into the Smallholder Plantation, Large Private Plantation (PBS) and the Large State Plantation (PBN). State and Private Plantations are generally managed in the form of Nucleus Estate Smallholder Crops (NES), a pattern of plantation development that involves the smallholder as plasm partners and big plantations on the other side as the nucleus that plays a patronage role. Large plantations play a role in helping and leading the smallholder plantations as plasma in a mutually beneficial, complete and sustainable system of cooperation [1].

The most famous crops grow in nucleus estate crops system lately in Indonesia is Oil Palm. Oil palm plantation is growing fast in Indonesia either managed by smallholder farmer, big state plantation or large-scale private corporation. Oil palm is now become a very important crop to Indonesia as well as Jambi Province economy through its large contribution to Indonesia foreign exchange earning [2]. Besides that, oil palm plantations can be used as basic livelihoods to farmers especially in Jambi Province. Data shows that since it was introduced to the community through the transmigration program in 1993 in Jambi Province, the oil palm plantations has multiplied and can be found in almost all districts except Kerinci Regency in Jambi Province. Jambi Province Plantation...
Office shows that in 2014 there was 662864 Ha of oil palm plantation in Jambi Province. Not less than a half of it managed by 200,991 households in smallholder scheme farm.

Comparing both types of palm oil farming scheme become more interesting to be studied further. As it was commonly known, smallholder farmers are mostly own limited capital for they most of the time looked for cheaper and lower quality inputs and has limited access to palm oil mill that made them receive less price than what their colleagues made in partnership scheme. However, on the other hand, partnership schemed farmer even though received higher price, they have to share some part of their oil palm production to pay inputs cost and various caring expenses paid by patron during immature oil palm periods. This study is aimed to compare the oil palm estate revenue between smallholder and partnership farmer in Jambi Province and to analyze factors affect the the oil palm farming income.

2. Research methods
This research was carried out in survey method at Tanjung Jabung Barat and Muaro Jambi Regencies, Jambi Province. The selection of the two districts location was made purposively under the consideration that the two districts were the centres of oil palm production in Jambi Province. Furthermore, in each district was selected one sample sub-district under consideration of having the largest oil palm plantation area, productivity and the ratio of the number of smallholders per ha. The sample districts selected in Tanjung Jabung Barat Regency was Renah Mendaluh Sub-District, while in Muaro Jambi Regency, Maro Sebo Sub-District. At the village level, two villages Lampisi and Lubuk Kambing villages were chosen in Renah Mendaluh Sub-District, while in the Maro Sebo, Niaso and Jambi Kecil Villages were selected.

Respondents in this study were PIR plasm oil palm farmers and smallholder oil palm farmers who manage oil palm with plantation age at least 10 years old and have a land of 2 ha or more. The focus of this research is on oil palm farming activities carried out by farmers including crop maintenance, costs incurred, prices, income received, as well as other data relating to the decisions of oil palm farmers in managing their oil palm plantations.

Data collected in this study consist of primary and secondary data. Primary data is collected on direct interviews by using structured listed questioner with farmers whose data is taken from the year 2017 oil palm plantation period. While secondary data were obtained from literature studies either by book survey, journals and scientific papers evaluation that have been recorded and published.

Sampling is taken by using the snowball method (nonprobability sample) which is started by an initial respondent decided based on village head information. The next respondent was determined based on information from the sample farmers who had been interviewed before. The number of samples in each village was determined by 10 farmers representing plasma farmers and 10 independent smallholders in each village so that 40 farmers were represented representing the plasma farmer population and 40 farmers representing independent smallholder populations. The snowball method (nonprobability sample) is used due to the limited official information about sub-population intended in this research.

The data collected in this research was analyzed in income and multiple linear regression analysis. The first purpose was analyzed by using income analysis which consists of total revenues minus the total production costs. The cost structure in this study referred to fixed costs and variable costs. Mathematically it can be written as follows:

\[ P_d = TR - TC \]

Where :
- \( P_d \) = Oil Palm Farm Income (IDR)
- \( TR \) = Total Revenue (IDR)
- \( TC \) = Total Cost (IDR).
To analyze factors affecting oil palm farm income was analyzed by using multiple linear regression analysis, with mathematical model:

\[ Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5D + e \]

Where:
- \( Y \) = Oil Palm Plantation Total income (IDR/Year)
- \( X_1 \) = Depreciation Cost (IDR/Year)
- \( X_2 \) = Fertilizer Cost (IDR/Year/ha)
- \( X_3 \) = Herbicide Cost (IDR/Year/ha)
- \( X_4 \) = Labour Cost (IDR/Year/ha)
- \( D \) = Farm System
  - \( D = 1 \) for PIR Plasm
  - \( D = 0 \) for smallholder Oil Plantation
- \( b_1, b_2, \ldots, b_5 \) = Estimated Parameters
- \( e \) = Error

Depreciation Cost become one factor effecting the Palm Oil Income in this study is to represent the fix cost. Some authors may be write that fix cost is related to the sunken cost that need not to be counted in effecting annual plant farm production. Never the less [6] said that both fix cost and variable cost should be counted to be variables in analyzing farm income. Depreciation could affect the farm income through the size of the farm. The bigger is the farm size the higher will be expenditure paid to buy utilities and services.

Fertilizer, herbicide, and labor are known as production inputs. As long as the production process is in efficient phase, the higher the inputs is the higher the production will be [3], [4], [5], [6]. These three kinds of inputs then should be counted as variables in the model.

The last variable, farm system, adopted as a variable in the model for it is scientifically believed that the way of large entrepreneur runs business is differ to smallholder does. Large enterprise mostly run its business in commercial manner while small holder farm tends to be act in subsistence manner [7]. Farm system is then eligible to be counted in the model.

To know the effect of variables simultaneously is analyzed by using F test with the formula:

\[ F_{\text{value}} = \frac{|K_{\text{Regresi}}|}{|K_{\text{Residu}}|} \]

Hypothesis build to be proved in this study was:
- \( H_0 : R^2 = 0 \) (no effect of hypotesized variables)
- \( H_1 : R^2 \neq 0 \) (there is a significant effect of independent variable in to dependent variable)

The decision rule was:
- if \( F_{\text{value}} < F_{\text{table}} (\alpha = 5\% \; \text{db} = k \; \text{n}-k-1) \); except \( H_0 \)
- if \( F_{\text{value}} \geq F_{\text{table}} (\alpha = 5\% \; \text{db} = k \; \text{n}-k-1) \); reject \( H_0 \)

Furthermore to evaluate the effect of the independent variable to the dependent variable partially was approached by using \( t_{\text{student}} \) test with the formula:

\[ t = \frac{b^*}{\text{Se} (b^*)} \]

Where:
- \( t \) = \( t_{\text{value}} \) for each independent variable
- \( b \) = regression coefficient
- \( \text{Se} \) = standard error
With the built hypothesis:

\[ H_0 : b_i = 0 \]
\[ H_1 : b_i \neq 0 \]

The decision rule was:

- If \( t \text{value} < t_{a = 0.05; df = 79} \); accept \( H_0 \)
- If \( t \text{value} \geq t_{a = 0.05; df = 79} \); reject \( H_0 \)

3. Results and discussion

Farm management is a science that studies the ways farmers combine and operate various factors of production such as land, labour, and capital as the basis for how farmers choose the type and size of farm branches in the form of crops or livestock to provide maximum and continuous revenue [3]. Further more, According [4], revenue is all income earned from farming for a period calculated from the sale or reassessment. Farming is a series of processes that aim to obtain optimal production results by using certain production factors. According to [5], low farm income is mostly influenced by several factors, namely the small size of the farm and the use of farming production elements, and the low skills of farmers in managing their farming.

Oil palm plantation has good prospects that promise good income to the farmers. Data showed that oil palm plantation is one of the mayor estated crop after rubber which is grown in Jambi Province as well as in the research area. Just like other agribusiness management, oil palm farming is inseparable from farming costs, where the costs incurred in the production process [4], [5]. Just like other farm cost schedule, oil palm farming cost can be classified into 2 (two) categories, namely fixed costs and variable costs. Fixed cost is any cost incurred in the farming production process that is not affected by the amount of production. In this study, fixed costs consist of dodos, gancu, eggrek, angkong, axes, machetes, and hoes used in the production process. The depreciation cost of the tool referred to in this study is the cost that has been reduced in value (depreciation) or the amount of money spent by farmers to buy farming equipment used in a relatively long time. Non-fixed costs (variable costs), namely the cost of which the size is affected by the product obtained. For example, costs for production facilities. If you want higher production, then labour needs to be added, fertilizer needs to be added, and so on. So that these non-fixed costs are variable depending on the size of the desired product. Non-fixed costs referred to in this study are the cost of fertilizer, herbicide costs and labour costs.

Farm income is farm revenue from all sources of farming, including the number of additional inventories, the value of sales of products, the value of home use and consumption [5]. In general, farmers expect the income earned from their farming activities will always be greater than the costs incurred on the farm. Revenue referred to in this study is the amount of FFB production per year multiplied by the price of FFB at the farmer level at the time of sale, while the production costs incurred are equipment depreciation costs, fertilizer costs, medical expenses and labour costs [4], [5]. The average partnership schemed (PIR) farmer income from oil palm farming is IDR 58,959,129.26/year. Moreover, the income of smallholder farmers from oil palm farming is IDR 92,204,588.24/year.

Further more, according to [6], farm income is the difference between revenue and all costs incurred by a certain period. The income received by farmers is affected by revenues and production costs. If the income received by large farmers and production costs incurred is small, then the income that will be received by farmers will be higher and vice versa if the income received by small farmers and production costs incurred is large then what will be received by farmers will be smaller. As it was also found by [8], [10], what greatly affects the size of the farmer's income level is revenue and production costs. If the revenue is large while the production costs are small then the income will be even greater, and vice versa if the costs are greater than the income gets smaller. Sample farmer income in the study area comes from oil palm farming. Where income is derived from the difference between receiving and total production costs. Production costs incurred are equipment depreciation
costs, fertilizer costs, medical expenses and labour costs. The oil palm farming income of the sample farmers in the study area can be seen in table 1 below:

**Table 1.** Average Revenue, Total Production Costs and Income of Oil Palm Farming in 2017 Research Area

| Description       | Partnership Farmer (IDR/Ha) | Smallholder Farmer (IDR/Ha) |
|-------------------|-----------------------------|-----------------------------|
| Revenue           | 58,959,129.26               | 92,204,588.24               |
| Total cost        | 3,064,179.94                | 2,514,083.33                |
| Depresiasion Cost | 233,346.60                  | 237,862.75                  |
| Fertilizer Cost   | 470,000.00                  | 270,129.63                  |
| Herbicide Cost    | 369,722.22                  | 360,764.71                  |
| Labour Cost       | 1,991,111.11                | 935,898.15                  |
| Benefit           | 55,894,949.32               | 89,690,504.90               |

At table 1 above, it can be seen that the average oil palm farming income of partnership schemed farmer is IDR. 55,894,949.32/year/ha, the largest production costs incurred were labour costs, which amounted to IDR. 1,991,111.11/year/ha. That labour cost contribute more to the smallholder oil farm cost also agree to [8], [9] found. While the average oil palm farming income of independent smallholders is IDR. 89,690,504.90/year/ha, the largest production costs incurred are labour costs, which are IDR. 935,898,15/year/ha. To find out the magnitude of the influence of FFB price factors, equipment depreciation costs, fertilizer costs, herbicide costs, labour costs and dummy (business pattern). The results of data analysis from multiple linear regression can be seen in table 2 below:

**Table 2.** Estimating Regression Parameters Results of Factors Affecting Oil Palm Farm Income in Jambi Province, Year 2017

| Variable                   | Coefficients (b) | Standard Error (Std) | t-value |
|----------------------------|------------------|----------------------|----------|
| Intercept                  | 198,771,705,2    | 24,056,676,56       | 8,263    |
| FFB Price                  | 75,134.281       | 17,075,193          | 4,400    |
| Depreciation Cost          | -32,849          | 43,816              | -0.750   |
| Fertilizer Cost            | -85,582          | 33,046              | -2.590   |
| Herbicide Cost             | -19,676          | 17,169              | -1.146   |
| Labour Cost                | -91,690          | 7,433               | -12,335  |
| Farming System (Dummy)     | -8,625,240,342   | 6,996,215,694      | -1,233   |

R Square: 0.922
F-value: 73,274

Note: D=1 for Partnership Farmer,
D=0 For Smallholder Farmer

Based on the regression result as presented on table 2 above, it is known that the oil palm (FFB) independent variable has a positive effect, that any additional change in FFB prices will cause an increase in farming income as much as IDR 75,134 per Ha per year. On the other hand, the other variables which represent the cost expenditure in managing oil palm plantation effect negatively into the farming income. That price of FFB effect positively and labour cost effect negatively are also agree to what [8], [10] found. The limitation of labour available in household made them to pay commercial labour force which is made higher expenditure and reduce income gained from the oil farm.

The other variable, dummy variable, goes to the direction with input cost also shows negative coefficient which means that there is a tendency though it was not significant that the income of Partnership Schemed Farmer or Plasm PIR is smaller than the income of Smallholder Oil Farm farmer.

Based on the regression results of factors influencing oil palm farming income, on table 3 is presented the effect of dummy simulating on smallholders and partnership schemed farmer’s income in Jambi Province.
Table 3. Regression Estimating Result of factors influencing oil palm farming income without Dummy Variable in Jambi Province Year 2017

| Variable          | Regression Coefficients |
|-------------------|-------------------------|
| FFB Price         | 58,789,333              |
| Depreciation Cost | -25,213                 |
| Fertilizer Cost   | -84,479                 |
| Herbicide Cost    | -19,799                 |
| Labour Cost       | -94,806                 |
| Dummy             | -                       |
| R²                | 0.919                   |
| Fhitung           | 86,442                  |

Comparing to the value of regression estimating results presented on table 2, the regression estimation results in table 3 is different each other, this explicitly exposes that the slope of independent variable also somehow different between the two farming system.

Based on the multiple linear regression analysis, it was obtained that the determination coefficient (R²) value was 0.922, showed a high determination coefficient value. This coefficient means that 92.2 percent of the variation in oil palm farming income is influenced by the price of FFB, depreciation costs, fertilizer costs, herbicide costs, labour costs and dummy simultaneously, while the remaining 7.8 percent is caused by other variables. Based on the analysis of variance it was obtained that the F value is 73.274 is greater than F table at \( \alpha = 0.05 \): 2.356, means that the R² determination coefficient was significantly different to zero. This value indicates that the independent variables, FFB price \( X_1 \), depreciation cost \( X_2 \), fertilizer cost \( X_3 \), herbicide cost \( X_4 \), and labour costs \( X_5 \) as well as dummy variables \( D \), simultaneously affect the oil palm farming income in Jambi Province in the year 2017.

4. Conclusion
1. The research showed that the average income received by Smallholders and Partnership Farmer Farmers in Jambi Province in the year 2017 was different each other
2. Some independent variables namely: the price of FFB, fertilizer costs and labour costs were significantly effect on the oil palm farming income, while the depreciation costs, medical expenses and the farming system were not significantly affect the oil palm farming income in Jambi Province (2017).

References
[1] Syamsulbahri, 1996. Bercocok Tanam Tanaman Perkebunan Tahunan (Annual Planting Crops). Penerbit Gajah Mada University Press. Yogyakarta
[2] Fauzi, yan. 2002. Kelapa Sawit (Oil Palm). Penebar Swadaya. Jakarta
[3] Daniel, M. 2009. Pengantar Ekonomi Pertanian (Introduction to Agriculture Economics). Bumi Aksara. Jakarta
[4] Suratiyah, Ken, 2009. Ilmu Usaha Tani (Farm Management). Penerbit Penebar Swadaya. Jakarta
[5] Hernanto, Fadholi, 1996. Ilmu Usaha Tani. Cetakan pertama. Penerbit PT. Penebar Swadaya. Jakarta
[6] Soekartawi, 1995. Analisis Usahatani. Universitas Indonesia. Jakarta
[7] Scott, J. C., 1983. Moral Ekonomi Petani. Pergolakan dan Subsistensi di Asia Tenggara. Ed. Repro. Lp3ES. Jakarta
[8] Choiriyah, Siti. 2005. Analisis Faktor-Faktor Yang Mempengaruhi Produksi Kelapa Sawit. Skripsi Fakultas Pertanian (Analysis of Factors Affecting Palm Oil Production. Faculty of Agriculture Thesis). Universitas Jambi
[9] Noraniza Yusoff, 2016. Analysis on Cost and Profit in Farming Activity in Malaysia. Journal of
Modern Accounting and Auditing, April 2016, Vol. 12, No. 4, 183-207

[10] Kunaifi. A. 2008. Analisis Faktor-Faktor Yang Mempengaruhi Pendapatan Usahatani Kelapa Sawit Peserta Pir-Trans Pt.Inti Indosawit Subur Dikecamatan Merlung (Analysis of Factors Affecting Pir-Trans Participants of Palm Farming Income of Pt.Inti Indosawit Subur in Merlung District). Skripsi Fakultas Pertanian. Universitas Jambi