Can smallholder's oil palm income contribute to household expenses during replanting?

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Abstract. Oil palm has increased welfare and food security for low-income families in Indonesia. In Jambi Province, the independent smallholders own most farms. However, the land area of old or damaged crops reaches 43.38% of the total area. It requires smallholders to perform replanting to avoid a decrease in productivity and income. The research objectives are: 1) describing oil palm replanting in Sungai Bahar Sub-District, Muaro Jambi Regency, 2) analyzing the Amount of smallholder's income and 3) Predicting the contribution of smallholder's income to household living expenditure during the period of replanting. This research was conducted by a descriptive and quantitative method. The results showed a replanting oil palm farm area of 1.96 hectares. Prior to replanting, palm oil farming income was IDR 4,229,530/month. After replanting when crops had not generated, smallholders' income of IDR 1,239,486/month sourced from the cultivation of food crops, namely corn, chili, and peanut. If the household expenses of IDR 2,613,542 per month, then the income from the plantation of horticultural plants or food plants contributes 47.42 percent. It indicates the utilization of palm oil upright land before the crop yield becomes one of the policies considered into question as a contributor to household income.

1. Introduction

Global demand for palm oil has led to a rapid increase in oil palm acreage and production over the last three decades [1]–[3]. Smallholder farmers play a significant role in the expansion of palm oil as a global commodity crop [4]. Palm oil has become one of the leading commodities of the community's economy in Indonesia. Oil palm has increased welfare and food security for low-income families in Indonesia. Until 2020, the total area of oil palm has reached 16.38 million hectares, of which 6.72 million hectares are smallholders palm oil. Inadequate knowledge and capital resources lead to the sustainability of smallholder oil palm plantations. Statistical data shows that until now, there are 2.78 million hectares of oil palm plantations that already reached the replanting period. Among of old and damaged oil palm trees, about 2.27 million (81.65%) hectares of them are plasm and smallholder oil palm farm, while the rest are PIR-BUN and other plasm kinds [5].

Oil palm plantations in Jambi Province are spread throughout the regency; the district with the largest area of oil palm plantation is Muaro Jambi Regency, with an area of 97,749 thousand hectares, production of 189,663 thousand tons, and productivity of 2,575 Tons/ Ha. Farmers who collect palm
oil in Jambi Province as many as 221,711 head of the family [6]. Muaro Jambi Regency has carried out various policies to encourage the acceleration of regional development. The development policy is included in the local development program, which is included in the short, medium, and long term development policy. Through these policies not only have an impact on economic development but also on reducing income inequality, expanding employment opportunities, and reducing poverty rates. Especially for Muaro Jambi regency, the effect of infrastructure development is the increase in the added value of the agricultural sector. In 2015, the growth rate of gross domestic product agricultural sector in muaro jambi district was 13.49 percent, then in 2019 increased to 13.57 percent. Variable road, irrigation, and market infrastructure together have a positive and significant impact on the added value of the agricultural sector [7].

The largest oil palm plantation in Muaro Jambi Regency is Sungai Bahar Sub-district, which amounts to 27.91% of the total area of oil palm land in Muaro Jambi Regency with the largest number of smallholder and is able to contribute the third largest production of 33,689 tons in 2017. People in Bahar River Sub-district rely on palm oil farming as their primary source of household income. Economically, palm oil plantations provide positive value in terms of the economy by reducing poverty for palm oil plantation smallholders.

The age of palm oil crops in Bahar River Sub-district has passed the economic lifespan (25 Years) of 36 years. Old palm oil crops cannot produce to the maximum and can harm smallholders because the energy and costs sacrificed are not comparable to the income. The productivity level of Sungai Bahar Sub-district only reaches 2,296 Kg/Ha. Low productivity due to the area of old or damaged crops that reached 11,839 hectares or 43.38% of the total area of palm oil. This condition requires smallholders to be able to perform replanting to increase the productivity of palm oil crops and the income of smallholders.

Smallholders are faced with a cost problem between the costs that must be incurred for replanting and maintenance costs during the period of palm oil crops have not produced (TBM) and household expenditures. This research aims to 1) describing oil palm replanting in Sungai Bahar Sub-District, Muaro Jambi Regency, 2) analyzing the Amount of smallholder's income and 3) Predicting the contribution of smallholder's oil palm income to household living expenditure during the period of replanting.

2. Method

This study used secondary and primary data. Secondary data was obtained at the agency of Plantation of Jambi Province, Directorate General of Plantation of Indonesia, and Central Bureau of Statistics. In contrast, primary data was obtained directly in the field by using the survey method by interviewing farmers of respondents with some questions on the questionnaire. Some of the scope and limitations in this study are only done on palm oil income and income distribution from palm oil farming. The palm oil commodity studied is a commodity that is attempted by independent smallholders. The susceptible time used in this study is the last Year that is calculated in June 2019 to May 2020. The research was conducted in 2 villages in Sungai Bahar District, Muaro Jambi Regency. Location selection is made purposively.

The object of this research is independence smallholders who have done replanting, which means old or damaged crops have been replaced with new palm oil crops. To answer the first objective used the data are as follows:
1. The identity of the smallholders includes data on name, age, education, the experience of palm oil farming, and the number of family dependents.
2. Palm Oil farming has seeds used, palm oil life, and production.
3. Land ownership area (Ha)
4. Replanted palm oil land area (Ha)
5. Palm oil production and beyond palm oil (Ton/ha)
6. The selling price of palm oil production and beyond palm oil (IDR)
7. Sources of income outside palm oil farming
8. Variable cost of palm oil farming and beyond palm oil (IDR)
9. The fixed cost of oil palm farming and beyond palm oil (IDR)
10. The total cost of oil palm farming and outside palm oil (IDR)
11. Total revenue of palm oil and outer palm plantations (IDR)
12. Total.
Other Relevant Data required in research. To calculate the income of smallholders, for the second objective using the equation below:

\[ \pi = TR - TC \]  
\[ TR = P \times Q \]

Where:
- \( \pi \) = Income (IDR/Ha/Year)
- \( TR \) = Total Revenue (IDR/Ha/Year)
- \( P \) = Price (IDR/Kg)
- \( Q \) = Production (Kg/Ha/Year)
- \( TC \) = Total Cost (IDR/Ha/Year)

Results and discussion

The third goal is to predict the contribution of palm oil income to household expenditure with the assumption the other ceteris paribus is to look at the percentage of palm oil income to smallholder’s total household expenditure.

3. Results and discussion

Sungai Bahar sub-district is one of the palm oil producing sub-districts in Muaro Jambi regency and has the largest oil palm land area. Bahar River sub-district has been working on palm oil since 1983 and is a farmer of transmigration participants. The Smallholders' goal to utilize good land as long as palm oil has not been produced in the monoculture system is to earn higher incomes to meet families' needs. This activity contributes to more stable income and certainty of access to food and non-food. Independence smallholders diversify cash crops among palm oil crops that have not yet produced a promising alternative as an alternative revenue. Table 1 shows the performance of Palm Oil cultivation after Replanting since 2018.

| Land Area (Ha) | 1.96 |
| Smallholders (People) | 30 |
| Plant Age (Year) | 1.8 |
| Plant Distance (meter) | 8 x 9 |

Table 1. The Performance of Palm Oil Cultivation after Replanting since 2018.

Table 1 shows that the age of palm oil crops is replanted by one Year and six months. Meanwhile, the area of rata rat owned by farmers is 1.96 ha. With the planting distance, the number of plants per hectare is 142 trees. Plant maintenance in palm oil commodities usually grouped into plants, has not produced/immature or abbreviated (TBM), and the plant produces/mature abbreviated (TM). TBM in palm oil is the period before harvest (starting from planting until the first harvest) that lasts 30-36 months. The period TBM in palm oil plants consists of TBM 0: states the land has been opened, planted with ground cover beans, and palm oil has been produced at each staking point. TBM 1: plant in Year I (0-12 months) TBM 2: plant in Year II (13-24 months) TBM 3: plant in Year III (25-30 or 36 months) The goal of TBM maintenance is to get the same plant in terms of growth, productive and high production.

Furthermore, there is no pruning/harvesting during the not producing (TBM) until six months leading up to the first harvest. Usually, 24 months after planting, workers should not cut or dispose of the rim at this time. The Smallholders do need an implementation of pruning in the event of a dead and unproductive.
Table 2 shows the palm oil farming costs before replanting. This calculation of palm oil farming income shows that labor costs outside the family reach 45.63 percent of the total cost paid. While the palm oil farming's revenue at the prevailing price of IDR 69,087,705 each farmer or IDR 18,271,129/ha. The income of smallholders IDR 4,229,530/month before replanting. While the household living expenditure on average IDR 2,613,542. After replanting, smallholders do not have income from the palm oil cultivation. So they fulfill the household expenditure through the utilization of palm oil land that has not yet produced. The smallholders plant cash crops or food crops to diversify their income for a living.

| Description                | Before Replanting |
|----------------------------|-------------------|
|                            | each farmer       | Ha |
| A. Revenue                 |                   |    |
| Production (Kg)            | 54.701            | 14.466 |
| Price (IDR)                | 1.263             | 1.263 |
| Total Revenue (IDR)        | 69,087.363        | 18,271.129 |
| B. Fee Paid (IDR)          |                   |    |
| Fertilizer                 | 7,426.354         | 1,963.994 |
| Medicine                   | 1,593.645         | 421.459 |
| Labor outside the family   | 8,276.279         | 2,188.768 |
| Other costs                | 842.396           | 222.782 |
| Total Cost                 | 18,138.675        | 4,797.005 |
| C. Fee Unpaid (IDR)        |                   |    |
| Depreciation Cost          | 193.502           | 51.174 |
| Total Cost                 | 193.502           | 51.174 |
| D. Total Cost (B+C) (IDR)  | 18,332.177        | 4,848.179 |
| Income (IDR/Year) (A-D)    | 50,775.186        | 13,492.536 |

In many developing countries, food or cash crops are widely promoted in low-income areas as poverty alleviation strategies for several reasons [8]. First, the cultivation of food crops can help increase the adoption of yield enhancement technologies (e.g., fertilizers, pesticides, and enhanced seeds), agronomy practices (e.g., integrated pest management, soil testing, and formulated fertilization), and facilitate smallholders access to credit training and agricultural counseling [9], [10]. Second, the additional income received from the cultivation of food or cash crops allows farmers to improve the nutrition, health, and educational conditions of family members. Third, the cultivation of food or other commercial crops can accelerate investment in rural infrastructure and public services (e.g., roads, bridges, power grids, and telecommunications) by commercializing crop production and modernizing agricultural systems [11], [12].

The independence smallholders cultivate cash crops by intercropping. They plant Corn, Chili, and peanut. Generally, intercropping aims to produce more production per unit of land area than monoculture plants [13], [14]. Intercropping is also useful to lower crop failure risk due to pest attacks [15]–[17]. Smallholder's get income for twice until three times a year by doing cash crop cultivation. The intercropping plant is beneficial for farmers in meeting the needs of their household expenses. Based on the calculation results obtained that the smallholders income amounted to IDR 1,239,486/month. Other income outside the farm is considered ceteris paribus. Thus, if smallholder needs per month amounted to IDR 2,613,542 per month, the intercropping crop business can contribute as much as 47.42 percent. This study implies that farmers should not delay the implementation of replanting. Smallholders do replanting by utilizing their resources. Smallholders should look for other
acceptance sources to meet the needs as long as the replanted palm oil has not yet obtained results. The loss and reduced acceptance of smallholders due to the replanting will lead to a new acceptance of smallholders that will later affect their welfare.

4. Conclusion
Smallholder's oil palm income can contribute to household expenses during replanting about 47.42 percent, ceteris paribus. The rest of the farmers need to intercropping activities, both food crop and cash crop. The utilization of palm oil upright land before the crop yield becomes of the policies considered into question as a contributor to household income.

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