Name	Counterpart	Title
Edison, Ira Wahyuni	**C08**	The analysis of a replanting model on smallholders oil palm in Muaro Jambi District, Jambi Province

Background and Objectives

Muaro Jambi is a district with the largest oil palm plantation area in Jambi Province (91,206 ha, Picture 1) with a total production of 535,337 tons in 2019. The smallholder's oil palm plantation in this district has been operating since the 1980s. Therefore, most of the smallholder oil palm trees are currently in the final stages of the production cycle, so it is necessary to plan the replanting activities (Anonymous, 2020) (Picture 2). The oil palm plantations of smallholders in Muaro Jambi district have a much larger area than the other two plantations. However, the problem is that the productivity of smallholder oil palm plantations cannot compete with the government and private plantations. This condition is due to various factors, both internal and external to the management actors, in this case, the farmers or planters (Edison, 2020). The status of conventional and under-planted smallholder oil palm cultivation in Muaro Jambi District varies in terms of the yield of fresh fruit bunches (FFB, Picture 3) produced in 2021. This result is due to the fact that the number of plants and the age of the plants affect the amount of oil palm production and the farmer's profit (Edison and Wahyuni, 2020). Choosing the right replanting technique to provide farmers with an alternative income during replanting. The objective of this research is to (1) analyze the feasibility of replanting oil palm plantations by smallholders based on investment criteria, and (2) analyze the sensitivity of replanting oil palm plantations by smallholders in case of changing output and input prices.

Picture 1. Oil palm plantation in Muara Jambi District.

Picture 2. Replanting activities for the next production cycle.

Picture 3. Fresh fruit bunches produced from the oil palm plantations.

Methods

The study was conducted in Muaro Jambi District. Research data was obtained through interviews using questionnaires in the Muaro Jambi District. As many as 60 purely independent smallholder farmers replanting oil palm were obtained by snowball sampling. Methods of data analysis used criterion investment using NPV, IRR, Net B/C, PP, and sensitivity analysis.

Results and Conclusion

Feasibility criteria analysis was conducted for replanting using conventional techniques and underplanting techniques. The financial feasibility criteria were Net Present Value (NPV), Internal Rate of Return, Net Benefit Ratio (Net B/C), and Payback Period. The discount factor used in this study is the prevailing interest rate of 4.5 %. The value of NPV, IRR, Net B/C Ratio, and payback period for replanting conventional techniques and underplanting techniques can be seen in table 1.

Table 1. The value of NPV, IRR, Net B/C Ratio, and *Payback Period* of conventional techniques and underplanting techniques

No	Criteria	Conventional techniques	Underplanting techniques
1	NPV (IDR)	356,612,925	83,750,145
2	IRR (%)	56,24	19,38
3	Net B/C Ratio	136,28	59,85
4	Payback Period (Year)	6,42	5,35

The results of the study showed that oil palm planting by smallholders is feasible through both conventional replanting and underplanting. The results of the sensitivity analysis showed that both types of replanting oil palm plantations are feasible if the input price increases by 15% and the selling price of FFB is kept constant, or if the price of FFB decreases by 15% and the input price remains the same. Changes in FFB prices are more sensitive to changes in standard investment values than changes in input prices.

The smallholder oil palm plantation replanting model, both the conventional and underplanting models, is suitable for farmers. The investment criteria for the two models of oil palm replanting are that the NPV, Net B/C, IRR, and Payback Period values are quite profitable for farmers. It is better to use the conventional model for oil palm replanting because it provides higher productivity and more efficient plantation management than the underplanting model. The response to changes in the value of NPV, Net B/C, IRR, and the payback period is more sensitive to changes in FFB prices compared to increases in production factor prices. The increase in the values of NPV, Net B/C, IRR, and the payback period is very large when there is an increase in FFB prices for both the conventional replanting model and the underplanting model. The conventional model responds stronger than the underplanting model when there is an increase in FFB prices.

References

Anonymous, 2020. Kecamatan Sungai Bahar Dalam Angka Tahun 2019. BPS Kabupaten Muaro Jambi. Sengeti.

Edison, 2020. Financial Feasibility Study of Smallholder Oil Palm in Muaro Jambi District Jambi. IOP Conf. Series: Earth and Environmental Science 583 (2020) 012012 pp. 1 – 7.

Edison and Wahyuni, I. 2020. The Effect of Land Typologies of Smallholders Palm Oil Profit. Test Engineering & Management. 83(1), pp. 23473 – 23481