



Economic assessment of palm oil production

The introduction and expansion of oil palm in Indonesia reflects the crop's economic attractiveness and benefits, but the social interactions between companies and local communities have had a mixed track record that requires attention. To some extent, oil palm plantations have been portrayed as costly from social and environmental perspectives. To understand the economic benefits of palm oil production, we analyzed both private and financial returns at the plantation level as well as the return to labour. Socially, interaction areas were identified as the result of labour requirements of oil palm plantations and the profitability of independent and plasma smallholders' plantations.

Main findings	Implications
Profitability <ul style="list-style-type: none"> The potential profitability of the 23 plantations sampled varied between IDR 44 million and IDR 295 million per hectare. The returns to labour of the 23 samples varied between IDR 60,000 and IDR 260,000 per person per day, which equates to 2 to 7 times greater, respectively, than the average agricultural wage. Several sample plantations received additional income from logging in the establishment period, which varied between 7% and 9% of total income for the full life cycle. Returns to land for independent smallholders' oil palm plantations varied between IDR 92 million and IDR 143 million per hectare in a 25-year cycle, with return to labour between IDR 122,000 and IDR 178,000 per person per day. Return to land of plasma plantations varied between IDR 125 million and IDR 266 million; return to labour varied between IDR 67,000 and IDR 297,000. 	<ul style="list-style-type: none"> Oil palm plantations are attractive to investors. The growing worldwide interest in biofuel as an alternative for fossil fuels will increase demand for its feedstock and lead to the expansion of oil palm plantations in climatically suitable regions. In cases where a plantation was established in a sparsely populated area there might have been higher wages but the plantation was still able to cover the cost of labour. Consequently, higher wages in certain regions attracted more people and drove further land-use conversion. Excluding forest conversion, benefits from the establishment phase of oil palm plantations did not have a major negative impact on profitability. The expansion of smallholders' oil palm plantations benefits from a direct link to plantation companies, providing technical assistance, good quality planting material, fertilizer markets and delivery contracts to the mill.
Oil palm cultivation on peat and mineral soils <ul style="list-style-type: none"> The profitability of oil palm on peat soil was 25% lower than on mineral soil and return to labour was also 56% lower than on mineral soil. This is in line with the 33% higher cost of establishment and 21% higher labour requirement on peat. In the operational phase, oil palm cultivation on peat soil required 75 persons-day per hectare per year, which is 10% higher than on mineral soil. 	<ul style="list-style-type: none"> Expansion of oil palm on peat contributes less to the economy than expansion on mineral soils.
Palm oil production and profitability <ul style="list-style-type: none"> The net present value for 15 years' investment varied between USD 13.8 million and USD 102.9 million. Profit per ton CPO production (plus kernel) ranged between USD 43 and USD 164. 	<ul style="list-style-type: none"> Investment in palm oil processing is attractive. As long as fresh fruit bunch (FFB) supply from the market can be secured, the investment is feasible. As an alternative to the vertical integration of plantations and mill, a business model where mills and FFB producers are partially independent, as in Thailand, is possible.

Background

Economic assessment of palm oil production in this study covered two layers: 1) at the plantation level, using profitability parameters of per unit of land and per unit of labour; and 2) at the palm oil processing unit (mill), using profit margin per unit of palm oil product (CPO plus kernel) as a profitability parameter. Profitability assessment estimated the economic return of palm oil production. This explains the production incentives and also the economic viability of producing palm oil.

By combining profitability figures with the result of a carbon footprint assessment, the economic return per unit of carbon emitted in producing palm oil can be estimated.

This economic assessment included four components of palm oil production: 1) cost of establishment; 2) labour requirements; 3) profitability of oil palm plantations (return to land and return to labour); and 4) the economic returns from palm oil production.

Objective

To estimate the economic return of palm oil production.

Methodology

1. At the plantation level, the economic analysis employed profitability parameters of per unit of land and per unit of labour. The logical framework of the policy analysis matrix differentiates private profitability and social profitability.
2. Both private and social profitability use net present value (NPV) as an indicator, measuring the economic return to land of oil palm plantations (Figure 1).
3. Return per unit of labour was calculated by finding the value of the wage rate, which generated an NPV equal to zero.
4. Cost of establishment was defined as the total costs during the period of negative cashflow at the beginning of the plantation.
5. The economic analysis of palm oil processing estimated the cost of production and profit for each ton of CPO and kernels processed.

Macroeconomic assumptions

The profitability calculation in the study used macroeconomic parameters of 2010. The exchange rate was IDR 10,712 to USD 1 when the data collection was carried out. Real interest rates—that is, interest rates net of inflation—were the discount factors used to value future cash flows in current terms.

Table 1. Macroeconomic parameters

Macroeconomic parameters	March 2010
Official exchange rate (IDR/USD)	10,712
Real interest rate (per annum)	
Private interest rate	8%
Social interest rate	3%
Agricultural wage rate (IDR/person-day)	
Private price	Varied between IDR 35,000 and 50,000
Social price	Varied between IDR 35,000 and 50,000

Results

Profitability of oil palm plantation

Return to land

Figure 1 shows returns to land for the sampled plantations. High variability in the profitability of the 23 plantations can be explained by the variability of planting progress on each. The more progressive an estate was in planting during the establishment phase—as indicated by the number of planted areas during the first 5 years—the higher possibility an estate would achieve better profitability.

Return to labour

The measure of return to labour, that is, the wage rate that sets the NPV equal to zero, converts the 'surplus' to a wage after accounting for purchased inputs and discounting for the cost of capital and no surplus attributed to land. This is profitability from the perspective of farmers or operators as a production incentive. This measure of return to labour is valid when land is abundant and labour is scarce. Returns that exceed the average agricultural wage rate (IDR 35,000–50,000 per person per day) indicate that the activity is attractive to operators (farmers) compared to other off-farm work (Figure 2).

Net present value of oil palm plantations (IDR 000/ha)



Figure 1. Return to land of sample plantations (IDR 000/ha)

Return to labour (IDR/person/day)

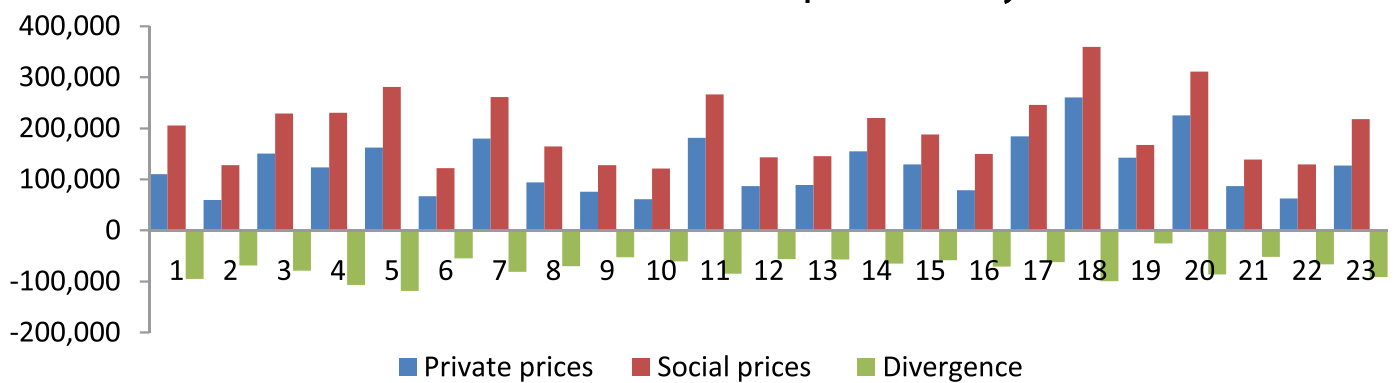


Figure 2. Return to labour (IDR/person/day)

Averaged cost of establishment according to years to positive cashflow (IDR million/ha)

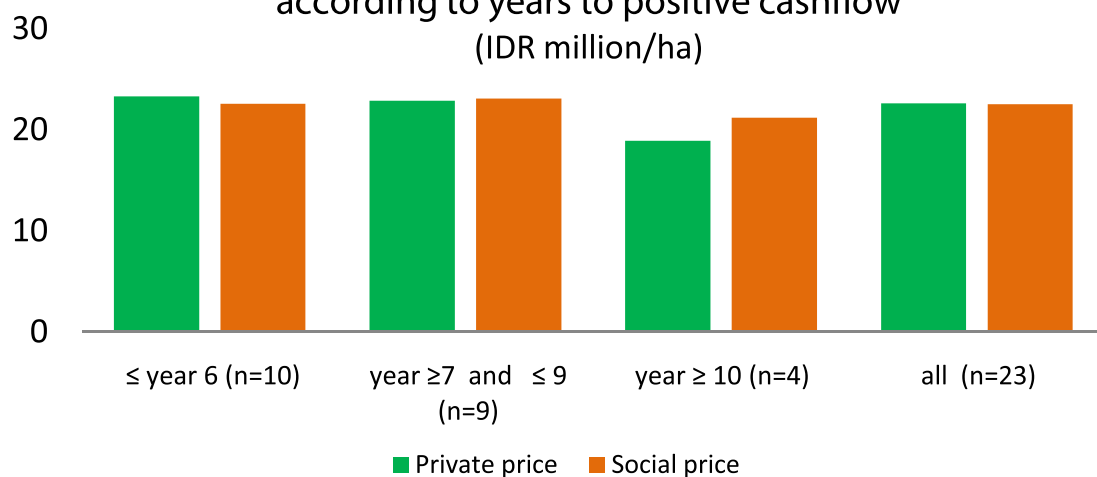


Figure 3. Averaged cost of establishment

Cost of establishment

The occurrence of positive cash flow among the sampled plantations ranged between Year 4 and Year 12. Thirteen plantations were able to reach positive cash flow in Year 6 or earlier. The discounted establishment cost in the private price, which is derived directly from cash flow analysis, probably is the best indicator of cash flow constraints for smallholders and oil palm operators. We found that the estimated establishment cost was about IDR 22 million/ha. Investments of this magnitude would not be easy for many smallholders without financial assistance.

Labour requirements

Large-scale oil palm plantations with relatively high potential profitability have very high labour requirements during the establishment phase, ranging 332–2542 person-days per hectare over the period (5–12 years), and also high labour requirements in the operational phase for tree-crop maintenance and harvesting. However, as discussed above, oil palm plantations also had high returns to labour. Problems in the labour market that might be constraints for a plantation can be dealt with flexibly.

From the perspective of policy makers concerned with employment generation, total time-averaged labour requirement is a good indicator related to equity and stability. Note, however, that while labour-intensive alternatives should be attractive for policy makers who are interested in investment in job creation, these alternatives will only be attractive to households if they provide good returns to labour. In this regard, palm oil plantations can provide better returns to labour. On the other hand, labour availability in the market is another factor to consider.

Labor requirements during establishment period

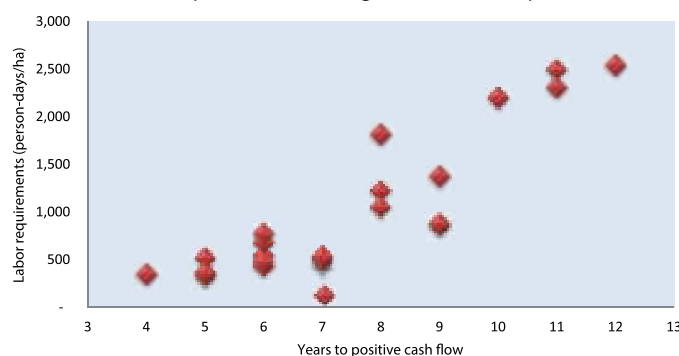


Figure 4. Labour requirements (person-days/ha)

Independent smallholders' and plasma plantations

The profitability of smallholders' oil palm plantations is similar to that of large plantations. Returns to land for independent smallholders' oil palm plantations varied between IDR 92 million and IDR 143 million per hectare in a 25-year cycle, with return to labour between IDR 122,000 and IDR 178,000 per person per day. For plasma farmers (with direct links to a nucleus plantation), the profitability was slightly higher than for independent farmers: returns to land varied between IDR 125 million and IDR 266 million while returns to labour varied between IDR 67,000 and IDR 297,000.

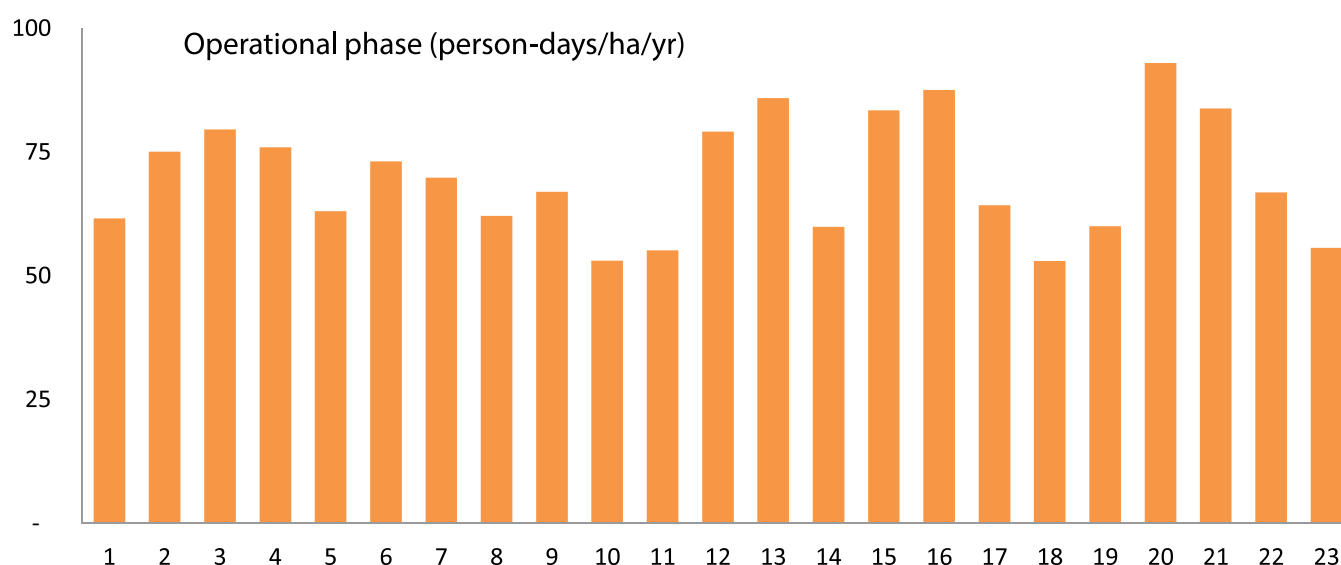


Figure 5. Labour requirements during operational phase

Oil palm cultivation on peat and mineral soils

Comparing the three profitability parameters of oil palm cultivation on peat soil and on mineral soil, the study found that profitability on peat was 35% lower than on mineral soil, and return to labour was also lower. This is in line with the cost of establishment and labour requirements. The cost of establishment of plantations on peat soil was higher than on mineral soil. Labour requirements for oil palm cultivation on peat soil were also higher: for establishing plantations on peat soil, 683 person-days per hectare were required, which is 4% higher than for mineral soil.

Palm oil production and profitability

Investment in palm oil processing is profitable. The NPV for a 15-year investment varied between USD 13.8 million and USD 102.9 million. Profit per ton of CPO production (plus kernels) varied between USD 43 and USD 164. Investment in palm oil processing is attractive. As long as FFB supply from markets can be secured, this investment is feasible.

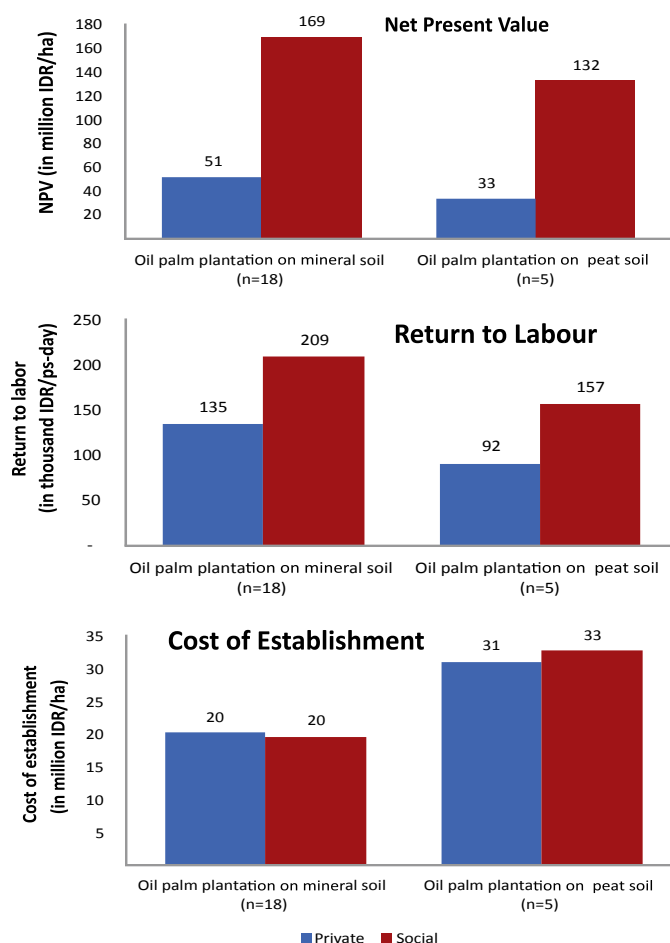


Figure 6. Profitability of oil palm cultivation on peat and mineral soils

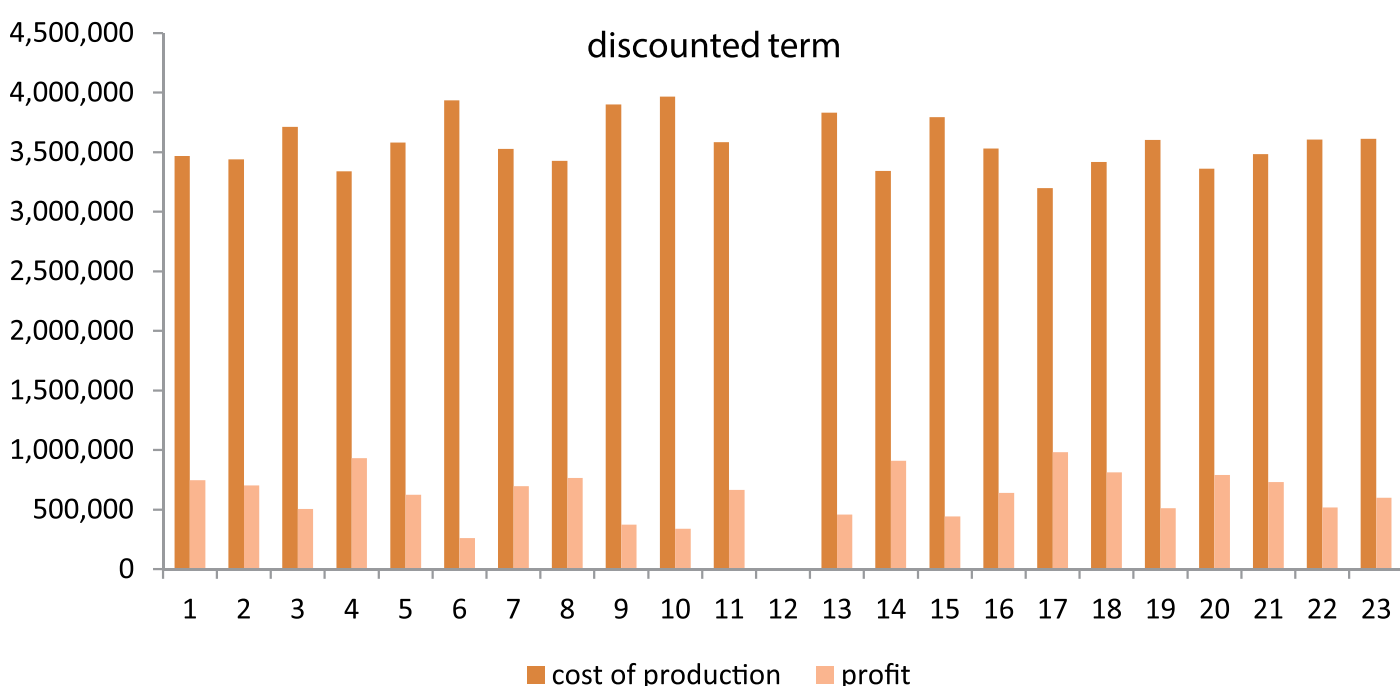


Figure 7. Cost of production (IDR/ton CPO plus kernels) and profit (IDR/ton CPO plus kernels) of palm oil



photo: Muhammad Sofiyuddin

Conclusion and recommendations

- Potential profitability (return to land/NPV at social prices) of the 23 sampled plantations varied between IDR 44 million and IDR 295 million per hectare. The measure of return to labour showed that oil palm cultivation can potentially provide returns to labour that are 2 to 7 times higher than the average agricultural wage rate (ranged IDR 60,000–IDR 260,000 per person per day).
- The profitability of oil palm on peat soil was 35% lower than on mineral soil, and return to labour was also lower on peat than on mineral soil.
- For palm oil processing, the NPV for a 15-year investment ranged USD 13.8 million–USD 102.9 million. Profit per ton of CPO production (plus kernels) varied between USD 43 and USD 164.

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