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Empowering Oil Palm Smallholder Farmers through Alternative Livelihoods

A Business Case Study of Beef Cattle Farming and Fish Cultivation in Central Kalimantan

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October 2018

Acknowledgements

This study has been made possible by the generous support of the Governments of Central Kalimantan, East Kotawaringin and Katingan Districts. We thank them for their partnership, support, and facilitation during data collecting, group discussions, and interviews. Special thanks to Ir. Cakra Birawa, M.P, Dean Faculty of Agriculture, University of Palangka Raya; Beef Cattle Farming Research Team: Dr. Ir. Heri Sujoko, M.Si, Dr. Ir. Asri Pudjirahaju, M.P, and Ria Anjalani, S.Pt, M.Si; and Fish Cultivation Research Team: Dr. Ir. Edison Harteman, Dr. Yulintine, S.Pi, M.Sc., and Suriansyah, S.Pi, M.Si.

We thank our partners, Dr. Ir. Yusurum Jagau, M.S. and Ari Hidayat Alda from PILAR Foundation.

We would like to thank our CPI colleagues: Dr. Suzanty Sitorus, Randy Rakhmadi for their review, Darianus Tarigan for facilitating engagement in Central Kalimantan; Elysha Davila, Caroline Dreyer, and Bhakti Nair for their communication support. Cover photo by Craig Morey.

Descriptors

Sector	Land Use
Region	Indonesia
Keywords	Land use, deforestation, palm oil, alternative livelihood
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About CPI

Climate Policy Initiative works to improve the most important energy and land use policies around the world, with a particular focus on finance. An independent organization supported in part by a grant from the Open Society Foundations, CPI works in places that provide the most potential for policy impact including Brazil, China, Europe, India, Indonesia, and the United States.

Our work helps nations grow while addressing increasingly scarce resources and climate risk. This is a complex challenge in which policy plays a crucial role.

About PALM

This paper is the first series of Alternative Livelihood studies to be conducted by CPI in Central Kalimantan, as a part of Production and Protection Approach to Landscape Management (PALM) project. In partnership with the University of Palangka Raya and PILAR Foundation, PALM project aims to make a significant contribution to the development and realization of Central Kalimantan's green growth strategy through transition towards sustainable oil palm production while protecting vital natural landscapes. This project is funded by Norwegian Agency for Development Cooperation (Norad) through Norway's International Climate and Forest Initiative (NICFI).



Summary

The oil palm sector is highly important in Central Kalimantan. It contributes nearly 21% to the province's gross domestic regional product (GDRP) and employs nearly half of the province's working population. Currently, smallholders own around 13% of the total oil palm plantations in the province and this will continue to expand: The Central Kalimantan government has indicated a mandate that smallholders manage 20% of plantations by 2020. However, smallholders are exposed to various risks that can affect their earnings.

Climate Policy Initiative (CPI) and the University of Palangka Raya and PILAR Foundation have developed an alternative livelihood research program that will not only help smallholder farmers secure alternative sources of income, but will also be scaled to businesses with the means to further grow the rural economy. This brief focuses on the business model aspects of two alternative livelihoods - cattle feed and fisheries - with application specifically to the East Kotawaringin and Katingan districts of Central Kalimantan.

I. Background

Smallholder farmers engaging in oil palm are critical to Central Kalimantan's economy

The majority of agricultural land in the province is planted with oil palm, in 2016 reaching 1.495 hectares (BPS, 2018) out of the 4 million hectares oil palm plantations concession (Central Kalimantan Plantation Office, 2017). While oil palm plantations continue to expand, there is a critical need to address deforestation, while ensuring the growth of Central Kalimantan's rural economy.

Within Central Kalimantan, the districts of Kotawaringin Timur, Kotawaringin Barat, and Seruyan are the largest producers of oil palm. However, Seruyan has the highest rate of poverty in the province (7.46%), followed by Kotawaringin Timur (6.24%) (BPS, 2018). The majority of the working population in these districts are oil palm farmers, but despite efforts to make their plantations highly productive and sustainable, they face climate-related and market

We find that both cattle feed and fisheries are feasible in conjunction with oil palm and offer high potential for increased, diversified incomes for smallholders. Cattle cultivation offers an attractive net profit of approximately IDR 2 million per month, which is close to the minimum provincial wage of IDR 2.4 million per month (Central Kalimantan Governor Decree No. 30/ 2017). However, cattle business requires high upfront investments, therefore, access to financing is necessary to maximize the profit obtained from the intended business size. It also requires more maintenance. Fish cultivation, on the other hand, requires relatively lower investment with less maintenance work than cattle. Tilapia, for example, only needs IDR 3.8 million investment for potential net profit of IDR 7.4 million per year within three harvest periods. These business models can both be scaled up in Central Kalimantan and beyond.

price risks, which affects their income. Therefore, finding alternative source of income will help to buffer against these risks.

Currently, approximately 13% of oil palm plantations in the Central Kalimantan region belong to smallholder farmers (Directorate General of Estate Crops, 2016). In East Kotawaringin, smallholder farmers hold 5% of the oil palm plantations. There, they produced approximately 13 thousand tons of fresh fruit bunches in 2015 (Statistics Indonesia, 2015). On the other hand, smallholders in Katingan hold about 20% of total oil palm plantations, but produced only about 6 thousand tons in 2015 since the age of the trees have not reached their peak productivity (Katingan Crop Estate Agency, 2015).

With the government mandate that requires 20% of oil palm plantations to be managed by smallholders, smallholders' plantation overall is expected to expand between now and 2020. Therefore, smallholder farmers' role will be more significant in the upcoming years, particularly in improving overall productivity

in the region and ensuring that produce is not sourced from deforested areas.

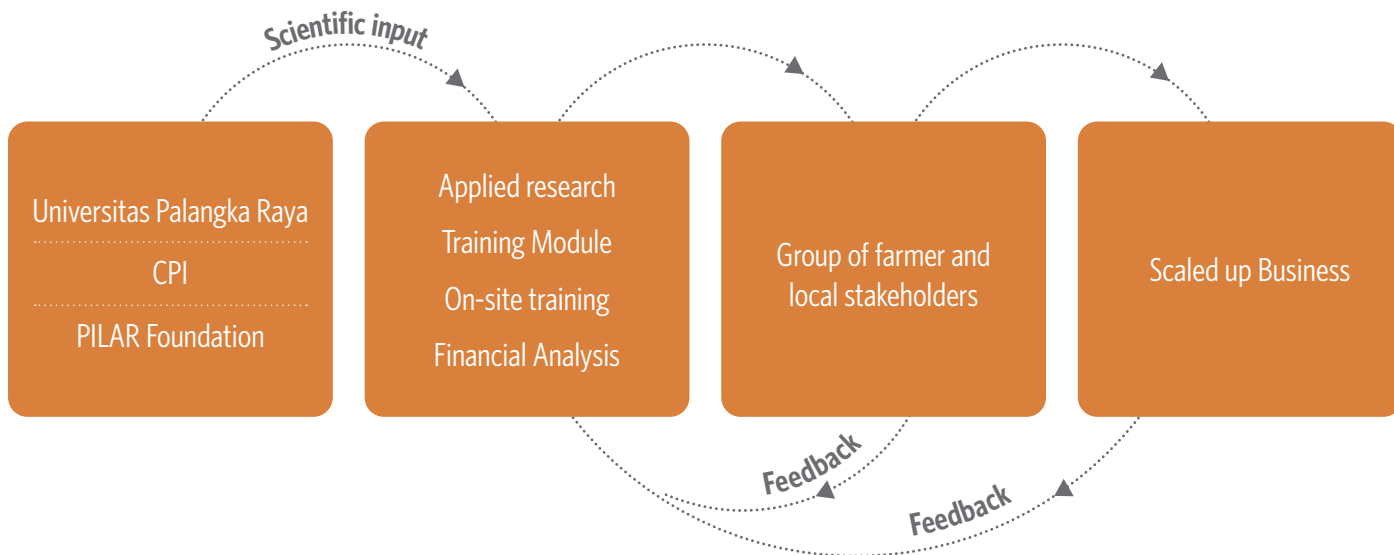
Smallholder farmers engaging in oil palm require alternative livelihoods

Long-term sustainability of smallholder-based economies requires smallholders to engage in alternative livelihoods for several reasons:

1. Without good agricultural practices, independent smallholders can only produce about half the yield that plasma farmers can (PILAR, 2015). The plasma business model allows smallholders to cooperate with a large company (nucleus). Plasma farmers benefit from technical assistance and high quality inputs (e.g fertilizer, pesticides), which independent smallholders lack. Therefore, it is difficult for smallholders to compete in regions dominated by the plasma business model.
2. Fresh fruit bunches are typically harvested approximately four years after planting, and do not reach peak productivity until after seven years, therefore smallholders struggle to sustain even basic livelihoods through oil palm alone.
3. Smallholders face several risks that can affect their earnings, including climate change, which can hinder the growth of their harvests.
4. Furthermore, prices are controlled by the mills and intermediaries, meaning that smallholders' earnings highly depend on the price given to them.
5. Smallholders also face a multitude of barriers related to land certificate ownership, access to quality seedlings, a lack of knowledge of good agricultural practices, access to organizational support, and access to finance. Efforts to improve productivity need to be coupled with teaching farmers how to secure alternative sources of income, especially during non-harvest season, when there is a poor harvest, or when there is price volatility.
6. Central Kalimantan has approximately 2.7 million hectares of peatland (INCAS, 2011), which naturally contains highly acidic soil and water (pH is about 3 to 6). Only oil palm is suitable to growing in this environment. It has thus been a challenge for rural dwellers to develop alternatives to oil palm growing.

About this study: Applied research for rural economy improvement

Figure 1. Framework of the alternative livelihood program



Researchers from the University of Palangka Raya (UPR) have assessed alternate livelihoods for farmers which would optimize land use and oil palm resources, increase their income, and, in turn, develop the local economy.

There are two alternative livelihood projects that have been developed by UPR’s researchers: ‘Utilization of Waste from Oil Palm Plantation for Cattle Feed’ and ‘Fish Cultivation in Oil Palm Plantation.’

The projects were piloted on a demonstration plot in Henda Village, near the province’s capital, Palangka Raya. Once the projects were deemed successful, the researchers developed alternative livelihood guidelines and training modules for smallholder farmers, which provided background information and simple steps that could be easily followed and replicated by smallholder farmers in their plantations. Training for farmers and extension service officers was then conducted by UPR researchers and PILAR Foundation. It was a two-way learning exercise with farmers providing feedback on the applicability of the alternative livelihoods being taught.

In this brief, CPI provides business analysis for both projects to help farmers understand investment needs and cash flow analysis to scale up these activities.

A focus on East Kotawaringin and Katingan

This research brief focuses on the East Kotawaringin and Katingan districts. East Kotawaringin was selected because the economic welfare of its farmers remains low, despite being the highest palm oil producer in Central Kalimantan, contributing approximately 40% to the province’s total production of fresh-fruit bunches (Statistics Indonesia, 2017). Katingan, however, was selected because it has the highest conservation area in Central Kalimantan, and, in the last decade, the number oil palm plantations have increased rapidly, including those belonging to smallholder farmers who could benefit from alternative sources of income.

Further, for the pilot livelihood projects, UPR’s partner, PILAR Foundation, engaged with the district governments’ agricultural office in order to select which villages to conduct the training in. Sampit (in Kotawaringin Timur) and Bapeang (in Katingan) were selected because they have active smallholder farmers’ groups.

II. Utilization of Waste from Oil Palm Plantation for Cattle Feed

The first potential alternative livelihood is utilization of waste cattle feed. Due to the availability of land and local feed resources in Central Kalimantan, livestock presents opportunities to generate additional income for farmers. Oil palm leaf, for example, is usually treated as plantation waste, but can be utilized for cattle feed. Research conducted by the agriculture department at Palangka Raya University found that oil palm leaf is suitable to substitute grass for feeding cows, and works best if combined with nutritive supplements, such as molasses or rice bran.

Research Intervention

Feed is the main determinant of beef cattle's physical growth, and, the more the cow weighs, the higher its productivity and value in the market will be. Using oil palm leaf as a substitute to grass is one way to overcome the difficulties in obtaining feed forage. The research team firstly studied the nutritional aspect of basic feed (grass, molase, etc) and oil palm leaf mixture for cattle feed. After the mixture was proven compatible and nutritionally suitable, the team then calculated the maximum ratio of oil palm leaf included in the feed and how this would affect the physical growth of the cattle and its economic value. The study also involves financial projections for five-years of cattle production, which provides a potential cashflow structure and a profitability analysis of the business.

Benefits

The study examined a cattle farm with six cows and a six months cultivation period. The research team learned that the most suitable proportion for feed is 20% of grass, 20% of rice bran, and 60% of palm leaf. With this mixture, the cattle's weight grows at the rate of 0.50 Kg per day during cultivation.

Initial weight	150 kg
Daily weight growth	0.50 kg/day
Final weight	240 kg

Challenges

Several challenges persist for cattle cultivation, particularly related to the capital needs and the operational costs within the cultivation period.

- **High initial capital**

Cattle farming requires high initial capital, particularly in obtaining calves and establishing the cowshed. Total investment cost for the cattle alone amounted to IDR70 million, more than half of the total initial cost. Our financial projection includes analysis of financing access for small and medium businesses to cover high capital needs.

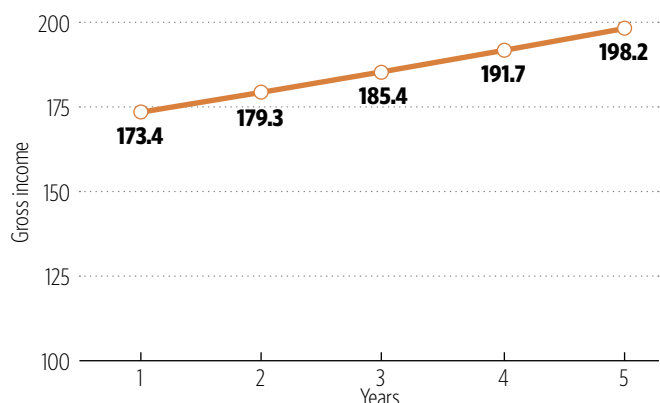
- **Price volatility and market demand**

This includes the cost of obtaining the calves and their selling price. Since most calves are obtained from outside Central Kalimantan, transports cost and the availability of calves greatly affect the price per kg for the farmers. Also, Central Kalimantan beef consumption is lower than national average consumption. Factors that lead to beef consumption in the province are unknown, thus providing uncertainty for cattle business in the region. Our financial projection provided a moderate selling price per/kg for the cattle production.

- **Sustainability of feed supply**

Securing a continuous supply of a grass variant that has more nutrition for the cattle feed mix is a challenge, because it typically needs to be sourced from outside of the region. Changes to grass transport cost will affect daily feed cost, thus affecting profitability.

Figure 2. Total annual gross income for a five-year period (IDR Million)



Business Analysis

Figure 2 describes the annual gross income over a five-year period for the six-month cultivation of six cows. The numbers have accounted for a 3.5% annual inflation rate. The assumptions used for the small and medium business loans are: an annual interest rate of 7%; credit proportion of 90% from total investment cost; and, financing tenor of five years using an annuity scheme.

Figure 3 shows the investment need for the cattle farm. The calves, feed, and labor investment needs are for one cultivation period for six cows. We assume that the cowshed and equipment will depreciate in five years. The smallholders need to prepare capital of IDR 8.9 million, which accounts for 10% of the total investment need. The remaining investment need (90%) would be covered by a bank loan. The loan installment would be IDR 1,591,856 for 60 months period.

Based on our projection, smallholders could earn approximately IDR 2 million every month from cattle

Figure 3. Investment Need For Cattle Farm (IDR Million)

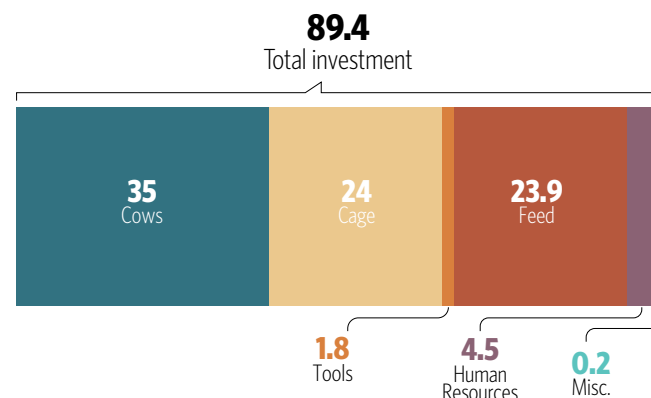
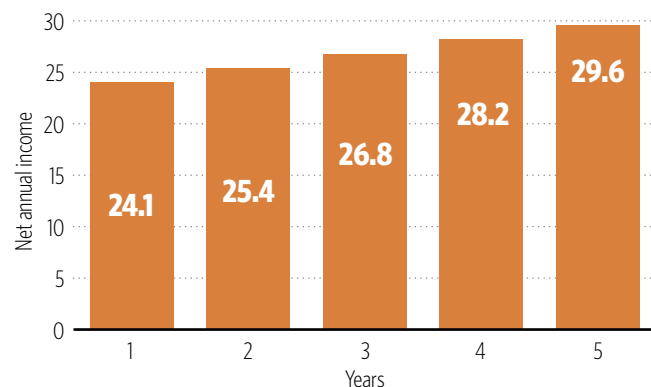


Figure 4. Total annual net income for 5 years period (in IDR million)



farming. Figure 4 provides the annual net income for the five-year period.

The annual net income ranges from IDR 24 million in the first year to IDR 29.6 million after five years. The figure accounts for loan repayment and cash balance after deducted investment and operational costs.

Recommendation

Based on our analysis and financial projection, cattle farming is a sound alternative livelihood for smallholders, which also provides an effective use of oil palm leaf that would otherwise be discarded. The internal rate of return for the business is 274.4%, making it a very profitable business. While the equity from smallholders can be recovered within one year of operation, the overall success of the business depends on whether smallholders can access financing from banks, due to high investment cost requirements for capital expenditures. Furthermore, external factors, especially beef demand, remains a key challenge that could affect profitability of the business.

III. Optimization of Oil Palm Plantation Area for Fish Cultivation

Fish cultivation is the second alternative livelihood option that we studied in Central Kalimantan. Fish cultivation does not require dedicated land, because ponds can be installed within the palm oil plantation area. With minimal equipment and relatively easy maintenance, our research demonstrates that fish cultivation can support oil palm farmers during non-productive seasons.

Research Intervention

The main component of fish cultivation is the water. The water in Central Kalimantan contains high acidity due to the peatland. Because of this, farmers are required to continuously monitor the acidity level of the fish pond, and use calcium carbonate to modify its acidity level. The study involves a financial projection for one year of cultivation, resulting in a potential cashflow structure and profitability analysis for the business.

Benefits

The study examined the cultivation of silver catfish and tilapia for one year, looking at three harvest periods for tilapia and two harvest periods for silver catfish. Feed provision is different for every fish. The comparison of feed for tilapia and silver catfish is:

Tilapia	3% of total weight
Silver catfish	<ul style="list-style-type: none"> • Month 1 - 4: 4% of total weight • Month 5 - 6: 2% of total weight

The pond capacity for tilapia is 20 fish per/m², and 1000 fish/m² for silver catfish. The harvest period for tilapia is four months, with a final weight between 200 - 205 grams per fish. As for silver catfish, the harvest period is six months, with a final weight between 250 - 300 grams per fish.

Challenges

There are several challenges in fish cultivation, particularly with profitability and the operational costs during the cultivation period.

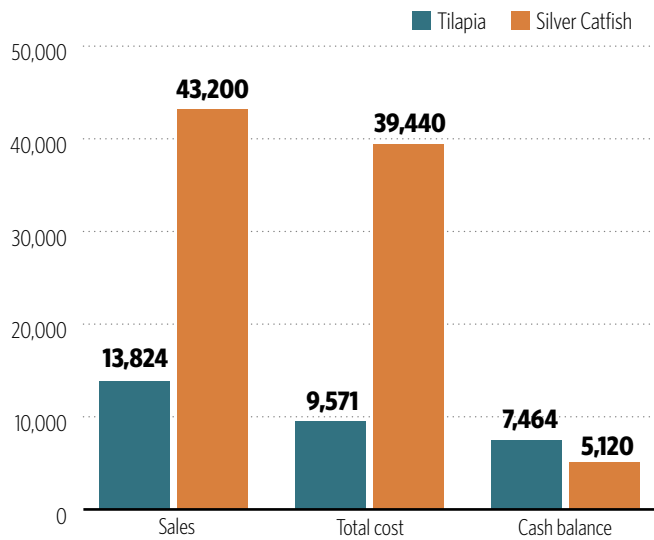
- **Price volatility and market demand**

Both tilapia and silver catfish are widely consumed in Central Kalimantan, although silver catfish has greater popularity among local people. However, the price of fish is volatile and highly driven by market conditions. Price drops can significantly impact farmers' profitability.

- **Survival rate**

During fish cultivation, the survival rate can vary greatly, affecting the harvest outcome. Our calculation of an 80% survival rate is still profitable for the farmers. Fish survival rate can be improved by proper maintenance of the fish pond. This include changing the tarpaulin regularly, and ensuring proper levels of water supply and pH balance.

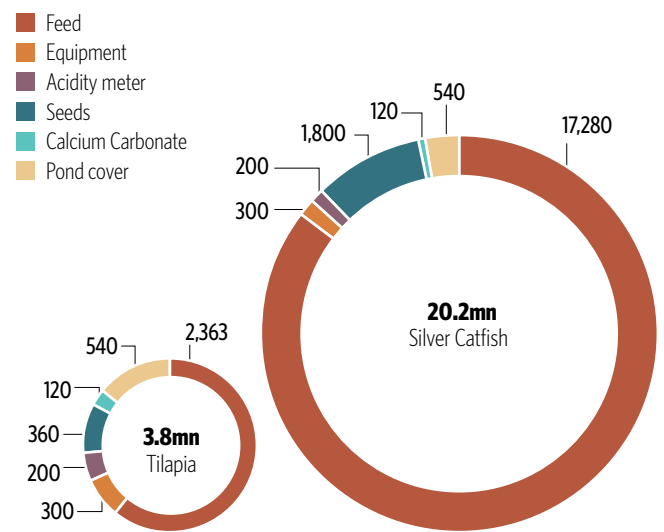
Figure 5. Profitability Comparison



Business Analysis

Figure 5 illustrates the annual sales cost and year-end cash balance in a one-year period. Silver catfish have more costs than tilapia, but greater productivity due to more fish/m2. The harvest period for tilapia is four months, and six months for silver catfish. The numbers have accounted for an 80% survival rate for every harvesting period. Despite greater costs and longer harvest periods, silver catfish still present possible profit sources for farmers, although not as much as tilapia. The harvest periods for the fish can be matched with palm oil’s harvest period.

Figure 6. Investment Need for Fish Cultivation



Our analysis suggests that at the end of year, the farmers could obtain net profit of IDR 7.4 million for tilapia and IDR 5.1 million for silver catfish.

Figure 6 shows total investment needs. Total investment need for tilapia is IDR 3.8 million, and IDR 20.2 million for silver catfish. The large investment need gap between the two fish is due to the bigger capacity requirement and longer harvest period for silver catfish, resulting in high investment needs to purchase seeds and feed. The cost for equipment is not significant compared to seeds and feed provision.

Recommendation

Based on our analysis and financial projection, fish cultivation provides adequate alternative livelihoods for smallholders, with lower investment needs than cattle farms. The equity from smallholders can be recovered within the first harvest period. However, the success of the business depends on the price volatility of the fish in the market, inflated feed price, and survival rate during cultivation. The farmers are also required to continuously monitor the quality of the water in the fish pond to increase survival rate.

Conclusion

Alternative livelihood activities that optimize oil palm land and agricultural outputs not only provide smallholder farmers with significant opportunities to earn additional income, but also have economic and environmental benefits for the rural and peat areas of Central Kalimantan. The alternative livelihood options examined in this study, cattle farming and fish cultivation, present other options for oil palm agriculture beyond oil palm fruit bunches in the existing plantation areas.

Our findings include:

- Cattle cultivation offers an attractive net profit of approximately IDR 2 million per month, which is close to the minimum provincial wage of IDR 2.4 million per month (Central Kalimantan Governor Decree No. 30/ 2017). Cattle cultivation, however, requires high upfront investment, therefore, access to financing is necessary to maximize the profit obtained from the intended business size. More maintenance is required in cattle businesses than fish cultivation, particularly

in maintaining the quality of the feed and cleaning the cowshed.

- Fish cultivation requires relatively lower investment with less maintenance work than cattle farming. Tilapia cultivation only requires IDR 3.8 million investment for a potential net profit of IDR 7.4 million per year with three harvest periods. Silver catfish is a less beneficial alternative to tilapia because it requires much greater investment and lower rate of return.

In conclusion, our research finds that waste from palm oil plantations can be utilized for cattle feed, and that fish cultivation in the peatland water is feasible. Our financial analysis indicates that the two alternative livelihood options have high potential to be developed into micro-to-small scale business for oil palm smallholder farmers, especially in Central Kalimantan where demand for beef and fish is high. This business model has a high potential for replication in other areas in Central Kalimantan and beyond, particularly where similar natural and market conditions exist.

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