



ECONOMIC BEHAVIOUR AND WELFARE ATTAINMENT OF INDEPENDENT SMALLHOLDER OIL PALM HOUSEHOLDS IN MUSI RAWAS REGENCY

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ABSTRACT

This research examines the economic behaviour of independent oil palm smallholders in fulfilling household expenditures from all their income sources and their level of welfare at present and the stability in the future. The income of oil palm smallholders in Megang Sakti District, Musi Rawas Regency, was IDR 24,731,506 per hectare per year. The total income of the farm household was IDR 43,614,839 per year, which was contributed by the oil palm plantation, the non-oil palm plantation, and non-farming productive activities. All household expenditures could be covered by all existing sources of income, and the net future income will increase as the oil palm plantation enters productive age periods. It has been revealed that oil palm plantations operated by independent smallholders present significant opportunities for economic growth and rural development, but they raise challenges related to sustainability, market access, and social equity. The independent oil palm farmers are recommended to (1) form an independent farmer institution and implement proper and sustainable institution management and (2) submit a proposal to the Oil Palm Plantation Fund Management Agency (BPDPKS) and other financial institutions to demand a grant or get a loan at an affordable interest rate for financing their future business activities. Furthermore, there are ten practical actions that can be implemented by the independent oil palm smallholders.

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INTRODUCTION

Oil palm plantations in Indonesia have been developed in three patterns, namely Large States, Large Privates, and Smallholders. The large state plantations belong to and are operated by the government companies, the large private plantations belong to and are managed by private companies, while the smallholder



plantations are owned by plasma or independent farmers. The oil palm plantations can be cultivated by the farmers in partnership with companies in the form of plasma, or by independent farmers who can operate the plantations (Lifianthi et al., 2018). In other words, independent palm oil farmers are farmers who manage their palm oil farming business independently, both in meeting capital needs, managing the farming business, and selling their products (Lestari et al, 2025).

The smallholder oil palm plantations in Indonesia, as presented in Table 1, occupy the second place (42,29%) with a balanced proportion between plasma and independent plantations. The first area size occupation held by the private large plantations (54. 08%), and the third by the state-owned plantations (3,63 %).

Table 1. Areal of Oil Palm Plantations and CPO Prodction in Indonesia, 2023

Oil Palm Plantation	Estate Areal (ha)	Proportion (%)	Production (Ton CPO)	Proportion (%)	CPO Yield (Ton/ha)
Smallholder	6,736,516	42.29	16,223,443	34.45	2.41
Large State	577,937	3.63	2,197,217	4.65	3.80
Large Private	8,614,259	54.08	28,663,639	60.90	3.33
Total	15,928,712	100.00	47,084,299	100.00	-

Source: Directorate General of Plantations (2023)

In terms of production contributions, smallholder oil palm plantations are also in second place (34.45%), below the contribution of large private production (60.90%). However, its productivity in the form of crude palm oil (CPO) is 2.41 tons per Ha, showing the lowest position compared to large private plantation productivity (3.33 tons per Ha), even much lower than the productivity of the large state plantation at 3.80 tons per Ha.

The majority of independent oil palm smallholders have difficulty accessing financial capital, superior seed, and business legality status, as well as a lack of implementation of good agricultural practices and a weak market bargaining position (Candra et al., 2021). On the other side, they still continue managing the plantations as the main source of household livelihoods, although their FFB sales depend on stronger merchants or oil palm mills. Indeed, they were recommended to collaborate with oil palm mills even though the FFB production and quality are lower compared to that of the plasma farmers (Lifianthi et al., 2018). Until recently, the independent oil palm farmers still earned income from selling FFB from the plantation as the main source of their economic livelihood.

In such a context, it is important to understand the performance of production and income versus consumption and expenditure in palm plantation households, as well as how both conditions relate to the attainment of household welfare. This understanding can be used as a basis for formulating a strategy of increasing productivity and sustainability of oil palm plantation business by independent smallholders, especially in the Musi Rawas Regency, which is one of the centers of the palm plantations of the people in South Sumatra.

South Sumatra Province is the fifth-ranked oil palm plantation region in Indonesia, with a size of 1,268,200 Ha in 2024, and about 113.849 Ha is cultivated in Musi Rawas Regency as one of the production centers in the province. About 522.247 Ha (41.18%) of the total area of plantations in the province is managed by

independent smallholder farmers, while from the total area in Musi Rawas Regency, around 59.950 hectares (52.66%) are also operated by independent smallholder farmers. Therefore, it is relevant to carry out the research on the site of independent oil palm smallholders in the Regency.

Based on the above descriptions, the objectives of this study are (1) to analyze the structure of income and expenditure on food and non-food items of independent smallholder households, (2) to determine the welfare level of independent farmers' households at present and its implications for the future

RESEARCH METHOD

The technique used in farmer sampling is simple random because all of the population of independent oil palm farmers in two villages, namely Jajaran (63 farmers) and Ciptodadi (428 farmers), in Megang Sakti District. The total number of samples selected is 100 independent oil palm farmers, or 50 farmers from each village. The samples are expected to represent the total population of independent oil palm farmers in Musi Rawas Regency. Annual 2023 household primary data are collected about FFB production and its prices, inputs used and the costs, household income from other productive activities, and consumption and non-consumption expenditures. The same period of secondary data is also taken from the Central Bureau of Statistics (CBS) of Musi Rawas Regency concerning the average income of the Regency population based on registered main jobs. The data were analyzed using a basic household income model and the Engel's ratio approach to assess welfare conditions backed up by average income based on registered main jobs. Some of the relevant formulations are the following:

$$\pi = TR - TC.....(1)$$

Note: π = Farm income (IDR/year); TR = Farm income (IDR/year); and TC = Total farm costs (IDR/year)

Furthermore, referring to the analysis of the income structure, the analysis of the income structure of farmer households can be formulated with the following formula:

$$Y_{rt} = A + B.....(2)$$

and equation (2) then expanded become:

$$Y_{rt} = A + (B_1 + B_2).....(3)$$

Note: Y_{rt} = Household income (IDR/year); A = Main Household Income (IDR/year); B = Other Income (IDR/year); A1 = Oil Palm Farming Income (IDR/year); B1 = Non-oil Palm farming income (IDR/year) ; and B2 = Off-Farm Income (IDR/year)

Answering the second objective is to analyze the level of household welfare of independent oil palm farmers through the household needs expenditure calculation approach using the following equation model:

$$C_t = C_a + C_b.....(4)$$

Note: Ct = Total Household Expenditure (IDR/year); Ca = Food Consumption Expenditure (IDR/year); and Cb = Non-Food Consumption Expenditure (IDR/year)

$$PKP = \frac{PP}{(PP + PNP)} \times 100\%.....(5)$$

Proportion of non-food consumption (PKNP), which is the result of the comparison between non-food expenditure and total consumption expenditure (food and non-food), with the formula:

$$PKNP = \frac{PNP}{(PP + PNP)} \times 100\%.....(6)$$

Note: PKP = Proportion of food expenditure (%); PKNP = Proportion of non-food expenditure (%); PP = Expenditure on food (IDR); and PNP = Expenditure on non-food (IDR)

RESULT AND DISCUSSION

Characteristics of Independent Oil Palm Smallholder Farmers

Table 2 shows several relevant characteristics of the independent smallholder farmers who manage oil palm plantations in Megang Sakti District. It is known that, on average, the farmers are still at a productive age of 42.50 years in managing oil palm plantations when the trees reach the planting age of 11.25 years. The size of plantation land owned by the farmers on average is only 2.69 Ha, which does not have legal property status yet. Since the plantation maintenance have been done not intensive enough, the average FFB yield of 7,313 Kg/Ha per year does not reach the corresponding amount normal productivity which can achieve around 11,000 kg per Ha per year (Candra, 2021), even can attain more than 17,000 kg per Ha when the farmer uses superior seed and recommended fertilizers as well as good maintenance (Syahza et al, 2023). However, the income proportion from the oil palm plantation contributes 56.7 % to the total income of independent smallholder households. The detailed phenomenon of income will be described later on.

Table 2. Characteristics of Sample Smallholder Farmers of Oil Palm, 2023

No.	Characteristics	Unit	Mean	Stand_dev
1.	Age	Year	42.50	4.53
2.	Education	Year	7.72	2.03
3.	Oil Palm Farming Experience	Year	11.56	2.76
4.	Oil Plam Land Owned	Ha	2.69	0.44
5.	Oil Palm Planting Age	Year	11.25	3.24
6.	FFB Yield	Kg/Ha/Year	7,313	2,234
7.	Oil Palm Proportion Income	%	56.70	2.42

Income and Households Income Structure

The income of respondent farmer from oil palm farming is calculated based on the revenue earned from FFB sold deducted by the production costs incurred by oil

palm respondent farmers (Bagio et al., 2020). In addition to income calculation from oil palm farming, household income structure will be added by income from agriculture business of non-oil palm farming and from activities outside agriculture (Susilawati et al., 2022). By measuring the average income of all respondent farmers, we will know the farm households level of welfare when the average total household income is compared with average total food and non-food expenditure in their households.

Revenue of Independent Oil Palm Respondent Farmers

Oil palm farming revenue is obtained from the multiplication of selling price and the amount FFB produced. The higher (or lower) the selling price and the production of FFB, the greater (or smaller) the revenue earned by farmers.

Table 3. Average Revenue of Independent Oil Palm Respondent Farmers, 2023

No	Description	Amount
1	FFB Production (Kg)	19,671
2	Selling price (IDR)	1,975
3	Revenue (IDR)	38,850,225

The average production of oil palm of independent smallholders is 19,671 kilograms per hectare per year, and the average selling price of FFB is IDR 1,975 per kilogram; then the revenue obtained by respondent farmers is IDR 8,850,225 per hectare per year.

Production Costs and Income of Oil Palm Respondent Farmers

Production Cost of Oil Palm Farming

Production costs are costs incurred by respondent farmers for their palm oil farming activities. Total production costs are the sum of fixed costs plus variable costs. In this study, detailed data on the total production costs of oil palm farming can be seen in Table 4.

Table 4. Average Production Costs of Independent Oil Palm Respondent Farmers, 2023

No	Description	Value (IDR)	Proportion (%)
1	Fixed Cost	220,565	15.62
2	Variable Cost	13,898,154	84.48
	Total	14,118,719	100.00

The value of fixed costs at oil palm smallholder farms in Megang Sakti Sub-district is calculated based on the cost of depreciation of farming tools in a year, with the amount of 15.62 % per cultivated area per year. The largest fixed cost is a handsprayer of IDR 56,500 per cultivated area per year, while the smallest is a gancu of IDR 7,565 per cultivated area per year. The variable costs include fertilizers, pesticides, and labor. The largest variable cost of oil palm farming is the cost of labor which was IDR 8,240,000, - or 59.29 percent per cultivated area which was spent for maintenance and harvesting activities (Lestari et al., 2015) which was also mentioned

in the research by (Haykal & Yunus, 2021) in Aceh Province, and the smallest variable cost is the cost of pesticides which is IDR 690,850, or 4.97 percent per cultivated area.

Oil Palm Farming Income

Income is the result of revenue minus production costs. In this study, the income in question is the independent oil palm farm income received by farmers. On the other hand, production costs are expenses incurred by farmers to carry out their farming activities, which consist of fixed costs (hoes, machetes, dodos, slashing machines, egrek, gancu, handsprayer and thrust) and variable costs (fertilizers, pesticides and labor wages). The average income received by oil palm farmers is presented in Table 5.

Table 5. Average Income of Independent Oil Palm Respondent Farmers, 2023

No.	Description	Value (IDR)
1.	Revenue (IDR)	38,850,225
2.	Production Cost (IDR)	14,118,719
3.	Income (IDR)	24,731,506

The average income, as shown in Tabel 5, from oil palm smallholder farming by independent farmers is IDR 24,731,506 per hectare per year. Although FFB (*fresh fruit bunch*) yields produced by independent oil palm farmers in Megang Sakti Subdistrict is still relatively young, the net farm income is slightly higher compare to the average net income (IDR 20,698,848), for the same unit and similar range of plantation age, which earned by independent smallholder farmers in North Barito Regency, Central Kalimantan as researched by (Fahmi et al., 2023).

Income Structure of Independent Oil Palm Respondent Farmers

The income structure in this study, obtained by respondent farmers, includes oil palm farming income, which is the main source of income, and then added to farm income outside oil palm farming and non-farm income. The results of the research in Megang Sakti Sub-District showed that respondent farmers obtained income outside oil palm farming from rubber commodity farming, while non-farm income was obtained from work as farm labourers and traders. Side jobs carried out by independent oil palm farmers are based on their ability to run the business. When viewed in terms of optimal labor productivity, it will produce the highest labour productivity and the highest income from the combination of both, the acquisition of a combination of oil palm farm income and non-farm income, which is also revealed by Andriani (2017). Megang Sakti Sub-District itself is known as one of the oil palm production center in Musi Rawas Regency, which is promising enough in increasing the income of local oil palm farm households, as indicated by the research by Utomo & Siddiq (2024) in three Sub-Districts in Musi Rawas Utara Regency, namely Karang Dapo, Rawas Ilir, and Nibung, which are located just next to Megang Sakti.

(Udoh et al., 2017) Explained that the number of large family members has a tendency to diversify livelihoods. The diversification can be in the form of economic activities outside the agricultural sector. For independent farmers, their main priority is to be able to continue their lives, because there are still many needs that must be met in the households. The higher the level of household income, the smaller the

proportion of expenditure on food to all household expenditure. In other words, it can be said that households/families will be more prosperous if the percentage of expenditure on food is much smaller than the percentage of expenditure on non-food (Gai et al., 2020). The income of farmer household members and farmer consumption has a unidirectional relationship due to the increase in household member income, motivating people to eat large amounts of food of good quality, so that the prosperity of farmers has increased (Yanti et al., 2022).

As can be seen in the Table 5, with a yearly total income of IDR43,614,839, from three main sources, each independent oil palm household on average earned an income of IDR 3,634,569.92 per month. If they only rely on oil palm farming income alone, their monthly income is getting smaller; therefore, they increase their income by working at other farm business and at non-agriculture activities to meet their household needs, while oil palm farming is still their main household business (Hakim, 2018; Bagio et al., 2020).

Table 6. Average Yearly Income of Independent Oil Palm Farmers, 2023

No	Description	Value (IDR)	Proportion (%)
1	Oil Palm Farming	24,731,506	56.70
2	Farming Outside of Oil Palm	16,463,333	37.75
3	Non Farming	2,420,000	5.55
Total		43,614,839	100.00

Table 6 reveals that with an average monthly income of IDR 2,060,958.83 only from oil palm farms, which account for 56.70% of the total income from all sources, the independent oil palm farmers in 2023 were in the same position as the group residents with an average income in Musi Rawas Regency. That position is almost equal to group residents whose' source of income from agriculture, forestry, and fishery is the average income of IDR2,057,208.85, code 1 of source of income in Table 7. The income level is also equivalent to the average incomes of 17 or all sources of income of the population in the regency, as shown in the same table, although lower than the income of RSPO-certified independent farm households that earned IDR2,594,676/ha/month in the same regency (Nugroho et al., 2024).

However, by utilizing free time available, the independent farmers seek for other jobs like working at rubber farms as tappers, at other farms, as traders or at other off farms. Therefore, their total income increases to IDR3,634,570 as the code of jobs zero written in Table 6. Compared to secondary data from the year 2023 collected from the Central Bureau of Statistics (CBS) of Musi Rawas 2024, it is shown that the total income of independent oil palm households on average is higher than the average income of other households working in different sectors. The achievement level is also higher than the South Sumatra regional minimum wage at IDR 3,404,177, showing similar conditions as have been revealed by Chalil (2024) for South Sumatra Province.

Household Welfare Level of Independent Oil Palm Farmers

Magbondé et al. (2024) categorized total expenditure into two groups, namely expenditure on food and non-food. The proportion between food and non-food expenditures is also used as an indicator to determine the level of household welfare or food security. The proportion of food expenditure can be expressed as the higher

the proportion of food expenditure, the lower the level of household welfare or food security, and vice versa (Sobari et al., 2022). The expenditure of respondent farmer households in Megang Sakti District is grouped into two, namely expenditure on food and non-food. Food expenditure is a food arrangement that includes the type and amount of food within a certain period of time. Furthermore, Riswani et al. (2017) stated that household consumption expenditure is also affected when there is a decline in FFB prices, which makes respondent farmers save on consumption expenditure, both food and non-food expenditure.

The accumulated calculation of average household consumption expenditure was made over a one-year period. Food expenditure consists of grains, tubers, fish, meat, eggs, milk, vegetables, nuts, fruits, oil and fats, beverage ingredients, seasonings, processed food and beverages, tobacco and betel nut, and other food and beverages such as noodles or alcohol. Non-food expenditure is the cost of farmers' expenditure in buying non-food items for the household. Non-food expenditure consists of clothing, education, care and health, housing maintenance, toiletries, recreation, communication, durable commodities such as refrigerators and washing machines, taxes and insurance, transportation, and savings. Household expenditure is divided into two, namely for food consumption and non-food consumption. The amount of food, both alone and in variety, which is consumed alone or in groups with the aim of fulfilling physical, psychological, and sociological needs, is called food (Mayuri et al., 2021; Hayat et al., 2023). More clearly, the household expenditure structure of oil palm respondent farmers can be seen in Table 7.

Table 7. shows that the food consumption of respondent farmers amounts to IDR 18,057,010 per year, which includes spending for rice, flour, vegetables, fruits, vegetable oil and other consumption, while expenses on non-food consumption amount to IDR 16,929,700 per year. The third largest expenditure on food needs is tobacco and betel nut, in terms of farmers always consuming at least one to two packs of cigarettes per day, by 5.20 percent. Meanwhile, for non-food consumption, expenditure is for savings of 14.86 percent, which shows that independent oil palm respondent farmers can still set aside the income earned from activities carried out to be saved. The next large allocation of non-food consumption expenditure is on housing and household facilities at 6.55 percent. Based on the calculation, the resulting food consumption pattern for independent oil palm respondent farmer households is 51.61 percent and for non-food consumption expenditures of 48.39 percent. This composition was similar to the results of the study by Candra et al. (2021), which found that 51.11% independent smallholder oil palm farmers in Riau Province have more food expenditure than non-food. The research by Miranti et al. (2016) concluded that food consumption has a greater proportion than the proportion of non-food consumption expenditures.

Table 7. Average Income of Musi Rawas Regency Population Based on Registered Main Jobs, 2023

Main Jobs Code	Description of Main Jobs	Average Income (IDR/Month)
0	Independent Oil Palm Household	3,634,569.92
1	Agriculture, Forestry and Fishery	2,057,208.85
2	Mining and Quarrying	3,729,274.78
3	Manufacturing	2,008,329.49
6	Construction	2,318,819.84
7	Wholesale and Retail Trade	1,906,271.72
8	Transportation and Storage	2,687,489.21
9	Accommodation and Food Service Activities	912,773.63
10	Information and Communication	2,000,000.00
11	Financial and Insurance Activities	2,705,213.95
13	Professional and Business Activities	2,125,798.53
14	Public Administration; Defense and Compulsory Social Security	3,190,038.60
15	Education	2,326,690.27
16	Human Health and Social Work Activities	1,054,568.15
17	Other Services Activities	1,512,009.61
Average Income		2,089,957.06

Source: Central Bureau of Statistics Musi Rawas Regency (2024)

The proportion tends to show that independent oil palm respondent farmer households use part of their income for food consumption. In line with what Forgenie et al. (2024) explain, if the value of the proportion of expenditure for food consumption is getting smaller, then the level of household welfare is said to be getting better. This is evidenced by the ability of farmer households to meet their needs not only for food needs, but also for non-food needs such as education, transportation, health, social gatherings (arisan) and so on.

The proportion of food consumption in Megang Sakti Sub-district is slightly greater than the proportion of non-food consumption. This proportion still indicates that independent smallholder households in this research area were prosperous. This is in accordance with the findings of (Prasetyoningrum et al., 2017), that household expenditure can be a measure of income earned, which means that the sufficient coverage of the expenditure on food indicates a more prosperous life for the household. Welfare is defined as the family's ability to fulfil all the needs to live a decent, healthy, and productive life (Lalita et al., 2019). Praza & Shamadiyah (2020) explained that the increasing value of expenditure proportion on food consumption is an indication of farmer household capabilities to easily access both physically and economically safe and nutritious food for the family members, which then directs them to become prosperous. Furthermore, Setyawan et al. (2020) concluded that smallholder oil palm farm households have gained their welfare by achieving the consumption needs of all family members, owning savings for the future, owning valuable and durable goods, providing social assistance and having permanent homeownership. Following Engel's ratio approach in assessing welfare conditions

of the independent oil palm smallholder households, it is revealed that the average total income of independent smallholders was higher, IDR 8.65 million, than their total expenditure, and the proportion of food expenditure (51.61%) was only slightly higher than that of the non-food expenditure (48.39%). When the ratio calculation is applied to the total income, it will become 41.40%, which means the smallholders have relatively attained prosperity.

Table 8. Household Expenditure Structure of Independent Oil Palm Respondent Farmers, 2023

No.	Expenditure Type	Average cost (IDR)	Proportion (%)
A	Food	18,057,010	51.61
1.	Grains	4,500,000	12.86
2.	Tubers	84,298	0.24
3.	Fish/shrimp/squid/shellfish	1,350,000	3.86
4.	Meat	1,650,000	4.72
5.	Egg and milk	3,042,000	3.01
6.	Vegetables	1,050,000	8.70
7.	Nuts	312,000	0.89
8.	Fruits	710,000	2.03
9.	Oils and Fats	1,255,000	3.59
10.	Beverages	690,000	1.97
11.	Spices	445,000	1.27
12.	Ready-to-eat Food and Beverages	509,000	1.45
13.	Tobacco and Betel	1,821,000	5.20
14.	Other Consumption	637,712	1.82
B	Non-Food	16,929,700	48.39
1.	Housing and Households Facilities	2,292,000	6.55
2.	Toiletries	1,600,000	4.57
3.	Transportation Costs	1,340,000	3.83
4.	Health	934,000	2.67
5.	Education	2,070,000	5.92
6.	Clothing	724,000	2.07
7.	Durable Commodities	592,000	1.69
8.	Taxes, levies and Insurance	1,750,000	5.01
9.	Recreation/Entertainment	427,700	1.22
10.	Savings	5,200,000	14.86
	Total Expenditure	34,986,710	100.00

In their new research, Purba et al. (2024) have combined a strategy of improving the internal weaknesses of independent smallholder farmers with the availability of opportunities in order to increase their household welfare. The strategy is to apply for funding assistance from the Oil Palm Plantation Fund Management Agency, with the short version of Indonesian names (BPDPKS) for buying superior oil palm seeds, replanting the plantations, financing for oil palm worker training, investing in collaborative palm oil mills development, and other productive activities. Furthermore, research by Chalil et al. (2019) reveals that RSPO

certification on smallholder oil palm plantations has the impact of increasing income as a result of production, selling price and cost of production improvements, meaning that the certification should be seriously carried out by the independent smallholders in order to achieve sustainable oil palm farming business.

CONCLUSION

It can be conclude from this research that each independent oil palm smallholders in Megang Sakti District, Musi Rawas Regency, with the age of the plants ranging 6 to 15 years, earns IDR 24,731,506 per hectare per year. The total household income structure is IDR 43,614,839 per year, with contribution from the oil farm farming is 56.70 percent, farming other than oil palm 37.75 percent and from outside farming 5.55 percent. Every smallholder household earn an income of IDR 3,674,570 per month, that higher than average income of other households working at different sectors in the Musi Rawas Regency in 2023. All household expenditures could be covered by all existing sources of income, and the net future income will increase as the oil palm plantation enters productive age periods.

Independent oil palm smallholder farming is quite promising for future business type of development, but it is faced with challenges that must be overcome. The short-run policies focused on improving market access, promoting technology, ensuring land rights, and providing climate-resilient farming practices are essential. Other policy and implemented action suggested urgently to carried out are strengthening bargaining position of independent smallholder oil palm farmers through organization such as forming cooperatives and start leveraging business cooperation with mills, upgrading quality by getting ISPO certification, get involve in training for productivity and production efficiency, and get access to affordable credit and apply for replanting program from government agent (BPDPKS).

Moreover, for improving the income stability of independent oil palm farmers for their long-term financial security, some other actions suggested to be implemented are promoting practices like waste recycling palm kernel cake for energy production, reducing land-use changes, and preventing deforestation. improve financial literacy for smallholder farmers by providing training on financial management, budgeting, and saving to help them better manage their income and save for future challenges. Finally, there should be capacity building about (a) skill training of long-term financial planning for the cooperatives by teaching cooperative management and co-operators how to plan financially, manage cash flow, and reinvest in their farms for sustained growth, and (b) leadership development by providing leadership and business skills training to farmer groups so they can better manage cooperatives, improve their advocacy, and make informed decisions.

AUTHOR CONTRIBUTION STATEMENT

[Author 1] research designed, methodology design and writing the initial manuscript; [Author 2] research supervision, analytical validation, review & editing the manuscript; [Author 3] research data curation, formal analysis, review & editing the manuscript; Thirtawati: literature review, addressing reviewer comments,

editing the manuscript. All authors reviewed and approved the final version of the article.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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ETHIC STATEMENT

Ethical review and approval were waived for this study as it did not involve any intervention and posed minimal risk to participants. Nevertheless, informed consent was obtained from all respondents prior to participation, and all data were anonymized and kept confidential.

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