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1. Title Page

Smallholders Palm Oil Farmer's Welfare Gap Analysis Within Two Scheme Farming Management: Case Study in Lampung Province, Indonesia

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Abstract

Amid global demands for sustainable production of palm oil derivative products, smallholder palm oil farmers in Indonesia face complex issues in increasing productivity related to limited access to technology, labor, capital, and markets. Indonesia palm oil farming mostly is carried out on smallholder's scale. The pattern of farming management could has an impact on farming productivity, farming income, household income and the welfare of palm oil farmers. Therefore, this paper aims to analyze the level of welfare of palm oil farmers and the factors that influence it. The research was conducted using a survey method involved 594 palm oil farmers, spread across six districts in Lampung Province, Indonesia. Data was analyzed using poverty criteria and the ordinal logit regression. Based on analysis, the majority of smallholder palm oil farmers, whether with independent or partnership pattern are in the prosperous category. The independent pattern has a higher chance of improving welfare than the partnership. The business pattern that is directly connected to the palm oil industry supply chain in Indonesia in the form of production cooperation patterns and factory supply guarantees is a basic prerequisite in ensuring improvements in the level of productivity and income of farmers. Sustainable palm oil economic development will only be realized in conditions of synergy across stakeholders within the framework of a fair business value chain that strengthens farmers in the upstream production line, intermediaries, manufacturers, to local, regional, and international distribution partners.

Keywords:

partnership, smallholders farmer, palm-oil, prosperous, ordinal-logit

1. Introduction

Palm oil is the main raw material in the supply of crude palm oil (CPO) in the world. In the Indonesian economy, palm oil plays a strategic role because this commodity has bright prospects as a source of foreign exchange (Rosa, R.N., dan Zam³⁴ 2017; Suroso et al., 2021). Rittengers (Rittgers, C., McDonald, G., and²⁵ hmanulloh, 2019) stated that Indonesia is listed as the largest palm oil producing country in the world. Indonesia is a competi⁴⁷ country in the global oil market, representing major export and import countries ((Rifin, 2010), (Salleh, K.M., Abdullah, R., Khomeini, M.A., Rahman, Ab., Balu, N., and Nordin, 2016), (Ramadhani, T.N., dan Santoso, 2019)). On the other hand, Ling (Ling, 2019) stated that the need for palm oil has increased very rapidly following the increase in human populations in the world. In 2050, the need for palm oil is predicted to increase by 56 million tonnes from 2015, which reached 174 million tons.

The promising prospects for the palm oil indu³²y are facing negative issues, especially for the environment. Issues related to the negative impacts of the palm oil industry have be⁹ne a global concern, especially after the Sustainable Development Goals (SDGs) Agenda⁶rwiningsih, 2023). The European Union (EU) has officially implemented the Anti-Deforestation Law, which aims to ensure that products entering the European Union market come from legal sources and do not cause deforestation. This rule aims to ensure consumption and trade do not contribute to world deforestation. Deforestation can result in ecosystem changes, including loss of biodiversity, increased greenhouse gas emissions, and overall environmental damage. There are at least seven commodities regulated in the European Union's Anti-Deforestation Law, namely palm oil, coffee, meat, wood, cocoa, soybeans, and rubber. The existence of the Anti-Deforestation Law certainly has implications for the European Union's trading partners, including Indonesia.

³⁹ the midst of the debate on the issue of deforestation, Indonesia is still exporting CPO to reach US\$29.62 billion in 2022, an increase of 3.56 percent compared to the previous year (Badan Pusat Statistik, 2022a). This is in line with data from the Indonesian Palm Oil Entrepreneurs Association (Gabungan Pengusaha Sawit Indonesia, 2022), which notes that in August 2022 Indonesia exported 506,8⁵⁵ tons of CPO, up 51.7 percent from 334,000 tons in the previous month. Indonesia's palm oil production in 2022 will reach 45.58 million tons, an increase of 0.88 percent from⁴² the previous year (Badan Pusat Statistik Provinsi Lampung, 2022). This production is generated from Indonesia's palm oil plantation area, which has reached 14.9 million hectares with the largest proportion being in Riau Province, which reaches 2.9 million hectares (Badan Pusat Statistik, 2022b).

Furthermore, (Mudatsir, 2021) and (Jamilah., Mawardati., dan Syamni, 2022) stated t⁴⁶ palm oil farming contributes to improving farmers' welfare. Edward (Edward, 2019) s⁶⁸ted that the rate of poverty reduction in palm oil center districts is faster than in districts that do not have palm oil plantations. The development of palm oil plantations in world palm oil-producing countries can contribute significantly to redu²ng poverty in those countries (Palm Oil Agribusiness Strategic Policy²stitute, 2021; Syahza et al., 2023). The most important thing about⁸elfare is income, because meeting needs is limited by household income (Purba, R., Rifai, A., 20²). The higher the household income, the lower the percentage of income spent on food consumption. So, if there is an increase in income and²is increase does not change consumption patterns, then the household is prosperous. On the other hand, if an increase in household income changes consumption patterns, the household will not be as prosperous.

The growing world market share related to CPO needs has meant that Lampung Province, one of the provinces on Sumatra⁵⁴and, continues to strive to develop palm oil plantations as a driver of regional economic growth. By 2022, the area of palm oil plantations in Lampung Province will have reached 109,876 hectares. In accordance with the 2019-2024 Lampung Province RPJMD, the plantation sub-sector is expected to make a significant contribution to the GRDP of Lampung Province through increasing production of plantation commodities, especially smallholder plantations (PR), namely palm oil, coffee, pepper, cocoa, coconut, rubber, and sugar cane. Nationally, Lampung Province only ranks 15th as a palm oil producing province. The contribution of exports of animal/vegetable fats and oils (CPO and refined

palm oil) in Lampung Province is 38.03 percent of the national level. The central districts for palm oil production are Mesuji Regency, Tulang Bawang Regency, Central Lampung Regency, and Way Kanan Regency (Badan Pusat Statistik Provinsi Lampung, 2022). Tulang Bawang Regency is the largest palm oil producer with a contribution of 22.96 percent of the total palm oil production of Lampung Province. Zoelkarnaen (Zoelkarnaen, 2018), stated that palm oil is included in the superior commodity category with a location quotient value of 2.72 in Tulang Bawang Regency and 3.89 in Mesuji Regency, so it has the potential for further development.

Palm oil cultivation in Lampung Province is divided into two, namely independent palm oil farmers and plasma palm oil farmers. 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. Plasma palm oil cultivation involves the management of palm oil farming as a core company partner. This relates to palm oil farming activities under a cooperation agreement with the core company regarding mutually agreed rights and obligations. Palm oil cultivation using an independent pattern and a partner pattern will influence the income obtained. Most of the palm oil in Lampung Province is old, so it is time for it to be rejuvenated. However, because palm oil farming is still a mainstay for earning income and achieving prosperity, amidst the issue of limiting world palm oil exports, palm oil farming is still being carried out. Therefore, this research aims to analyze the level of welfare of farmers whose palm oil plants are old and the factors that influence this under the pattern of farming management issues.

2. MATERIAL AND METHODS

The research carried out as survey methods. The location covers six districts in Lampung Province, Indonesia as palm oil production center of the smallholder palm oil plantation. It involved Tulang Bawang, Mesuji, Way Kanan, Central Lampung, South Lampung, and Pesisir Barat districts. Sampling frame of smallholder palm oil farmers divided into two categories, independent and partnership farmers. Palm oil farmers with partnership pattern located in Tulang Bawang, Mesuji, and Way Kanan Regencies. Map of distribution of research areas in Lampung Province can be seen in Figure 1

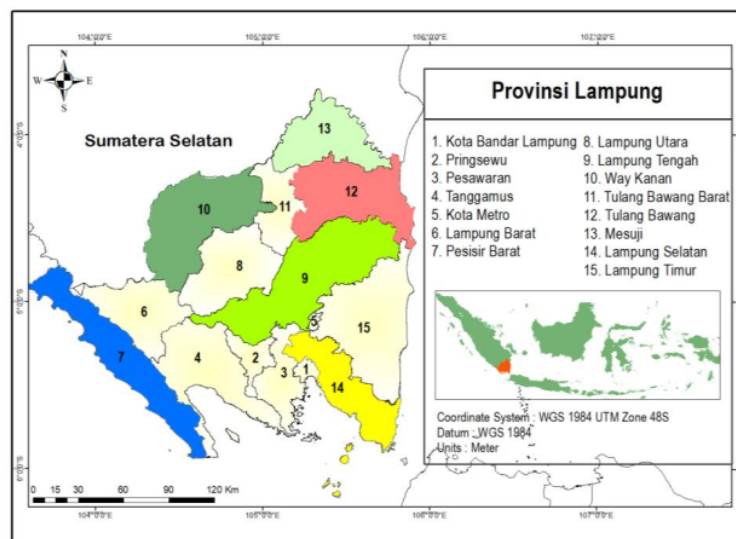


Figure 1. Map of distribution of research areas in Lampung Province (Badan Informasi Geospasial, 2022)

The data consists of primary data and secondary data. Primary data was obtained from interviews with respondents using a questionnaire. Secondary data was obtained from related agencies. The number of farmers with palm oil plants old (>17 years) in Lampung Province is 1,008 households (Ismono, H.,

Prasmatiwi, F.E., dan Lestari, 2019). From this population data, households were selected that owned one parcel of palm oil land with a maximum land area of 2 ha. Therefore, the farmers' sample was 594 households spread across six districts determined by simple randomness. The distribution of samples of palm oil farmers in six districts of Lampung Province can be seen in Table 1.

Table 1. Distribution of samples of palm oil farmers in six districts of Lampung Province

No	District	Sample Amount		Total
		Independent	Partnership	
1	South Lampung	64	0	64
2	Central Lampung	98	0	98
3	Pesisir Barat	36	0	36
4	Mesuji	21	108	129
5	Tulang Bawang	30	70	100
6	Way Kanan	46	121	167
Total		295	299	594

The analytical method for measuring the level of welfare of palm oil farming households uses Sajogyo's (1997) (Sajogyo, 1997) poverty criteria (Fitriani et al., 2010; Fitriani, 2022). This method uses a household expenditure approach, which is calculated using the formula:

$$C_t = C_a + C_b + C_n \quad (1)$$

Information:

C_t = Total household expenditure

C_a = Expenditure on food

C_b = Non-food expenditure

C_n = Other expenditures

$$\text{Expenses per capita/year (Rp)} = \frac{\text{Household expenditure/year}}{\text{Number of family dependents}} \quad (2)$$

$$\text{Expenses/capita/year equal to rice consumption (Kg)} = \frac{\text{Expenditure/capita/year (Rp)}}{\text{Rice price (Rp/Kg)}} \quad (3)$$

From these calculations, the poverty level obtained according to Sajogyo (1997) is categorized as follows:

- The poorest: expenditure equivalent to ≤ 180 kg of rice/capita/year.
- Very poor: expenditure equivalent to 181 – 240 kg of rice/capita/year.
- Poor: expenditure equivalent to 241 – 320 kg of rice/capita/year.
- Near poverty: expenditure equivalent to 321 – 480 kg of rice/capita/year.
- Enough: expenditure equivalent to 481 – 960 kg of rice/capita/year.
- Decent living: expenditure equivalent to >960 kg of rice/capita/year.

The poorest, very poor, poor and almost poor categories mean not well off, while the moderate and decent living categories mean well off. Factors that influence the welfare of palm oil farmer households in Lampung Province were analyzed using a logistic regression model (Rosadi, 2011). There were more than 2 categories in ordinal logit regression. The following is an econometric approach to the logit model:

$$P_i = F(Z_i) = F(\alpha + \beta X_i + \mu) \quad (4)$$

$$P_i = 1/(1+e^{-Z_i}) \quad (5)$$

$$P_i = 1/(1+e^{-(\alpha + \beta X_i + \mu)}) \quad (6)$$

If both sides of the equation are multiplied $1+e^{-Z_i}$ then obtained:

$$(1 + e^{-Z_i}) P_i = 1 \quad (7)$$

$$e^{-Z_i} = \frac{1}{P_i} - 1 = \frac{P_i}{1 - P_i} \quad (8)$$

while $e^{-Z_i} = 1 / e^{-Z_i}$ then:

$$e^{-Z_i} = \frac{P_i}{1 - P_i} \text{ (Rasio Odds)} \quad (9)$$

Next, the ordinal logit regression equation is expressed as follows:

$$P_i = F(Z_i) = F(\alpha + \beta_1 X_i + \mu) \quad (10)$$

Z_i find with the formula:

$$Z_i = \ln \left[\frac{P_i}{1 - P_i} \right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 D_1 + \mu \quad (11)$$

Information :

- Z_i : Probability $Z_1 = Z(Y=1)$ for the poorest category of households
- Opportunity $Z_2 = Z(Y=2)$ for households in the very poor category
- Opportunity $Z_3 = Z(Y=3)$ for poor category households
- Opportunity $Z_4 = Z(Y=4)$ for households in the near poor category
- Opportunity $Z_5 = Z(Y=5)$ for sufficient category households
- Opportunity $Z_6 = Z(Y=6)$ for households in the decent living category
- P_i : The opportunity to determine the level of household welfare if X_i is known
- α : Intercept
- $\beta - \beta_8$: regression coefficient ($i = 1, 2, 3, 4, 5, 6, 7, 8$)
- X_1 : Age (year)
- X_2 : Education (year)
- X_3 : Family members (person)
- X_4 : Duration in palm oil farming (year)
- X_5 : Land acreage (ha)
- X_6 : Palm oil income (Rp)
- X_7 : Household income (Rp)
- D_1 : Farming pattern : 0 = independent; 1 = partnership
- μ : Error term

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3. RESULT AND DISCUSSION

3.1 Farmers Characteristic

The pattern of people's palm oil cultivation in Lampung Province is that 50.34 percent are partner farmers and the remaining 49.66 percent are independent farmers. Independent palm oil farmers are spread across Central Lampung, South Lampung, Pesisir Barat, Way Kanan, Tulang Bawang and Mesuji Districts with a total of 295 households. The largest independent palm oil farmers are in Central Lampung Regency, namely 33.22 percent.

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Partnership pattern of palm oil farmers in Lampung Province are only found in three districts, Tulang Bawang, Mesuji, and Way Kanan and total 299 farmers, with the largest percentage being in Way Kanan District (40.47%). These three districts have a greater number of partner palm oil farmers than independent

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palm oil farmers. The distribution of palm oil farmers with independent and partner businesses in Lampung Province can be seen in Figure 2.

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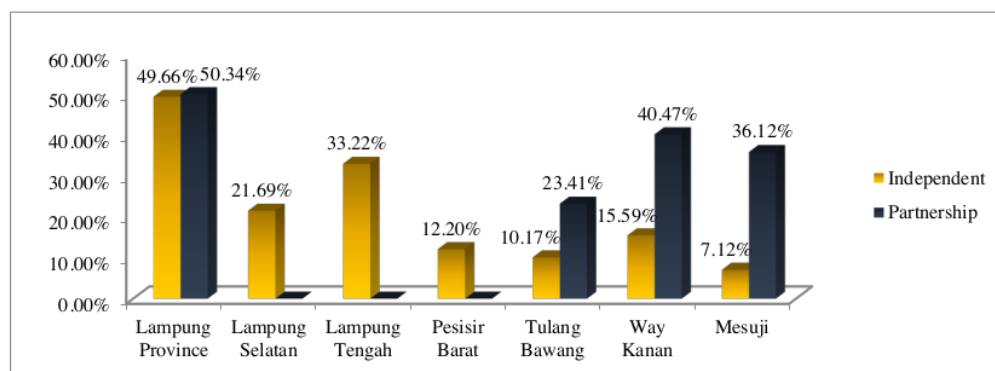


Figure 2. Distribution of palm oil farmers with independent and partner businesses in Lampung Province

The average age of palm oil cultivation is 24.52 years. The majority (81.80 percent) were in the 22 - 31 year range. In fact, the productive life of palm oil is only 25 years. However, palm oil is still one of the commodities that farmers rely on to meet their household needs.

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Table 2. Characteristics of smallholder palm oil farmers in Lampung Province

District	Pattern of farming	
	Independent	Partnership
Farmer Age (year)	56	57
Education level	Elementary School	Elementary School
Family members (persson)	4	3
Farming duration (year)	23	25
Palm oil land acreage (ha)	1,01	0,98

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The majority of palm oil farmers in Lampung Province are still in the productive age range, with an average of 57 years for partner farmers and 56 years for independent farmer in accordance with what Manyamsari and Mujiburrahmad (Manyamsari, I., 2014) stated, the age group 15–64 years is classified as a productive group for work in producing goods and services.

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The education level of palm oil farmers in Lampung Province varies in seven levels, namely no school, elementary school, middle school, high school, D2, D3, and S1. The majority (59.76 percent) of both independent and partner farmers have an elementary school education. According to Pranomo dan Yuliawati (Pranomo, L.G., 2019) a person's level of education influences a person's ability to accept new innovations, as well as influencing farming activities. Economic factors were one of the things that caused palm oil farmers not to receive education at that time.

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The number of dependents influences the size of the farmer's household expenses. On the other hand, if family dependents are of productive age and help in farming activities, this will reduce the use of labor outside the family, thereby reducing the costs of palm oil farming. The responsibilities of independent and partner farming families are not much different. Most of the dependent families of independent palm oil farmers are 4 people, while partner farmers are 3 people.

The farming experience of palm oil farmers can influence their success in farming. The experiences of independent and partner farmers are not much different. The average experience of independent farmers is 23 years, while that of partner farmers is 25 years. The average area of palm oil land cultivated is 0.99 ha, with a range between 0.13 ha and 2.00 ha. The average land area for independent farmers is 1.01 ha, while

for partner farmers it is 0.98 ha. It turns out that palm oil farmers with independent business patterns have slightly larger areas of palm oil land than partner palm oil farmers. The results of the study Moeis et al. (Moeis, F. R., Dartanto, T., Moeis, J. P., and Ikhsan, 2020), show that agricultural land is an important asset for agricultural households in addition to its role as the main production factor in the agricultural sector.

Accepted

Apart from palm oil farming, household income for palm oil farmers also comes from other sources of income such as non-palm oil farming income, off-farm income, and on-farm income. All of these sources of income have an important role in helping palm oil farmers to meet their household needs. The distribution of household income contributions from palm oil farmers in Lampung Province can be seen in Table 3.

Table 3. Distribution of contribution to household income of palm oil farmers in Lampung Province

Component	Independent		Partnership	
	(Rp/thn)	(%)	(Rp/thn)	(%)
Palm Oil incomes	7,056,525	18.56	10,097,087	21.33
Farming incomes exclude Palm oil	14,506,922	38.15	20,766,693	43.87
Household off farm incomes	5,899,356	15.52	4,240,535	8.96
Household non farm incomes	10,559,661	27.77	12,237,793	25.85
Total Household incomes	38,022,464	100.00	47,342,108	100.00

Table 3 showed that the largest contribution to household income of palm oil farmers in Lampung Province comes from farming income other than palm oil, namely 38.15 percent for independent farmers and 43.87 percent for partner farmers. The contribution to income from palm oil farming for both independent farmers and partner farmers is only in third place. This is in line with research by Ismono et al. (Ismono, H., Prasmatiwi, F.E., dan Lestari, 2019), that although palm oil farming is the main livelihood, it is not the largest contributor to the household income structure of palm oil farmers in Lampung Province. Mehraban et al, (Mehraban, N., Kubitz, C., Alamsyah, Z., and Qaim, 2021), said that palm oil farmers engage in more non-agricultural activities which help facilitate income and fulfill consumption needs. The low percentage contribution of palm oil farming income to household income is due to the relatively old age of palm oil plants, namely an average of 24.52 years old. The old age of palm oil plants has an impact on decreasing production levels. This decrease in production will affect the revenue and income of palm oil farming. Research by Aristiyani et al. (Aristiyani, R., Arifin, B., dan Lestari, 2021), concluded that palm oil farming income in the plant age group of 22 - 25 years had the lowest income because the palm oil plants were old and less productive.

3.2 Level of welfare of palm oil farmer's households

Figure 3 explains that the average total expenditure of independent farmer households in Lampung Province is IDR 28,257,944 per year, while that of partner farmers is IDR 26,535,683 per year. The share of food expenditure by independent farmers and partner farmers is 49.40 percent and 49.36 percent, respectively. The non-food expenditure shares of independent farmers and partner farmers are 50.60 percent and 50.64 percent, respectively. So, the share of non-food expenditures is greater in the total household expenditure structure. The households with a high level of welfare will be able to meet their needs not only for food, but also for non-food items (Praza, R., dan Syamadiyah, 2020). This is similar to what applies to Engel's Law, that the proportion of total expenditure allocated to food will decrease with increasing income.

If we look at the percentage of food and non-food expenditure, independent and partner palm oil farmers are prosperous families because their food expenditure is smaller than their non-food expenditure. If a household is able to meet non-food needs, then food needs will definitely be met. This is because the greater the non-food expenditure, the more guaranteed the availability of food needs.

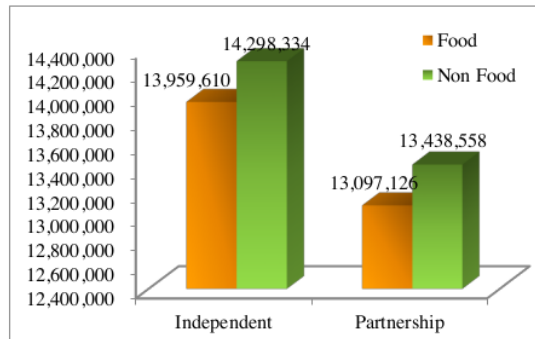


Figure 3. Food and non-food expenditure of palm oil farmers in Lampung Province

Furthermore, based on Sajogyo's (1997) criteria¹⁵, the level of welfare of palm oil farmer households in Lampung Province is presented in Figure 3. It can be seen in Figure 3 that the majority of palm oil farmers are in the sufficient group (54.24 percent) for independent farmers and 47.49 percent for partner farmers. For the decent living category, the number of independent farmers and partner farmers is the same, namely 25.08 percent. So there are 79.32 percent of independent farmers and 72.57 percent of partner farmers in Lampung Province who are classified as prosperous. This is due to the diversity of income sources for households, so that the total income generated is able to meet household needs, both food and non-food.

However, in Figure 4, it can also be seen that there are farmers in the categories of almost poor, poor, very poor, and even the poorest, although only 20.68 percent for independent farmers and 27.43 percent for partner farmers. This shows that there are still quite a lot of independent and partner farmers who are not yet prosperous.

In general, results of this research are in line with Yanti et al. (Yanti, I.R., Nuraeni, dan Rasyid, 2022), who found that the level of welfare of palm oil farmer households in Pebatae Village is classified as a prosperous household. This result is also in line with Lalita et al. (Lalita, R., Ismono, H., dan Prasmatiwi, 2019), who found that for both palm oil farmers who have small, medium, and large areas of land in Lampung Province, the majority (62.39 percent) are in the sufficient category.

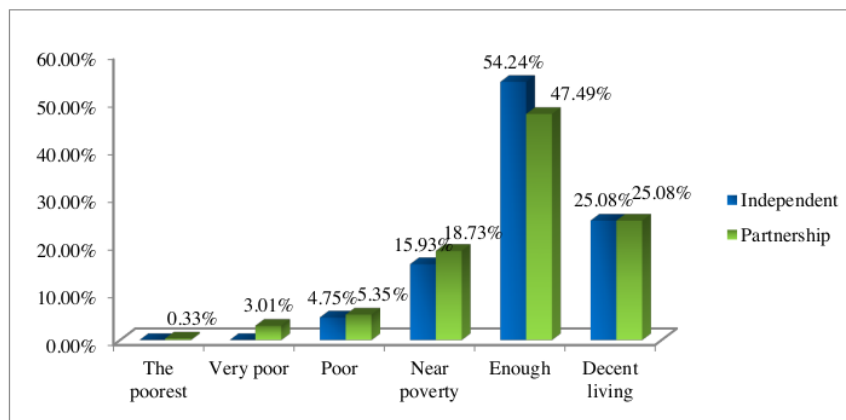


Figure 4. Distribution of farmer welfare in Lampung Province according to Sajogyo criteria

3.3 Factors that Influence the Level of Welfare of Palm Oil Farmer Households

The Parallel Lines Test results show that the Chi-Square value is 58.374, which means the slope coefficient is the same for all response variables with a confidence level of 99 percent (Table 4). Furthermore, the simultaneous test results show that the Chi-Square value is 68.457 with a confidence level of 99 percent. These results show that there is a decrease in the -2 Log Likelihood value from Intercept Only to Final, namely 1448.963 to 1380.506 with a confidence level of 99 percent (Table 7). This means that a model with independent variables is better than a model with only an intercept, so it can be concluded that the regression model formed is a fit model.

Table 4. Test results of parallel lines

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	1380.506			
General	1312.132 ^b	58.374 ^c	32	.000

Table 5. Hasil model fitting information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	1448.963			
Final	1380.506	68.457	8	.000

Table 6. pseudo R-Square result

Cox and Snell	.109
Nagelkerke	.119
McFadden	.047

Testing the coefficient of determination using several methods shows that the Nagelkerke method provides the largest value compared to other methods, namely 0.119 (Table 6). This means that 11.90 percent of the variation in opportunities for palm oil farmer households to achieve household prosperity can be explained by the variables age, last education, number of family dependents, length of palm oil farming, area of land cultivated, income from palm oil farming, household income, and palm oil cultivation patterns, while the remaining 88.10 percent is explained by other variables not included in the model. The parameter estimation results for factors that influence the welfare of palm oil farming households in Lampung Province are presented in Table 7.

Based on Table 7, showed that the age of palm oil farmers has a negative effect on the opportunities for palm oil farmers to improve household welfare with a confidence level of 99 percent. The odds ratio value of 0.98 indicates that for every one year the age of palm oil farmers increases, the opportunity for palm oil farmers to achieve prosperity decreases by 0.98 times. Older farmers do not necessarily have better knowledge than younger farmers. Ryan et al. (Ryan, E., Prihtanti, T. M., dan Nadapdap, 2018), stated that farmers of productive age will work better than farmers of non-productive age. Sumekar et al. (Sumekar, W., Prasetyo, A. S., dan Nadhila, 2021), stated that farmers of productive age usually have sufficient ability and energy and are easy to understand and absorb information and technology.

Table 7. Parameter estimation results for factors that influence the welfare of palm oil farming households in Lampung Province

Variable	Estimate	Std. Error	Wald	df	Sig.	95% Interval	Confidence
						Lower Bound	Upper Bound
Threshold [Y = 1]	-6.762	1.218	30.796	1	.000	-9.150	-4.374
[Y = 2]	-4.429	.760	33.997	1	.000	-5.918	-2.940
[Y = 3]	-2.960	.708	17.486	1	.000	-4.347	-1.573
[Y = 4]	-1.414	.693	4.157	1	.041	-2.773	-.055
[Y = 5]	1.027	.691	2.208	1	.137	-.328	2.382
Location Age (X_1)	-.021***	.007	7.695	1	.006	-.035	-.006
Education (X_2)	-.004	.028	.019	1	.890	-.059	.051
Family members (X_3)	.104	.064	2.632	1	.105	-.022	.230
Farming duration (X_4)	-.004	.018	.055	1	.814	-.040	.032
Land acreage (X_5)	.147	.196	.564	1	.452	-.237	.532
Palm oil incomes (X_6)	.026***	.012	4.455	1	.035	.002	.050
Household incomes (X_7)	.014***	.003	23.583	1	.000	.020	
Pattern farming - management (D_1)	-.416***	.166	6.310	1	.012	-.740	-.091

Information:

* = significance with $\alpha = 0,10$;

** = significance $\alpha = 0,05$;

*** = significance $\alpha = 0,01$

Furthermore, the regression model based on Table 5 as follows.

$$Y_1 = -6,762 - 0,021X_1 - 0,004X_2 + 0,104X_3 - 0,004X_4 + 0,147X_5 + 0,026X_6 + 0,014X_7 - 0,0416D_1$$

$$Y_2 = -4,429 - 0,021X_1 - 0,004X_2 + 0,104X_3 - 0,004X_4 + 0,147X_5 + 0,026X_6 + 0,014X_7 - 0,0416D_1$$

$$Y_3 = -2,960 - 0,021X_1 - 0,004X_2 + 0,104X_3 - 0,004X_4 + 0,147X_5 + 0,026X_6 + 0,014X_7 - 0,0416D_1$$

$$Y_4 = -1,414 - 0,021X_1 - 0,004X_2 + 0,104X_3 - 0,004X_4 + 0,147X_5 + 0,026X_6 + 0,014X_7 - 0,0416D_1$$

$$Y_5 = 1,027 - 0,021X_1 - 0,004X_2 + 0,104X_3 - 0,004X_4 + 0,147X_5 + 0,026X_6 + 0,014X_7 - 0,0416D_1$$

Palm oil farming income has a real and positive effect on palm oil farmers' opportunities to improve household welfare with a confidence level of 95 percent. The odds ratio value of 1.03 indicates that every time there is an increase in palm oil income by one thousand rupiah, the opportunity for palm oil farmers to improve household welfare will increase by 1.03 times. This is in line with research by Wahyudi et al. (Wahyudi, A., Sissah, dan Ifazah, 2023), which concluded that income has a positive effect on the level of welfare of palm oil farmers.

The household income of palm oil farmers has a real and positive effect on the opportunities for palm oil farmers to improve household welfare with a confidence level of 99 percent. The odds ratio value of 1.01 indicates that every time there is an increase in the household income of palm oil farmers by one thousand rupiah, the opportunity for palm oil farmers to improve household welfare will increase by 1.01 times. Similar results were obtained by Alhudhori dan Amali (Alhudhori, M., dan Amali, 2020), who found household income had a positive and significant effect on the welfare of families of palm oil farmers in Muaro Jambi Regency. This supports Chrisendo et al. (Chrisendo, D., Siregar, H., and Qaim, 2022), who stated that palm oil cultivation can improve living standards and human resource formation in small farmer households.

Palm oil cultivation pattern have a negative effect on palm oil farmers' opportunities to improve household welfare with a confidence level of 95 percent. The odds ratio value of 0.66 indicates that partner farmers have a 0.66-time chance compared to independent farmers to improve household welfare. The independent palm oil cultivation pattern has a higher chance of increasing household welfare when compared to the partner palm oil cultivation pattern. Ismono et al. (Ismono, H., Prasmatiwi, F.E., dan Lestari, 2019), stated that the lower income of partner farmers compared to independent farmers is due to poor implementation of partnerships, especially in terms of transparency in profit sharing and costs incurred by large companies.

Recent education, number of family dependents, length of palm oil farming, and land area do not have a significant effect on opportunities to improve the welfare of palm oil farmers. The education level of palm oil farmers in Lampung Province is mostly elementary school (SD). This more varied and relatively low level of education means that its influence on the level of household welfare is not real. Pranata et al. (Pranata, Y., Widjaya, S., dan Silviyanti, 2020), states that education has no guarantee of increasing crop yield, which can directly affect the welfare of farming households and also revealed that the farmer's education level has no effect on the amount of income they earn.

The number of family dependents you have will determine the family's needs. The more family members there are, the more family needs must be met. Welfare can decrease due to the large expenditure of individuals in a family. The large number of family responsibilities, without being accompanied by an increase in income, can reduce the level of welfare of farmers (Pratama, N., Zulfanetti, dan Umiyati, 2021). In contrast to Pratama's research, this study found that the number of family dependents had no real effect on the opportunity to increase the welfare of palm oil farmers. Most of the dependent families of palm oil farmers in Lampung Province are only four people. Seeing this, the number of family dependents owned by palm oil farmers in Lampung Province is relatively small with less variety, so it does not affect the welfare of farmer households.

The length of farming does not have a significant effect on the opportunity to increase the welfare of palm oil farmers. A farmer's experience in palm oil farming does not guarantee the farmer's success in producing palm oil. The length of experience in palm oil farming, which is not accompanied by the use of technology and innovation in palm oil farming, can have an impact on the resulting palm oil production. This is in line with Hendrayana et al. (Hendrayana, J., Kurniati, D., dan Kusri, 2020), who stated that rubber farmers' farming experience does not have a significant effect on farmers' welfare.

Land area is a production factor that is used as arable land for farming production. The amount of land cultivated by farmers should influence the production obtained. However, the results of this study found that land area had no real effect on the opportunity to increase the welfare of palm oil farmers because the sample of farmers was limited to farmers with a maximum of 2 ha of land with an average of 0.99 ha, so there was less variation.

4. CONCLUSION

Indonesia must continue to fight against the negative issue of oil palm deforestation because on the other hand, it is proven that the majority of smallholder oil palm farmers in Lampung Province with limited land and old plantations, both with independent and partner business patterns, are in the adequate category and live a decent life or prosper. Oil palm farming income and household incomes of oil palm farmers have the opportunity to increase welfare, while the age of farmers has the opportunity to reduce welfare. The independent business pattern has a higher chance of improving welfare than the partner business pattern.

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