

The Influence of Farmers' Welfare on Oil Palm Plantation Productivity in Indonesia

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Abstract. Farmers, especially oil palm farmers, contribute greatly to the palm oil industry and the national economy. Strategic agendas to increase the productivity of oil palm plantations, such as land certification programs for the people, agrarian reform, social forestry, and rejuvenation of smallholder plantations, will be hampered if farmers' welfare is ignored. This research aims to determine the influence of variables measuring farmer welfare on palm oil productivity. This exploratory research uses inferential analysis techniques. The data used is secondary data in the form of a time series for the 2015-2021 period. This research uses simple linear regression statistical data analysis with the Structural Equation Model (SEM) with the alternative Partial Least Square (PLS) method. The research results show that farmer welfare has a significant positive effect on oil palm productivity ($0.000 < (0.005)$ with an estimated size of 0.910. In the sense that there is a positive and significant influence on farmer welfare on palm oil productivity.

Keywords: farmers' welfare, oil palm, productivity

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1. Introduction

The productivity of smallholder oil palm is determined by the quality of production inputs used in the management of smallholder oil palm plantations starting from the selection of superior seeds, plantation handling, fertilization, land suitability, natural factors, labor capacity, and harvest management. Those will be indicators of the success of farmers in managing oil palm plantations [1].

The development of the oil palm plantation has a trickle-down effect that it can provide benefits to society. The more oil palm plantations are developed, the more the impact will drip down to the workforce working in the plantation sector and its derivatives. This impact can be seen from the increased income of farming communities, resulting in increased purchasing power of rural communities, both for primary and secondary needs [2].

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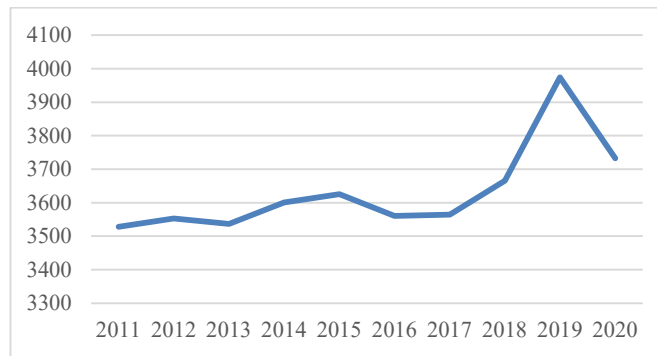


Figure 1. Overall Palm Oil Productivity (kg/ha/year) During 2011-2020 Experienced Ups and Downs

Farmers are also palm oil producers who have a role in the progress of palm oil plantations and the Indonesian palm oil industry. Farmers who act as suppliers of Fresh, Fruit Bunch FFB to the palm oil industry are expected can increase palm oil productivity which is attempted. Nevertheless, farmers still encounter many difficulties in cultivating oil palm, including solutions to land issues in forest areas, legality of land, conflicts between plasma farmers and companies, provision of biodiesel subsidies, and prices (FFB) producers. There are many difficulties faced by farmers is feared to be an obstacle to the productivity of farmers' businesses. There is also concern about the welfare of oil palm farmers affected [3]. The farmer Exchange Rate (NTP) is a proxy for seeing the level of farmer welfare [4]. The higher the NTP, the relatively more prosperous the level of life of farmers [5].

Table 1. Farmer Exchange Rates 2015-2021

Year	2015	2016	2017	2018	2019	2020	2021
NTP	101.59	101.65	101.28	102.46	100.90	101.65	104.64

Note: BPS-Statistics Indonesia

Table 1 above shows that farmers' exchange rates during 2015-2021 experienced fluctuations. This is influenced by various factors, namely the size of the farmer's land, the amount of production, the selling price of food crop products, and the price of fertilizer and pesticides [6]. Other factors such as age, education, number of farming family members, seed prices, labor costs, and farming household food expenditure [7].

Income and expenses in farming activities are considered to have an important influence on family welfare. One indicator of welfare can be seen in the distribution of income. Income is influenced by the productivity of production which contributes to household welfare, where the size of the contribution depends on the amount of income received by farmers [8]. Providing capital and strengthening farmer groups can improve farmer welfare [9].

Extension officers play an important role in assisting to improve farmers' knowledge and skills regarding the latest technologies in oil palm plantation cultivation so that they can apply better farming techniques, improve farming business), and improve livelihoods. farmers and their

people (better living). Extension officers assist and visit farmers 1-2 times a week particularly when there are problems faced by farmers [10].

As farmers involve in farmer organizations/farmer groups, they can obtain periodic monitoring and evaluation of activities by the government. This section attempts to highlight matters that are closely related to farmer institutions to improve the welfare of the people who are members of them [11].

The obstacle faced by oil palm farmers or general agricultural commodities producers in rural areas is the unstable selling price of crops, which affects productivity and farmers' income. This productivity depends on the availability of potential natural and human resources. The low productivity of oil palm plantations results in a low income obtained by farmers which prevents farmers' welfare [12]. This indicates that oil palm plantation is an essential commodity for improving farmers' welfare, absorbing labor, and improving the regional economy [13].

Based on previous research conducted [14] shows that oil palm productivity partially has a significant effect on the welfare of oil palm farmers in Siamporik Village, South Kualuh District, North Labuhanbatu Regency. The research results of [15] show that palm oil productivity also has a positive effect on the welfare of oil palm farmers in Janji Village, West Bilah District, Labuhanbatu Regency. However, research conducted [16] shows that productivity has a negative and insignificant effect on the welfare of oil palm farmers in Tanjung Medan Village.

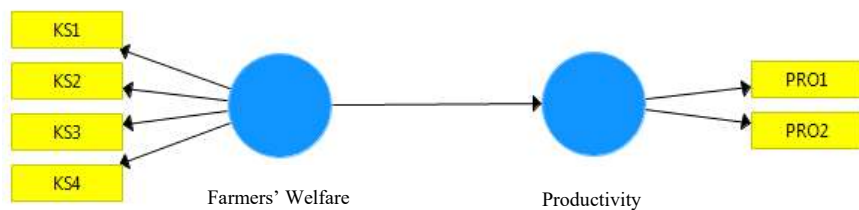


Figure 2. Conceptual Framework

Based on the exposure of the literature above, the hypothesis obtained in this study is:

H1: There is an influence on the welfare of farmers on the productivity of palm oil

H0: There is no effect of the welfare of farmers on the productivity of palm oil

2. Research Methods

This exploratory research was carried out over seven years taking into account the availability of existing data. In this study, there are limited data and forming variables of each variable. Limited data was obtained from the previous year, namely 2012-2014. Exploratory type research aims to deepen knowledge and look for new ideas about a particular phenomenon, describe social

phenomena, and explain how a social phenomenon occurs to formulate problems in more detail or develop hypotheses rather than test hypotheses [17].

2.1. Data Types and Sources

Secondary data was obtained from Indonesian Statistic in terms of wage/salaries of workers in the agricultural sector, BDPDP in terms of BDPDPKS Budget Fund, Ministry of Agriculture in terms of Farmers Group and Farmer Economic Institution, BPS (Badan Pusat Statistika) in terms of Area Oil-Palm Plantation and Palm Oil Production From 2015-2021 as mentioned in Table 1

Table 2. Wages/Salaries of Workers in the Agricultural Sector, Budget Funds, Farmer Groups, Farmer Economic Institutions, Area Size and Oil Palm Production

Year	KS1	KS2	KS3	KS4	PRO1	PRO2
2015	1.790.342	0.53	422.770	13.230	11.260.277	31.070.015
2016	1.560.394	10.92	531.287	12.584	11.201.465	31.730.961
2017	1.646.201	10.87	561.791	12.546	14.048.722	37.965.224
2018	1.774.427	6.24	588.653	11.910	14.326.350	42.883.631
2019	1.881.129	5.49	616.419	12.018	14.456.611	47.120.247
2020	1.757.004	30.75	646.293	11.817	14.658.300	45.741.845
2021	1.822.587	30.75	700.353	12.833	15.081.021	46.854.457

Data sources: Wages/Salaries (Indonesian Statistics); BDPDPKS Budget Fund (BDPDP); Farmers Group (Ministry of Agriculture); Farmer Economic Institution (Ministry of Agriculture); Area Oil-Palm Plantation (Superior Statistics – BPS); Palm Oil Production (Leading Statistics – BPS)

Information:

- KS1 : The number of wages/Salary generated by workers in the agricultural sector including in the oil-palm sector (Million Rupiah/year)
- KS2 : Budget funds provided by the government for palm oil development (Trillion Rupiah/year)
- KS3 : The number of farmers' Groups in the agricultural sector including oil-palm plantation (Group)
- KS4 : The number of Agricultural Economic Institutions (KEP) (Institution) such as Joint Business Groups (KUB), Cooperatives and Limited Liability Companies (PT)
- PRO1 : Total area of oil-palm plantation (Ha)
- PRO2 : Palm Oil Production (Tons)

In this research, the definition of each construct variable of farmer welfare and oil palm productivity is outlined as follows:

- a. Wages/Salaries (KS1) are remuneration in the form of money or goods given directly to workers for work/services that have been performed, and this is a nominal wage. The minimum wage is expected to improve the welfare of low-wage workers [18]. Wages are

- actually a reward for their achievements, the greater the wages they receive, achievements in this case are expressed as productivity [19].
- b. Budget funds (KS2) in this case come from BPDP-KS. The Palm Oil Plantation Fund Management Agency (BPDPKS) is a plantation fund management body that was established as a manifestation of the mandate of Government Regulation Number 24 of 2015 concerning the Collection of Oil Palm Plantation Funds which is tasked with collecting funds to encourage the development of oil palm plantations. One use of the funds collected is research and development of oil palm plantations [20]. The distribution of funds is of course a matter for farmers in palm oil rejuvenation, so there needs to be comprehensive guidance and assistance for oil palm farmers [21].
 - c. Farmers Group (KS3) is a group of farmers/breeders/planters formed by farmers based on shared interests and similar conditions in social, economic, and resource environments, commodity similarities, and familiarity to improve and develop member businesses [22].
 - d. The Farmer's Economic Institution (KS4) is the implementing institution of farming activities formed by, from, and for farmers, to increase the productivity and efficiency of farming businesses, both those with legal entities and those who have not yet incorporated a legal entity [23]
 - e. The area (PRO1) of oil palm plantations can influence the amount of oil palm production. Apart from that, the planting area of the land used by oil palm farmers can influence the level of productivity of oil palm plantations [24]
 - f. Palm Oil Production (PRO2) is the result harvested from plantation businesses without going through further processing. A study [25] analyzed the influence of production factors on productivity.

2.2. Data Analysis Technique

The structural equation model (SEM) based on variance or component-based SEM, which is known as Partial Least Square (PLS), is a powerful analytical method. This analysis does not require data with a certain scale of measurement, is able for a small number of samples, and can also be used for theory confirmation. SEM is a multivariate analysis method that can be used to describe the simultaneous linear relationship between observational variables (indicators) and variables that cannot be measured directly (so-called latent variables). Latent variables have to be measured through several indicators. There are two types of latent variables in SEM, namely endogenous and exogenous [26].

3. Results and Discussion

3.1. Assessing the Outer Model or Measurement Model

There are three criteria in the use of data analysis techniques with Smart-PLS to assess the outer model, namely Discriminant Validity, Convergent Validity, and Composite Reliability

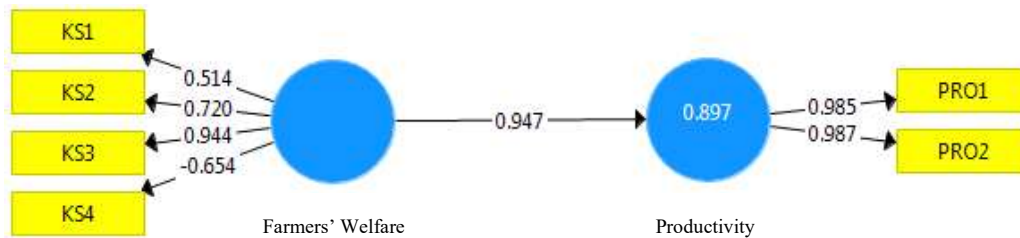


Figure 3. Initial Path Relationship Model of Farmers' Welfare and Oil Palm Plantation Productivity with SEM-PLS that Indicate Outer Loading Values

Table 3. Early Models Outer Loadings

No	Note	KS	PRO
1	KS1	0.514	
2	KS2	0.720	
3	KS3	0.944	
4	KS4	-0.654	
5	PRO1		0.985
6	PRO2		0.987

Source: Research Results, 2023 (Processed Data)

In empirical research experience, a loading factor value of ≥ 0.5 is still acceptable. Even some experts tolerate the figure 0.4. Thus, loading factor values ≤ 0.4 must be removed from the model [27]. Therefore, the KS4 construct variable was removed in this study.

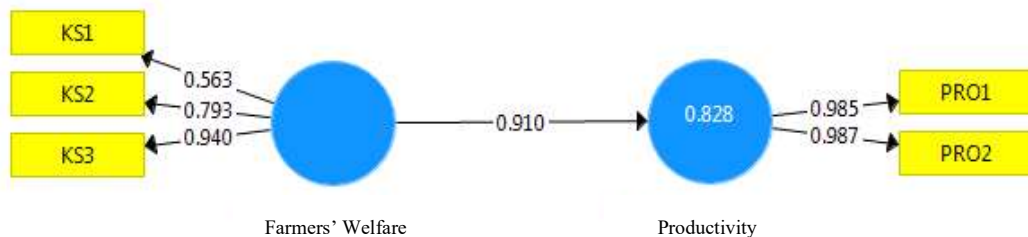


Figure 4. Modification Model of the Relationship Farmers' Welfare and Oil-palm Plantation Productivity with SEM-PLS that Indicate Outer Loading Values

Table 4. Outer Loadings Modification Models

No	Note	KS	PRO
1	KS1	0,563	
2	KS2	0,793	
3	KS3	0,940	
4	PRO1		0,985
5	PRO2		0,987

Source: Research Results, 2023 (Processed Data)

According to Figure 2/Table 2, the value of the outer model does not meet the convergent validity requirement due to one indicator, namely agricultural economic institution has a loading factor value less than 0,5. The modified model as in Table 3. shows that all loading factors so that the constructs for all variables are no longer eliminated from the model.

a. Discriminant validity

Discriminant validity is carried out to ensure that each concept of each latent variable is different from other variables. The model has good discriminant validity if each loading value of each indicator of a latent variable has the largest loading value with other loading values for other latent variables.

Table 5. Discriminant Validity Value of Relationship Model of Farmers' Welfare and Oil Palm Productivity Based on Fornell-Larcker Criteria

No	Information	KS	PRO
1	KS	0.781	
2	PRO	0.910	0.986

Source: Research Results, 2023 (Processed Data)

Discriminant validity is carried out to ensure that each concept of each latent variable is different from other variables. The model has good discriminant validity if each loading value for each indicator of a latent variable has the largest loading value compared to other loading values for other latent variables.

Table 6. Discriminant Validity Value of Relationship Model of Farmers' Welfare and Oil Palm Productivity Based on Cross Loading Value

No	Information	KS	PRO
1	KS1	0.563	0.598
2	KS2	0.793	0.565
3	KS3	0.940	0.897
4	PRO1	0.867	0.985
5	PRO2	0.925	0.987

Source: Research Results, 2023 (Processed Data)

Based on Table 6, several (except KS1) roots of AVE (Fornell-Larcker Criterion) for each construct are greater than their correlations with other variables. It can be seen that the loading factor value of KS is $0.563 < 0.598$ (PRO), which means that it still has a loading factor

value that is not the greatest compared to the loading value when connected to other latent variables. This means that the latent variable does not yet have good discriminant validity as it still has a measure that is highly correlated with other constructs [28] - [29].

b. Reliability and Average Variance Extracted (AVE)

Table 7. Composite Reliability and Average Variance Extracted

No	Information	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
1	KS	0.651	0.735	0.818	0.610
2	PRO	0.972	0.975	0.986	0.972

Source: Research Results, 2023 (Processed Data)

Based on Table 7 it can be concluded that all constructs meet the criteria of being reliable. This is indicated by the composite reliability value and Cronbach's alpha value above 0.70 and AVE above 0.50 as the recommended criteria. The AVE value obtained in this research is the AVE KS value, namely 0.610 and the AVE PRO value is 0.972.

3.2. Assessing the Inner Model or Structural Model

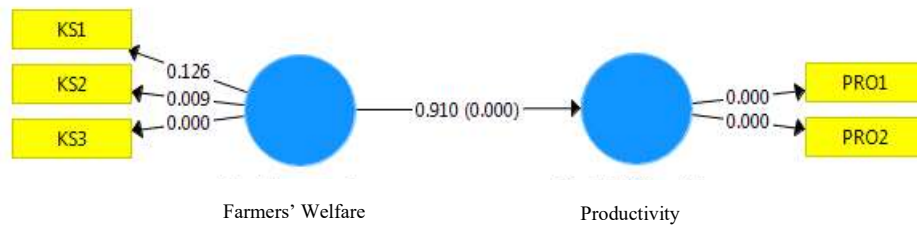


Figure 5. Inner Model Test Results

In assessing the model with PLS begins by looking at the R-square for each dependent latent variable. Table 8 is the result of R-square estimation using SmartPLS.

Table 8. R Square Results

	R Square	R Square Adjusted
Farmers' Welfare >> Oil-Palm Productivity	0.828	0.793

Source: Research Results, 2023 (Processed Data)

Table 8 shows the R-square value for oil palm productivity of 0.828 while the Adjusted R-square value is 0.793. These results indicate that 82.8% of the oil palm productivity variable is explained by the welfare of farmers, and the remaining 17.2% is explained by other variables not examined in this study.

Table 9. Result for Inner weight (Path Coefficients)

	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistics	P Values
Farmers' Welfare >> Oil-Palm Productivity	0.910	0.936	0.043	21.360	0.000

Source: Research Results, 2023 (Processed Data)

According to Table 9, there is a significant positive effect of the farmers' welfare on oil palm productivity (P value < (0.005) with a large estimate of 0.910. This means that Hypothesis 1 is accepted, that that increasing and developing human resources to achieve farmer welfare can increase palm oil productivity in Indonesia.

3.3. Farmer Welfare Construct Variables

According to [30], states that oil palm farmers will try to maintain their level of welfare. This is related to productivity, the sustainability of oil palm plantations, and the survival of oil palm farmers. According to [31], it is stated that the minimum wage is expected to increase the welfare of workers with low wages. Implementing minimum wage is an important tool to reduce poverty. According to Law Number 39 of 2014 concerning Plantations, which regulates the allocation of BPDPKS funds, this financial support is necessary to increase the productivity and the welfare of oil palm smallholders, such as through financing plantation rejuvenation, enhancing human resource capacity, and conducting research.

Farmers' welfare is influenced by the use of BPDPKS funds, especially in the community oil palm rejuvenation (PSR) program. In 2023, the rejuvenation target targets 180,000 hectares of smallholder oil palm plantations per year. Where 100,000 hectares are implemented independently and 80,000 hectares using a partnership pattern with several companies. Efforts to accelerate the rejuvenation of farmers' oil palm plantations will increase the productivity of oil palm plantations so that farmers' lives will be more prosperous.

The role of farmer groups is also in mentoring, outreach, and education to obtain sustainable certification for palm oil farmers according to the target of 2025. By involvement in farmer groups, farmers are expected to be able to determine the price of palm oil in the downstream industry. Farmers' capacity to determine palm oil prices through village-owned enterprises and government support. Therefore, strengthening farmer groups is very important. According to [32], strengthening farmer groups is required to improve farmers' welfare.

3.4. Palm Oil Productivity Construct Variables

In this study, there are two measuring variables as constructs that form the variables of oil palm productivity, namely areal and production, supported by previous research such as [32], According to [33], the productivity of oil palm plantation is influenced by various factors, starting from rainfall, human resources (agricultural labor), government policies, etc. The production and productivity of oil palm is influenced by the area of the oil palm plantation, the higher the demand

for palm oil products, the higher the price because it requires increasing palm oil production activities.

To increase the level of productivity of farmers' land and crops, it is hoped that the government can act more actively, especially regarding reducing farmers' production costs, especially the policy of supporting production factor subsidies (fertilizers, pesticides, agricultural machinery and equipment, basic plantation infrastructure). This is the case with existing companies being asked to be willing to assist farmers in terms of quality control of FFB products, maintenance, land and plant productivity, and plantation management with a global market orientation [34].

3.5. Modification of Farmer Group Economic Institutional Construct Variables

In this study, modifications have been made to the variable measuring farmer welfare by removing latent variables, namely the economic institutions of farmer groups such as Joint Business Groups (KUB), Cooperatives, and Limited Liability Companies (PT). [35], stated that so far effectiveness in groups is still relatively low. This is caused by the limited role of farmer groups, unclear members, incomplete organizational structure, low productivity, and the formation of an economic institution for agricultural groups that are not carried out in a participatory manner. So it cannot gather the potential and interests of farmers, which should be the main capital in building farmer institutions in their collective action. In fact, in some places what happens is that these farmer groups are only formed at certain times, such as when providing government funds, providing fertilizer assistance, and other assistance. Even though the existence of this farmer group has provided very significant results in helping to achieve agricultural development programs, the paradigm in developing this farmer group is still not appropriate. The development of farmer groups created by the government tends to make farmer groups into formal groups. This has resulted in farmer groups which were originally social groups becoming task groups often called Task Groups, where there is too much intervention from outside towards these groups. This resulted in farmer groups that were originally social groups (social groups) becoming task groups often called Task Groups, there was too much outside intervention in these groups.

In this research, economic institutional indicators of farmer groups were removed as forming construct variables. This is supported by research by [36], which states that one of the factors that improve farmers' welfare is through institutions. However, the results obtained in the study were not significant. This is because social and institutional variables do not influence production variables significantly considering that the contribution of these variables is very small, whereas the items in question are from these two variables because they do not directly influence the production process. For example, in the institutional variable, considering that the role of financial institutions in rural areas is not strong enough to contribute to the success of farming in rural areas, it is also added that existing institutions are not in line with farmers' expectations.

This is supported by the opinion in research by [37], which states that the government has implemented many development programs to form farmer group institutions. However, it has not been able to change the conditions of many rural communities who live in poverty. Instead of being participatory, the establishment, for example, KUD, which cannot be separated from the dominance of this stability policy, actually limits (poor) farmers. They do not have access to voice their basic needs and complaints to the organization, and they are also hampered in getting access to services.

The greater agricultural development in the future, especially in achieving the so-called welfare of farmers, the institutionalization of farmer groups throughout rural Indonesia must be addressed and empowered, so that they become empowered in their farming life. To achieve this empowerment, the empowerment program carried out must be able to increase the ability of farmer groups in terms of understanding the strengths and potentials, and weaknesses of groups, taking into account the opportunities and challenges faced, choosing existing alternatives in solving problems, and organizing a group and community life. that are compatible with their environment [38]. Operational steps are needed to strengthen farmer groups to improve farmer welfare [39]. According to research [40], states that referring to Law Number 16 of 2006, the purpose of the extension system itself includes the development of human resources and increasing social capital.

4. Conclusion and Recommendation

Based on the results of the analysis and discussion that has been carried out in this study, the following conclusions can be obtained here 2 measuring variables (manifest variables) from a construct of oil palm productivity, namely area, and production. There are 4\3 measuring variables of farmer welfare, namely wages, distribution of BPDP budget funds, and number of farmer groups. After evaluating the measurement model (Outer Model) on the latent variable of farmer welfare, KS4 is obtained which does not meet the outer loading value. So the model modification is carried out to meet the loading factor value on the construct variable. While the measuring variable of the oil palm productivity construct has fulfilled the outer loading. The results of this study showed that the welfare of farmers has a positive and significant impact on oil palm productivity. The more efforts to achieve farmer welfare increase, the more palm oil productivity will increase.

This research is exploratory in nature, namely, exploratory factor analysis (EFA) when the theoretical basis of the construct or model is still weak. Therefore exploratory research is initial research that aims to get an overview of a research topic that will be examined further. Therefore, research needs to be carried out by adding other measuring variables so as not to provide biased results. It is necessary to conduct research using other measuring variables to determine the effect of farmer welfare on oil palm productivity.

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