

Readiness of Independent Oil Palm Farmers to Face Replanting

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ABSTRACT

BACKGROUND AND OBJECTIVES

Oil palm has an average productive life of about 25 years, after which yields decline. Replanting is therefore essential to sustain long-term productivity. This study examines the readiness of independent oil palm farmers and identifies the main factors that influence their preparedness to undertake replanting in Laman Bukit Village, Belimbing District, Melawi Regency, Indonesia.

METHODS

The research was conducted in Laman Bukit Village, an area with the largest oil palm plantation coverage in the regency. A total of 100 respondents were selected from 351 farming households using simple random sampling. Data were gathered using structured Likert-scale questionnaires and analyzed using descriptive statistics and Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS 4.

FINDINGS

The results show that independent farmers were generally classified as prepared to implement replanting. Personal factors, ownership of other plantations, and financial conditions had a significant positive effect on readiness. In contrast, institutional factors did not show a significant statistical effect, indicating that existing institutions have not yet functioned effectively to directly support farmers' readiness. This indicates that strengthening local institutional capacity remains necessary.

CONCLUSION

Farmers' readiness for replanting is strongly supported by personal experience, access to alternative productive assets, and financial preparedness. Strengthening these aspects is crucial to ensure the sustainability of oil palm replanting programs.

Keywords: Readiness; Independent farmers; PLS-SEM; Replanting; Oil palm

INTRODUCTION

The agricultural sector plays a crucial role in the Indonesian economy, as it contributes to food provision, employment, and national foreign exchange earnings (1). Oil palm plantations are one of the main subsectors and have become a nationally strategic commodity as well as the largest contributor to global vegetable oil production. In addition, oil palm development

encourages rural development and improves community welfare (2). These conditions indicate that oil palm functions not only as an economic commodity but also as a driver of social welfare in rural areas, especially in creating employment opportunities and improving farmers' living standards.

Oil palm productivity is only optimal up to approximately 25 years of age, after which yields decline and harvesting becomes increasingly difficult (3). This condition makes replanting a critical step to maintain production sustainability and farming efficiency. Replanting is intensified to replace old plants with superior planting materials that are more productive and resistant to diseases (4). Thus, replanting becomes one of the most important strategies to ensure the sustainability of the oil palm industry so that it remains productive and competitive in the future.

However, this process creates major challenges for independent smallholder farmers because during the replanting period, production stops and income is lost for several years (5). Independent farmers manage their plantations independently without company support, so they face limitations in capital, technology, and institutional support (6). As a result, although independent farmers play a major role in the national oil palm area, many of them are not yet prepared to implement replanting due to economic constraints and the lack of alternative income sources (7). This situation indicates that the readiness of independent farmers to face replanting remains a fundamental challenge that requires serious attention from various parties, including the government, financial institutions, and other supporting organizations. Efforts to strengthen farmers' capacity, provide financial support, and reinforce institutional structures are key to encouraging independent farmers to be better prepared to face the replanting process in a sustainable manner (8). Therefore, research on the factors influencing the readiness of independent farmers to face replanting is important to provide more effective policy recommendations and assistance strategies.

Farmers' readiness plays a critical role in determining the success of replanting programs, as it reflects their capacity to adapt to technical, financial, and managerial challenges. Readiness is not only shaped by knowledge and technical skills, but also by experience, confidence, and the ability to manage risk. When farmers are insufficiently prepared, replanting initiatives often face delays, low participation, and limited long-term effectiveness. Therefore, readiness should be understood as a dynamic process developed through learning, practice, and environmental support. According to (9), readiness is a person's physical, mental, and emotional condition in dealing with certain situations. Research (10) explains that farmers' readiness reflects their ability to understand and apply agricultural innovations, which are influenced by knowledge, skills, and the ability to manage risks. Furthermore, (11) adds that readiness is also determined by self-efficacy, perceived control, and risk perception. Meanwhile, other studies state that farmers' readiness is the result of interaction between internal factors (personal factors, ownership of other plantations, and financial conditions) and external factors such as institutional support (7, 12, 13). This shows that farmers' readiness does not emerge suddenly but is formed through learning processes, experience, and environmental support. Therefore, strengthening farmers' capacity, improving access to resources, and providing adequate institutional support are essential to

enable independent farmers to face the replanting process with greater confidence and competitiveness.

Melawi Regency, particularly Belimbing District, has strong potential for oil palm development, with plantation areas reaching 31,290 hectares (14). Laman Bukit Village is one of the areas currently facing replanting challenges because most oil palm trees are more than 25 years old. After the termination of the partnership scheme with Sinar Dinamika Kapuas Company in 2019, farmers in this village shifted to become independent farmers and were required to bear all production costs independently. This situation was further exacerbated by the limited functionality of farmer groups and cooperatives, as well as limited access to financing and technical assistance. As a result, most farmers are not yet financially and technically prepared to carry out replanting, even though plantation productivity has declined.

The novelty of this study lies in its focus on independent oil palm smallholders in Laman Bukit Village, Belimbing District, Melawi Regency, which has rarely been examined in the context of the transition from plasma farming to independent farming after the termination of company partnerships. The objectives of this study were: (i) to determine the readiness of independent farmers to face oil palm replanting, and (ii) to analyze the factors influencing the readiness of independent farmers in facing oil palm replanting.

RESEARCH METHOD

Based on the background and theoretical foundation that have been described, a research framework was developed to illustrate the relationships among variables that influence the readiness of independent farmers in facing oil palm replanting. This framework is presented in Figure 1 below.

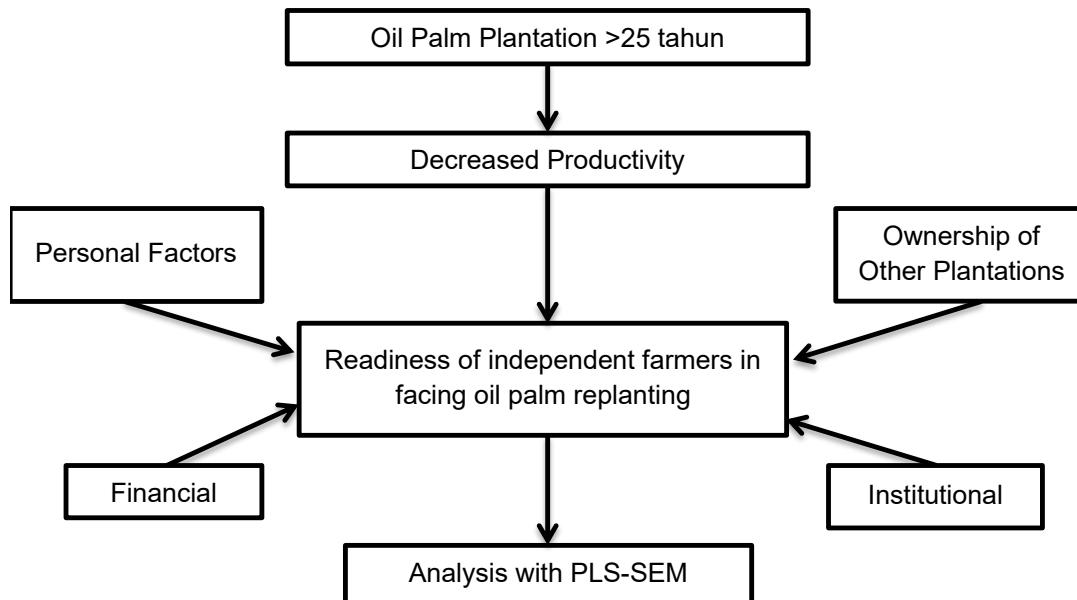


Figure 1. Conceptual Framework of Readiness in Facing Replanting

This study was conducted in Laman Bukit Village, Belimbing District, Melawi Regency, which was selected because it has experienced a decline in productivity due to aging oil palm trees and weak institutional support. The population in this study consisted of all oil palm farmers in Laman Bukit Village, totaling 351 households. A sample of 100 respondents was determined using the simple random sampling technique. Data collection methods included primary and secondary data.

This research used a quantitative descriptive method and was carried out in March–April 2025. The data collection instrument was a questionnaire based on a Likert scale. The data analysis methods in this study were arranged according to the following objectives:

1. Objective 1 was analyzed using a categorization method according to (15) into five levels, with readiness scores divided into five categories: <21% as very unprepared, 21–40% unprepared, 41–60% moderately prepared, 61–80% prepared, and 81–100% very prepared in facing replanting.
2. Objective 2 was analyzed using PLS-SEM through path coefficient testing to determine the direction and strength of the influence, as well as T-statistic and p-value values ($p < 0.05$) to assess significance. Variables with the largest path coefficients and the highest significance values were determined as the most dominant factors influencing the readiness of independent farmers in Laman Bukit Village.

RESULTS AND DISCUSSION

Readiness Level of Independent Farmers

Based on the descriptive analysis of the four variables that influence the readiness of independent farmers to face oil palm replanting in Laman Bukit Village, Belimbing District, Melawi Regency, the results are presented in Table 1 below.

Table 1. Readiness of Independent Farmers for Replanting

No	Variable	Mean (%)
1	Personal Factors (X1)	80.06
2	Ownership of Other Plantations (X2)	81.64
3	Financial (X3)	77.60
4	Institutional (X4)	82.85

Source: Primary Data Processed (2025)

Based on Table 1, the personal factors variable obtained a value of 80.06%, which falls into the “Prepared” category, indicating that farmers’ experience, attitudes, and self-confidence play an important role in their readiness to face replanting. This finding is in line with previous research (16), which shows that farmers’ ability to manage their plantations and their technical experience influence their decisions to carry out replanting. In addition, (17) explains that farmers’ knowledge and capacity are key determinants of readiness in facing changes in plantation

management. The findings of this study reflect these conditions; therefore, strengthening extension services remains necessary to improve farmers' overall readiness.

Ownership of other plantations recorded a value of 81.64%, categorized as "Very Prepared," indicating that additional productive assets help farmers maintain their income during the replanting period. This is consistent with the findings of (18), which state that farmers with alternative sources of income are better able to maintain economic stability when their main plantations are not productive. Furthermore, (19) emphasizes that reserve income plays an important role in the sustainability of oil palm farming, especially during the replanting period. However, some farmers still face challenges such as the long distance to alternative plantations, indicating that better time and labor management are required.

The financial factor obtained the lowest value, 77.60%, which falls into the "Prepared" category, indicating that limited capital and unstable income remain the main obstacles for farmers. This finding aligns with research (20), which indicates that limited access to capital hinders smallholder farmers from rejuvenating their plantations or investing in replanting. The explanation from (19) also supports that financial constraints cause farmers to delay replanting or to be reluctant to take risks. Therefore, financial support from the government and financial institutions needs to be strengthened so that farmers can be more financially prepared.

The institutional factor obtained the highest value, 82.85%, which falls into the "Very Prepared" category, indicating that the presence of farmer groups, facilitators, and government institutions is considered important by farmers. This finding is consistent with (21), which states that strong farmer organizations help facilitate the flow of information, technical support, and access to replanting programs. Reports from (18) also show that active institutions increase the success of sustainable oil palm management. Although the institutional factor obtained a high descriptive score, its statistical effect was not significant, indicating that existing institutions have not functioned effectively enough to directly influence farmers' readiness. Therefore, strengthening local institutional capacity is strongly needed.

Factors Influencing Farmers' Readiness For Replanting

Various internal and external factors influence the readiness of independent farmers in facing replanting. To better understand the relationships among variables, an analysis using the Partial Least Squares (PLS) approach was conducted. This analysis aims to assess the relationships between latent constructs and their indicators, as well as to measure the extent to which the variables studied can explain the level of farmers' readiness in the replanting process.

a. Measurement Model Development (Outer Model)

The testing of the outer model was conducted to evaluate the quality of indicators in representing the constructs measured in the research model. The testing procedures included convergent validity, discriminant validity, and reliability, so that the analysis results could indicate whether the indicators were valid and reliable for use in the study.

1. Convergent Validity

Convergent validity testing was conducted to ensure that each indicator truly represents the measured variable. An indicator is considered valid if it has a strong factor loading value on its latent construct. The results of this test are presented in Figure 2 below.

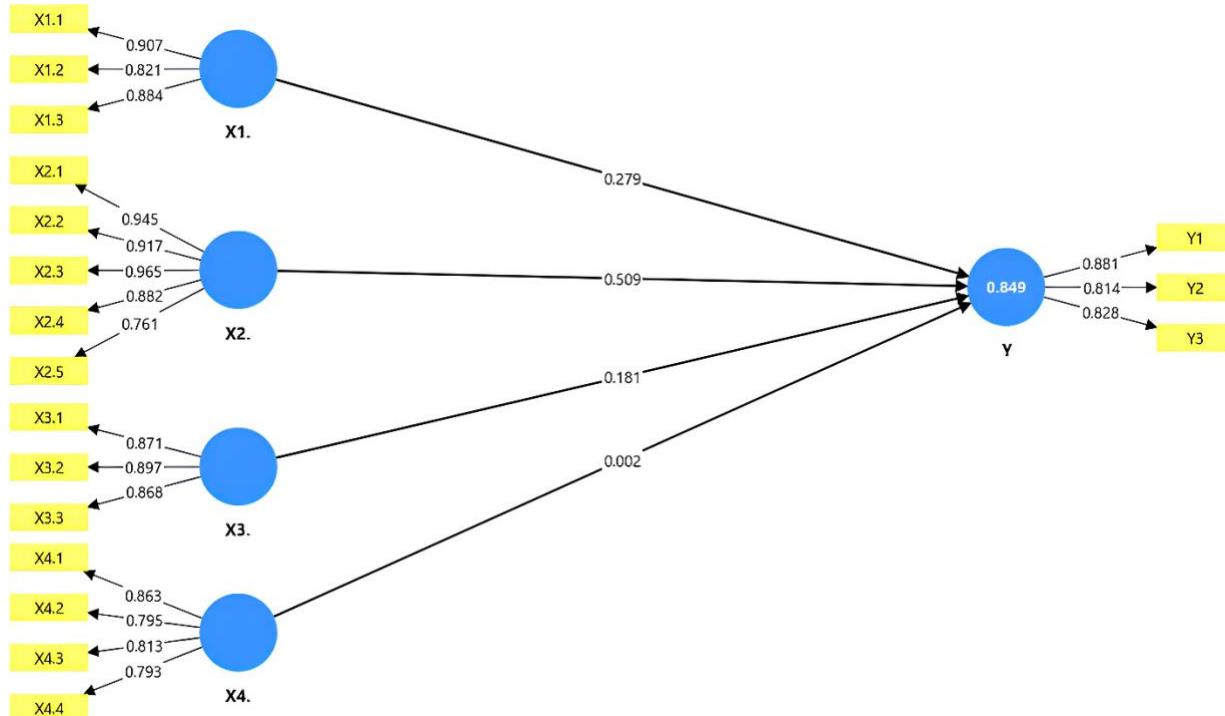


Figure 2. Outer Model Scheme

Figure 2 shows the influence of four independent variables, namely personal factors, ownership of other plantations, financial factors, and institutional factors, on the readiness of independent farmers in facing oil palm replanting. The outer loading values of all research variables, namely Personal Factors (X1), Ownership of Other Plantations (X2), Financial (X3), Institutional (X4), and Farmers' Readiness (Y), are above the threshold value of 0.7. This indicates that each latent construct can explain the variability of the data in its indicator variables very well, namely, more than 70%. Therefore, all indicators are considered convergently valid and suitable for further analysis.

2. Discriminant Validity

The discriminant validity test was conducted to ensure that each variable in the study is truly different from the others (22). This test employed the Fornell–Larcker criterion, which requires that the square root of the AVE value be greater than the correlations between variables. The results show that all variables, namely personal factors, ownership of other plantations, financial factors, institutional factors, and readiness, met the discriminant validity criteria. The lowest value was found in the institutional variable (0.817), and the highest was in the ownership

of other plantations variable (0.897). This means that all variables in this study are valid and can be clearly distinguished from each other.

3. Composite Reliability

Composite Reliability was used to assess the extent to which the research instrument can provide consistent and reliable results (23). According to (24), a Composite Reliability value is considered good if it reaches ≥ 0.70 .

Table 2. Composite Reliability Test Results

No.	Variable	Cronbach's alpha	Composite reliability
1	Personal Factors (X1)	0.840	0.843
2	Ownership of Other Plantations (X2)	0.937	0.945
3	Financial (X3)	0.852	0.853
4	Institutional (X4)	0.833	0.838
5	Readiness (Y)	0.795	0.812

Source: Data Processed using SmartPLS 4 (2025)

Based on Table 2, all variables have Composite Reliability and Cronbach's Alpha values above 0.70. This indicates that all indicators in each variable have high internal consistency; therefore, the research instrument is considered reliable and suitable for use. Good reliability is important because each variable in this study represents factors influencing the readiness of independent farmers in facing oil palm replanting, such as personal factors, ownership of other plantations, financial conditions, and institutional support. With reliable instruments, the results of the analysis regarding the influence of each factor on farmers' readiness can be trusted and reflect actual field conditions.

b. Structural Model (Inner model)

The inner model test was used to determine the predictive power and overall model fit. This test also provides information regarding the reliability and significance of the relationships among variables.

1. R-Square Test

The R-Square value was used to determine how much the independent variables influence the dependent variable (25). The R-Square value for the readiness variable (Y) was 0.849 (high category). This means that 84.90% of the readiness variable can be explained by personal factors, ownership of other plantations, financial, and institutional factors, while the remaining 15.10% is influenced by other factors outside this research model. Thus, this model has strong predictive capability, although there is still influence from external factors that were not examined.

Hypothesis Testing

2. Partial Test (t-test)

The hypotheses in this study were tested using a calculation model with the bootstrapping technique in SmartPLS. The bootstrapping analysis produced partial t-values along with their probability values. The results of the hypothesis test are presented in Table 3 below.

Table 3. Bootstrapping Test Results

No.	Variable	Original	T statistics	P values	Hypothesis
1	X1. → Y	0.279	2.268	0.023	Accepted
2	X2. → Y	0.509	3.836	0.000	Accepted
3	X3. → Y	0.181	1.965	0.049	Accepted
4	X4. → Y	0.002	0.018	0.986	Rejected

Source: Data Processed using SmartPLS 4 (2025)

The results of the study indicate that three main factors significantly influence the readiness of independent farmers in facing oil palm replanting, namely personal factors, ownership of other plantations, and financial factors.

Personal factors (X1) have a positive and significant effect on farmers' readiness (p-value = 0.023; t-value = 2.268). This means that farmers' experience, attitudes, and self-confidence play an important role in preparing themselves to face replanting. Farmers who are experienced and have positive attitudes tend to be more mentally and technically prepared to face the replanting period.

Ownership of other plantations (X2) has the greatest influence on farmers' readiness (p-value = 0.000; t-value = 3.836). Other productive plantations help farmers maintain income during the replanting period. The wider and more productive the additional plantations owned, the higher the farmers' level of readiness.

Financial factors (X3) also have a significant influence (p-value = 0.049; t-value = 1.965), although the effect is not as strong as X1 and X2. This indicates that the ability to manage finances, have savings, and plan expenditures remains important for farmers to survive during non-productive periods.

In contrast, institutional factors (X4) do not have a significant influence on farmers' readiness (p-value = 0.986; t-value = 0.018). This is because institutions such as the Village Unit Cooperative (KUD) in Laman Bukit Village are no longer active, so farmers do not directly feel their benefits. This condition indicates the need for stronger institutional roles to effectively support farmers in facing replanting programs.

The results of this study are consistent with research (13), which states that personal factors influence readiness for replanting, and research (7), which emphasizes that ownership of other plantations is important for farmers in facing replanting to meet their household needs. Similar findings are also shown in research (26), which found that financial factors play an important role in replanting readiness. Other studies, such as (8), also highlight that internal farmer factors, such as economic capacity and knowledge, are the main determinants of replanting decisions. However, there is an important difference between the research locations:

study (8) conducted in various regions in Indonesia found that the main barriers to replanting came from a lack of access to inputs, financing, and information, as well as strong pressure for institutional support, whereas in this study institutional factors did not have a significant influence because farmer groups and cooperatives in Laman Bukit Village were inactive and therefore did not become determining factors.

CONCLUSION

The readiness of independent farmers to implement replanting in Laman Bukit Village, Belimbing District, Melawi Regency, is categorized as "prepared." The analysis of the influence of independent variables reveals that personal factors, ownership of other plantations, and financial aspects have a positive and significant impact on readiness. Meanwhile, institutional variables do not have a significant effect on farmers' readiness.

RECOMMENDATIONS

This study shows that the readiness of independent farmers to face replanting is significantly influenced by personal factors, financial conditions, and ownership of other plantations. To improve this readiness, farmers need to receive regular mentoring and training, easier access to financing, and diversification of income sources. The government is also expected to strengthen farmer institutions and adjust replanting programs to local socio-economic conditions. The limitation of this study lies in its scope, which is limited to one village and a relatively small number of respondents; therefore, the results cannot yet be widely generalised. Future research is recommended to cover wider areas and consider additional variables such as technological support and regional government policies.

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