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The Effect of Training and Mentoring on Farmers' Compliance with RSPO-Based Good Practices in Oil Palm Plantations

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Abstract

Members of the Tani Mandiri Farmers' Group (Gapoktan) in LautTador Subdistrict, Batu Bara Regency, have received training and mentoring to maintain their Roundtable on Sustainable Palm Oil (RSPO) certification; however, several internal audit findings still indicate gaps in the implementation of best practices in the field. This study aims to examine the relationship between training and mentoring and farmers' compliance scores with RSPO-based best practices in oil palm plantations, both individually and in combination. The research design was an explanatory survey of 79 farmers selected using proportionate stratified random sampling from among 377 certified members across five farmer groups. Data were collected via a Likert-scale questionnaire that had been tested for validity and reliability, and then analyzed using multiple linear regression. The initial model yielded the equation Y = 4.545 + 0.936X1 + 0.270X2, with training (Beta = 0.573) and mentoring (Beta = 0.241) both showing positive and significant relationships with compliance scores ($p < 0.01$), and explaining 47.7% of the variance ($F = 34.641$; $p < 0.001$). Since the classical Glejser test indicated heteroscedasticity, these coefficients still need to be further confirmed using robust standard errors. These preliminary findings suggest that strengthening technical training and providing more regular on-site mentoring have the potential to support consistent compliance, although the cross-sectional design of this study cannot yet establish a causal relationship.

Keywords Training; Mentoring; Farmer Compliance; RSPO

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1. INTRODUCTION

Oil palm is one of the plantation commodities that supports the livelihoods of most farming households in Indonesia, while also serving as a vital source of foreign exchange for the country (Directorate General of Plantations, 2022). As the world's largest producer of palm oil, Indonesia accounts for approximately 59 percent of global production (United States Department of Agriculture, 2023). International market demands for environmental and social sustainability have driven the development of certification schemes such as the Roundtable on Sustainable Palm Oil (RSPO), which has now become one of the primary benchmarks for sustainable oil palm plantation practices (Putri et al., 2022).

The RSPO Principles & Criteria (P&C) 2024 outline seven principles that must be met by certified entities, ranging from transparency and the legality of operations to the protection of ecosystems and workers' rights (Roundtable on Sustainable Palm Oil, 2024a). For independent smallholders, the implementation of these standards is facilitated through the RSPO Independent Smallholder (ISH) Standard, which emphasizes a group-based certification approach via the Internal Control System (SKI) (Roundtable on Sustainable Palm Oil, 2024b). Through this scheme, each member's compliance with RSPO principles and criteria becomes a collective prerequisite that determines the sustainability of the entire group's certification—not merely a matter for individual farmers.

The Tani Mandiri Farmers' Group Association (Gapoktan) in Laut Tador Subdistrict, Batu Bara Regency, is one of the independent smallholder oil palm farmer groups that has obtained RSPO certification. Its members come from three villages: Tanjung Prapat, Laut Tador, and Kandangan. Since joining the certification scheme, this farmers' group has regularly received training through the Field School program, covering topics such as sustainable cultivation, the use of certified high-yield seeds, planting techniques, harvesting patterns based on fruit ripeness criteria, and fertilization practices. The field guidance provided covers harvest criteria, a ban on land burning, management of hazardous and toxic waste (B3), protection of riverbanks, a ban on child labor, and protection of endangered species (based on preliminary interviews, February 2026).

However, an initial review of internal audit documents and interviews with the management of the Tani Mandiri Farmers' Group in February 2026 indicated that the implementation of best practices by some members was not yet fully consistent. Some relevant observations include: fertilization that does not fully adhere to recommended dosage and application schedules; incomplete records of fertilization and harvesting activities; the use of seeds that are not all certified; and the inconsistent implementation of integrated pest management (IPM) across all members' farms. It should be emphasized that the use of chemical fertilizers or pesticides by farmers does not in and of itself constitute a violation of RSPO standards, as Criteria 7.1 and 7.2 of the 2024 RSPO Principles and Criteria (P&C) still permit the use of agrochemicals provided they follow technical recommendations, are properly recorded, use materials not included on the prohibited list, are accompanied by the implementation of IPM, and is accompanied by the proper management of packaging and hazardous waste in accordance with procedures (Roundtable on Sustainable Palm Oil, 2024a). Thus, the relevant indicator of non-compliance lies not in the use of these substances themselves, but in the adherence to proper application procedures.

These conditions are believed to be related to the demographic characteristics of the farmer group members, the majority of whom are over 40 years old with relatively limited formal education, as well as the uneven distribution of training and mentoring among members.

Previous studies have consistently shown that training plays a crucial role in building farmers' knowledge and skills to implement cultivation procedures in accordance with specific standards (Safei et al., 2021; Fadhillah et al., 2021). However, training that is not followed by ongoing mentoring tends to result in short-lived adoption of practices, as farmers risk reverting to old habits once the training program ends (Apriani et al., 2020). Ongoing support, on the other hand, allows for direct and repeated monitoring of implementation in the field, and is thus believed to help strengthen farmers' consistent adherence to group guidelines as well as to their membership in certification schemes (de Vos et al., 2023; Nupueng et al., 2023).

Most previous studies have focused more on farmers' readiness to obtain certification (de Vos et al., 2023; Nupueng et al., 2023), their capacity to adopt agricultural technologies or innovations (Safei et al., 2021; Gusti et al., 2022), or the adoption of sustainable agricultural practices in general (Apriani et al., 2020). Quantitative studies that specifically distinguish the contributions of formal training and ongoing mentoring to farmer group members' compliance after obtaining RSPO certification—particularly among self-help farmer groups in North Sumatra—remain relatively scarce. This study was designed to address this gap, with the following objectives: (1) to analyze the relationship between training and farmers' compliance scores; (2) to analyze the relationship between mentoring and farmers' compliance scores; and (3) to analyze the combined relationship between training and mentoring and the compliance scores of farmers who are members of the Tani Mandiri Farmers' Group (Gapoktan) in Laut Tador Subdistrict.

2. METHOD

This study employed a quantitative design using an explanatory survey method with a cross-sectional approach. The independent variables were training (X1) and mentoring (X2), while the dependent variable was farmers' compliance scores with good practices according to RSPO standards (Y). The study was conducted in Laut Tador Subdistrict, Batu Bara Regency, covering the villages of Tanjung Prapat, Laut Tador, and Kandangan. This area was selected purposively because it serves as the base for Gapoktan Tani Mandiri— 's RSPO-certified independent smallholder oil palm farmer group—which still faces challenges in consistently implementing good practices. Primary data collection took place from February to March 2026.

The study population consists of all 377 RSPO-certified members of the Tani Mandiri Farmers' Association, distributed across five farmer groups: one group in Kandangan Village, three groups in Laut Tador Village, and one group in Tanjung Prapat Village. Inclusion criteria for respondents included: (1) being registered as an active member of an RSPO-certified farmer group; (2) owning and managing a productive oil palm plantation; and (3) being willing to participate after receiving an

explanation of the study's objectives. Exclusion criteria included members with inactive status, those not present at the location during the data collection period, or those who refused to participate. Before completing the questionnaire, each prospective respondent was given a verbal explanation of the research objectives and asked to provide informed consent, either verbally or by signing a consent form on the questionnaire. Respondent identities were kept confidential, and all collected data were used solely for the purposes of this study.

The initial sample size was calculated using the Slovin formula with a 10% margin of error, namely $n = N/(1+N.e^2) = 377/(1+377\times0.01) \approx 79$ respondents. A 10% margin of error was chosen due to the time and resource constraints typical of a bachelor's thesis, as is commonly used in social research with a population spread across multiple locations. Beyond the Slovin calculation, the adequacy of the sample size was also assessed in terms of the requirements for multiple linear regression analysis with two predictors. Referring to the observation-to-predictor ratio of approximately 15–20 observations per predictor, which is commonly required in multiple regression (Ghozali, 2021), as well as Green's (1991) practical rule of thumb $N \geq 50 + 8m$ for testing the regression model as a whole (m = number of predictors = 2, so $N \geq \approx 66$), the sample size of 79 respondents was deemed sufficient to produce sufficiently stable regression coefficient estimates in a model with two predictors.

Sampling was conducted using the proportionate stratified random sampling technique, with farmer groups as strata. The sample size for each farmers' group was allocated proportionally to the population size within that stratum using the formula $ns = (Ns/N) \times n$, resulting in an allocation of 13 respondents from the Kandangan Farmers' Group, 15 respondents from the Tanjung Prapat Farmers' Group, and 17 respondents each from the three farmers' groups in Laut Tador Village. In the next stage, the selection of respondents within each stratum was conducted using simple random sampling, with the list of farmer group members obtained from the Gapoktan administrators serving as the sampling frame. Each member on the list was assigned a serial number, and a random draw was conducted using a random number table to select the allocated number of respondents from each group, ensuring that every member had an equal chance of being selected.

Primary data were collected through a closed-ended questionnaire using a 1–5 Likert scale (Strongly Disagree to Strongly Agree), supplemented by non-participant observation and semi-structured interviews with the farmers' group management. Secondary data were obtained from the subdistrict office, Gapoktan leaders, and RSPO audit/certification documents. The training variable (X1) was measured using three indicators: frequency of training participation, training duration, and the relevance of training materials to farmers' needs, which were broken down into 10 statements. The extension support variable (X2) was measured using five indicators: empowerment; provision of information and education; technical guidance; monitoring and evaluation; and problem-solving

support, which were broken down into 15 statements. These two sets of indicators were developed based on a literature review of agricultural extension and mentoring (Fadhillah et al., 2021; Nurida et al., 2024), then adapted to the context of RSPO mentoring and reviewed for linguistic appropriateness with the supervising instructor before being used in the field.

The farmer compliance variable (Y) was measured using indicators formulated by directly mapping to the relevant criteria in the 2024 RSPO P&C and RSPO ISH Standards as they apply to the field conditions of the Tani Mandiri Farmers' Group, namely: compliance with harvesting and fertilization criteria in accordance with recommendations (Criteria 4 and 7.1), completeness of farm activity records and documentation (Criteria 2 and 7.1), prohibition of land burning (Criterion 7.4), management of hazardous waste and agrochemical packaging (Criterion 7.2), protection of riverbanks (Criterion 7.5), prohibition of child labor (Criteria 6.5), and protection of protected wildlife (Criteria 7.7). These seven areas are further elaborated into 18 specific statements (Roundtable on Sustainable Palm Oil, 2024a, 2024b).

Operationally, training (X1) is defined as farmers' perceived scores regarding the frequency, duration, and relevance of the content of formal training activities they participate in for the implementation of RSPO standards, measured using 10 statements on a 1–5 Likert scale. Mentoring (X2) is defined as farmers' perceived scores regarding the intensity and quality of on-site guidance they receive from group mentors, covering empowerment, information provision, technical guidance, monitoring and evaluation, and problem-solving, measured using valid items from a total of 15 developed items. Farmer compliance (Y) is defined as farmers' self-report scores regarding their level of implementation of the seven RSPO best practice areas mentioned earlier, measured using valid items from a total of 18 developed items. All three variables were measured at the individual respondent level and summed to yield a total score per variable for regression analysis.

Validity testing was conducted using Pearson's product-moment correlation between the score of each item and the total score of its respective variable, with validity criteria set such that the calculated r value must be greater than the table r value at a 5% significance level (n = 79; table r = 0.221). The results of the item-level validity tests for the three variables are presented in Table 1, Table 2, and Table 3.

Table 1. Validity Test Results for the Training Variable (X1)

No	Item	Calculated r	Table r	Remarks
1	X1.1	0.704	0.221	Valid
2	X1.2	0.674	0.221	Valid
3	X1.3	0.685	0.221	Valid
4	X1.4	0.827	0.221	Valid
5	X1.5	0.505	0.221	Valid
6	X1.6	0.611	0.221	Valid
7	X1.7	0.607	0.221	Valid
8	X1.8	0.639	0.221	Valid

9	X1.9	0.694	0.221	Valid
10	X1.10	0.801	0.221	Valid

Source: Processed primary data, 2026

Table 2. Results of the Validity Test for the Mentoring Variable (X2)

No	Item	Calculated r	Table r	Remarks
1	X2.1	0.891	0.221	Valid
2	X2.2	0.905	0.221	Valid
3	X2.3	0.779	0.221	Valid
4	X2.4	0.840	0.221	Valid
5	X2.5	0.513	0.221	Valid
6	X2.6	0.478	0.221	Valid
7	X2.7	0.739	0.221	Valid
8	X2.8	0.866	0.221	Valid
9	X2.9	0.852	0.221	Valid
10	X2.10	0.565	0.221	Valid
11	X2.11	0.696	0.221	Valid
12	X2.12	0.843	0.221	Valid
13	X2.13	0.807	0.221	Valid
14	X2.14	Constant	0.221	Invalid
15	X2.15	Constant	0.221	Invalid

Source: Processed primary data, 2026.

Table 3. Results of the Validity Test for the Farmer Compliance Variable (Y)

No	Item	Calculated r	Table r	Remarks
1	Y.1	0.761	0.221	Valid
2	Y.2	0.680	0.221	Valid
3	Y.3	0.608	0.221	Valid
4	Y.4	0.934	0.221	Valid
5	Y.5	0.069	0.221	Invalid
6	Y.6	0.739	0.221	Valid
7	Y.7	0.447	0.221	Valid
8	Y.8	0.620	0.221	Valid
9	Y.9	0.577	0.221	Valid
10	Y.10	-0.329	0.221	Invalid
11	Y.11	0.642	0.221	Valid
12	Y.12	0.667	0.221	Valid
13	Y.13	0.750	0.221	Valid
14	Y.14	0.162	0.221	Invalid
15	Y.15	0.756	0.221	Valid
16	Y.16	0.162	0.221	Invalid
17	Y.17	0.667	0.221	Valid
18	Y.18	0.567	0.221	Valid

Source: Processed primary data, 2026.

Based on these three tables, all 10 items in the training variable were deemed valid (calculated r values ranging from 0.505 to 0.827). For the mentoring variable, 13 out of 15 items were deemed valid (calculated r values ranging from 0.478 to 0.905), while the validity of 2 items (X2.14 and X2.15) could not be tested because all respondents provided uniform answers to both items; consequently, both were

excluded from the total score calculation. For the compliance variable, 14 of the 18 items were deemed valid (calculated r values ranging from 0.447 to 0.934), while 4 items (Y.5, Y.10, Y.14, and Y.16) were deemed invalid because their calculated r values were smaller than the table r values or were even negative; consequently, all four were excluded and not included in the subsequent analysis. The reliability of the instrument was then tested using Cronbach's Alpha coefficient based on the items deemed valid, with a reliability threshold of ≥ 0.60 (Ghozali, 2021).

Prior to regression analysis, the data were tested using classical assumption tests, including the normality test (Kolmogorov-Smirnov), the multicollinearity test (Tolerance and VIF values), and the heteroscedasticity test (Glejser test). The primary analysis technique was multiple linear regression using the equation Y = a + b1X1 + b2X2+ e, followed by hypothesis testing via the t-test, F-test, and coefficient of determination (R^2) at a 5% significance level. Since the results of the classical assumption tests on the research data indicate deviations from the assumptions of normality and homoscedasticity (discussed in the results section), the significance of the regression coefficients was also re-examined using a non-parametric bootstrap approach (5,000 replications) to complement the classical tests, so that the interpretation of the results does not rely solely on the assumption of a normal distribution.

3. FINDINGS AND DISCUSSION

3.1 Respondent Characteristics

The study sample consisted of 79 farmers who are members of the Tani Mandiri Farmers' Group (Gapoktan), who have been members for at least 6 years and own active, productive oil palm plantations. The majority of respondents were in the 50–59 age group (72.15%), male (63.29%), and had completed high school or vocational school (51.90%). In terms of farming experience, 54.43% of respondents had been farming oil palm for 25–30 years, with the majority owning 1–2 hectares of land (44.30%). All respondents (100%) were landowners holding a Certificate of Ownership (SHM), possessed a map or sketch of their plantation, and still used chemical pesticides in plantation maintenance. A total of 69.62% of respondents maintain plantation logbooks, and 72.15% have undergone RSPO internal or external audits. This profile indicates that respondents are relatively homogeneous in terms of land legality and duration of participation in the RSPO program, but vary considerably in terms of age, education, land area, and the intensity of training they have received.

3.2 Descriptive Statistics of Research Variables

The total score for each variable was calculated based on the items that were determined to be valid and reliable. The results of the descriptive statistical analysis are presented in Table 4.

Table 4. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Training (X1)	79	26.00	49.00	40.8734	4.15830
Mentoring (X2)	79	34.00	65.00	52.1646	6.07945
Compliance (Y)	79	48.00	68.00	56.8608	6.79505

Source: Processed primary data, 2026

The average training score (X1) was 40.87 out of a theoretical range of 10–50, the average mentoring score (X2) was 52.16 out of a theoretical range of 13–65, and the average compliance score (Y) was 56.86 out of a theoretical range of 14–70. The compliance score showed variation among respondents, with a standard deviation of 6.80. The magnitude of this variation indicates that the level of compliance among group members is not yet entirely uniform; however, interpreting this as a significant gap requires further comparison with the score range and the data distribution pattern. Since this study did not establish interval categories (e.g., low–moderate–high) based on a formula or standard source, the mean and standard deviation in Table 4 are reported as is without such categorization.

3.3 Reliability Test Results

Table 5. Reliability Test Results for Variables X1, X2, and Y

Variable	Number of Valid Items	Cronbach's Alpha	Standard	Notes
Training (X1)	10	0.861	0.60	Reliable
Mentoring (X2)	13	0.908	0.60	Reliable
Compliance (Y)	14	0.919	0.60	Reliable

Source: Processed primary data, 2026

All variables have Cronbach's Alpha values above 0.60; therefore, the instruments for the three variables are deemed reliable and internally consistent, and are suitable for use as the basis for regression analysis and hypothesis testing in the following section.

3.4 Classical Assumption Tests

The normality test using the Kolmogorov-Smirnov test yielded a statistic of 0.235 with a significance level of 0.001 (< 0.05), indicating that the residual data are not perfectly normally distributed. Therefore, the researcher conducted a follow-up test using the bootstrapping approach (5,000 replications), which does not require the normality assumption, to ensure the validity of the test results.

Table 6. Results of the Multicollinearity Test

Variable	Tolerance	VIF	Description
Training (X1)	0.892	1.121	No multicollinearity
Mentoring (X2)	0.892	1.121	No multicollinearity

Source: Processed primary data, 2026

Both independent variables have a Tolerance value of 0.892 (> 0.10) and a VIF of 1.121 (< 10), indicating that there is no multicollinearity in the regression model, with the correlation between the two independent variables classified as weak to moderate (r = 0.328). The heteroscedasticity test using the classical Glejser test, however, indicates the presence of heteroscedasticity (Sig. for training and mentoring: 0.005 each). Further *bootstrap* testing showed that the 95% *bootstrap* confidence intervals for both coefficients included zero (X1: -0.344 to 0.430, p = 0.739; X2: –0.335 to 0.011, p = 0.072), so the indication of heteroscedasticity in the classical test is not entirely consistent when standard errors are estimated nonparametrically. Nevertheless, the regression and ANOVA results in the following sections appear arithmetically consistent with one another (the R^2 values, sums of squares, mean squares, and F-values are mutually supportive); however, the validity of the inferences can only be fully confirmed after the coefficients are recalculated using *robust standard errors*. Therefore, the significance values in Table 7 and Table 8 should be interpreted as preliminary results that still require further confirmation.

3.5 Multiple Linear Regression Analysis and Hypothesis Testing

Table 7. Results of Multiple Linear Regression Test

Model	B	Std. Error	Beta	t	Sig.
(Constant)	4.545	6.421	-	0.708	0.481
Training (X1)	0.936	0.144	0.573	6.518	0.000
Mentoring (X2)	0.270	0.098	0.241	2.748	0.007

Source: Processed primary data, 2026. Dependent variable: Farmer Compliance (Y)

Based on Table 7, the initial regression equation is: Y = 4.545 + 0.936X1 + 0.270X2 + e. The regression coefficients for training (0.936) and mentoring (0.270) are positive, indicating that increases in training and mentoring scores are positively correlated with increases in compliance scores in this study sample. The t-test shows that training (X1) is positively and partially significantly associated with farmer compliance (calculated t = 6.518 > table t = 1.992; Sig. = 0.000 < 0.05), thus supporting H1. Mentoring (X2) also has a positive and statistically significant partial relationship (calculated t = 2.748 > table t = 1.992; Sig. = 0.007 < 0.05), thus H2 is also supported. The standardized coefficients indicate that training has a relatively greater contribution than mentoring in this model (Beta = 0.573 versus 0.241).

Table 8. Results of the Simultaneous Test (F-Test) – ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1,717.460	2	858.730	34,641	0.000
Residual	1,884.008	76	24,790		
Total	3,601.468	78			

Source: Processed primary data, 2026. Predictors: (Constant), Training, Mentoring

The F-test yielded a calculated F-value of 34.641 (> table F-value of 3.117 at df1=2, df2=76) with a significance level of 0.000 (< 0.05), indicating that H3 is supported by the data, meaning that training and mentoring are jointly positively and significantly associated with farmer compliance.

Table 9. Results of the Coefficient of Determination (R^2) Test

R	R-Square	Adjusted R-Square	Standard Error of the Estimate
0.691	0.477	0.463	4.979

Source: Processed primary data, 2026. Predictors: (Constant), Training, Mentoring

An R-squared value of 0.477 (47.7%) indicates that training and mentoring together account for 47.7% of the variation in farmer compliance within the study sample, while the remaining 52.3% is explained by other factors outside the model, such as farmers' socioeconomic characteristics, land area, institutional support from farmer groups, or price incentives for RSPO-certified fresh fruit bunches (FFB).

3.6 Discussion

3.6.1. Why Is the Coefficient for Training Larger Than That for Mentoring

The standardized regression coefficient for training (Beta = 0.573) is larger than that for mentoring (Beta = 0.241), indicating that the variance in training contributes relatively more to compliance scores in this study's data. This pattern aligns with the findings of Fadhillah et al. (2021) and Safei et al. (2021), who demonstrated that formal training tends to serve as the foundation for the knowledge and technical skills required to implement standards in the field. The training materials received by members of the Tani Mandiri Farmers' Group—particularly regarding fertilization techniques according to recommended doses and schedules, harvesting patterns based on fruit ripeness criteria, and the use of certified seeds—are directly related to most of the compliance indicators measured in this study. Therefore, the relevance of the training materials is presumed to be the most significant contributing factor, compared to mere training frequency or duration alone. However, since training is measured as a composite variable comprising three indicators, the hypothesis regarding which aspect is most

dominant remains interpretive and requires further testing at the indicator level.

3.6.2. Why Mentoring Remains Influential Despite Its Smaller Effect

Mentoring still shows a positive and significant relationship with compliance (Beta = 0.241; Sig. = 0.007), although its contribution is smaller than that of training. This pattern can be understood given that, based on preliminary interview results, mentoring at Gapoktan Tani Mandiri is often conducted concurrently with internal audit activities or group verification visits. This situation raises the possibility that some members perceive mentoring more as a compliance-checking activity rather than as a supportive, ongoing capacity-building process. If the frequency of mentoring visits outside the audit period is relatively limited, the functions of monitoring, providing feedback, and problem-solving in the field also become less effective, resulting in some members failing to fully translate training outcomes into consistent practices. This hypothesis aligns with the findings of Nupueng et al. (2023) that members' trust in the mentoring scheme and the involvement of farmer groups also determine the effectiveness of sustainability standard adoption among independent farmers, as well as with the idea that the role of the mentor as a facilitator should ideally be ongoing, rather than merely incidental during the audit period (Nurida et al., 2024).

3.6.3. Still Weak Compliance Practices

Based on the respondents' profiles, approximately 30% of members do not yet have farm logbooks, while all respondents (100%) still use chemical pesticides in farm maintenance. As explained in the Introduction section, the use of such agrochemicals does not in itself violate RSPO standards; however, the completeness of records regarding their use and the consistency of integrated pest management practices remain areas that require attention. Questionnaire items related to recording plantation activities and pest control also showed relatively lower response variation compared to other items during validity testing, which indirectly indicates that this area is one of the weak points in the group members' current compliance practices.

3.6.4. Farmer Characteristics as Contextual Factors

The demographic characteristics of the respondents also provide an important context for interpreting these results. The majority of respondents were in the 50–59 age group and had completed high school or vocational school, with farming experience generally exceeding 25 years. The combination of relatively advanced age and extensive farming experience may mean that some farmers have long-established cultivation habits, so the process of adopting new standards through training or mentoring may proceed more slowly compared to younger farmers or those just starting their farming operations. Variations in land area may also affect farmers' ability to consistently implement all technical recommendations, given that farmers with larger plots generally face a greater burden of monitoring and record-keeping. This study has not yet statistically tested these characteristics as

moderating variables; therefore, the relationships mentioned above remain preliminary hypotheses that need to be confirmed in future research, for example, through regression analysis incorporating interaction or moderation variables.

3.6.5. Implications for the Group's Internal Control System

In practical terms, these findings are relevant to strengthening the Internal Control System (ICS) of the Tani Mandiri Farmers' Group. Since training demonstrated a relatively stronger association with compliance, group administrators may consider periodically evaluating the alignment of training materials with current field conditions, including updating materials in accordance with the 2024 RSPO Principles and Criteria. At the same , since mentoring that is overly audit-oriented appears less effective in supporting compliance, the ICS can be strengthened by more clearly distinguishing between supportive mentoring activities (technical guidance, problem-solving) and compliance verification activities (internal audits), so that these two functions can complement each other without causing group members to perceive mentoring solely as a form of oversight.The test results show that training has a positive and significant effect on farmer compliance ($t = 6.518$; Sig. = 0.000), with a beta coefficient of 0.573, making it the most dominant predictor. The results of the bivariate correlation test also showed a strong relationship ($r = 0.652$). These findings are consistent with Vos et al. (2023), who found that training and technical guidance are key factors in the success of smallholder farmers in obtaining and maintaining RSPO certification; these findings are further supported by Mardikanto and Soebiato (2015) and Fadhillah et al. (2021), who emphasize the crucial role of training in fostering farmers' readiness and compliance with sustainability standards. The RSPO training materials received by farmers—including balanced fertilization, sustainable cultivation, the use of certified high-yield seeds, planting techniques, and harvesting patterns based on fruit ripeness criteria—are directly related to the compliance indicators measured in this study, resulting in a consistent and strong influence.

4. CONCLUSION

Based on the regression model developed in this study, training and mentoring show a positive relationship with the compliance scores reported by farmers regarding sustainable plantation practices in accordance with RSPO standards. Training exhibited a larger standardized regression coefficient compared to mentoring (Beta = 0.573 versus 0.241), and together these two variables explained 47.7% of the variation in compliance scores within the study sample ($R^2 = 0.477$; $F = 34.641$; Sig. = 0.000). Since this study used a cross-sectional design and self-reported variable measurements, these findings should be interpreted as statistical relationships between variables and cannot yet be used to conclude a cause-and-effect relationship between training, mentoring, and farmer compliance. Given the initial indications of heteroscedasticity in the classical Glejser test, the final estimates of the regression

coefficients also need further confirmation using robust standard errors or other estimation methods that are robust to violations of this assumption, before these results can serve as the basis for broader generalizations.

Based on the areas of compliance identified as still weak, the Tani Mandiri Farmers' Group (Gapoktan) leadership may consider several more specific follow-up steps, namely: (1) retraining on the procedures for complete and periodic recording of farm activities; (2) strengthening specialized mentoring on the implementation of integrated pest management; (3) routine inspection of members' farm " " logbooks by group leaders; (4) prioritizing field visits to members with a higher risk of non-compliance; (5) the use of a checklist based on the RSPO ISH Standard as a tool for both mentoring and internal audits; and (6) the designation of exemplary farmers as peer mentors to strengthen continuous learning among group members, rather than relying solely on external mentors. Future research is recommended to consider a longitudinal design, include farmers' socioeconomic characteristics as moderating variables, expand the sample scope to other RSPO farmer groups, and use estimation methods that are robust to heteroscedasticity to yield stronger conclusions.

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