



ASSESSING KNOWLEDGE LEVELS OF PALM OIL FARMERS TOWARD THE EFFECTIVENESS OF ISPO CERTIFICATION SUPPORT IN SINTANG REGENCY

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ABSTRACT

The palm oil industry in Indonesia faces problems and criticism for causing deforestation, destroying biodiversity, employing minors, and violating human rights. This problem limits access for Indonesian palm oil to the European Union. To overcome this, the ISPO (Indonesian Sustainable Palm Oil) Certification Program was established by the Indonesian government with the aim of increasing the competitiveness of Indonesian palm oil in the world market. However, there are still a limited number of independent farmers who have obtained ISPO certification. This is due to a lack of information and knowledge regarding the application of ISPO principles and criteria, as well as a lack of socialization regarding the importance of ISPO certification among independent farmers. This research aims to determine the level of knowledge and effectiveness of implementing the ISPO certification program, as well as analyzing the extent to which elements of knowledge influence the effectiveness of this program. The research used a Quantitative Descriptive method with 87 ISPO-certified independent farmers in Sintang Regency as respondents. Data analysis was carried out using descriptive statistics and Structural Equation Modeling (SEM) using SMARTPLS 4.0 software. The research results show that the level of farmer knowledge is in the "good" category. The effectiveness of implementing the ISPO certification program is also classified as "effective", with elements of knowledge that have a significant effect on effectiveness, including understanding, synthesis, and evaluation. In contrast, knowledge, application, and analysis do not affect the effectiveness of implementing the ISPO program.

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INTRODUCTION

Palm oil is one of the most important export commodities as a foreign exchange earner for the country (Nurhaliza et al., 2021). In addition, the existence of oil palm plantations contributes to creating jobs and increasing the income of farming communities (Chalil & Barus, 2018). Although it seems that the existence of oil palm plantations has a positive impact, it also has another negative impact on international trade in meeting world demand, especially in the European Union, which is one of Indonesia's trading partners in palm oil exports (Saragih & Rahayu, 2022). Criticisms and pressures faced by Indonesian palm oil plantations are the cause of forest fires, forest deforestation, damage to wildlife diversity, and underage labor (Riady et al., 2023). In 2011, the government launched the Indonesia Sustainable Palm Oil (ISPO) program to ensure that oil palm plantations in Indonesia comply with applicable regulations and support sustainable management. The program involves the private sector and civil society organizations to ensure the social, economic, and environmental benefits of the palm oil industry (Purwanto, 2020). To ensure that the palm oil industry will continue to be sustainable, the government has developed a sustainability standard known as Indonesia Sustainable Palm Oil (ISPO) (Hutabarat, 2022). However, as a program with a fairly broad target, the implementation of the ISPO certification program is inseparable from problems and obstacles that result in a decrease in program effectiveness. The business actors who received the least certification were independent smallholders (Utami, 2022). The failure to obtain ISPO certification is due to the lack of socialization, understanding, and knowledge of farmers about the importance of ISPO certification. Meanwhile, very few independent oil palm plantations are ISPO certified, and most are plasma oil palm plantations. This is because independent oil palm plantations do not receive sufficient support and socialization regarding ISPO (Hadi et al., 2023).

Every year, West Kalimantan's plantation sector experiences a significant increase, especially in the growth of oil palm plantations (Risyadi, 2023). One of the areas of oil plantation development in West Kalimantan is the Sintang District (Kana, 2022). Sintang Regency is one of the regencies with the highest number of oil palm farmers in West Kalimantan, with more than 12,000 households. (Sokoastri et al., 2019). The involvement of the government and other stakeholders is instrumental for independent oil palm smallholders as part of the international palm oil industry (Hutabarat, 2017). Sepauk sub-district, which was chosen as the research location in this study, is one of the areas assisted by NGOs in an effort to increase the acceptance of ISPO certification among farmers.

Sepauk District consists of 40 villages, most of which are located in lowlands and along the Kapuas River and its tributaries. This area is in a humid tropical climate zone and features plantations, agricultural land, and forests. Some villages are located on the riverbanks and have access to water transportation, while villages in the upper reaches have more hilly and isolated topography. The general geography consists of agriculture, water, and the influence of rivers and high rainfall.

One of the villages receiving support, Bangun Village the research location faces a specific challenge: farmers have a low level of knowledge regarding the ISPO program. The lack of Information is due to the difficulty of internet access, which cannot be accessed (Muliadi, 2023). Independent smallholders' knowledge of the ISPO certification program is very important to support the implementation of

sustainable palm oil; farmers who have insight into ISPO certification are more prepared to implement the standard (Nainggolan et al., 2023).

An approach known as program effectiveness is used to evaluate how the program objectives are achieved or not. The ISPO certification program is declared successful if it has met several requirements and conditions, such as cooperative and land legality, good management practices, and contributes to environmental sustainability and social aspects. The Indonesian Government's policy towards the ISPO certification program as a medium for sustainable palm oil management is expected to prove effective in the course of implementation.

An approach known as program effectiveness is used to evaluate the achievement of program objectives. The ISPO certification program is considered successful if it meets several requirements and conditions, such as the legality of cooperatives and land, good management practices, contributions to environmental sustainability, and social aspects. The Indonesian government's policy to encourage the implementation of ISPO certification as an instrument for sustainable palm oil management is expected to demonstrate its effectiveness in the field. The ISPO certification program targets not only large companies but also smallholders, including independent palm oil farmers, most of whom have low educational backgrounds and limited capacity to implement sustainable plantation standards. The success of this program is supported by farmers' knowledge of ISPO certification implementation.

This study aims to analyze the knowledge gaps in the implementation of the ISPO certification program after assisting farmers, as well as to evaluate the ISPO program implementation system to ensure the effectiveness of its implementation and the achievement of its targets. This study also examines the factors that influence the implementation of the ISPO program, one of which is through the element of cognitive knowledge, namely knowing, understanding, applying, analyzing, synthesizing, and evaluating.

RESEARCH METHOD

This research is a study using a quantitative approach. Data collection conducted in the study consisted of primary and secondary data sources. Primary data in this study were obtained through observation, interviews, and questionnaires. Secondary data to support this research is obtained from BPS, books, reports, journals, and other sources (Sugiyono, 2019). The scale used in this study was a Likert-5 scale. This research was conducted in Bangun Village, one of the villages located in Sepauk Subdistrict, Sintang Regency. The location was selected purposively because Bangun Village is one of the villages that receives support in the implementation of the ISPO certification program. The study population consisted of 87 farmers. A saturated sampling technique was employed, meaning all members of the population were used as the sample that uses all members of the population as a sample who are members of a cooperative (Amin et al., 2023). Data collection and data processing were conducted between June 2024 and August 2024. The purpose of this data collection was to access more specific information and data based on the research objectives. The main objective of this study is to explore the level of farmer knowledge of the ISPO certification program, which is analyzed using descriptive statistics. The level of effectiveness of the implementation of the ISPO

certification program was analyzed using the EPIC model framework to see the extent to which the ISPO program has been achieved. Furthermore, the last stage analyzes the elements of farmer knowledge in influencing the effectiveness of the implementation of the ISPO certification program using Structural Equation Modeling (SEM) SmartPLS 4.

RESULT AND DISCUSSION

Demographic Characteristics of Oil Palm Farmers

The characteristics of independent farmer respondents in this study consisted of age, gender, education, land size, land ownership status, and farming experience. The age of farmers varies in the range of 26 to 53 years, including in the productive age category (Wulandari & Wiranata, 2022). Based on the results in the table above, it is known that the 40-49 years age group has the highest percentage, which is 36% or 31 people, who are included in the productive age category. At this age stage, farmers in oil palm cultivation are more ready to respond and adopt new things to develop their business (Haksami & Sumirah, 2024).

Based on gender among the independent smallholders in this study, men dominated with 78% or 68 people. This shows that the participation of men is higher than that of women in oil palm cultivation. According to Hendi & Fitrianti (2024), this is influenced by the fact that men are responsible for work that requires great physical strength. Meanwhile, women's participation is limited to lighter activities such as land clearing, oil palm seedling, and fertilizing (Hanifa & Pramudya, 2018).

The education level of independent oil palm farmers with the highest percentage is in the SMA category, which is 43% or 37 people. Farmers with higher levels of education tend to be more ready to accept innovations and more quickly understand how to apply new technologies or innovations, as well as gain new understanding to improve agricultural yields (Gusti et al., 2022).

The average land area owned by independent oil palm smallholders is ≤ 5 Ha or 76%. Most of the land owned by farmers is less than 5 Ha, categorized as medium, and a small portion has a land area of more than 10 Ha, namely 18%. This is supported by the statement (Nurhaliza et al., 2021) that most independent smallholders only have a land area of around 2 to 4 Ha.

Legality is an important aspect in the oil palm plantation business because it involves proof of rights that must be owned by farmers related to land legality. As stipulated in the Minister of Agriculture Regulation Number e of 2022, article 17, paragraph 1, land ownership documents are proven by SHM (Kementerian Pertanian, 2022). A total of 54 people, or 62%, have obtained land ownership certificates, while 33 people, or 38%, are in the process of issuing land certificates issued by the BPN (National Land Agenc). This is also in line with Rokhim's statement, which illustrates that proof of land ownership is one of the ISPO requirements that is an obstacle to be fulfilled by independent oil palm smallholders in the field (Atik et al., 2020).

Farming experience is the length of time required for farmers to carry out their agricultural activities. Gusti et al. (2022) state that the length of time farming is divided into three categories: new (less than <10 years), medium (10- 20 years), and long (>20 years). The majority of independent oil palm smallholders have farming experience between 10 and 15 years, or 82%, totaling 71 people who are categorized

as having medium experience. Long farming experience can encourage good communication, allowing farmers to manage and potentially have higher incomes and awareness of the impacts of unsustainable palm oil (Aisyah, 2017).

Table 1. Demographics of Independent Oil Palm Farmer

Characteristics of Independent Smallholders	Percentage
Age (years)	
20-29	2
30-39	32
40-49	36
50-59	29
>70	1
Gender	
Male	78
Female	22
Education Degree	
Not graduated from elementary school	16
Elementary School	23
Junior High School	43
High School	2
Vocational High School	3
Bachelor	13
Land Area	
≤5 Ha	76
5-10 Ha	6
>10 Ha	18
Land Ownership Status	
Land Certificate	38
Land Title Letter	62
Farming Experience	
<10 years	18
10-15 years	82
>15 years	0

Knowledge Level of Independent Smallholders about the ISPO Certification Program Regency

The results of research on the level of knowledge of farmers about the ISPO certification program in Bangun Village, Sepauk Subdistrict, Sintang Regency, consist of good indicators, namely knowing, understanding, application, analysis, synthesis, and evaluation (Notoatmodjo, in Octaviana, 2021), results of the assessment based on respondents' answers about the ISPO certification program.

The overall knowledge level of independent smallholders regarding the ISPO certification program, which includes aspects of knowing, understanding, application, analysis, synthesis, and evaluation, was 78.07% (see Table 2). Based on

the score interpretation set out in this study, the knowledge of independent smallholders falls into the “High” category. This means that the assistance provided by *the Solidaridad Foundation* NGO has been successful in increasing the knowledge of farmers in Bangun Village, Sepauk District, Sintang Regency, who are ready to implement and evaluate oil palm cultivation practices in accordance with ISPO standards at the level of knowledge and understanding.

Table 2. Cognitive Indicators of Independent Smallholders' Knowledge Level of ISPO Certification

No	Indicator	Average Values of Farmers Knowledge	Percentage	Description
1	Know	15.84	15.84	High
2	Comprehension	15.56	15.56	High
3	Application	11.82	11.82	Medium
4	Analysis	11.55	11.55	Medium
5	Synthesis	11.05	11.05	Medium
6	Evaluation	12.25	12.25	Medium
	Amount	78.07	78.07	High

Research conducted by Gusti et al. (2022) found that there are factors that affect knowledge, namely education, age, and length of farming. This study shows that the education of respondents is dominated by the high school level. This allows farmers to receive better information to innovate in sustainable oil palm plantations.

Based on the age of the respondents, most are in the productive age category, mostly in the 40-49 years age group. Farmers who are productive will usually work better (Wulandari & Wiranata, 2022). The duration of farmers in carrying out farming activities will be more specific and careful in making decisions (Gusti et al., 2022). Farmers have farming experience between 10 and 15 years.

The limited knowledge and understanding of farmers in this study has a focus on increasing the acceptance and use of PPE, the introduction of pests and diseases, the characteristics of certified or non-certified seeds, land clearing, utilizing natural materials in environmentally friendly alternatives, limiting the use of pesticides and the use of fertilizers, applying fertilizers on target according to the needs or conditions faced by oil palm plants. This can be done again by deepening the field school and evaluating the shortcomings felt by independent smallholders in ISPO standard oil palm management.

Effectiveness of the Implementation of the ISPO Certification Program

The Epic rate is used to see the scores of the five indicators that have been calculated previously. Each dimension's calculated average value will be used as an indicator to calculate the Epic average value. Estimation result of Epic rate is presented in Table 3.

Program effectiveness is an assessment of the level of program suitability based on predetermined indicators. As presented in Table 3, the overall Epic rate results from the five aspects is 3.98, which, based on the assessment, is included in the effective criteria, namely between the scale range of 3.41-4.20. This indicates that the implementation of the certification program by the NGO facilitator has met the program objectives, including increasing awareness and sustainable practices

Table 3. Indicators of Effectiveness of ISPO Certification Program for Independent Smallholders

No.	Epic Model	Score	Decision Criteria
1	Comprehension Program	3.91	Effective
2	Target Accuracy	3.98	Effective
3	Timeliness	4.08	Effective
4	Goal Achievement	3.96	Effective
5	Real Change	4.01	Effective
	Average	3.98	Effective

Understanding the program has an assessment score of 3.91, which indicates that this aspect has met the effective criteria. This program understanding relates to the readiness and compliance of farmers with ISPO certification standards in supporting the sustainability of oil palm plantations. Based on the items proposed in the assessment of the ISPO certification program, the aspect of understanding the program reached the effective category in the implementation to independent smallholders in understanding fertilization procedures, training on fire control mitigation, and understanding waste management. The readiness of farmers in the required administration is quite good. However, it is still always constrained in the process of changes that often occur in the administrative process, and fertilization procedures need to be improved in the implementation of the ISPO certification program.

Target accuracy has an assessment score of 3.98, which indicates that this aspect has met the effective criteria. This relates to whether it is in accordance with the expected target or vice versa. Based on the items proposed in the assessment of the ISPO certification program in the aspect of target accuracy, it reaches the effective category in implementing independent smallholders in improving occupational safety and health standards, identifying protected conservation areas, satisfaction with improving sustainable practice behavior, and being able to manage palm oil waste properly. However, even though the availability of safety equipment has been met, it is still not consistently applied, and the understanding of the importance of protected areas also requires further improvement to ensure environmental sustainability in the long term.

Timeliness has an assessment score of 4.08, which indicates that this aspect has met the effective criteria. This relates to the impact on farmers in increasing program efficiency through scheduling that considers the availability of farmers' time and consistent monitoring in carrying out program activities that have been determined. Based on the items proposed in the assessment of the ISPO certification program in the aspect of timeliness, the program schedule has considered the time of farmers well, the targets and activities of the program are monitored and evaluated by the NGO institution providing the program, and training and mentoring are provided properly. The availability of facilities and infrastructure in achieving sustainability goals has been well provided.

The achievement of objectives has an assessment score of 3.96, which indicates that this aspect has met the effective criteria. This relates to the impact on improving the ability of farmers, as expected. This relates to the ability to use tools in overcoming fires, strengthening the institutional capacity of financial management

skills. However, farmers' readiness in the administrative preparation process is still an obstacle, especially in STD-B and land ownership status.

Real changes have an assessment score of 4.01, which indicates that this aspect has met the effective criteria. Changes are interpreted as the extent to which the ISPO program provides real impacts and changes for the implementers. Changes that have been felt from farmers in implementing the ISPO program in the aspect of sustainability are developing a waste management unit that aims to make an agricultural product made from unused palm oil waste that can increase farmers' income while paying attention to the rights of labor in plantations socially. The ISPO program has felt good in realizing labor equality. As well as the ability to interact with companion farmers in the community to explain the results of understanding in the aspect of good sustainable management practices.

Structural Equation Modeling (SEM-PLS) Analysis of Farmer Knowledge on Program Effectiveness

To examine the influence of farmer knowledge on the effectiveness of the ISPO certification program, this study employed Structural Equation Modeling using the Partial Least Squares approach (SEM-PLS) with SmartPLS 4.0 software. This analysis aims to evaluate the relationship between the cognitive dimensions of farmer knowledge namely knowing, comprehension, application, analysis, synthesis, and evaluation and the effectiveness of the ISPO certification program implementation. The SEM-PLS analysis was conducted through two main stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model). The measurement model evaluation begins with the convergent validity test to assess the reliability of each indicator in measuring the latent constructs. The results of the convergent validity test are presented in Table 4.

Table 4. Convergent Validity Test Through Other Loading Value

Indicator	X1	X2	X3	X4	X5	X6	Y
Knowledge							
X1.1	0.780						
X1.2	0.863						
X1.3	0.800						
X1.4	0.725						
X2.1		0.770					
X2.2		0.773					
X2.3		0.803					
X2.4		0.773					
X3.1			0.819				
X3.2			0.873				
X3.3			0.767				
X4.1				0.804			
X4.2				0.858			
X4.3				0.839			
X5.1					0.722		
X5.2					0.703		

Indicator	X1	X2	X3	X4	X5	X6	Y
X5.3					0.790		
X6.1						0.812	
X6.2						0.826	
X6.3						0.873	
Effectiveness							
Y1.1							0.726
Y1.2							0.709
Y1.3							0.717
Y1.4							0.707
Y2.1							0.701
Y2.2							0.726
Y3.3							0.715
Y4.4							0.747
Y3.1							0.721
Y3.2							0.741
Y3.3							0.740
Y3.4							0.775
Y4.1							0.720
Y4.2							0.737
Y4.3							0.719
Y4.4							0.732
Y5.1							0.732
Y5.2							0.772
Y5.3							0.754
Y5.4							0.734

The table above shows that each factor loading value meets the convergent validity test. Therefore, it can proceed to the next stage.

Effect of Farmer Knowledge on The Effectiveness of ISPO Certification Program Implementation

The analysis technique used in this research is SEM-PLS (Structural Equation Modeling) with the software used, namely SmartPLS 4.0. The stages in this process consist of 2 stages of analysis, namely evaluation of the measurement model (Outer Model) and evaluation of the measurement model (Inner Model).

Evaluation of Measurement Model (Outer Model)

Convergent Validity Test

The criteria for testing convergent validity are based on the loading factor value; if the test results are greater than 0.7, it indicates good validity (Hair et al., 2021). Table 5 shows that each loading factor value has met the convergent validity test. Therefore, it can be continued at the next stage.

Table 5. Discriminant Validity Test

Variable	Cronbach's alpha	Composite Reliability	(AVE)
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Effectiveness_(Y)	0.954	0.955	0.535
Knowledge_(X1)	0.804	0.871	0.630
Comprehension_(X2)	0.786	0.861	0.609
Application_(X3)	0.757	0.861	0.674
Analysis_(X4)	0.781	0.873	0.696
Synthesis_(X5)	0.619	0.792	0.559
Evaluation_(X6)	0.787	0.875	0.701

Discriminant validity test is seen based on the Average Variance Extracted AVE value. If the AVE value is 0.5, then the indicator is able to explain other latent constructs (Riefky & Hamidah, 2021). Then the indicator is able to explain other latent constructs (Riefky & Hamidah, 2021). Based on the AVE value, each variable has a value of > 0.5, so that it can be interpreted that it has met the discriminant validity criteria and is tested as reliable and valid in measuring the model.

Inner Model Evaluation

Inner Model Evaluation is a systematic process to assess the quality, consistency, and relevance of internal models in supporting decision-making. This evaluation aims to ensure that the assumptions, structures, and parameters used truly reflect the reality that is to be understood.

Table 6. R-Square

	R ²	R-Adj
Effectiveness (Y)	0.749	0.730

The adjusted R-square value is a value that shows the variation of how much the independent variable (ecosogen) affects the dependent variable (endogenous) (Juliandi, 2018). The R² value criteria are 0.75 (strong), 0.50 (medium), and 0.25 (weak). These results can be concluded that the ability of the variables used to explain the effectiveness is strong enough, namely (73%), while the remaining (27%) is influenced by other variables.

Hypothesis Test

Path Coefficient

The significant value is seen from the P value < 0.05, which means it is significant; if the P value > 0.05, it is not significant (Juliandi 2018).

Table 7. Original Sample T statistic, and P value

	Original Sample	t statistic	p value
Knowledge (X1) → Effectiveness (Y)	0.097	0.547	0.292
Comprehension (X2) → Effectiveness (Y)	0.282	2.265	0.012
Application (X3) → Effectiveness (Y)	0.046	0.237	0.406
Analysis (4) → Effectiveness (Y)	0.070	0.635	0.263
Sythesis (X5) → Effectiveness (Y)	0.148	2.083	0.019
Evaluation (X6) → Effectiveness (Y)	0.335	3.583	0.000

The significant value is seen from the P-value; if the P-value is <0.05 , it means significant; if the P-value is 0.05 , it means insignificant (Juliandi 2018). The P-value of understanding is $0.012 < 0.05$, significantly. This means that understanding has a significant positive effect on effectiveness; the higher the understanding, the more likely it is that effectiveness will increase. Synthesis (X5) has a significant positive effect on effectiveness, with a P-Value of $0.019 < 0.05$; the higher the synthesis, the greater the increase in effectiveness. Evaluation (X6) has a significant positive effect on effectiveness, with a P-value of $0.000 < 0.05$. The higher the level of evaluation, the greater the increase in effectiveness.

The level of human knowledge consists of six stages, namely, knowing, understanding, application, analysis, synthesis, and evaluation. At the know stage, individuals, namely farmers, only recognize basic information without understanding or being able to apply it to the ISPO certification program. The results indicate that the known variable has a statistical T value of $0.097 < 1.96$ with a significant level of $0.292 > 0.05$, indicating no effect on Effectiveness. This indicates that basic knowledge about the ISPO program is not enough to influence farmers' actions.

Understanding is the stage where farmers have the ability to carry out and can interpret material to benefit and explain. The results indicate that the understanding variable has a statistical t value of $0.282 > 1.96$ with a significant level of $0.012 < 0.05$, indicating a significant influence on Effectiveness. The findings of this study indicate that farmers can interpret that the sustainability of oil palm plantations that will face changes will significantly affect all aspects of oil palm cultivation. In this case, farmers who understand that not having ISPO certification will burden the governance of oil palm plantations ineffectively for farmers and those who are members of farmer groups. This understanding plays a crucial role in the Effectiveness of the implementation of the ISPO program. This understanding can encourage farmers to obtain ISPO certification in order to avoid sanctions such as written warnings, temporary suspension, and revocation of business licenses (Indonesia, 2020).

Application is the stage of the ability to apply material in real situations. The findings of this study show that, although farmers know how to apply practices, farmers' inconsistency in the application and acceptance of the importance of PPE in reducing the negative impact on plantation activities is shown in the use of PPE, and a lack of routine monitoring in pest control. The results indicated that the application variable has a statistical t value of $0.237 < 1.96$ with a significant level of $0.406 > 0.05$, indicating no effect on Effectiveness.

Analysis is the stage of the ability to break down information into several parts. The findings of this study are that although farmers consciously know the bad use of chemical pesticides on the environment, they are still lacking in limiting the use of chemical pesticides in cultivation and are still gradual in switching to environmentally friendly alternatives, and know the types of fertilizers but lack in the application of recommended fertilizer doses. The results indicate that the analysis variable has a statistical T value of $0.635 < 1.96$ with a significant level of $0.263 > 0.05$, indicating no effect on Effectiveness.

Synthesize the ability to create and combine elements to create a different structure that can be a plan. This enables farmers to develop solutions to agricultural

challenges. The independent farmers in this study gained understanding in differentiating certified and non-certified seeds, utilization of natural materials, and land clearing. The results indicated that the synthesis variable has a statistical T value of $2.083 > 1.96$ with a significant level of $0.019 < 0.05$, indicating a significant effect on Effectiveness.

Evaluation is the ability to justify or evaluate a material or object based on a predetermined criterion. The implementation of assistance carried out by NGOs to farmers has provided an understanding of certification documents and certification fee support in achieving ISPO certification, which greatly contributes to the implementation of assistance carried out, thereby increasing farmer motivation. The results indicate that the evaluation variable has a statistical t value of $3.583 > 1.96$ with a significant level of $0.000 < 0.05$ indicating a significant effect on Effectiveness.

CONCLUSION

The results of the study indicate that the level of knowledge of farmers in Bangun Village reached 78.07% and is classified as high as an impact of ISPO program assistance by the Solidaridad Foundation, where the knowledge aspects that most influence the effectiveness of ISPO certification implementation are understanding, synthesis, and evaluation, while the aspects of knowing, applying, and analyzing do not show a significant influence, so that the success of the program is more determined by the ability of farmers to understand, integrate, and evaluate ISPO principles; therefore, to improve the effectiveness of the program and farmer knowledge, it is recommended to form an Internal Control System Team tasked with managing documentation and monitoring the implementation of principles that have not been met so that the process is more organized, empowering farmers through the introduction of an online registration and issuance system to accelerate and simplify access to obtain STD-B thereby reducing bureaucracy and issuance time, and strengthening collaboration between NGOs, agricultural services, and companies through field schools to increase farmer knowledge while meeting the needs of facilities and infrastructure for sustainable oil palm plantations as a closing article that emphasizes the practical relevance of the findings of this study.

AUTHOR CONTRIBUTION STATEMENT.

[Author 1]: Designed the research, collected field data through questionnaires, and drafted the initial manuscript. [Author 2]: Provided analytical guidance, reviewed the methodology, and edited the manuscript. [Author 3]: Conceptualized the research, analyzed the data, and reviewed the final version of this article.

DECLARATION OF COMPETING INTEREST

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

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ETHIC STATEMENT

This research was conducted in accordance with ethical standards for social science research. Official research permission was obtained from the Department of Agricultural Socioeconomics, Tanjungpura University, under research permit number 4067/UN22/TA.00.03/2024. Furthermore, all participants provided informed consent before participating in this study.

REFERENCES

- Aisyah, D. D., Irham & Mulyo, J. H. (2021). How Do Willingness and Ability to Pay of Palm Oil Smallholders Affect Their Willingness to Participate in Indonesian Sustainable Palm Oil Certification Empirical Evidence from North Sumatra?. *Open Agriculture*, 6(1), 369-381. doi: 10.1515/opag-2021-0019
- Amin, N. F., Garancang, S., & Abunawas, K. (2023). Konsep Umum Populasi dan Sampel dalam Penelitian. *Jurnal Pilar*, 14(1), 15-31. Retrieved from <https://journal.unismuh.ac.id/index.php/pilar/article/view/10624>
- Atik, U., Rokhim, R., & Rusdayanti, N. (2020). Social Intervention in Improving Smallholders Welfare in Realizing Eco-Friendly Palm Oil Plantations. *E3s Web of Conferences*, 211, 1-8. doi: 10.1051/e3sconf/202021105007
- Azizah, H. S., & Dewi, N. (2020). Analisis Penerapan ISPO pada Perkebunan Kelapa Sawit Pekebun swadaya di Kota Dumai. *Jurnal Agribisnis*, 22(1), 1-12. doi: 10.31849/agr.v22i1.3475
- Beni, S., Yurisinthae, E., & Oktoriana, S. (2021). Implementation of Indonesian Sustainable Palm Oil System (ISPO) Certification for Independent Oil Palm Smallholders in Sangau Rege. *JSEP (Journal of Social and Agricultural Economics)*, 14(2), 166-179. doi: 10.19184/jsep.v14i2.21161
- Chalil, D., & Barus, R. (2018). Partnership Models for Inclusive Oil Palm Smallholdings. *CSSPO International Conference*. Retrieved from https://easychair.org/publications/preprint_download/1fXN
- Dharmawan, A. H., Nasdian, F. T., Barus, B., Kinseng, R. A., Indaryanti, Y., Indriana, H., Mardianingsih, D. I., Rahmadian, F., Hidayati, H. N., & Roslinawati, A. M. (2019). Kesiapan Petani Kelapa Sawit Swadaya dalam Implementasi ISPO: Persoalan Lingkungan Hidup, Legalitas dan Keberlanjutan. *Jurnal Ilmu Lingkungan*, 17(2), 304-315. doi: 10.14710/jil.17.2.304-315

- Ernah, E., Wulandari, E., & Sudarjat, S. (2021). Pengenalan Standar Perkebunan Kelapa Sawit Berkelanjutan. *Jurnal Abdidas*, 2(1), 92–97. doi: 10.31004/abdidas.v2i1.218
- Fadhillah, S. N., Rosnita, R., & Dewi, N. (2021). Peran Penyuluhan Pada Persiapan Peremajaan Kelapa Sawit Petani Swadaya Sesuai Konsep ISPO di Kabupaten Rokan Hulu. *Jurnal Sosial Ekonomi Pertanian*, 17(3), 75–82. doi: 10.20956/jsep.v17i3.13534
- Gusti, I. M., Gayatri, S., & Prasetyo, A. S. (2022). The Affecting of Farmer Ages, Level of Education and Farm Experience of the Farming Knowledge about Kartu Tani Beneficial, and Method of Use in Parakan Distric, Temanggung Regency. *Jurnal Litbang Provinsi Jawa Tengah*, 19(2), 209–221. doi: 10.36762/jurnaljateng.v19i2.926
- Hadi, S., Bakce, D., Muwardi, D., Yusri, J., & Septya, F. (2023). Strategi Percepatan Sertifikasi ISPO di Perkebunan Kelapa Sawit Swadaya. *Analisis Kebijakan Pertanian*, 21(1), 21–42. doi: 10.21082/akp.v21n1.2023.21-42
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Square Structural Equation Modeling (PLS-SEM) Using R*. Taylor & Francis Ltd. doi: 10.1007/978-3-030-80519-7_5
- Haksami, A. A. T., & Sumirah, S. (2024). Analisis Pendapatan Usaha Tani Kelapa Sawit (*Elaeis guineensis Jacq*) di Desa Laburan Kecamatan Paser Belengkong Kabupaten Paser. *Jurnal Agribisnis Dan Pembangunan Pertanian (JAPP)*, 1(2), 89–96. doi: 10.37150/japp.v1i2.2549
- Hanifa, R., & Pramudya, E. P. (2018). Perspektif Gender dalam Keberlanjutan Sawit. *Masyarakat Indonesia*, 43(1), 33–45. doi: 10.14203/jmi.v43i1.715
- Hendi, H., & Fitrianti, W. (2024). Faktor-Faktor yang Mempengaruhi Produktifitas Kelapa Sawit Swadaya di Desa Lubuk Tajau, Kecamatan Nanga Taman, Kabupaten Sekadau. *Jurnal Ekonomi Pertanian dan Agribisnis*, 8(2), 500–509. doi: 10.21776/ub.jepa.2024.008.02.6
- Hutabarat, S. (2017). Tantangan Keberlanjutan Pekebun Kelapa Sawit Rakyat di Kabupaten Pelalawan, Riau dalam Perubahan Perdagangan Global. *Pekanbaru Indonesia*, 43(1), 47–64. doi: 10.14203/jmi.v43i1.713
- Hutabarat, S. (2022). ISPO Dan Keberlanjutan Perkebunan Kelapa Sawit di Indonesia. *Indonesian Journal of Agricultural Economics (IJAE)*, 13(2), 130–139. Retrieved from <https://ijae.ejournal.unri.ac.id/index.php/IJAE/article/view/7846>
- Indonesia, P. R. (2020). *Peraturan Menteri Pertanian Republik Indonesia Nomor 38 Tahun 2020 Tentang Penyelenggaraan Sertifikasi Perkebunan Kelapa Sawit Indonesia*. Retrieved from <https://peraturan.bpk.go.id/Details/201269/permentan-no-38-tahun-2020>
- Jamaluddin, Alex, T., Anwar, R., Pangaribuan, F., & Rahman, M. (2023). Tingkat Pengetahuan Karyawan Pemupukan Kelapa Sawit terhadap Prinsip 4T di PT. REA Kaltim Plantations. *Buletin LOUPE*, 19(2), 226–232. Retrieved from <https://e-journal.politanisamarinda.ac.id/index.php/jurnalloupe/article/view/2925/644>

- Juliandi, A. (2018). Structural Equation Model Based Partial Least Square (SEM-PLS): Menggunakan Smartpls. *Modul Pelatihan*, 1(4), 1-6. Retrieved from https://scholar.google.co.id/citations?view_op=view_citation&hl=id&user=s0iuNVcAAAAJ&sortby=pubdate&citation_for_view=s0iuNVcAAAAJ:70eg2SAELzsC
- Jusuf, J. B. K., & Raharja, A. T. (2019). Tingkat Pengetahuan dan Sikap Mahasiswa Program Studi Pendidikan Olahraga Universitas Muhammadiyah Kalimantan Timur terhadap Permainan Tenis. *Jurnal Pendidikan Jasmani Indonesia*, 15(2), 70-79. doi: 10.21831/jppi.v15i2.28301
- Kana, Y. A. (2022). Marketing Analysis of Oil Palm Fresh Fruit Fruits (FFB) in Binjai Hulu District Sintang District. *Jurnal Ekonomi Pertanian dan Agribisnis*, 6(4), 1247-1260. doi: 10.21776/ub.jepa.2022.006.04.5
- Kementerian Pertanian. (2022). *Peraturan Menteri Pertanian Republik Indonesia Nomor 3 Tahun 2022 tentang Pengembangan Sumber Daya Manusia, Penelitian dan Pengembangan, Peremajaan, serta Sarana dan Prasarana Perkebunan Kelapa Sawit*. Retrieved from [https://ditjenbunppid.pertanian.go.id/doc/16/Permentan Nomor 3 Tahun 2022.pdf](https://ditjenbunppid.pertanian.go.id/doc/16/Permentan%20Nomor%203%20Tahun%202022.pdf)
- Muliadi. (2023). Proses Informasi dan Komunikasi Sosial Petani Swadaya untuk Mengadopsi ISPO (Indonesia Sustainable Palm Oil) di Kabupaten Sambas. *Jurnal Ekonomi Pertanian dan Agribisnis (JEP)*, 7(1), 240-250. doi: 10.21776/ub.jepa.2023.007.01.21
- Nainggolan, H. L., Sidabalok, F. E. P., Saing, B. R., Bakkara, I. M., Tobing, A. G. L., & Sianturi, S. A. (2023). Analisis Pendapatan Usahatani dan Strategi Peningkatan Pemahaman Petani Atas Biaya Lingkungan Kelapa Sawit Rakyat di Kabupaten Batu Bara, Sumatera Utara, Indonesia. *Agro Bali: Agricultural Journal*, 6(1), 171-187. doi: 10.37637/ab.v6i1.1164
- Nasution, N. A. S., Ismiasih, I., & Dinarti, S. I. (2023). Tingkat Pengetahuan Petani Kelapa Sawit dalam Penerapan Good Agricultural Practices (GAP): Sebuah Analisis Rating Scale. *JSEP (Journal of Social and Agricultural Economics)*, 16(1), 41-56. doi: 10.19184/jsep.v16i1.37946
- Nurhaliza, N., Rosnita, R., & Dewi, N. (2021). Peran Penyuluh dalam Penerapan Indonesian Sustainable Palm Oil (ISPO) pada Petani Kelapa Sawit Swadaya di Kabupaten Kampar. *JSEP (Journal of Social and Agricultural Economics)*, 14(2), 311-318. doi: 10.19184/jsep.v14i3.25705
- Octaviana, D.R. (2021). Hakikat Manusia: Pengetahuan (Knowledge), Ilmu Pengetahuan (Sains), Filsafat dan Agama. *Jurnal Tawadhu*, 5(1), 143-159. doi: 10.25587/svfu.2021.22.1.007
- Pinem, L. J., & Pratiwi, M. (2020). Faktor-Faktor Pendorong Petani dalam Memilih Benih Kelapa Sawit (*Elaeis guineensis*) Bersertifikat dan Nonsertifikat. *Agrimor*, 5(1), 1-4. doi: 10.32938/ag.v5i1.853
- Purwanto E. (2020). ISPO Baru: Harapan Baru bagi Penguatan Tata Kelola Sawit?. *Trobenbos Indonesia*, 1-8. Retrieved from https://www.trobenbosindonesia.org/file.php/2197/202010_infobrief_ispo-bahasa.pdf

- Rahutomo, A. B., Karuniasa, M., & Frimawaty, E. (2022). Smallholders' Land Productivity Improvement through Sustainable Palm Oil Certification in Indonesia. *Analisis Kebijakan Pertanian*, 21(1), 43–55. doi: 10.21082/akp.v21n1.2023.43-55
- Riady, C., Badarul, K., & Hii, H. (2023). Analisis Upaya Indonesia dalam Melawan Black Campaign Minyak Kelapa Sawit dari Uni Eropa. *Proyeksi: Jurnal Ilmu Sosial dan Humaniora*, 28(1), 53–67. Retrieved from https://jurnafis.untan.ac.id/index.php/Proyeksi/article/download/2901/pdf_38
- Riefky, M., & Hamidah, W. N. (2021). Pemodelan SEM PLS Pada Faktor-Faktor Yang Mempengaruhi Kepuasan Layanan Mahasiswa Fakultas Ekonomi UNIPA Surabaya. *Seminar Nasional Hasil Riset Dan Pengabdian*, 2, 63-73. Retrieved from <http://snhrp.unipasby.ac.id/>
- Risyadi, I., Dolorosa, E., & Kurniati, D. (2023). Determinant of Farmers' Readiness Level and Their Strategies in Independent Palm Oil Plantations in Kapuas Hulu Regency. *Jurnal Manajemen dan Agribisnis*, 20(1), 112-121. doi: 10.17358/jma.20.1.112
- Saragih, H. M., & Rahayu, H. (2022). Pengaruh Kebijakan Uni Eropa terhadap Ekspor Kelapa Sawit Indonesia. *JPPPI (Jurnal Penelitian Pendidikan Indonesia)*, 8(2), 296-303. doi: 10.29210/020221377
- Sitorus, B.A., Andayani, N., Astuti, Y. T. M. (2018). Kajian Penerapan Alat Pelindung Diri di Perkebunan Kelapa Sawit. *Jurnal Agromast*, 20(4), 157-160. Retrieved from <https://journal.instiperjogja.ac.id/index.php/JAI/article/view/828>
- Sokoastri, V., Setiadi, D., Hakim, A. R., Mawardhi, A. D., & Fadli, M. L. (2019). Smallholder Oil Palm: Problems and Solutions. *Sodality: Jurnal Sosiologi Pedesaan*, 7(3), 182–194. doi: 10.22500/sodality.v7i3.27221
- Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabet. Retrieved from https://digilib.stekom.ac.id/assets/dokumen/ebook/feb_35efe6a47227d6031a75569c2f3f39d44fe2db43_1652079047.pdf
- Utami, I. P. (2022). Pengaruh Tipe Petani dan Ekspektasi Harga dalam Sertifikasi Kelapa Sawit. *Jurnal Ekonomi Pertanian dan Agribisnis (JEPA)*, 5(3), 679–690. doi: 10.21776/ub.jepa.2021.005.03.7
- Wulandari, S. A., & Wiranata, A. (2022). Kajian Kesejahteraan Petani Kelapa Sawit di Desa Talang Makmur Kecamatan Tebing Tinggi Kabupaten Tanjungabung Barat. *Jurnal MeA (Media Agribisnis)*, 7(1), 18-28. doi: 10.33087/mea.v7i1.107