

# Farmers' Perceptions of Sustainable Palm Oil Certification in Jambi Province

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**Abstract.** The purpose of implementing ISPO is to increase the competitiveness of palm oil products for the international market. However, most of the independent smallholders have not implemented the ISPO policy. This is because farmers' awareness of sustainable oil palm farming is still relatively low. Therefore, it is necessary to study farmers' perceptions of ISPO. The purpose of this study was to determine farmers' perceptions and to analyze the relationship between farmer characteristics and farmers' perceptions of ISPO. This research was conducted in one of Indonesia's palm oil production centers, namely Jambi Province. This study involved a sample of 300 respondents using the multistage disproportionate purposive sampling. Data were analyzed descriptively qualitatively using descriptive data analysis techniques using a Likert scale measurement approach and testing the characteristic relationship hypothesis using the Spearman Rank Correlation Test. The results showed that farmers have a high perception of the implementation of ISPO (3.47 Likert scale) and the benefits of ISPO (4.38 Likert scale). Farmers' overall perception of ISPO implementation is positive. Farmers like indicators of relative advantage, compatibility, trialability, observability and environmental aspects but do not like complexity indicators. Characteristics of farmers that correlate with farmers' perceptions are formal education, non-formal education, and income.

## 1 Introduction

Indonesia is one of the world's palm oil producing and exporting countries. Indonesia is able to export 52% in the form of CPO and processed CPO products by 40%[1]. The increase in demand in the world CPO market has led to the growth of the palm oil industry, especially in Indonesia. In addition, the high volume of CPO exports also made a high contribution to the Indonesian economy, especially foreign exchange, increased Gross

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Domestic Product (GDP), as well as increased employment [2], [3]. The development of the palm oil industry is also followed by increasingly high global market demands [4], [5]. Global market demands for environmental, social and economic aspects are becoming increasingly widespread and have an impact on the Indonesian palm oil trade. Palm oil certification is one way to overcome the environmental, economic, social impacts, global warming, extermination of endangered species and other impacts caused by oil palm plantations. One of the certifications that are enforced in Indonesia and is a national regulation is the certification of Indonesia Sustainable Palm Oil (ISPO). ISPO is a palm oil certification body that provides certain standards for the cultivation and processing of palm-based products [6].

The Indonesian Sustainable Palm Oil Plantation Policy (ISPO) aims to increase the competitiveness of palm oil products in international markets. This policy is contained in the Regulation of the Minister of Agriculture no. 19/Permentan/OT/140/3/2011 concerning guidelines for sustainable oil palm plantations and Minister of Agriculture Regulation No. 11/Permentan/OT.140/3/2015 regarding sustainable palm oil certification. The implication of the ISPO policy is that the palm oil produced by farmers meets international market standards [6]. The international market, especially the European Union, demands that the management and processing of oil palm plantations must be responsible by taking into account social, environmental and economic aspects. For this reason, in order to be accepted in the international market, the palm oil produced must be a sustainable and environmentally friendly product.

Jambi Province as one of the palm oil producers in Indonesia also faces the same problem, namely the demand to implement ISPO certification. However, the number of farmers implementing ISPO in Jambi Province is still relatively small. Some of the problems faced by independent smallholders or smallholders in implementing ISPO certification are as follows from the study results [6] including: debt and legality of the land, the large cost required for rejuvenation and concerns about fulfilling the needs of farm households during the immature plantation period [7]. Therefore partner farmers generally have greater potential to obtain ISPO certification compared to smallholders because they have clearer land ownership status compared to smallholders [8], [9].

Issues related to ISPO certification have caused many perceptions to arise among independent smallholders. Therefore, it is important to conduct research on the perceptions of independent smallholders regarding ISPO implementation in Jambi Province. Research related to ISPO certification has been carried out by Indrayadi, et. al., [10]; Dharmawan et al., [11], [12]; Fahamsyah and Pramudya, [13]; Majid, et. al., [14]; Hidayat et al., [15]; Ningsih et al., [16]; Isharyadi et al., [17]; Nurliza, et al., [18]. Previous research has focused more on farmers' perceptions of farmer readiness and interest in ISPO. The novelty of this study focuses more on the perceptions of farmers, especially independent smallholders, regarding ISPO implementation in Jambi Province. Farmers' perceptions will be assessed based on five characteristics of innovation, so farmers' attitudes toward ISPO implementation will be known (positive or negative). In addition, it will be known about the factors that influence farmers' perceptions of ISPO implementation in Jambi Province.

## **2 Material and Methods**

This research was conducted at the centers of smallholder oil palm plantations in Jambi Province, where there are 4 districts namely Batanghari, Tanjung Jabung Barat, Tebo and Muaro Jambi Regencies. The study locations were chosen deliberately with the consideration that the 4 districts are centers of oil palm plantations in Jambi Province. Batanghari and Tanjung Jabung Barat districts were chosen because most farmers had implemented ISPO, while Tebo and Muaro Jambi districts were chosen to represent

farmers who had not implemented ISPO in those areas. The data used in this research are primary data and secondary data. Primary data was obtained through an interview process using a structured questionnaire to respondents of oil palm farmers. Secondary data collection was carried out by library research and literature study through the website.

This study involved a sample of farmers to see the level of farmers' perceptions of ISPO certification. Farmers' perceptions are measured against three aspects of certification, namely social aspects, environmental aspects and economic aspects. This study determined 75 farmers as respondents in each district so that a sample of 300 respondents was obtained with details of 150 oil palm farmers who had implemented ISPO certification and 150 farmers who had not implemented ISPO certification who were selected randomly. The farmer sample was obtained using the Incidental method and selected independent farmers. To measure the level of perception of oil palm farmers towards ISPO certification, Likert Summated Ratings was used, which is a self-report technique for measuring attitudes where subjects were asked to indicate their level of agreement or disagreement with each question [19]. Use of this scale allows respondents to express the intensity of their feelings. The scale used is:

- a. SS : Really like; skor : 5
- b. ST : Like; skor : 4
- c. RR : Not like enough; skor : 3
- d. TS : Dislike; skor : 2
- e. STS : Really dislike; skor : 1

By calculating the score: Total Score for Each Criterion = Achievement Score X Number of Respondents

$$S5 = 5 \times 300 = 1500$$

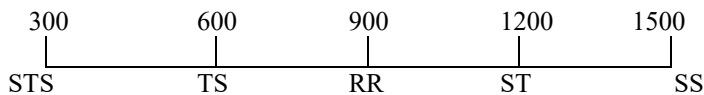
$$S4 = 4 \times 300 = 1200$$

$$S3 = 3 \times 300 = 900$$

$$S2 = 2 \times 300 = 600$$

$$S1 = 1 \times 300 = 300$$

Total highest score = 1500, and lowest total score = 300. With value interpretation



The way to calculate the overall score is to find out farmers' perceptions of ISPO sustainable certification implementation, namely: Total Score of All Criteria = Achievement Total Score x Number of respondents x Number of questions.

$$S5 = 5 \times 35 \times \text{Number of Questions} = \text{Really like}$$

$$S4 = 4 \times 35 \times \text{Number of Questions} = \text{Like}$$

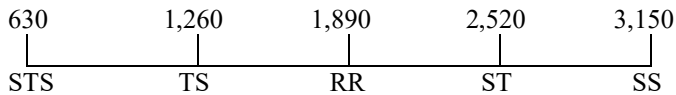
$$S3 = 3 \times 35 \times \text{Number of Questions} = \text{Not like enough}$$

$$S2 = 2 \times 35 \times \text{Number of Questions} = \text{Dislike}$$

$$S1 = 1 \times 35 \times \text{Number of Questions} = \text{Really dislike}$$

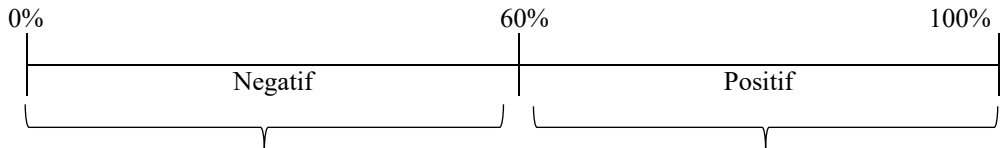
Total ideal score for the highest overall question = Really like, Total lowest score = Strongly Dislike

By value interpretation



The data analysis used is descriptive analysis which is analyzed using a Likert Scale which according to Ridwan (2008) is as follows:

$$\text{Farmers' Perception} = \frac{\text{The total score of data collection results}}{\text{Total ideal score (highest)}} \times 100\% \quad (1)$$



Description of score interpretation:

Number 0% – 60% = Negative

Number 61% – 100% = Positive

Furthermore, an analysis of the relationship between farmer characteristics and farmer perceptions of ISPO sustainable certification was carried out using the Rank Spearman test. Rank Spearman correlation analysis is a descriptive measure to measure the level of correlation of two variables, provided that both variables are in the form of a minimum ordinal scale [20]. Variable X used is the characteristics of farmers, including formal education, non-formal education, experience, income, and number of family dependents on farmers' perceptions of ISPO implementation. The value of  $r_s$  is formulated as follows:

$$r_s = \frac{x^2 + y^2 - \sum_{i=1}^n d_i^2}{2\sqrt{(x^2)(y^2)}} \quad (2)$$

By

$$x^2 = \frac{(n^3 - n) - (\sum t_x^3 - \sum t_x)}{12} \quad (3)$$

$$y^2 = \frac{(n^3 - n) - (\sum t_y^3 - \sum t_y)}{12} \quad (4)$$

Noted:

$t_x$  = The number of observations is the same on variable X for a certain rank

$t_y$  = The number of observations is the same on variable Y for a certain rank

$d_i$  = The difference between rank X and rank Y in the i-th observation

$i$  = The i-observation, for = 1,2,...,n

$\sum$  = The sum for all numbers is the same

The  $r_s$  value can be positive or negative, and the absolute value is a maximum of 1 and a minimum of 0 [20]. In general, the value of  $r_s$  is interpreted as follows:

1. If the value  $|r_s| = 0$ , means that the two variables are not correlated.
2. If the value  $|r_s| = 1$ , means that the two variables are perfectly correlated.
3. The higher the value  $|r_s|$ , means the stronger the relationship between the two variables.
4. The positive sign on  $r_s$  indicates that the two variables are correlated in the same direction, that is, if the X variable is higher, the Y variable will also tend to be higher, or vice versa.

5. The negative sign on rs indicates that the two variables are correlated in opposite directions, ie if the X variable is higher than the Y variable will tend to be lower, or vice versa.

### 3 Result and Discussion

#### 3.1 Characteristics of Respondents' Oil Palm Smallholders

The characteristics of respondent farmers is one of the important factors directly related to farmer perceptions. Characteristics of farmers that are considered important include land area, gender, age, education, farming experience, and membership of farmer groups. The characteristics of these farmers are divided into each district. The farming characteristics of the respondent oil palm farmers in Batanghari Regency are shown in Table 1. Most of the oil palm farmers in Batanghari Regency are farmers with a fairly large area of land with an average of 6 Ha, with land ownership status as private property. This is because the respondent farmers in Batanghari Regency are farmers who have implemented ISPO certification, so legal ownership of land is the main requirement. Men still dominate oil palm farming in Batanghari District (84%). 82.67 percent of farmers are over 40 years old, while only 17.33 percent of young farmers. Based on experience, farmers have an average of 15 years of farming experience.

**Table 1.** Characteristics of Respondents in Batanghari Regency

No	Characteristics	Batanghari Regency		West Tanjung Jabung Regency		Muaro Jambi Regency		Tebo Regency	
		Amount	Percentage	Amount	Percentage	Amount	Percentage	Amount	Percentage
1	Respondents' age (Years old)								
	<30	1	1.33	4	5.33	1	1.33	5	6.67
	30 – 40	12	16	15	20	15	20	20	26.67
	41 – 50	22	29.33	30	40	18	24	32	42.67
	51 – 60	29	38.67	20	26.67	31	41.33	9	12
	61 – 70	11	14.67	5	6.67	8	10.67	9	12
	>71	0	0	1	1.33	2	2.67	0	0
		75	100	75	100	75	100	75	100
2	Gender								
	L	63	84	71	94.67	75	100	73	97.33
	P	12	16	4	5.33	0	0	2	2.67
		75	100	75	100	75	100	75	100
3	Experience (Years)								
	<10	16	21.33	19	25.33	4	5.33	9	12
	10 – 20	42	56	49	65.33	23	30.67	30	40
	20 – 30	15	20	7	9.33	18	24	15	20
	30 – 40	2	2.67	0	0	30	40	21	28
		75	100	75	100	75	100	75	100
4	Education								
	None			0	0	1	1.33	2	2.67
	Elementary school	33	44	20	26.67	23	30.67	32	42.67
	Junior high school	13	17.33	11	14.67	16	21.33	17	22.67
	Senior high school	22	29.33	37	49.33	23	30.67	18	24
	Diploma	22	29.33	0	0	3	4	0	0
	Bachelor	0	0	7	9.33	10	13.33	6	8
	Total	75	100	75	100	75	100	75	100

This condition is in line with the facts on the ground that Batanghari Regency is one of the oldest palm oil producing centers in Jambi Province. In terms of education, farmers in Batanghari have relatively good education with more than 50 percent of farmers having high school and diploma education. In addition, another characteristic that needs to be

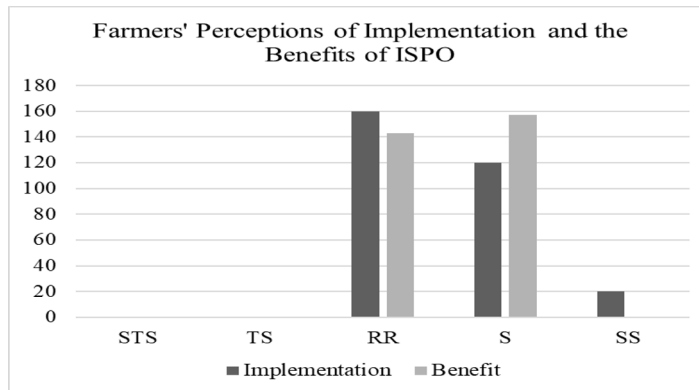
described is the participation of farmers in farmer groups. In Batanghari District, all of the respondent farmers joined farmer groups. Similar to Batanghari Regency, the respondent farmers in West Tanjung Jabung Regency are respondents who already have an ISPO certificate. The farming characteristics of farmers in West Tanjung Jabung Regency are shown in Table 1. Table 1 shows that more than 90 percent of the respondents are male. Farmers also have an average land ownership of 3,547 ha with ownership rights. Based on age and experience, respectively 75% of farmers have more than 40 and 10 years of age and experience. In addition, 90 percent of farmers in Tanjung Jabung Barat District have elementary, junior high and high school education. All of the respondent farmers are also members of farmer groups. This is because one of the requirements for applying for ISPO certification is membership in farmer groups.

The characteristics of the respondent farmers in Muaro Jambi Regency have different conditions compared to the two districts previously described. This is reflected in several indicators such as ownership of land area. The average land area controlled by farmers is 2 Ha. This figure is relatively lower than Batanghari and West Tanjung Jabung Regencies. Based on gender, all farmer respondents were male with an average age of 51 years. As much as 81 percent of the total respondents have an education below a bachelor's degree. In addition, the respondent farmers in Muaro Jambi Regency have an average experience in cultivating oil palm of 21 years. Table 1 shows that the respondent farmers in Tebo District have an average land ownership of 2.8 Ha, and some still do not have certificates. A total of 73 farmer respondents (97 percent) were male. The age distribution of the respondent farmers is also quite varied, where 32 percent are young. Based on farming experience, 66 respondent farmers have more than 10 years' experience. In terms of farmer group membership, more than 95 percent of farmers in Tebo District have joined farmer groups.

### **3.2 Palm Oil Farmers' Perceptions of ISPO Implementation**

Perception is an individual's interpretation of the meaning of something for him in relation to his world. People act partly based on their perceptions of a situation so that individual perceptions/understanding of their environment are important factors and greatly determine the actions they take. Litterer [21] states that perception formation consists of three mechanisms, namely selectivity, closure, and interpretation. Information that reaches a person causes the individual concerned to form a perception, starting with the selection, then the incoming information is arranged into a meaningful unit, and finally there is an interpretation of the facts of the entire information. The interpretation phase is heavily influenced by past experiences. The average perception of farmers in Jambi Province regarding the implementation of ISPO sustainable certification is high, which is indicated by an average value of 3.47 (Likert scale) although the majority (53 percent) of respondents responded with doubtful answers. Description of farmers' perceptions of ISPO sustainable certification implementation (Figure 1).

Based on the research results, the respondent farmers have a high perception of ISPO certification implementation. Jambi Province independent smallholders in implementing the 4 ISPO principles namely: land legality, smallholder institutions, cultivation techniques and environmental monitoring as a whole are not ready for certification. The institution of independent smallholders has not been implemented, this is because the only institutions in the smallholders' environment are working groups that do not yet have legality, so the formation of farmer groups according to ISPO certification criteria does not meet the criteria because they do not meet the requirements in ISPO principles regarding smallholder organizations. In addition, farmers' understanding of the functions and benefits of farmer groups is still low due to the lack of education so that farmer groups are only considered for mutual cooperation activities in farming activities.



**Fig. 1.** Distribution of Farmers' Perceptions of the Implementation and the Benefits of ISPO Sustainable Certification in Jambi Province, 2023

Although the establishment of institutions in accordance with ISPO criteria cannot be carried out, the initiation of the formation of smallholder institutions can be grown, seen from the fishbone diagram, [22] where the environmental conditions of independent smallholders have similarities in traditions, settlements, and ongoing farming taking place, language and ecology, with the number of smallholders, apart from that the motivation of the smallholders to form farmer groups is good in terms of farmers' expectations, with farmer groups it can facilitate the sale of TBS and obtain production inputs. In line with this, the results of the analysis of the average perception of farmers in Jambi Province on the benefits of ISPO sustainable certification are classified as high, which is indicated by an average value of 4.38 (Likert Scale) indicated by the majority of respondents (51.66 percent) who stated that they strongly agreed with ISPO benefits for the productivity of oil palm farming.

Farmers' perceptions of the benefits of ISPO are based on the perceived economic benefits category, namely managing oil palm plantations in groups, in the form of farmer groups and cooperatives will be more profitable, maintenance of oil palm plantations that are environmentally friendly and support productivity will provide economic benefits, integrated pest control and use of pesticides environmentally friendly will be more profitable, collaboration/cooperation in the sale of TBS with mills will provide mutually beneficial benefits and management of oil palm plantations that is free from conflict, both land conflicts and other conflicts, will be more profitable. While the perceived environmental benefits are that sustainable management of oil palm plantations will conserve land and water resources, sustainable management of oil palm plantations will preserve biodiversity. The real benefit for oil palm plants is that the use of pesticides that are not excessive in the management of oil palm plantations will have a good impact on biodiversity, integrated control of plant pest organizations through sustainable management of oil palm plantations will support the preservation of biodiversity. Management of oil palm plantations can run effectively and efficiently (thrifty) if it is carried out with farmer group organizations. The management of oil palm plantations can be effective if carried out side by side with cooperative forums, as well as plantations free of land and other disputes. Production increases in a sustainable manner.

### 3.2.1 Relative Profit Indicator

Relative advantage is an innovation can be seen from the extent to which new innovations will provide advantages over the old technology used [23]. For example, for farmers, the profits from farming when implementing the ISPO principle are higher than the profits

obtained by conventional means. Relative advantage in this study was measured by looking at the economic benefits that farmers get when implementing ISPO sustainable certification, namely the price of TBS received by farmers, the difference in profits, increased yields and technical benefits. The distribution of farmers to relative profits can be seen as follows:

**Table 2.** Distribution of Farmers' Perceptions of the Relative Advantage of ISPO Sustainable Certification Implementation

Answer Category	Score	Relative advantage	Compatibility Level	Level of Complexity	Level of Trialability	Level of Observability	Environmental Aspects
Really like	5	10.33	15.33	1.00	21.33	39.00	41.00
Like	4	81.00	77.66	29.66	64.66	53.00	55.67
Not like enough	3	8.67	7.00	50.33	12.00	7.33	3.00
Dislike	2	0	0	12.00	667	0	0.30
Really dislike	1	0	0	7.00	0	0	0
Total		100	100	100	100	100	100

Based on Table 2, it shows that most of the respondents (81 percent) answered like. In this category, some farmers consider that the implementation of ISPO sustainable certification economically provides benefits, including the costs incurred by participating in certification are higher than not participating, oil palm cultivation using the ISPO principle saves more time (efficient), selling value of TBS using the principle ISPO is higher than conventionally produced TBS and ISPO principles can increase agricultural yields. On the other hand, there is a perception of respondents who do not like it, namely as much as 8.67 percent. The unfavorable perception by farmers of the relative advantages of implementing ISPO sustainable certification is corroborated by the statement of [24]) that, not all innovation attributes have the same potential in influencing adopters' perceptions. Adoption occurs when farmers perceive that the innovation will enhance the achievement of their personal goals. Farmers' goals in adopting innovations are generally economic goals. In this category the total score obtained was 5 864 which means that in the category of relative advantage to the implementation of ISPO sustainable certification the perception of farmers is in the like and positive category with a percentage of 81.06%.

### 3.2.2 Compatibility

Compatibility is an innovation related to the extent to which an innovation is considered consistent and in accordance with socio-cultural values and beliefs, ideas that were previously introduced or in accordance with the needs of farmers. Often new technologies that replace old technologies do not support each other, however, it is often found that new technologies are a continuation of old technologies [23] The conformity indicator in this study was measured by assessing the suitability of ISPO sustainable certification implementation with the farmer's environment, conformity with existing habits, suitability with needs and incompatibility with farmers' habits in carrying out management. The distribution of farmers' perceptions of conformity to ISPO sustainable certification implementation is as follows. Based on Table 2 shows the distribution of farmers' perceptions based on the level of conformity to the implementation of ISPO sustainable certification, most of the respondents in the study locations liked it. In this category, farmers think that the implementation of ISPO sustainable certification is to be implemented in their environment because according to farmers, the implementation of ISPO sustainable certification can be implemented easily. According to the farmers, most of the stages in implementing ISPO sustainable certification are the same as those usually



done in conventional management. In this indicator the total score obtained is 4 838 which means that in the category of the level of conformity of farmers' perceptions in the positive like category with a percentage of 80.61%.

### **3.2.3 Complexity**

Complexity is the degree to which an innovation is considered complicated to understand and implement. The easier it is for new technologies to be understood and practiced, the faster the process of innovation adoption by farmers will be [25] (The level of complexity in this study was measured by looking at the ease of ISPO Sustainable Certification Implementation, the practicality of ISPO Sustainable Certification Implementation and the implementation of ISPO Sustainable Certification implementation does not require special skills. The distribution of farmers' perceptions in terms of complexity of ISPO Sustainable Certification Implementation is as follows. Based on Table 2, it shows the distribution of farmers' perceptions based on the level of complexity category regarding the implementation of ISPO sustainable certification, most of the respondents answered that they did not like it. This condition is reinforced by the opinions of farmers during the research where farmers consider that the implementation of ISPO sustainable certification is more difficult to apply than conventional methods. Farmers consider that the implementation of ISPO sustainable certification has a high level of complexity and accuracy when compared to the usual method. In addition, farmers consider that the implementation of ISPO sustainable certification is not very practical in its application. Also, farmers think that they must have special skills, especially when using environmentally friendly fertilizers and medicines which are considered very difficult for farmers. In this indicator the total score obtained is 2 742 which means that in the category of the level of complexity of farmers' perceptions in the less like and negative category with a percentage of 60.93%.

### **3.2.4 Trialability**

The ease with which an innovation can be tried (trialability) by farmers is shown in the ease with which an innovation can be practiced by farmers. Innovations that can be tried little by little will be used more quickly by farmers [26]. Farmers tend to adopt innovations if they have been tried on a small scale in their own land and are proven to give good results, because innovation involves many risks. The level of convenience to try in this research is measured by the ease with which farmers try to implement ISPO sustainable certification on a small scale, and the ease with which ISPO sustainable certification implementation technology is applied to oil palm land cultivated by farmers. The distribution of farmers' perceptions at the level of ease of testing for the implementation of ISPO sustainable certification is as follows. Based on Table 2, it shows the distribution of farmers' perceptions in the level of possibility of being tried (trialability) towards the implementation of ISPO sustainable certification, that most of the respondents like. This is shown in this study, some farmers think that the implementation of ISPO sustainable certification can be tried on a small scale to find out whether there are complications and benefits before farmers switch or apply ISPO sustainable certification implementation, besides that farmers can find out whether the oil palm land that is usually cultivated is This can be done using ISPO sustainable certification implementation. In this indicator the total score obtained is 2.406 which means that in the category of the level of possibility to try the perception of farmers in the category of like and positive with a percentage of 80.02%.

### 3.2.5 Observability

The observability of the results in this study is that the results obtained when using the implementation of ISPO sustainable certification can be seen in real terms both from the observations of the farmers themselves and the results of information obtained from other farmers. Indicators for ease of seeing the results in this study include significantly better plants and growth, higher quality yields, and a higher selling price for TBS. The distribution of farmers' perceptions in the convenience category to see the results for the implementation of ISPO sustainable certification is as follows. Based on Table 2, it shows the distribution of farmers' perceptions based on the level of convenience category to see the results, most of the respondents answered like. The fact on the ground is that farmers like the statement that it is clear that the production of palm oil (TBS) produced using the implementation of ISPO sustainable certification is of higher quality and obtains a higher selling price. This was disclosed by the farmers that the TBS produced through the implementation of the ISPO sustainable certification on average produced higher quality TBS when compared to the method normally carried out by farmers. The TBS produced with the implementation of ISPO sustainable certification has fewer defects/damage to fruit and stems caused by pests. So that the implementation of ISPO sustainable certification is able to increase farmers' income. In this indicator the total score obtained is 3 900 which means that it is in the category of ease of seeing the results of farmer perceptions in the like and positive category with a percentage of 86.67%.

### 3.2.6 Environmental Aspect

The environmental aspect in this study is that the environmental impact of implementing ISPO sustainable certification can be seen in real terms both from the observations of the farmers themselves and the results of information obtained from other farmers. The environmental aspect indicators for the results of this study include the implementation of the ISPO principle of being able to prevent and deal with fire disasters and being able to preserve biodiversity and protected areas. The distribution of farmers' perceptions of environmental aspects on the implementation of ISPO sustainable certification is as follows. Based on Table 2 shows the distribution of farmers' perceptions based on the category of environmental aspects, most of the respondents answered like. The facts on the ground are that farmers like the statement that it is clear that the implementation of ISPO principles can prevent and deal with fire disasters and can preserve biodiversity and protected areas. In this indicator, the total score obtained is 2.536, which means that it is in the category of ease of seeing the results of farmer perceptions in the like and positive category with a percentage of 84.53%.

### 3.2.7 Overall Perception of Farmers

Farmers' perceptions in this study were seen from perceptions of relative advantage, compatibility level, complexity level, trialability level, observability level and environmental aspects. Based on these six indicators, it can be seen how farmers' perceptions of the implementation of ISPO sustainable certification in Jambi Province. The following describes the perceptions of farmers in general towards the implementation of ISPO sustainable certification.

Table 3 shows the total score of all categories totaling 22,286 which means that the perception of farmers as a whole is in the like category. However, there are several characteristics that are classified as less as, namely the level of complexity category. The level of complexity in which the implementation of ISPO sustainable certification is felt to

have complexity and requires high precision in its management, in the use of environmentally friendly production facilities. From the results of scaling using the Likert scale, the overall percentage of perceptions that are in the like category is obtained with a percentage of 82.54 percent.

**Table 3.** Distribution of Farmers' Perceptions in General on the Implementation of ISPO Sustainable Certification

Perception Category	Score
Relative Advantage	5.864
Compatibility Level	4.838
Complexity Level	2.742
Trialability Level	2.406
Observability Level	3.900
Environmental Aspects	2.536
Total	22.286

### 3.3 Relationship between Farmer Characteristics and Farmer Perceptions of ISPO Sustainable Certification

The characteristics of the farmers observed in this study were formal education, non-formal education, experience, income, and number of family dependents. To determine the relationship between farmer characteristics and farmers' perceptions of ISPO sustainable certification, Rank Spearman's correlation test was used. Formal education has a significant correlation at the level of  $\alpha \leq 5\%$  with farmers' perceptions of ISPO implementation. The higher the farmer's formal education level, the higher his perception of ISPO implementation. Farmers with a high level of formal education will have broader insights than other farmers. Broad insight will make farmers more open to innovation. ISPO implementation is an innovation for farmers. Rogers (1995) states that innovation is an idea, concept, or technology that is seen as something new by individuals or users. Something that does not have to be an idea, idea, or technology that has just been discovered, but can be an idea, idea, or technology that for its users is something new.

Plant cultivation is not something new for oil palm farmers in Jambi Province because they have been working as farmers for decades. Formal education has a negative correlation with farmers' perceptions of the benefits of ISPO certification. This is because farmers with a higher level of formal education choose their main job outside the agricultural sector so that they do not experience direct benefits, even though they also enjoy ecological benefits (availability of clean water and air). This is in line with research by [27] in Nigeria which stated that a high level of education makes them have the opportunity to work in other sectors with better salaries compared to being farmers. Non-formal education has a significant correlation with farmers' perceptions of ISPO implementation.

The higher the non-formal education level of the farmer, the higher the perception will be and the more positive the interpretation of ISPO implementation will be. Non-formal education has a positive correlation but does not have a significant effect on farmers' perceptions of the benefits of ISPO certification. The higher the non-formal education a farmer has, the higher his perception of the benefits of ISPO certification will be. Non-formal education can improve the ability of farmers to manage their farms so that the results can be better. Through good plant cultivation techniques, oil palm plants will grow optimally and will have a higher selling value. This can increase the income of farming families so that economically these benefits can be felt by farmers. The number of dependents does not correlate with farmers' perceptions of ISPO implementation and ISPO benefits. The correlation value which is negative indicates that the more the number of

dependents of the farmer's family, the lower the farmer's perception of the benefits of ISPO. Farmers' experience correlates positively but not significantly with farmers' perceptions of ISPO implementation and ISPO benefits. Farmers in Jambi Province have experience in oil palm farming ranging from 7 – 39 years. The longer the experience of farmers managing oil palm farming, the higher their perception so that the more positive the implementation of ISPO and the benefits of ISPO.

**Table 4.** The coefficient value of the relationship between farmer characteristics and farmers' perceptions of ISPO sustainable certification in Jambi Province, 2023

Farmers' Characteristics	Farmers' Perception			
	ISPO Implementation	p-value	ISPO Benefits	p-value
Formal Education	0,232	0.002	-0,223	0.000
Non – Formal Education	0,426	0.000	0,118	0.112
Experience	0,131	0.225	0,075	0.332
Income	0,034	0.000	0,114	0.001
Number of Family Dependents	-0,032	0.112	-0,199	0.310

Note : real correlation at level  $\alpha = 5\%$

Based on experience, farmers are able to compare the correct farming management techniques so that the results obtained from oil palm farming will be even greater. Good farming management is able to provide better benefits (social, economic and environmental) to farmers. Income levels are positively correlated with farmers' perceptions of ISPO implementation and benefits. The higher the level of farmer income, the higher the productivity of farming business because farmers get good prices and quantities. This encourages farmers to manage oil palm farming well, using good cultivation techniques starting from land preparation to harvesting TBS. With ISPO certification, some of the benefits that are expected to be felt directly by farmers include increasing the selling price of oil palm TBS, increasing the quality of TBS from farmers, reducing the TBS marketing chain, and increasing the quality of production roads which have an impact on reducing transportation costs.

## 4 Conclusion

Characteristics of farmers in Batanghari Regency, the majority of oil palm planters are aged 51 – 60 years with male gender and 10 – 20 years of experience cultivating oil palm. The education level of the majority of these smallholders is elementary school. Tebo Regency has the majority of male smallholders with an age range of 41 – 50 years who are still in the productive age with the education level of the majority in this area being elementary school and 10 – 20 years of farming experience. The characteristics of the farmers in West Tanjung Jabung Regency were that 94.7 percent of the respondent smallholders were male with the age range of the majority of the smallholders being 41 – 50 years. The experience of cultivating these planters is between 10 – 20 years with the highest education being mostly high school. While the character of the farmers in Muaro Jambi Regency are all male with the age range of the majority being 51 – 60 years and the education level of the gardeners is elementary and high school with 10 – 20 years of cultivating experience. Farmers' perceptions in this study were seen from perceptions of relative advantage, compatibility, level of complexity, trialability, observability, and environmental aspects. The score of the entire category is 22,286 which means that the perception of farmers as a whole is in the like category. However, there are several characteristics that are classified as less like, namely the level of complexity category. The level of complexity in which the

implementation of ISPO sustainable certification is felt to have complexity and requires high precision in its management, in the use of environmentally friendly production facilities. From the results of scaling using the Likert scale, the overall percentage of perceptions that are in the like category is obtained with a percentage of 82.54 percent. Based on the correlation results, it was found that the characteristics of farmers that correlated with farmers' perceptions were formal education, non-formal education, and income.

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