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The Implementation of Indonesian Sustainable Palm Oil on Oil Palm Plantations Smallholders in Kumai District, Central Kalimantan Province

Holpu Ronal Ambarita[1], Any Suryantini[2], and Dwidjono Hadi Darwanto[3]

[1]Postgraduate Program of Agribusiness Management, Faculty of Agriculture, Universitas Gadjah Mada

[2,3]Department of Agricultural Sosio-Economics, Faculty of Agriculture, Universitas Gadjah Mada

[1,2,3]Jalan Flora, Bulaksumur, Depok, Sleman, Daerah Istimewa Yogyakarta

holpuronal2018@mail.ugm.ac.id

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ABSTRACT

Indonesia Sustainable Palm Oil is one of the Indonesian government's responses to environmental issues, such as deforestation and forest degradation. Central Kalimantan is a province on Borneo Island with the most extensive oil palm plantations. Its total area is about 1.6 million ha, of which smallholder plantations cover an area of 166,000 hectares. Smallholder plantations face many constraints in implementing ISPO certification. Because of that, it is essential to study the level of application of the ISPO criteria and the factors that influence the implementation of ISPO in Kumai District, Central Kalimantan. The study used non-probability sampling with a total of 100 respondents. This research used descriptive analysis and the Gutman scale to determine the application of ISPO criteria. Multiple linear regression analysis was used to determine the factors that influence the application of ISPO. The study showed that (1), On average, smallholders implement 80% of ISPO criteria, and (2) ISPO criteria implemented by smallholders were influenced by the length of farming experience, education level, and the number of household members.

INTRODUCTION

The plantation of the Indonesian agriculture sector with enormous economic potential is Palm Oil. It is the most significant contributor to the national income, amounting to US$ 20.72 billion in 2019 (Badan Pusat Statistik Indonesia, 2020). Oil palm plantations spread across 23 provinces in Indonesia are categorized into three groups: smallholder plantations, state-owned plantations, and private plantations. Environmental issues negatively affect the market acceptance of Indonesian palm products in some countries, especially Europe (Jelsma et al., 2017). Currently, Indonesia is facing a Banning Policy from the European Union on palm products (especially biodiesel products) from Indonesia. The international

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market considers that the expansion of smallholder oil palm plantations poses ecological unsustainability problems as a result of monocropping systems that disrupt biodiversity, hydrology, and land disputes (Abram et al., 2017). Sustainability standards are important to neutralize social and environmental risks from oil palm plantation expansion. ISPO was proposed to reduce ecological risks from expanding oil palm land. The Indonesian government has established ISPO through *Peraturan Menteri Pertanian Republik Indonesia Nomor 11. Permentan/ OT.140/3/2015 (Kementrian Pertanian Republik Indonesia, 2019).*

Sustainable development of oil palm plantations, apart from being a market demand, has become a mandate of the Constitution of the Republic of Indonesia, namely the 1945 Constitution of the Republic of Indonesia, from now on referred to as the 1945 Constitution and further elaborated in various laws and regulations. The Indonesian government has established and enforced standards for sustainable oil palm plantation development since 2011 through the ISPO certification system. In the future, ISPO will be a mandatory certification for oil palm smallholders. Based on the Minister of Agriculture Regulation No. 98/2013, Oil palm smallholders are growers that have a land size of less than 25 ha (Hutabarat, 2017).

In Puspa (2018) research, it is explained that the process of applying ISPO certification is influenced by several things, including: age, education, land area, plant age, and productivity. The income variable harms the implementation of ISPO with a note that low-income farmers expect to get a higher price of palm oil to increase their income. Barriers found to smallholders in the process of certifying sustainable gardens include: lack of information, support for the necessary resources, formation of farmer organizations or groups in the certification process, and support from related parties for the certification process (Brandi et al., 2015). The certification process requires additional costs farmers bear, such as audits and training costs. Farmers can still adapt to sustainable garden cultivation standards, for example, the use of personal protective equipment as a work safety procedure in activities on plantations (Harianja et al., 2015). For small farmers to gain increased income and productivity in the Indonesian palm oil industry, agricultural extension services to small farmers and government intervention policies are needed to ensure a conducive environment for oil palm development (Lee et al., 2014). The study conducted by Hutabarat et al., (2018), found that the initial cost of certification was 86 euros/hectare, and the average price increase for upgrading plantations to meet sustainable standards was 366 euros/hectare. In addition to carrying out an annual audit, it would cost 11 euros/hectare.

In Central Kalimantan Province, the largest oil palm plantation is around 1.6 million hectares. The majority of oil palm plantations in Central Kalimantan are controlled by private companies with an area of 1.3 million hectares, while smallholder plantations cover an area of 166 thousand hectares (Badan Pusat Statistik Indonesia, 2020). The challenge for oil palm smallholders in the future is the increasing demand for sustainable Crude Palm Oil (CPO), the issue of the impact of oil palm plantations on environmental sustainability, and land conversion. The application of ISPO to oil palm farmers provides information about the knowledge and understanding of oil palm farmers in Central Kalimantan. This research was conducted to determine the level of ISPO implementation, and the influencing factors, in Central Kalimantan.

METHODS

Location

The study used purposive sampling method (a sampling technique with certain considerations and objectives of the researcher) (Emilia et al., 2014). The respondents are from Kumai District, West Kotawaringin Regency, Central Kalimantan Province. The consideration for choosing this location is because oil palm farmers have easy access to sell FFB (Fresh Fruit Bunches) to plantation companies and in the Kumai District there is a TNTP (Tanjung Puting National Park) area where some planters have land adjacent to the national park. Based on these conditions, it is expected that oil palm farmers will obtain information about protecting the environment and knowledge about ISPO.

The population in this study are smallholder farmers and they are members of an oil palm cooperative in Kumai District. The number of samples in this study was 100 respondents. The samples were taken randomly without regard to the strata that exist in the population. The method is also called Simple Random Sampling. This method is carried out when members of the population are considered homogeneous (Wibowo & Wijayanto, 2015). To determine the research sample using 100 respondents, the formula can be explained as follows:

$$n = \frac{N}{1 + Ne^2}$$

where:
n > Number of samples
N = Total population
E = error tolerance

The slovin formula can be implemented by specifying the fault tolerance limit. The error tolerance limit can be expressed as a percentage. The smaller the error tolerance the more accurately the sample describes the population (Apriliani, 2013).

Research with an error limit of 10% has an accuracy rate of 90%. Around the number of recorded planters population is 2,815 planters *(Dinas Perindustrian Perdagangan Koperasi Kotawaringin Barat, 2020*).

Table 1 : Assessment based on ISPO criteria.

ISPO principles and criteria	Number of questions
The legality of smallholders	5
Management of smallholders	35
Environmental management and monitoring	6
Sustainable plantation business improvement	1
Total number	47

Source: (Kementrian Pertanian Republik Indonesia, 2019)

Based on the sample formula above, it can be seen that the number of respondents as follows:

$$n = \frac{2815}{1 + 2815(0.1)^2}$$

$$n = 96.56 \approx 100$$

Data Collection

Data collection focused on primary dataand secondary data. Primary data were obtained from direct interviewswith oil palm smallholders in Kumai District, and secondary data collection was obtained from BPS (*Badan Pusat Statistik*), ministry of agriculture. The time required for data collection is approximately five months from December 2020 to April 2021.

Data Analysis

The first stage of analysis is to identify the implementation of ISPO. Tabel 1 explain the principle criteria are based on *Peraturan Menteri Pertanian Republik Indonesia11/ Permentan/OT.140/3/2015.* The implementation of ISPO was represented by the Guttman scale from consistent answers to a problem. The Guttman scale was determined in the form of multiple-choice or a checklist. True, yes, or good is a positive answer that is given a score of 1, while wrong, no, and bad is a negative answer which is given a score of 0. The scoring table of respondents' calculations in the Guttman scale is as follows (Puspa, 2018).

Determination of the value of conformity is obtained from adding up the indicator values based on the ISPO provisions for each criterion in the form of percent. These results are the achievement values for the ISPO standard in the research area. Determination of the value in each criterion is follow as:

$$T_p = \frac{N_p}{N} \times 100\%$$

where :

T_p = total value of ISPO application for each respondent

N_p = the number of indicators in each criterion.

N = total number of indicators.

The estimated score of the total value of ISPO implementation is expressed on a scale from the worst

(bad) 0 percent to the best (good) 100 percent, which is grouped into four categories, namely: (1) 0-25 percent categorized as bad (unsustainable), (2) 25.01-50 percent as less (less sustainable), (3) 50.01-75 percent as enough (moderately sustainable) and, (4) 75.01-100 percent categorized as good (very sustainable) (Najmi et al., 2019).

After the percentage of application of ISPO criteria from each oil palm farmer in Kumai Sub-district is known, then analyze what factors can affect the application of these indicators. The factors affecting the application of ISPO criteria were analyzed using multiple linear regression analysis. The independent variables measured consisted of regression coefficients for the age of the farmer (Usi), land area (Lhn), oil palm production (Prd), plant age (Tnm), contribution to oil palm plantation income (Pdp), farm experience (Plm), education level (Pdk), number of households (Tng), counseling participation dummy (Plh), residence status dummy (Wlh). This is multiple linear regression models which transformed into the form of a natural logarithm:

$$\text{Ln ISPO} = \ln \alpha + \beta_1 \ln (\text{Usi}) + \beta_2 \ln (\text{Lhn}) + \beta_3 \ln (\text{Prd}) + \beta_4 \ln (\text{Tnm}) + \beta_5 \ln (\text{Pdp}) + \beta_6 \ln (\text{Plm}) + \beta_7 \ln (\text{Pdk}) + \beta_8 \ln (\text{Tng}) + \beta_9 D(\text{Plh}) + \beta_{10} D(\text{Wlh}) + e$$

Where is :

ISPO : ISPO Implementation Score (Score)

α : Constant

β : Regression coefficient

LnUsi : Age of the farmer (Year)

LnLhn : Land area (Hectares)

LnPrd : Oil palm production (Tons/Year)

LnTnm : Plant age (Year)

LnPdp : Contribution to oil palm plantation income (Score)

LnPlm : Farm experience (Year)

LnPdk : Education level (Year)

LnTng : Number of household (Person)

DPlh : Counseling participation (1 = attend, 0 = not attend)

DWlh : Residence status (1 = native, 0 = immigrant)

e : Error

Since multiple linear analysis is a model based on the ordinary least square method, which has a relationship of many variables between one independent variable and another, it is possible to test the accuracy of the model, including :

a. Coefficient of determination test (Adjusted R2)
b. Simultaneous test (F test)
c. Individual/partial test (t test)

To ensure that the regression equation meets the properties of the Best Linear Unbiased Estimator (BLUE), the model tested by the classical assumption, it is consisting of several tests, namely: normality test, multicollinearity test, heteroscedasticity test. The application used to analyze the data is Statistical Product and Service Solutions (SPSS) version 23.

RESULTS AND DISCUSSION

Implementation of ISPO criteria

The percentage level of ISPO criteria in smallholder oil palm plantations in Kumai District is divided into four categories, namely: bad (unsustainable), less sustainable, moderately sustainable, and good (very sustainable). The values in Table 2 describes the situation of the farmers in implementing ISPO, which consists of fourty seven question indicators divided into twenty three criteria, in accordance with the four principles of ISPO regulations. Each question is adjusted based on the regulation of the Minister of Agriculture of the Republic of Indonesia 11/Permentan/ OT.140/3/2015 concerning the Indonesian sustainable palm oil certification system. The results of the validity and reliability test were 40 questions that were declared valid and 7 questions were not explained in the discussion because the question items did not pass the validity test. The question items have passed the reliability test with a cronbach alpha value of 0.714 > 0.6.

Table 2: Percentage of ISPO application for smallholder oil palm plantations.

ISPO Criteria	Percentage (%)	Category
Legality of Independent Smallholders		
Legality of Independent Smallholders	95	Good
Legality and plantation management	92	Good
Plantation Location	85	Good
Average	91	
Plantation Management		
Management of independent smallholders	96	Good
Institutional organization of independent smallholders	96	Good
Independent smallholders are members of farmer groups and cooperatives	96	Good
Land disputes and other dispute compensation	95	Good
Providing information to relevant agencies	75	Enough
Technical guidelines for oil palm cultivation and transportation	95	Good
Land clearing takes into account the environment	94	Good
Seed Management	78	Good
Planting on mineral soil	57	Less
Planting on peat	43	Less
Plant maintenance	87	Good
Control of plant pest organisms (OPT)	61	Less
Harvest management	82	Good
Fresh fruit bunch transportation	84	Good
FFB sale and price agreement	76	Good
Average	77.53	
Environmental Management and Monitoring		
Environmental permit obligations	72	Enough
Biodiversity Conservation	71	Enough
Average	71.50	
Sustainable plantation business improvement	81	Good
Total Average	80.01	Good

Source: Primary Data analysis (2021)

The total mean value from Table 2 is known to be 80.01, meaning that of the 100 farmers studied regarding the application of ISPO rules, 80.01% of ISPO criteria can be applied by farmers, so it is classified in the sustainable category, or belong to the good category (very sustainable). In addition, there are three indicators with the lowest values, including: control of plant pest organisms, planting on mineral soils, and planting on peat soils. Control of plant pest organisms (OPT) was low in value because some farmers are still not trained in understanding how to control sustainable pests and pay attention to environmental aspects, besides that the estate owned by some respondents have no symptoms of plant pest attack organisms so that some farmers thought that they did not need to control. The percentage value of ISPO application for planting on mineral soils was 57%, meaning there were 57 farmers out of 100 respondents who manage their land on mineral soils and pay attention to environmental rules because not all farmers have peatlands. In addition, some farmers plant legume cover crops. To maintain humidity and minimize erosion in mineral soil areas. The percentage value of planting on peat soil is 43%, meaning that 43 farmers in Kumai District pay attention to sustainable aspects of land clearing on peat soil. One of the efforts of farmers to pay attention to the sustainability value of peatlands is to make ditches from drainage, which functions to keep the water Supply in the plantation area from being excessive, which can cause flooding.

ISPO Implementation Factors

The results of the regression analysis based on Table 3 has passed the model accuracy test and fit the classical assumption test. The adjusted r value of 0.669 means that the variables that become the analysis tool together affect palm oil production by 66.9 percent. This value is classified as good, the closer the value to 1, the more precise the model to explain the regression analysis. The statistical F-value (count) of 17.988 is significant at 1% that means all variables in the regression model simultaneously affect the implementation of ISPO in Kumai District.

Significant Variable

The positive variable coefficient explains the effect of the independent positive variable on the implementation variable (ISPO implementation). The constant value of 3,961 means that the implementation of ISPO will be 3,961 units (small implementation level). Age of the farmer, land area, age of the plant, contribution of plantation income, farming experience, education level, number of farmer households, training and residence status have no significant effect on the implementation ISPO Criteria. Farm experience, education level, and number of households have a significant effect on the implementation of ISPO.

Table 3. Factors that influencing the level of ISPO implementation

Variabels	Coefficient	Tstat	Sig t
C	3.961***	16.713	0.000
Ln Farmer Age	-0.022^{ns}	-0.416	0.678
Ln Land area	-0.032^{ns}	-0.894	0.374
Ln Production	0.004^{ns}	0.155	0.877
Ln Plant age	-0.017^{ns}	-0.766	0.446
Ln Plantation income contribution	0.008^{ns}	0.427	0.670
Ln Farm experience	0.067***	2.605	0.011
Ln Education	0.091**	2.052	0.043
Ln Number of household	0.168***	7.664	0.000
D Training	0.023^{ns}	1.147	0.254
D Residence status	-0.019^{ns}	-0.946	0.347
R squared	0.669		
Adjusted R squared	0.632		
F test	17.988***		

Source: Primary Data analysis (2021)

Farm experience

The coefficient value of farming experience was 0.067, meaning that farm experience that increases every one percent will increase the application of ISPO by 0.067 percent. Data obtained from the field shows that 95% of the planters had more than five years of experience. Smallholders managing oil palm plantations for a long time already had a lot of experience about the problems and challenges that are accepted in managing oil palm plantations. The experience possessed can increase the knowledge of farmers to implement good garden management. This shows that they can more easily accept new innovations. The results of the analysis were in line with the results Hanani et al., (2013), that farming experience and the level of side grafting adoption in cocoa farming have a significant effect on innovation acceptance. Research reviewed by Hutabarat (2017), explains that certification is an effort to ensure that products can be traded globally and processed sustainably, the ISPO certification process depends on farmers' knowledge of plantation practices.

Education level

Education had a positive effect on the implementation of ISPO. It can be explained that the higher the level of education owned by the farmers, the higher the interest of farmers in implementing ISPO. ISPO is an innovation to improve the quality of oil palm plantations, planters with low education do not want to take the risk of using this innovation. In addition, there are many standards and criteria in the ISPO

certification process, making it difficult for farmers with low education to understand and apply them. For farmers with low education, understanding and training can be provided on the benefits received when implementing ISPO. In Emilia et al., (2014), the factors that influence the interest of farmers with the KKPA (*Kredit Koperasi Primer Anggota*) pattern to participate in oil palm certification, which provide information about sustainable palm oil with RSPO (Roundtale on Sustainable Palm Oil) and ISPO certification are farmer education and smallholder land area, while the factors that influence interest independent smallholders in participating in oil palm certification are influenced by education, land area and occupation. The education possessed by the majority of farmers in Kumai Regency 76% were high school graduates, planters who understand the benefits of implementing ISPO will apply these innovations so that the knowledge and skills of farmers will increase. The results of this analysis were in line with the results Puspa (2018) which state that age, education, land area, plant age, and productivity have a positive effect on the implementation of ISPO in Jambi Province.

Number of households

The number of households had a significant value on the implementation of ISPO. The coefficient value of the number of households is 0.168, which means that if the number of households increases every 1%, the application of ISPO will increase by 0.168%. As the number of family members increases, the expenditure will increase, planters realize ISPO is one of the innovations that are expected to increase the income of oil palm plantations, plantations that have been certified by ISPO have a better selling price for their FFB (Fresh Fruit Bunches) harvests compared to those without certification. In addition to paying attention to plantation sustainability, ISPO also explains the best cultivation methods that provide optimal results. Study conducted by Hidayat et al., (2015) explains that certification is seen as an economic tool in pursuit of a better livelihood. Another study that supports the results of the analysis, states that the higher the number of dependents, the higher the perception of farmers to adopt rejuvenation innovations (Anggreany et al., 2016). The majority of farmers in Kumai District, or 36%, had three dependent members. This number is the national ideal number of families recommended by the government consisting of four people, with these conditions allowing farmers to focus and easily manage oil palm plantations, especially in the implementation of ISPO.

CONCLUSIONS AND SUGGESTIONS

ISPO is a national program with the objective develop Indonesian sustainable palm oil plantations, the government support is needed continuously to assist smallholders. Increased counseling for oil palm plantations and its' family laborers is

needed to increase the implementation rate of ISPO Criteria.

The average implementation rate of ISPO for oil palm smallholders in Kumai sub-district was 80.01%. There were still some criteria classified as low in their implementation, such as planting on peat soils, planting on mineral soils, controlling plant pest organisms. These factors influenced the implementation, including farming experience, education level, and the number of households.

There were 46 percent of all smallholders oil palm plantation with age oil palm trees more than 20 years old, which needed to be replanted. Farmers who have not fully implemented the ISPO criteria should pay attention to sustainable plantation practices. Providing training for farmers to reduce erosion on hilly land, preventing flooding by making drainage ditches, and controlling plant pests and diseases.

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