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Opportunity for Sustainable Palm Oil Practices by Smallholder Farmers in Riau

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Abstract: Riau Province has smallholder oil palm plantations located in forest areas. Land conflicts in the area consist of vertical conflicts and horizontal conflicts. Land conflicts hinder the sustainability of oil palm plantations. This study identifies the sustainability status of smallholder oil palm plantations using the index values of the ecological dimension, the economic dimension, the social dimension, and the legal dimensions of governance and governance. Data retrieval using a survey method was analyzed using Multi-Dimensional Schalling. The analysis of the sustainability status of oil palm plantations shows the index value of each dimension, namely the ecological dimension 63.84, the economic dimension 59.79, the social dimension 69.59, and the lowest index value is the legal and governance dimension, which is 40.61. The index value of the legal and governance dimensions is an obstacle to the sustainability of smallholder oil palm plantations. Respondents' land conflicts include vertical conflicts and horizontal conflicts. This study concludes that the sustainability of smallholder oil palm plantations is achieved by implementing legal governance of land ownership so that there is no conflict between the people and the government and conflicts over land ownership between the people.

Keywords: smallholder, Multi-Dimensional Schalling, oil palm plantations, sustainability, government.

独立小农走向可持续油棕种植园

摘要: 廖内省拥有位于林区的小农油棕种植园。该地区的土地冲突包括纵向冲突和横向冲突。土地冲突阻碍了油棕种植园的可持续性。本研究使用生态维度、经济维度、社会维度以及治理和治理的法律维度的指数值来确定小农油棕种植园的可持续性状况。使用多维分析使用调查方法的数据检索。油棕种植园可持续性状况分析结果显示各维度指标值分别为生态维度 63.84、经济维度 59.79、社会维度 69.59，最低指数值为法律和治理维度，即 40.61。法律和治理维度的指数值是小农油棕种植园可持续性的障碍。受访者的土地冲突包括纵向冲突和横向冲突。本研究的结论是，小农油棕种植园的可持续性是通过实施土地所有权的法律治理来实现的，因此不存在人民与政府之间的冲突，以及人民之间的土地所有权冲突。

关键词： 小農, 多維沙林, 油棕種植園, 可持續性, 政府。

1. Introduction

Riau Province is one of the provinces whose main product is oil palm and is the largest province with oil palm plantations, which accounts for 24% of Indonesia's total plantation area of 16,381,957 ha, including smallholder oil palm plantations of 2,601,416.80 (64.9%) and large plantations of 1,457,028.30 (35.9%) [1-4]. Sustainable oil palm plantations are an application of the concept of sustainable agriculture, namely an agricultural system oriented towards economic, social, and ecological balance [5-7]. Oil palm plantation business actors responded to this demand by applying ISPO (Indonesia Sustainable Palm Oil) in oil palm plantations in Indonesia [8, 9]. Investment in the oil palm sector in Indonesia is still facing obstacles to be optimized into a conducive business climate. Some of the obstacles include [10, 11]. Plantation business actors are

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prohibited from clearing and/or cultivating land by burning, Protection and Management of Peat Ecosystems, Cultivation Rights (HGU), and Spatial Planning have been regulated in the Regulation of the Minister of Agrarian Affairs and Spatial Planning [6, 12, 13].

Conflicts over land use and resource management are increasing because of the influence of the increasing economic value of natural resources, the threat of scarcity, clarity of regulation, and law enforcement in their utilization [6, 12]. Conflicts over land use and natural resource management have at least six triggers, including Expropriation of agricultural land without procedures in mining/plantation activities, issuance of permits by local governments without regard to the clarity of land tenure status [14], omission and non-optimal monitoring systems the use of natural resources from the regional government is the triggering background, the non-fulfillment of rights and obligations between users.

Scarcity and increasing economic value of natural resources but unfair in their distribution. Damage and pollution threaten the continuity of natural resources for some people [12, 14, 15]. This study identifies the sustainability status of smallholder oil palm plantations using the index values of the ecological dimension, the economic dimension, the social dimension, and the legal dimensions of governance and governance.

2. Literature Review

The development of oil palm plantations in Riau Province brought major changes to the community [13, 16-18]. In addition, the development of oil palm plantations also stimulates the growth of processing industries whose raw materials are palm oil [1]. Based on the exploitation, Indonesian oil palm plantations are divided into three namely People's Plantations (PR), State Large Plantations (PBN), and Large Private Plantations (PBS) [11, 19, 20].

Independent oil palm smallholders in Indonesia, the fastest-growing and most marginalized producer group in the palm oil sector, are especially faced with regulatory compliance barriers [7, 11, 21, 22]. Most of the oil palm farmers (97%) were transmigrants from Java who received 2.25 ha of land for the 1979/80 national transmigration program. The other 3% are ethnic groups from Sumatra, such as the Batak, Malay, Minang, and Palembang ethnic groups.

Despite very different ethnic compositions, land-use history began with the shift of the main cash crop from rubber to oil palm, starting in the 1990s and early 2000s [10, 14, 23]. Riau Province has the largest oil palm plantation at 2.4 million ha, more than a quarter of Riau Province [19, 21, 22]. The area is categorized into two parts: 34% corporate concessions and 65% outside concessions. Oil palm plantations are located in two types of areas: non-forested areas (9%) and forested land converted to plantations (3%) [9, 23, 24].

The oil palm industry receives fresh fruit bunches (FFB) from those who convert protected forests and national parks into oil palm plantations [1, 24]. Forest conversion into oil palm plantations is considered a source of forest degradation and deforestation [10, 25]–[27]. The transformation of forestland into oil palm plantations has gone through several stages. First, a major expansion of logging activity occurred between 1999 and 2005 [8, 28].

Second, after logging, forestland turns into peat scrub [10, 29]. Third, it takes two to three years for smallholders to register burned land with the Village office for the issuance of SKT (Surat Certificate of Compensation) after the land has been planted with oil palm (usually after the first year of planting) [5, 25]. Finally, the transformation process from the first party (local farmers) to the other party is officially registered at the Village office through the issuance of SKGR (Certificate of Compensation or Official Agreement between Seller and Buyer) [16, 23].

[30, 31] shows that SKT does not constitute strong legal evidence of ownership and can be easily denied by formal titles. The state uses its authority to allocate land use. All Indonesian Forest areas are included in state property so that the transformation can take several forms, namely; (1) from state property to private property; (2) from state property to common property; and (3) from state property to open-access property [5, 31, 32]. Lacking the protection of property rights, land used by smallholders is often untitled and subject to ambiguous and thus conflicting ownership structures [5, 33]

Independent smallholders in particular need to comply with several important legal requirements detailed in the ISPO Standards [5, 12, 16, 34]–[36], including (a) ensuring plantations are located on land legally designated for oil palm plantations (Other Use Areas, APL); (b) using seeds obtained through government registered sources; (c) have a plantation business license (Cultivation Registration Certificate, STD-B); and (d) have a land title certificate (Sertifikat Hak Milik, SHM) (Government of Indonesia, Land Certificate (SKT) although it is often vulnerable to competing and overlapping claims and does not guarantee the land is located in APL [11, 23, 37].

3. Research Methodology

The study was conducted on oil palm plantations managed by smallholders indicated in production forest areas in Riau Province. The object of the research were 200-smallholder oil palm spread across the districts of Rokan Hilir, Rokan Hulu, Kampar, Bengkalis, Indragiri Hulu, Indragiri Hilir, Siak, Pelalawan and Dumai City.

The research method used is a survey method. The data were analyzed using Multi-Dimensional Scaling (MDS) with the Rap-Insus palm oil program (Rapid Appraisal-Index Sustainability of palm oil).

All attributes are judged knowledge by experts/stakeholders. The resulting score then determines the value of the mode. Furthermore, the modes are grouped into four categories, namely: 0-25% is categorized as bad (not sustainable), 25.01-50% (less sustainable), 50.01-75% (moderately sustainable), and 75.01-100% is categorized as good (Very sustainable).

4. Results and Discussion

4.1. Ecological Dimension Sustainability

The ecological dimension attributes consist of the type of land cover, peat depth, land clearing method, protected fauna and flora, flood/drought, and land fires [12, 38]. The results of the analysis of each attribute of the ecological dimension are shown in Table 1.

Table 1 Results of attribute analysis of ecological dimensions

No	Attribute	RMS value
1	Types of Land Cover	0.84
2	Peat Depth	4.82
3	Land Clearing Method	5.35
4	Land Fire	5.32
5	Flood / Drought	1.20
6	Flora and Fauna protected	4.52

Table 1 shows that the highest root means square (RMS) value for flora and fauna attributes is 5.32. This is in line with research [23, 39, 40] that the protection of flora and fauna is the most sensitive attribute that affects the sustainability index of oil palm plantations on the ecological dimension because of the negative impact on the habitat of endangered flora and fauna. Land clearing that is not carried out by operational standards and procedures will affect other sustainability indicators on the ecological dimension. In line with the results of research [15, 26, 41] that in general, the impact caused by oil palm cultivation begins with land clearings, such as land preparation, type of land cover, soil erosion during land clearing, changes in water availability and quality and changes in soil fertility due to land clearing [42, 43].

4.2. Ecological Dimension Sustainability

Economic dimension sustainability analysis consists of land area, production; FFB price; and farmers' income. The results of the analysis of each attribute of the economic dimension are presented in Table 2.

Table 2 The results of the analysis of the Attributes of the Economic Dimension

No	Attribute	RMS value
1	Land area	5.24
2	Land Price	4.12
3	Production	4.67
4	Price of Fresh Fruit Bunches (FFB)	5.99
5	Farmers' income	5,66

Table 2 shows that the root means square (RMS) value of the five economic dimension attributes obtained by production prices, farmers' incomes, and farmers' land area greatly affects sustainability, but the sensitive factors are FFB price attributes and farmers' income [28, 44]. The price of FFB in this study is a sensitive factor in the economic dimension that has the most influence on the sustainability of oil palm farming, with an RMS value of 5.99. FFB prices are closely related to farmers' income, so these two attributes are the main factors of the sustainability of this economic dimension [42, 45]. Marketing channels influence the price of FFB at the farm level, the marketing costs incurred by each marketing chain [16, 46].

Independent smallholders face a long marketing chain before the fruit reaches the factory. The low sales income received by farmers resulted in low income based on unit area of production [2, 47]. In addition to income from oil palm plantations, some farmers also have income from other sectors such as agents of FFB purchasing companies, plantation workers, small farmers, motorcycle repair shops, cooperatives, and others [45, 48]. These elements interact with each other to shape the oil palm economic cycle in the study area.

Farmers' land is in the land suitability class S2. This is very influential on productivity [47, 49]. Peatland utilization for oil palm farming is very concerned with land use systems integrating other crops into a good agroforestry system to increase land productivity [47, 50].

4.3. Status of Sustainability Legal and Governance Dimensions

Attributes of the Legal and Governance dimensions consist of land legality, the indication of forest area, land conflicts, types of conflicts, and farmer institutions [12, 38]. The results of the analysis of each attribute of the legal and governance dimensions are shown in Table 3.

Table 3 Analysis of the attributes of legal and governance dimensions

No	Attribute	RMS value
1	Land Legality	4.62
2	Forest area indication	6.80
3	Land conflict	7.23
4	Conflict Type	4.43
5	Farmer Institution	5.52

Table 3 shows that the root means square (RMS) value of five legal and governance dimensions attributes obtained by land legality, forest area indications, land conflicts, types of conflicts, and farmer institutions greatly affect sustainability. However, the sensitive factor is in the forest area indication attribute and land conflicts [8, 17]. This means that the current management of the legal-governance aspect is still lacking and requires attention, improving why this legal and governance aspect is classified as unsustainable [32, 51, 52]. In line with research [2, 53] that the ignorance of farmers in gardening about forest areas is the most dominant thing, and the lack of land that is not forest areas makes

smallholder oil palm plantations unsustainable [3, 8] In addition, the above conditions have resulted in vertical conflicts whose resolutions were lighter after the Law on Job Creation and its derivatives were issued [32, 51, 52]. The transfer of land ownership and the lack of land availability will cause horizontal conflicts that are very sensitive to the value of the sustainability of oil palm plantations.

4.4. Social Dimension Sustainability Status

The attributes of the social dimension consist of: education level, livelihood, number of family members, land acquisition, and farmer development [12, 38, 54]. The results of the analysis of each attribute of the social dimension are presented in Table 4.

Table 4 Results of attribute analysis of social dimensions

No	Attribute	RMS value
1	Level of education	1.88
2	Livelihood	8.77
3	Number of Family Members	6.27
4	Land Acquisition	6.18
5	Farmer Coaching	2.67

Thickness 4 shows that several attributes have a role towards sustainable oil palm plantations from the social dimension. The livelihood attribute has a value of 8.77. This indicates that the livelihood of farmers is a sensitive attribute in the sustainability of oil palm plantations [54, 55]. Livelihood attributes influence all attributes of the social dimension. The increasing income obtained from farmers' livelihoods will impact increasing farmers' education levels [56]. Mastery of education and natural resource management that only takes sides and prioritizes investment will cause problems in the future, especially due to the marginalization of the surrounding community [56].

Increased farmer education indirectly affects how farmers obtain land, and it is easier for farmers to develop. Land tenure by the surrounding community and indigenous peoples needs attention in the concept of sustainability because most conflicts occur due to jealousy from the surrounding community towards the oil palm plantation business, which is generally cultivated by people who are not from the surrounding community [57]

The number of families influences the livelihoods of farming families, so the larger the number of farming families, the more sensitive towards sustainability. The number of family members is one of the drivers of social relations with the surrounding community in forming a social community in the community. The value of the sustainability index of the social dimension is categorized as moderately sustainable. The value of the sustainability index and sustainability status on the socio-cultural dimension reflects the social and cultural conditions of the local community [54]. The research results by [54, 58] said that oil palm plantations meet all indicators of social and environmental aspects as stated in the ISPO Principles.

4.5. MDS Validity and Accuracy Test

Analysis of the Multi-Dimensional Schalling (MDS) method is then tested for validity using Monte Carlo analysis. The stress value and coefficient of determination (R2) will be obtained to determine whether it is quite accurate (correlated) with the actual situation. The sustainability index, stress value, and coefficient of determination can be seen in Table 5.

Table 5 shows that the difference between the MDS sustainability index and Monte Carlo is relatively small, namely 0.27-0.90. This explains that the validity test is at the 95% confidence level for each dimension. The resulting stress value is between 0.12 - 0.14, in line with research [8, 56], which is smaller than the provision (<0.25), meaning that the results of the analysis obtained are good. The coefficient of determination (R2) in each dimension and multi-dimensional is quite high, namely: 95%. In line with research [8, 56] that the higher the value of R2, the relationship between attributes affects each other's efforts to sustain oil palm plantations. All attributes used in each dimension are good enough to explain the existing condition of community oil palm plantation sustainability in forest areas in terms of four dimensions, social, ecological, economic, legal, and governance.

Table 5 Results of MDS Analysis, Monte Carlo, Stress, and Coefficient of Determination (R2)

No	Attribute	Sustainability Index			Stress	R2	Category
		MDS	Monte Carlo	Diff			
1	Ecology	63,83	63,56	0,27	0,14	0,95	Sustainable Enough
2	Economy	59,79	59,4	0,39	0,13	0,95	Sustainable Enough
3	Law and Governance	40,61	41,51	0,90	0,12	0,95	Less Sustainable
4	Social	69,59	69,28	0,31	0,13	0,95	Sustainable Enough

5. Conclusion

The index value of the ecological, economic, legal, and governance dimensions shows that the conditions are interconnected towards the sustainability status of oil palm plantations. Especially on the legal and governance dimensions, it shows a less sustainable status. Many oil palm farmers are still experiencing land conflicts and gardening in forest areas. This is because understanding the area at the farmer level is not the same as understanding the applicable law.

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