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MANAGEMENT STRATEGY FOR SUSTAINABLE DEVELOPMENT OF OIL PALM PLANTATION COMMUNITY OF PARENGGEAN AND EAST KOTAWARINGIN DISTRICTS, INDONESIA

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ABSTRACT

Palm oil is one of the leading commodities which play a strategic role in alleviating poverty, providing employment opportunities, spreading development and a source of foreign exchange for the country. The rapid development of oil palm plantation development has had negative impacts on the environment and social. The conversion of natural forests with high conservation value can reduce the quality of the environment and ecosystem. The development of oil palm plantations that do not pay attention to the rights of customary, customary and indigenous communities without the permission of the relevant communities before plantation development is carried out will cause social conflict. These problems need to be addressed to maintain the competitiveness of Indonesian palm oil products by realizing the development of sustainable palm oil plantations.

KEY WORDS

Management, strategy, community, palm oil, plantation.

Palm Oil (*Elaeis Guineensis*) is one of the mainstay commodities in the plantation sector as a contributor to the country's foreign exchange because its selling value in the form of CPO (Crude palm oil) is high and export-oriented. Indonesia is one of the largest CPO producing countries in the world, where more than 50% of the world's palm oil needs are met by Indonesia (FAO, 2017). According to Hasnah et al. (2021) the value of Indonesian palm oil exports has fluctuated in the last eight years. Palm oil exports in 2019 reached 29.55 million tonnes with a value of US\$15.57 billion. There was an increase in export volume of 0.84% compared to the previous year, but the export value decreased. This situation is motivated by the emergence of negative issues in palm oil production, one of which is related to environmental problems, namely that palm oil plantations have caused environmental damage (Aikanathan et al., 2011).

The palm oil commodity is one of the leading commodities which plays a strategic role in alleviating poverty, providing employment opportunities, spreading development and a source of foreign exchange for the country. The rapid development of oil palm plantation development has had negative impacts on the environment and social. The conversion of natural forests with high conservation value can reduce the quality of the environment and ecosystem. The development of oil palm plantations that do not pay attention to the rights of customary, customary and indigenous communities without the permission of the relevant communities before plantation development is carried out will cause social conflict.

The negative impacts resulting from unsustainable palm oil management are used as a campaign against the development of the palm oil industry at home and abroad. In line with increasing consumer demand for sustainable palm oil, international non-governmental organizations initiated the formation of the Roundtable on Sustainability Palm Oil (RSPO) in 2004. Apart from RSPO, international non-governmental organizations also established Indonesian Sustainable Palm Oil (ISPO). ISPO was founded with almost the same objectives as RSPO, namely to avoid/stop deforestation and reduce its impact on the environment and social life (ISPO 2014).



ISPO and RSPO are institutions that handle sustainable practices for palm oil plantations, but there are several differences between ISPO and RSPO. According to ISPO (2015), RSPO is a business initiative where its members voluntarily commit themselves to the RSPO mechanism with the aim of producing and using sustainable palm oil. Plantation practices that adhere to sustainability principles prioritize aspects of environmental legality and long-term socio-economic feasibility. However, ISPO aims to ensure the implementation of laws and regulations regarding sustainable palm oil plantations.

These problems need to be addressed to maintain the competitiveness of Indonesian palm oil products by realizing the development of sustainable palm oil plantations. Sustainability practices in the palm oil plantation sector in Indonesia have been increasingly emphasized since the Indonesian Government issued Presidential Regulation of the Republic of Indonesia No. 44 of 2020 concerning the Indonesian Sustainable Palm Oil Plantation Certification System, which is an update to the Minister of Agriculture Regulation No. 11 of 2015 concerning the Indonesian Sustainable Palm Oil Plantation Certification System. Improving and strengthening regulations to implement ISPO must be complied with oil palm plantation business actors, both large plantations and smallholder plantations, and action will be taken against those who violate them.

Central Kalimantan Province is one of the palm oil producing centres in Indonesia, where the agricultural sector, especially the plantation sub-sector, plays an important role in the Gross Regional Domestic Product (GRDP) of Central Kalimantan Province for 5 consecutive years, namely 2002-2006 with an average of 37, 07% per year Multi-stakeholder Palm Oil Working Group, Central Kalimantan Provincial Government (2008). The increasingly bright prospects for the palm oil industry in the domestic market and in the world market have encouraged an increase in the area of smallholder oil palm plantations. The results of this research are supported by an increase in the area of people's plantation land (PR) in Central Kalimantan Province by 11% or an area of 5,665 ha every year (Central Kalimantan Provincial Plantation Service, 2018). Community plantations have a strategic contribution and role in the palm oil sector to achieve more sustainable production by protecting rural livelihoods and the local environment (Jezeer et al., 2019; Razak et al., 2020). East Kotawaringin Regency is located in the Central Kalimantan Province, which has the largest smallholder oil palm plantations of 53,659.00 ha, where oil palm plantations are spread across various sub-districts, one of which is Parenggean District which is the center of oil palm plantations in East Kotawaringin Regency covering an area of 23,865 ha. 00 ha with total production reaching 124,764.00 tons (BPS East Kotawaringin Regency, 2023a).

Farmers see the strategic contribution of oil palm in the Indonesian economy as an opportunity for livelihood, so that quite a few people cultivate and expand their land in both cultivation and forest areas (Hasibuan, 2020). However, this has implications for new problems, namely land use and legality. In general, illegal land status is caused by oil palm plantations being cultivated in conservation areas (conservation forests) or production forest areas (Apriyanto et al., 2021). Legality is not only seen administratively as fulfilling government regulations for data collection on smallholder oil palm plantations, but can also create wider opportunities for improving livelihoods such as the opportunity to obtain ISPO certification and as an additional document to strengthen requirements for access to capital from banks (SPOS Indonesia, 2022).

Apart from that, various government efforts are also being made to develop sustainable palm oil plantations, one of which is through the smallholder palm oil rejuvenation (PSR) program to optimize smallholder palm oil production considering that the productivity of smallholder palm oil plantations is still low. However, unfortunately many farmers have not been able to access government assistance programs because their plantations still have forest area status. This will of course have an impact on farmers' income which is less than optimal. The complex relationship between humans and natural resources shows the need for a management approach that considers problems in environmental and conservation aspects as well as social and economic welfare (Jimenez et al., 2021).

The concept of sustainable development is a development concept that carries out development to meet the living needs of the current generation without risking the needs of



future generations. The concept of sustainability is not something new, however, nowadays the concept of sustainability is shifting the paradigm for the development of business activities where profit is the initial motive, but now we are required to practice and carry out activities that refer to the concept of sustainable development, namely 3P (Profit, people and planet) (Saragih et al., 2020).

The concept of sustainable palm oil plantations is the adoption of the concept of sustainable development which needs to be implemented to strengthen the position of farmers in the palm oil sector by synchronizing, integrating and giving equal weight to three aspects, namely economic, social and environmental aspects (Kay, D.; Alder, 1999). Sustainable management is not limited to legal aspects alone, but strengthens the aspects of good cultivation practices, governance, and encouraging policies. With this holistic approach, sustainable palm oil management will be economically productive and environmentally friendly by avoiding the expansion of oil palm plantations in forest areas (SPOS Indonesia, 2022).

According to FAO (1996) in Ivanov & Ponomareva (2011), in order to achieve this goal, educational support, the use of economic innovation and the development of new and appropriate technologies are needed, thereby ensuring stable access to food that meets human nutritional needs, development of commodity production, reducing unemployment rates and increasing incomes, reducing poverty levels, as well as managing natural resources and protecting the environment.

The concept of sustainability continues to be developed and sharpened by adding two other dimensions, namely technological and institutional dimensions. According to Azis (2011) the role of related institutions supported by the use of adequate technology is important in supporting agricultural sustainability:

- The technological dimension is not only limited to the level of technology use in farming management, but in the concept of sustainability, farmers must pay attention to production inputs and management techniques to increase production yields meet food needs and provide increased employment opportunities. (FAO, 1989);
- The institutional dimension interprets the availability of supporting institutions, including extension centres, financial institutions, farmer groups, and other institutions that can improve the sustainability of farming and resource utilization. For example, farmers know about the benefits of using superior seeds, but do not have access to them because of weak infrastructure in the marketing system. Therefore, in matters like this, institutions have a very important role (FAO, 1989).

METHODS OF RESEARCH

This research was conducted in Parenggean District, specifically Karang Tunggal Village and Karang Sari Village. This location was chosen deliberately based on the consideration that Parenggean District is the center of oil palm producing districts in East Kotawaringin Regency. The research period was carried out for 1 month, starting from September to October 2023.

This research uses a quantitative descriptive approach. According to Sugiyono (2012) in Rahmawati (2019) the descriptive method is a problem solving method by describing a phenomenon or research object as it really is. Thus, the quantitative descriptive method intends to explain a phenomenon under study by using aspects of calculation, measurement and numerical data, starting from data collection to data interpretation.

Farmer respondents in the research were selected using a purposive sampling method. Purposive sampling is a sampling technique from the research population that is based on certain considerations and is expected to provide answers/assessments to the questions asked. The criteria considered are that the farmer has an oil palm plantation in Karang Sari Village and Karang Tunggal Village, Parenggean District, East Kotawaringin Regency and the farmer has produced at least one harvest. Based on these considerations, the farmer respondents in the research were 60 farmers consisting of 30 farmers from Karang Tunggal Village and 30 farmers from Karang Sari Village.



Expert respondents in the research were selected using a purposive sampling method. Several considerations in determining burn respondents refer to the following criteria:

- Have experience and competence in accordance with the field studied;
- Have high credibility, be willing, and/or be at the research location;
- Be neutral regarding differences of opinion from other respondents;
- Have a reputation, position/position within their competence in the field being studied, and have demonstrated their credibility as an expert in the area being studied.

There were 10 expert respondents in the research consisting of representatives of cooperative administrators, heads of farmer groups, academics, plantation services and village government.

The data collection methods in this research are: Questionnaire, Interview and Literature Study. And the Data Source uses primary data and secondary data.

The data analysis used is Multi-Dimensional Scaling (MDS) with the RAP-Palm Oil approach which is a modification of the RAPFISH (Rapid Assessment Techniques for Fisheries) technique. Sustainability analysis in this research is represented by five dimensions, namely environmental, economic, social, institutions, and technology. Prospective analysis is used to determine important factors that influence sustainable smallholder oil palm plantations.

RESULTS AND DISCUSSION

The sustainability status in this research was analyzed through a sustainability index using the Multidimensional Scaling (MDS) method with the RAP-Fish (Rapid Apparsial Fish) approach which was then modified to become RAP-Palm Oil. The dimensions and attributes studied in the MDS analysis method can be identified based on the results of previous research and literature reviews by adjusting conditions in the field. The dimensions used in this research include environmental dimensions (8 attributes), economic dimensions (8 attributes), social dimensions (6 attributes), institutional dimensions (6 attributes), and technological dimensions (6 attributes).

The statistical parameters in this research consist of Monte Carlo analysis, s-stress value, and coefficient of determination (R²). According to Kavanagh & Pitcher (2004) sustainability analysis using the Rapid Apparcial (RAP) approach is considered valid if the s-stress value is below 0.25 and the coefficient of determination (R²) is close to 1 in each dimension produced.

Table 1 – Results of Sustainability Analysis of People's Palm Oil Plantations

Dimensions (%)	Sustainability Index (%)	S-Stress	R ²
Environment	48,55	0,141	0,945
Economy	50,94	0,138	0,933
Social	65,53	0,146	0,938
Institutional	57,98	0,153	0,920
Technology	55,32	0,168	0,910
Multidimensional	51,66	0,128	0,959

Source: Research results (2023).

The s-stress value is the ability of the attribute used to reflect the original data, while the R² value describes the ability of the attribute used to explain and influence the sustainability of the system being studied which is capable of being fulfilled. Average s-stress value in this study was 0.15 and the average R² value was 0.93. Thus, it can be concluded that all the attributes studied in each dimension have met the statistical criteria and are appropriate in explaining the sustainability of smallholder oil palm plantations in Parenggean District, East Kotawaringin Regency.

The results of the Multidimensional Scaling analysis using the RAP-Palm Oil approach show that smallholder oil palm plantations in Parenggean District are classified as quite



sustainable with an index of 51.66%. Even though it is classified as quite sustainable, it needs to be repaired and upgraded again to increase the sustainability index.

Of the five dimensions, there is one dimension that is classified as less sustainable so its management needs to be prioritized so that its sustainability status can be improved, namely the environmental dimension with a sustainability index value of 48.55%. The other four dimensions, namely the economic dimension, social dimension, institutional dimension and technological dimension, are classified as quite sustainable.

The value of each sustainability dimension can be projected on a flyover diagram, which shows that if the sustainability point moves further away from the centre point, the sustainability value will be greater. Social dimension has the highest sustainability value of 65.53%, then followed by the institutional dimension with a value of 57.98%, the technological dimension with a value of 55.32%, the economic dimension with a value of 50.94%, and the environment with value 48,55%.

Table 2 – Results of Monte Carlo Analysis

Dimensions	Sustainability Index Value (%)		Difference
	MDS	Monte Carlo	
Environment	48,55	48,71	0,16
Economy	50,94	51,18	0,24
Social	65,53	65,36	0,17
Institutional	57,98	57,15	0,83
Technology	55,32	54,76	0,56

Source: Research Results (2023).

Monte Carlo analysis was analyzed to determine the error rate in the RAP-Palm Oil analysis with a confidence level of 95%. The difference between the Monte Carlo value and the MDS value is not significantly different at the 95% confidence level. According to Kavanagh (2011), the difference between the Monte Carlo score and the MDS score for each dimension is relatively small (less than 1) indicating that (1) the error in scoring each attribute is relatively small, (2) variation in scoring due to differences in opinion relatively small, (3) high level of MDS stability, and (4) errors in entering data or missing data that can be avoided.

Based on the results of the Multidimensional Scaling (MDS) ordination analysis using the RAP-Palm Oil approach on 8 attributes in the environmental dimension, including (1) Use of forest land conversion, (2) Existence of Cover Crops (LCC), (3) Availability of drainage channels, (4) Application of transportation techniques, (5) Licensing and legality, (6) Application of cultivation techniques, (7) Forest damage or forest burning, and (8) Use of peat land. These attributes have different influences on the value of the sustainability index. The results show that the environmental dimension sustainability index value is 48.55, where this value is included in the less sustainable category (Fig 2).

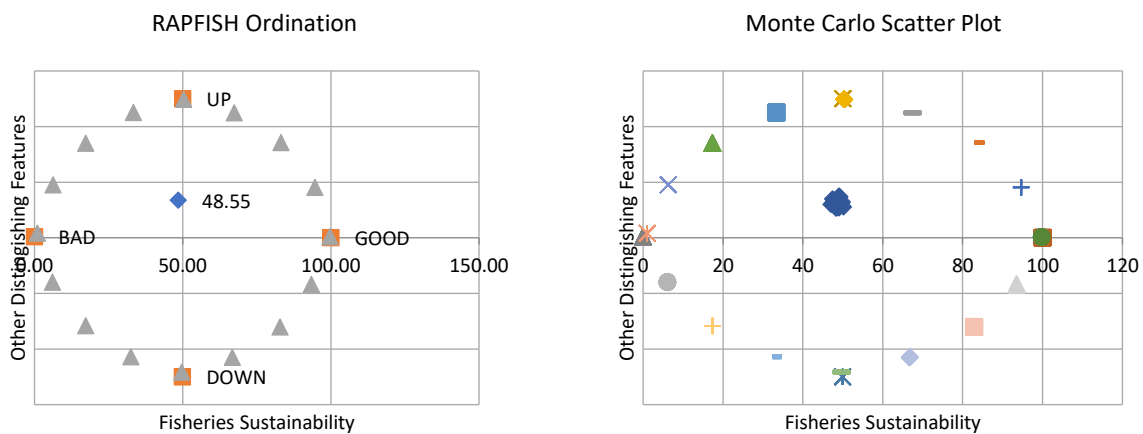


Figure 1 – Environmental Dimension Sustainability Index using the RAP-Palm Oil Approach



Sensitivity analysis was carried out to determine the sensitive attributes that influence the value of the oil palm plantation index in the environmental dimension. Based on the results of sensitivity analysis, four sensitive attributes were obtained including (1) Availability of drainage channels (6.30), (2) Implementation of cultivation and transportation techniques (6.83), (3) Licensing and legality (6.78), and (4) Forest destruction or forest burning (4.92). These sensitive attributes need to be managed well so that the sustainability index value can increase in the future.

It is known that the attributes of technical implementation of cultivation and transportation are sensitive attributes that influence the sustainability of smallholder oil palm plantations in Parenggean District. The technical application of cultivation and transportation referred to is all aspects of technical cultivation from seeding to harvesting and sustainable transportation that are practiced by farmers. The expected application of cultivation techniques refers to the principles of Good Agricultural Practices (GAP). GAP is a guideline regarding how to cultivate agricultural commodities appropriately, properly, environmentally friendly, and produce products that are safe for consumption (Nasution et al., 2023). High production and productivity can be achieved through implementing GAP, thus GAP is a form of realization of sustainable agriculture carried out by farmers (Nahraeni et al., 2020). In general, smallholder oil palm farmers in Parenggean District still carry out traditional oil palm cultivation activities. The limited knowledge of farmers regarding GAP and the availability of capital means that the application of GAP in oil palm cultivation activities is relatively not optimal. The technical cultivation items that are vulnerable to the sustainability category are nurseries. Farmers' lack of understanding regarding certified seeds and prices tend to be more expensive, so farmers prefer ready-to-plant seeds from local sellers or choose to use seeds that are sown independently.

The availability of drainage channels is another sensitive attribute that influences the sustainability of smallholder oil palm plantations in Parenggean District. Peat is a type of soil formed from piles of organic material. The nature of this land is always saturated with water. Water management on peatlands is one of the key factors in realizing sustainable peatland management. The aim of water management on peatlands is to create aerobic conditions by lowering the groundwater level and removing some of the organic acids that can poison plants (Rahayu et al., 2021). The plantation land area in Parenggean District is divided into swamp and non-swamp areas. The irrigation system is a water management effort to maintain the groundwater level needed by plants so that during the dry season the peatlands do not run out of water, while drainage aims to remove excess water from the peatlands so that the water does not stagnate. The research results showed that not many farmers in Parenggean District use water management systems, both drainage systems as an effort to dispose of excess water and irrigation systems.

Other sensitive attributes that influence the sustainability of smallholder oil palm plantations in Parenggean District are licensing and legality. The legality of smallholder oil palm plantations consists of land legality and cultivation legality. Land legality refers to land ownership documents in the form of a Certificate of Ownership (SHM) and cultivation legality in the form of a Plantation Business Registration Certificate for Cultivation (STD-B). To obtain legal cultivation, land legality must be met. According to SPOS Indonesia (2022), the area of oil palm plantations in Central Kalimantan is 1,778,701.68 ha and around 46.7% is within the state forest area. Thus, only 948,782.64 ha or around 53.3% of oil palm plantations are located in areas where they should be, namely non-forestry cultivation areas or other use areas (APL). Seeing these conditions, quite a few oil palm farmers in Parenggean District have difficulty obtaining legality, both land legality and cultivation legality. If smallholder oil palm plantations are in forest areas, they face land legality issues, while plantations outside the area face cultivation legality issues.

Forest destruction or forest burning is another sensitive attribute that influences the sustainability of people's oil palm plantations in Parenggean District. This attribute refers to land clearing that meets soil and water conservation principles. Specific provisions for land clearing have been issued in the Regulation of the Minister of Agriculture of the Republic of Indonesia Number 38 of 2020 concerning Implementation of Indonesian Sustainable Palm



Oil Plantation Certification which states that farmers carry out land clearing in accordance with the technical guidelines for land clearing without burning from the Directorate General of Plantation of the Ministry of Agriculture and guidelines from other agencies. The research results show that land expansion and land clearing often destroy forests, but nowadays land clearing is done mechanically using excavators or without burning.

Analysis of the sustainability of the economic dimension is carried out using 7 attributes that influence the sustainability of the economic dimension, including (1) Product market, (2) Plantation income status, (3) Pricing, (4) Access to FFB sales, (5) Access to price information, (6) Balance of profit distribution, and (7) Profit. The results of MDS analysis using the RAP-Palm Oil approach on the economic dimension are 50.94 which is classified as quite sustainable.

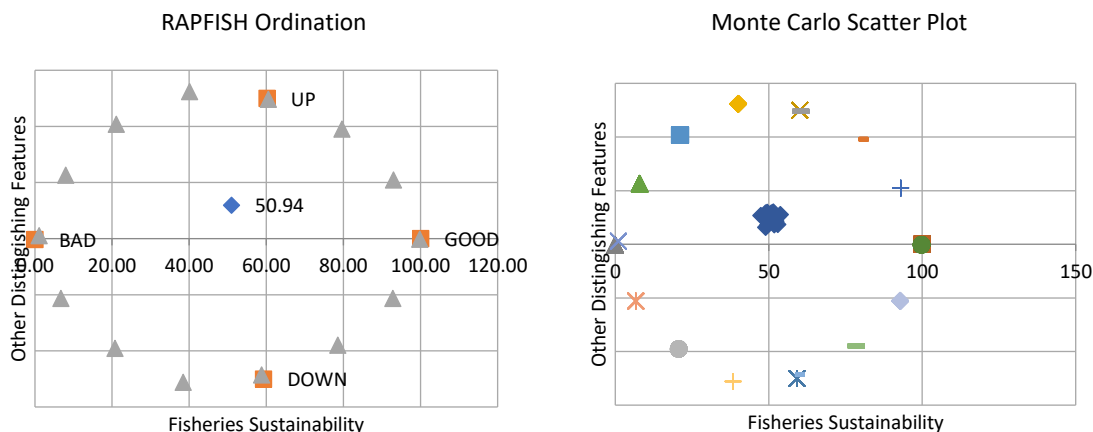


Figure 2 – Economic Dimension Sustainability Index using the RAP-Palm Oil Approach

The results of the sensitivity analysis of sensitive attributes that influence the sustainability index value of smallholder oil palm plantations in Parenggean District in the economic dimension include (1) Plantation income status (7.05), (2) Price determination (13.02), (3) Access to FFB sales (15.11), and (4) Balance of profit distribution (7.38). These attributes need to be considered and managed well to increase the sustainable value of smallholder oil palm plantations.

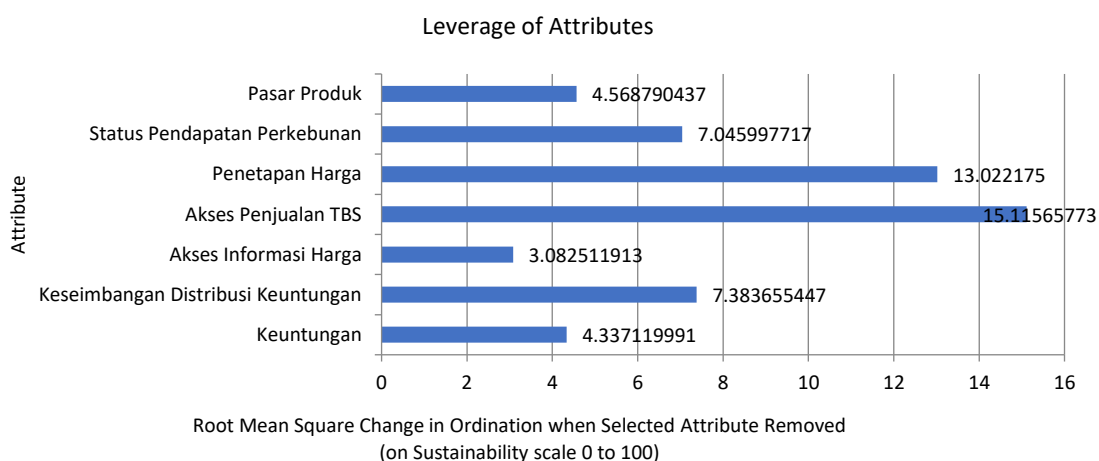


Figure 3 – Sensitivity Values of Economic Dimension Attributes

Access to FFB sales is the most sensitive attribute that influences the sustainability of smallholder oil palm plantations in Parenggean District in the economic dimension. Tandah fresh fruit (FFB) is the first product produced from smallholder oil palm plantations. Farmers



should be able to choose to sell FFB without reducing FFB quality or other obstacles by considering the distance of sale and transportation costs. The research results showed that the majority of farmers had no obstacles in selling FFB. This is because most farmers sell their agricultural products to middlemen directly on the farmers' plantations. In connection with another sensitive attribute in the economic dimension, namely the balance of profit distribution. This attribute is related to the FFB sales chain which refers to obtaining the optimum FFB price from the factory received by farmers. Most of the oil palm plantation farmers in Parenggean District get prices <95% from the factory, because farmers do not sell FFB directly to the factory but through certain parties, namely middlemen. Limited capital is the main reason why farmers sell their agricultural products to middlemen, where marketing costs which include transportation costs, loading and unloading costs, weighing costs and transportation costs are borne by the middlemen. Apart from that, the cash payment system which is paid directly at the plantation after the FFB weighing process is considered to make things easier for farmers even though the selling price received by farmers is much lower.

Another sensitive attribute that influences the sustainability of smallholder oil palm plantations is price setting. Pricing for fresh fruit bunches (FFB) in the last five years has tended to fluctuate. The rise and fall of FFB prices has an impact on the uncertain lives of oil palm farmers. The government plays a role in setting FFB prices through Law no. 19 of 2013 concerning Protection and Empowerment of Farmers. However, the government's role only extends to its determination and there is a lack of supervision over FFB price determination from middlemen so that collectors have the authority to determine profit-oriented prices. According to Hasriani et al. (2021) price determination at the farmer level cannot be underestimated, where smallholder oil palm plantations contribute 41% of the total area of national oil palm plantations, while the remainder is 54% private plantations and 5% state plantations. Besides that, cheating through manipulation of scales often occurs. This manipulation of scales is contrary to business ethics and if it continues it will be detrimental to farmers. Thus, the government's role is needed again to carry out supervision.

The ability of smallholder oil palm plantations to meet the needs of farmer households can be seen from their income status. (Saragih et al., 2020) Most smallholder oil palm plantation farmers in Parenggean District use oil palm plantations as their main source of income and depend on the sale of FFB. The opening of large-scale company plantations motivates farmers who live around these plantations to plant oil palm, and quite a few farmers even convert commodities into oil palm. Fluctuations in the selling price of Fresh Fruit Bunches (FFB) also influence the income of oil palm farmers, which tends to vary. The income of oil palm farmers in Parenggean District ranges from IDR 28 million - IDR 40 million per hectare per year with a land area of between 2 - 5 Ha so it is considered sufficient to meet household needs. Supported by research by Andriani (2007) that farmers who only focus on oil palm plantations tend to have higher incomes than farmers who have dual livelihoods outside oil palm plantations. However, if the plantation is not managed well, it will threaten the sustainability of oil palm plantations from an economic dimension considering that most of the livelihoods of the people of Parenggean District rely on oil palm plantations.

Analysis of social dimension sustainability is carried out using 7 attributes that influence the sustainability of the social dimension, namely (1) Knowledge of laws and regulations, (2) Land conflicts, (3) Average age, (4) Access to health, (5) Farmer regeneration, (6) Farmer education level, and (7) Commitment to transparency. The results of MDS analysis using the RAP-Palm Oil approach on the social dimension were 65.53 which is classified as quite sustainable.

The results of the sensitivity analysis of the 4 attributes that need to be managed well because they have a sensitive influence on the sustainability index value of independent oil palm plantations in the social dimension include (1) Average age (5.30), (2) Access health (5.69), (3) Farmer regeneration (4.66), and (4) Farmer education level (4,83).

Access to health is a sensitive attribute that has the most influence on the sustainability of smallholder oil palm plantations in Parenggean District. The limited availability of access to health services considering that oil palm plantations are geographically far from urban areas means that occupational safety and health (K3) practices need to be considered. The use of



Personal Protective Equipment (PPE) is often ignored by independent farmers so that work accidents still occur. This condition needs special attention from the government considering the limited access to health received by farmers, as a result of which farmers often prefer traditional medicine.

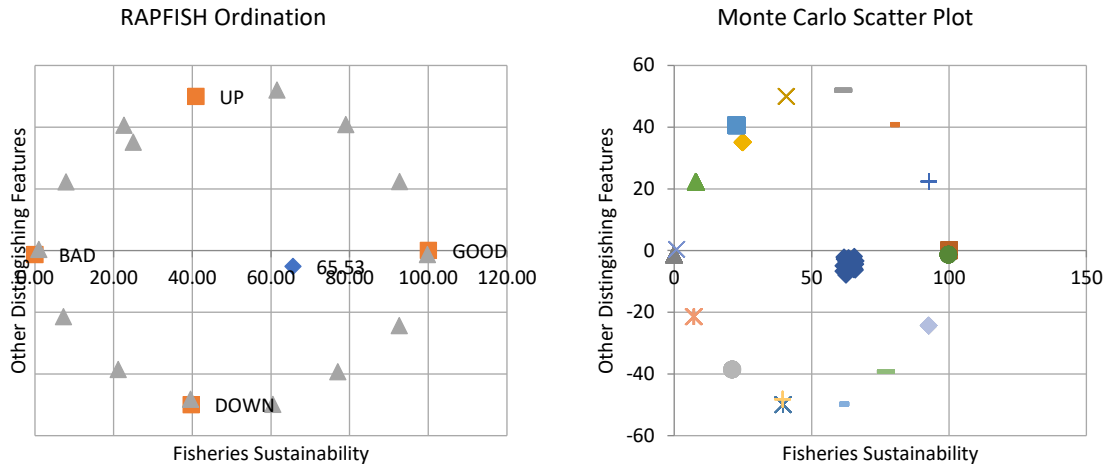


Figure 4 – Social Dimension Sustainability Index using the RAP-Palm Oil Approach

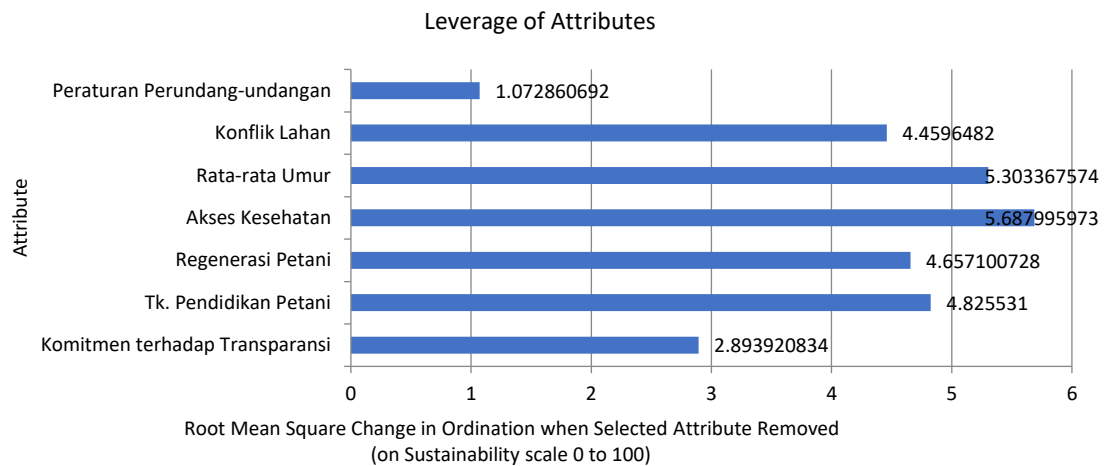


Figure 5 – Sensitivity Value of Social Dimension Attributes

Farmer age is a sensitive attribute that influences the sustainability of oil palm plantations. Farmer age level is used to measure the most appropriate age for adopting sustainable practices in oil palm plantations which have implications for physical ability and performance in managing oil palm plantation businesses (Saragih et al., 2020). Economically productive age is divided into non-productive age (0 - 14 years), productive age (15 - 64 years), and unproductive age (64 years and above) (Mantra, 2004). Supported by Guo's research (2015) that age level has a significant impact on agricultural yields. Although the experience of older farmers continues to increase with age, performance and energy have decreased. Younger farmers tend to have the courage to take risks, adapt to technological developments, and accept new innovations (Hidayat, 2018). The research results showed that the average age of oil palm farmers in Parenggean District was of productive age, ranging from 16-64 years.

Farmer regeneration is another sensitive attribute that influences the sustainability of smallholder oil palm plantations in Parenggean District. This attribute explains the views regarding the interest of non-oil palm farming communities towards oil palm plantations



according to oil palm plantation farmers. The research results showed that the local community's interest in the oil palm plantation business was very high. The condition of land that has potential for oil palm plantations and the income of oil palm farmers tends to be higher than that of food farmers, which is the reason for the high public interest in oil palm plantation businesses. However, the high level of public interest must be accompanied by community compliance with applicable regulations as well as community knowledge and practices regarding sustainable palm oil plantation management.

The level of education of farmers is also a sensitive attribute that influences the sustainability of the people's oil palm plantations in Parenggean District in the social dimension. According to the research results, the majority of farmer respondents had junior high school (SMP) education. At the research location, both Karang Tunggal Village and Karang Sari Village only have access to education up to junior high school level, where to continue high school (SMA) to college you need to travel quite a long distance or have to live in urban areas so it is not time efficient. and the amount of educational costs incurred. This condition deserves special attention from the government to provide educational services that are affordable to the community, especially oil palm farmers in remote villages.

The preparation of a strategy for sustainable management of smallholder oil palm plantations in Parenggean District, East Kotawaringin Regency was carried out using prospective analysis. Prospective analysis is carried out to explore various possibilities in the future in accordance with predetermined goals, so that strategic actions can be prepared to achieve the desired scenario. These various future possibilities are formulated in the form of strategic scenarios.

Key factors in strategy development are identified through three stages. The first stage is determining key factors based on needs analysis obtained from expert respondents with the help of a questionnaire. The second stage is determining key factors based on sensitive attributes that influence the current sustainability index (existing conditions) in each dimension. Next, the third stage is determining the key factors, a combination of both need analysis and existing conditions.

Based on the results of identifying key factors from expert respondents with the help of a questionnaire, there are 18 factors that need attention in managing smallholder oil palm plantations in Parenggean District, East Kotawaringin Regency, Central Kalimantan Province. These factors include, among others:

- Environmental dimensions: (a) Legality (K1), (b) Land suitability (K2), and (c) Use of chemical fertilizers (K3);
- Economic dimensions: (a) Availability of farmer capital (K4), (b) Access to price information (K5), (c) Productivity (K6), and (d) Selling price of FFB (K7);
- Social dimensions: (a) Land conflict (K8), (b) Knowledge about ISPO (K9), (c) Education level (K10) and (d) Community interest in oil palm plantations (K11);
- Institutional dimensions: (a) Cross-sector collaboration (K12), (b) Intensity of extension activities (K13), (c) Regional government support (K14), and (d) Law enforcement (K15);
- Technological dimensions: (a) Utilization of palm oil waste (K16), (b) Availability of palm oil mills (PKS) (K17) and (c) Superior seeds (K18).

These attributes are then assessed so that assessment results are obtained based on prospective analysis in the form of grouping attributes into four quadrant groups.

There are 2 factors that have high influence and low dependence between factors, including (1) Land suitability and (2) Cross-sector collaboration, as well as 6 factors that have high influence and low dependence between factors, including (1) Access to price information, (2) Knowledge of ISPO, (3) FFB selling price, (4) Regional government support, (5) Productivity, and (6) Availability of farmer capital.

Based on sustainability analysis using the Multidimensional Scaling method with the RAP-Palm Oil approach, 20 sensitive attributes were obtained that influence the sustainability index, including the following:



- Environmental dimensions: (a) Availability of drainage channels (S1), (b) Application of cultivation and transportation techniques (S2), (c) Licensing and legality (S3), and (d) Forest damage or forest burning (S4);
- Economic dimensions: (a) Plantation income status (S5), (b) Pricing (S6), (c) Access to FFB sales (S7), and (d) Balance of profit distribution (S8);
- Social dimensions: (a) Average age (S9), (b) Access to health (S10), (c) Farmer regeneration (S11), and (d) Farmer education level (S12);
- Institutional dimensions: (a) Accessibility of farmer groups to banking (S13), (b) Role of cooperatives in farming (S14), (c) Participation of farmers in farmer groups (S15), and (d) Ability of MFIs to serve farmers (S16);
- Technological dimensions: (a) Use of fertilizers according to recommendations (S17), (b) Management of plant pest organisms (S18), (c) Use of superior seeds (S19), and (d) Application of land and water conservation technology (S20).

The results of assessing the direct influence between factors based on sensitive attributes in sustainability analysis using prospective analysis identified 10 attributes that influence the sustainability index of smallholder oil palm plantations in Parenggean District. There are 3 factors that have high influence and low dependence between factors, including (1) Licensing and legality, (2) Farmer education level, and (3) Application of land and water conservation technology, as well as 7 factors that have high influence and dependence between factors. Low levels include (1) Plantation income status, (2) Price determination, (3) Access to FFB sales, (4) Balance of profit distribution, (5) Role of cooperatives in farming, (6) Farmer participation in farmer groups, and (7) LKM's ability to serve farmers.

The combination of important factors from prospective analysis of existing conditions based on sensitive attributes in sustainability analysis and need analysis based on needs analysis, produces 18 factors that influence the sustainability of smallholder oil palm plantations in Parenggean District (10 factors come from existing conditions and 8 factors come from need analysis). Some of these factors are similar and can be combined, so that the combined factors influence the system into 17 factors.

Table 3 – Results of Combining Existing Condition and Need Analysis Factors on the Sustainability of People's Palm Oil Plantations

No	Existing Condition	Need Analysis
1	Licensing and legality (S3)	
2	Estate income status (S5)	
3	Pricing (S6)	Selling price TBS (K7)
4	Profit distribution balance (S8)	
5	Farmer education level (S12)	
6	Accessibility of farmer groups to banking (S13)	
7	The role of cooperatives in farming (S14)	
8	Farmer participation in farmer groups (S15)	
9	MFI's ability to serve farmers (S16)	
10	Application of land and water conservation technology (S20)	
11		Land suitability (K2)
12		Access price information (K5)
13		Cross-sector collaboration (K12)
14		Capital availability (K4)
15		Productivity (K6)
16		Knowledge of ISPO (K9)
17		Local government support (K14)

The factors resulting from combining existing conditions and needs analysis were reanalyzed using prospective analysis to determine the level of importance between factors. There are 9 factors that have a big influence on sustainability, namely (1) Regional government support, (2) Accessibility of farmer groups to banking, (3) The role of cooperatives in farming, (4) Price determination, (5) Knowledge about ISPO, (6) Cross-sector collaboration, (7) Legality, (8) Balance of profit distribution, and (9) Farmer participation in farmer groups. These nine factors need to be managed as well as possible and are the



determining factors for the realization of smallholder oil palm plantations in Parenggean District.

There are nine key factors, including: (1) four key factors have a high influence with a low level of dependence between factors (local government support, accessibility of farmer groups to banking, the role of cooperatives in farming, and price fixing); and (2) five high influencing factors with a low level of inter-factor dependency (Knowledge of ISPO, cross-sector collaboration, legality, balance of profit distribution, and farmer participation in farmer groups). A description of each key factor is as follows:

1. Local government support. Not only are oil palm farmers the main actors in the oil palm plantation business, local governments also play a role in the development of sustainable oil palm plantations. Regional governments are obliged to ensure that regulations regarding sustainable palm oil practices can be implemented by farmers. Since the issuance of Presidential Regulation no. 44 of 2020 concerning the Indonesian Sustainable Palm Oil Plantation Certification System (ISPO), which requires smallholder oil palm plantations to have ISPO certification, provincial and district governments are taking this seriously. This can be seen from the gradual increase in capacity and data management, especially spatial data on smallholder oil palm plantations and increased coordination between parties in developing support programs for smallholder oil palm plantations (SPOS Indonesia, 2022).

2. Accessibility of farmer groups to banking. Not all oil palm farmers in Parenggean District have access to banking. Limited knowledge regarding banking administration is the main cause of low accessibility for farmers. Banking has an important role as a distributor of credit or working capital and/or investment from government programs, namely People's Business Credit (KUR) in order to advance Indonesia's agricultural sector. Integrated farmer groups are expected to be able to access banking as a source of capital. Thus, farmer groups have an important role as facilitators between farmers and banks.

3. The role of cooperatives in farming. The existence of cooperatives plays an important role in farming, where cooperatives can strengthen their bargaining position in product marketing, access to production inputs and financial services (Pramudya et al., 2022). Access to production inputs can be utilized by increasing FFB production which will increase farmers' income through the provision of superior and certified seeds, provision of quality fertilizer and sustainable empowerment of farmers. Cooperatives are obliged to carry out all these roles which are not only limited to marketing FFB, but also coaching farmers so that they are able to obtain adequate income. So far, all these roles have been carried out by cooperatives, but they still need to be intensified.

4. Pricing. Pricing for fresh fruit bunches (FFB) in the last five years has tended to fluctuate. The rise and fall of FFB prices has an impact on the uncertain lives of oil palm farmers. The government plays a role in setting FFB prices through Law no. 19 of 2013 concerning Protection and Empowerment of Farmers. Unfortunately, the Law does not regulate which categories of farmers should receive protection (Hasriani et al., 2021). The government's role in determining FFB prices only extends to its determination and there is a lack of supervision over FFB price determination from middlemen so that collectors have the authority to determine profit-oriented prices which will be detrimental to farmers.

5. Knowledge of ISPO. The biggest obstacle facing the implementation of the ISPO certification scheme in Parenggean District is farmers' limited understanding of ISPO. This has implications for the lack of implementation of good agricultural practices (GAP) which directly affects productivity. On the other hand, financial conditions are often the reason why farmers are not used to keeping plantation operational records, fertilizing according to recommendations, and maintaining plants properly.

6. Cross-sector collaboration. The success of various sustainable developments certainly cannot be separated from the participation of various related sectors. Coordination between various sectors is needed in cross-sector cooperation to achieve the stated goals. In the management of sustainable smallholder oil palm plantations there are several sectors that are related either directly or indirectly, namely the banking sector in terms of providing business capital, the industrial sector in terms of processing fresh fruit bunches (FFB) and



marketing, the plantation sub-department which is technically responsible towards the success of development in the plantation sector, extension services and regional infrastructure sectors in terms of providing supporting infrastructure such as roads.

7. Legality. Requirements for land legality and cultivation legality are one of the main problems in the slow implementation of sustainable certification. Land legality refers to land ownership documents in the form of a Certificate of Ownership (SHM) for non-forest land. Apart from land legality, there is business legality in the form of a Plantation Business Registration Certificate for Cultivation (STD-B). With the rise of oil palm plantations in forest areas, access to capital is a problem for many oil palm farmers. Lack of access to capital means that many farmers are unable to purchase quality production inputs, which ultimately has implications for difficulties in implementing good agricultural practices (GAP).

8. Balance distribution of profits. The balance of profit distribution is related to the sales chain of fresh fruit bunches (FFB). Profit balance will occur if the supply chain is able to run efficiently so that at least farmers get 99% of the factory price (Sumartono, 2018). Farmers are expected to be able to access FFB sales directly to factories. However, selling FFB to middlemen dominates the choices of oil palm farmers in Parenggean District. Harvest times are not uniform so the transportation costs that farmers have to incur to deliver them directly to the factory will be much greater so farmers prefer to sell to middlemen. Apart from that, the cash payment system which is paid directly to farmers' plantations after the weighing process is carried out is considered to be easier for farmers even though the selling price received by farmers is much lower than farmers who sell directly to factories.

9. Farmer participation in farmer groups. The government has an obligation to encourage and facilitate the economic institutions of small farmers as stated in the Minister of Agriculture Regulation Number 82/Permentan/OT.140/8/2013 concerning Guidelines for the Development of Farmer Groups and Associations of Farmer Groups which stipulate that small farmers as members are formed based on common interests, circumstances. socio-economic-environmental, availability of resources and commodities, as well as harmony for member progress and business growth. This regulation is in no way intended to place small farmers in a problematic situation. Rather, it applies the precautionary principle in terms of access to programs and guidance for small farmers to become credible by institutionalizing themselves.

The results of the sustainability analysis using Multidimensional Scaling with the RAP-Palm Oil approach show that the sustainability index is still in a fairly sustainable position. Thus, it is necessary to formulate various management strategy scenarios so that sustainable oil palm plantations can be realized in Parenggean District.

Based on the results of the analysis of the influence between factors, eight factors were obtained that were influential and interdependent. Prospective key factors for sustainable smallholder oil palm plantation management are presented with various states for each factor. Various strategic scenarios were formulated by pairing the changes that would occur to obtain three strategic scenarios for sustainable smallholder oil palm plantation management in Parenggean District, namely: (1) Conservative-pessimistic scenario, (2) Moderate scenario -optimistic, and (3) Progressive-optimistic scenario. The number of strategic scenarios formulated in the context of managing smallholder oil palm plantations can be more than three, but based on the circumstances of each key factor, the greatest possibilities that are predicted to occur in the future are these three scenarios.

These key factors include (1) Regional government support, (2) Accessibility of farmer groups to banking, (3) The role of cooperatives in farming, (4) Price determination, (5) Knowledge of ISPO, (6) Cross-sector collaboration, (7) Legality, (8) Balance of profit distribution, and (9) Farmer participation in farmer groups.

The conservative-pessimistic scenario is built based on the existing conditions of sustainable management of smallholder oil palm plantations in Parenggean District. This scenario means that the formulation of development concepts is still traditional and does not have future-oriented development prospects (Mersyah, 2005). Thus, the main actors in this scenario consider that oil palm plantation business activities are not a potential business opportunity to be developed in order to improve welfare and regional economic dynamics.



Table 4 – Prospective Key Factors for Sustainable Management of Smallholder Palm Oil Plantations in Parenggean District

No	Factor	Circumstances (<i>State</i>)		
		1A	1B	1C
1	Local government support	Less supportive, because they think they play less of a role in regional economic dynamics	Support by implementing the concept of sustainable development in stages	Support and implement the concept of sustainable development
		2A	2B	2C
2	Accessibility of farmer groups to banking	Less available	Available with strict requirements	Available on soft terms
		3A	3B	3C
3	The role of cooperatives in farming	Still	Increase	Increase
		4A	4B	4C
4	Pricing	Fluctuating	Stable	Stable
		5A	5B	5C
5	Knowledge of ISPO	Still	Increase gradually according to the farmer's abilities and knowledge	It has increased drastically because it is supported by the regional government and related agencies
		6A	6B	6C
6	Cross-sector collaboration	Lack of synergy due to sectoral ego	It is somewhat synergistic because it is supported by the strategic plan and propeda	Synergistic because the strategic plan and regional regulations are implemented
		7A	7B	7C
7	Legality	Enough	Fulfilled gradually	Fulfilled
		8A	8B	8C
8	Balance of profit distribution	It's less balanced because farmers get <95% of the price from the factory	It is more balanced because farmers get 95-99% of the price from the factory	It is more balanced because farmers get 99% of the price from the factory
		9A	9B	
9	Farmer participation in farmer groups	Still	Increase	Step up and play an active role

Table 5 – Results of Scenario Analysis for Sustainable Management of Smallholder Palm Oil Plantations in Parenggean District

No	Scenario	Factor Order
1	Conservative-Pessimistic	1A;2A;3A;4A;5A;6A;7A;8A;9A
2	Moderate-Optimistic	1B;2B;3B;4B;5B;6B;7B;8B;9B
3	Progressive-Optimistic	1C;2C;3C;4C;5C;6C;7C;8C;9C

The conservative-pessimistic scenario is built based on key factors with conditions: (1) The regional government still does not support it because it believes that smallholder oil palm plantations play little role in regional economic dynamics. (2) Accessibility of farmer groups to banking is still lacking, (3) Cooperatives play quite a role in farming, (4) Determination of selling prices for fresh fruit bunches (FFB) tends to fluctuate, (5) Farmers' knowledge regarding ISPO is still limited as a result of the implementation of the principles and Sustainable criteria are still rarely applied, (6) Cross-sector collaboration is still not synergistic resulting in development programs that often overlap, (7) Legality, (8) Profit distribution is still less than balanced, where farmers get prices less than 95% of factory prices, and (9) Farmer participation in farmer groups

The application of this conservative-pessimistic scenario has implications in the form of: (1) Low FFB productivity, (2) Limited capital in purchasing quality production inputs, (3) There is an opportunity to increase the role of cooperatives through sustainable empowerment of farmers in order to increase productivity so that farmers gain adequate income, (4) Fluctuations in FFB selling prices which impact the vulnerability of farmers' ability to meet their needs, (5) Waste of development budgets due to cross-sector collaboration that is not yet synergistic, (6) Vulnerability to land conflicts and the inability of farmers to access sustainable government programs due to legalities not being fully fulfilled, and (7) The role of related institutions cannot function optimally.

The support needed in managing sustainable smallholder oil palm plantations in Parenggean District in a conservative-pessimistic scenario, includes:

- Increased government support through training and training for farmers in implementing environmentally friendly palm oil cultivation;



- Increase synergistic cross-sector collaboration so that regulatory mandates issued by the government regarding sustainable palm oil governance can be implemented properly;
- Increased accessibility of farmer groups to banking, followed by socialization and assistance to farmers in order to provide knowledge and insight regarding banking administration;
- Increasing incentives for oil palm plantations in order to increase business scale through ease in obtaining capital credit, whether funds sourced from banks or other institutions;
- Strengthening the role of institutions such as farmer groups and cooperatives in order to solve various problems faced by farmers such as procuring quality seeds, providing fertilizer, providing medicines, capital and marketing;
- Improve the management of oil palm cultivation, especially in the use of production inputs and the implementation of Good Agricultural Practices (GAP) in order to guarantee the quantity and quality of FFB.

CONCLUSION

Based on the results of the analysis and discussion which are in accordance with the objectives of the research problem, several things can be concluded as follows.

The sustainability index value of smallholder oil palm plantations in Parenggean District, East Kotawaringin Regency is included in the moderately sustainable category with an index value of 51.66. The results of the analysis of each sustainability dimension show that the social dimension has the highest index value (65.53/quite sustainable), followed by the institutional dimension (57.98/quite sustainable), the technological dimension (55.32/quite sustainable), the economic dimension (50.94/quite sustainable), and environmental dimensions (48.55/less sustainable). The results of the leverage analysis show that there are 20 sensitive attributes that influence the sustainability index, among others:

- Environmental dimensions: (1) Availability of drainage channels, (2) Transportation techniques, (3) Licensing and legality, and (4) Forest damage or forest burning;
- Economic dimensions: (1) Plantation income status, (2) Price determination, (3) Access to FFB sales, and (4) Balance of profit distribution;
- Social dimensions: (1) Average age, (2) Access to health, (3) Farmer regeneration, and (4) Farmer education level.

The results of statistical tests show that the RAP-Palm Oil method is quite good for use as a tool for rapid appraisal (rapid appraisal) of the sustainability of smallholder oil palm plantations in Parenggean District, East Kotawaringin Regency.

Based on prospective analysis with a combination of existing conditions (important factors based on sensitive attributes of leverage analysis) and need analysis (important factors based on needs analysis), it is known that 9 important factors influence sustainability, namely: (1) four important factors have a high influence on sustainability with a high level of dependence between factors. low include local government support, accessibility of farmer groups to banking, cooperative roles in farming, and price fixing; and (2) five important factors have a high influence on sustainability with a high level of inter-factor dependency, including knowledge about ISPO, cross-sector collaboration, legality, balanced distribution of profits, and farmer participation in farmer groups. To increase the sustainability of smallholder oil palm plantations in Parenggean District, East Kotawaringin Regency, improvements are needed in each of these important attributes.

Sustainable management of smallholder oil palm plantations in Parenggean District, East Kotawaringin Regency can be carried out by implementing a "Moderate-Optimistic" strategy which needs to be supported by several support recommendations including:

- (1) Collaboration between local government and related agencies to develop strategies to synergize and integrate ongoing initiatives in the field with regional development programs;



(2) Increasing the use of quality production inputs and governance of sustainable oil palm cultivation in order to guarantee the quantity and quality of FFB without reducing the quality of the surrounding environment;

(3) Assistance and education to farmers regarding the concept and intensive oil palm plantation practices through institutional strengthening;

(4) Encouraging increased accessibility of farmer groups to banks to provide capital credit and business development with soft credit terms in the context of developing the scale of oil palm plantation businesses in Parenggean District.

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