Analysis of oil palm plantation performance in environmental management based on ISPO principles and criteria

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Abstract. Excellence, potential, and good prospects make palm oil plantations grow rapidly. Another underlying consideration is the important and strategic role as an activator or accelerator in development and economy. Environmental and social issues become challenging in development’s sector, especially in the development of sustainable oil palm plantations. Since the implementations of the certification system for sustainable palm oil plantation’s in 2011 and was further clarified in Regulation of the Minister of Agriculture No. 11 of 2015 about Indonesian Sustainable Palm Oil Certification System (ISPO), the Indonesian Government requires companies to produce palm oil sustainably. This research aims to analysis on the performance of oil palm plantations in environmental management based on ISPO principles and criteria. Research on several palm oil plantations in South Sumatera Province located in Musi Banyuasin Regency. Methods were used by collecting primary data through interviews and secondary data was obtained from data reviews such as company literature. The results of the analysis showed that the effectiveness of policy implementation through the fulfillment of environmental policy components can be fulfilled by most of companies. Meanwhile, in some cases, such as online reporting of land fires has not been fulfilled yet.

1. Introduction

Plantations are closely related to economic development. As the leading subsector of agriculture, the plantations’ implementation has a purpose stipulated in Law No. 39 of 2014 on Plantations. Plantation development is a realistic choice, because it’s strength and ability are the main reasons. That is seen from the plantation industry’s resilience to the crisis conditions that are still able to survive and become economic fundamentals. The role of plantations in agriculture and national economy’s activator can be seen by the value of Plantations’ Gross Domestic Product (GDP) as the dominant contributors to agricultural, forestry, and fisheries businesses with an average cost of 3.39% in 2015-2018, while for agricultural, forestry, and fisheries businesses amounting to 13.23% which is the second-largest GDP structure after processing industry [1].

The type of commodity crops can support the purpose of plantation development. The selection of plantation crops is very crucial because as an effort to optimize natural resources and to increase...
comparative advantage and competitive advantage [2][3]. Indonesian has some of the leading commodities of plantations, namely palm oil (Elaeis guineensis Jacq.), which has benefits, economic value, and becomes the commodity with the most enormous export volume [4][5]. The demand for global palm oil continues to increase in line with the growth of the world's population, versatile utilization (food raw materials, cosmetics, cleaning products, and energy/biofuels), as well as competitive prices and advantages [6]. Palm oil consumption is above 60% of the world's total vegetable oil production, among its 34% use for food and 44% non-food [7].

The great encouragement towards the palm oil industry is an opportunity for Indonesian also followed by the development of oil palm plantations. Excellence, potential, and good prospects make palm oil plantations overgrow. Priorities in terms of equalization of development have a positive effect on economic growth [8][9][10]. Indonesian palm oil production, in the form of Crude Palm Oil (CPO) and Palm Kernel Oil (PKO) from the process of processing Fresh Fruit Bunches (FFB), can dominate the global market or amount to 46.8% of the world's total production [11].

Indonesian palm oil plantation area in 2016 was 11.20 million ha, in 2017 increased by 10.55% to 12.38 million ha, and in 2018 increased by 3.06% to 12.76 million ha. Based on its business status, in 2017, the area of plantations attempted by The State Large Plantation amounted to 0.64 million ha or 5.15%, People's Plantation 5.70 million ha or 46.01%, and Large Private Plantations 6.05 million ha or 48.83%, with a total CPO and PKO production of 34.94 million tons and 7 million tons respectively [12][13]. The emergence of problems related to the environmental aspect sparked criticism from local and international communities [14]. The World Non-Governmental Organization (NGO) considers that the expansion of oil palm plantations is the main leading of forest deforestation, illegal land clearing, destruction of endangered species habitats, and the extension of national park functions [15][16]. As a result, it has drawn criticism from importers who will not buy palm oil products if they are not produced by sustainable oil palm plantations. This is a strategic need for companies (stakeholders) and the government in managing palm oil plantations sustainably [17].

Through the Ministry of Agriculture, Directorate General of Plantations, the government encourages sustainable, competitive palm oil plantation business and supports the licensing of natural resources and environmental functions in Regulation of the Minister of Agriculture No. 11 of 2015 on Indonesia Sustainable Palm Oil Certification System (ISPO). Based on applicable legal products, The palm oil plantation business can improve the company's performance as well as improve the competitiveness of Indonesian palm oil in the world market. The application of indicators on the ISPO Principles and Criteria (PnC) becomes standard in sustainable palm oil plantation business. Concerning to, this study aims to analyze the performance of oil palm plantations in ecological management based on the fulfillment of environmental policy components related to the ISPO PnC indicators.

2. Data and method
The research was conducted at several palm oil plantation companies of South Sumatera Province which are administratively located in Musi Banyuasin (Muba) Regency. The scope of this research is limited to the fulfillment of environmental policy components related to the PnC ISPO indicators 1, 2, 3 and 4, listed in table 1. The method used is to collect primary data through interviews with companies and secondary data derived from company data. Data collection is done by triangulation techniques. Triangulation is a data collection technique that combines various data collection techniques from existing data sources [18][19]. Furthermore, it is calculated using the formula of achievement of each component of environmental policy related to the PnC ISPO indicator as follows:

\[ Pp = \frac{\text{the amount of criteria fulfilled on } x}{\text{number of criteria on } x} \times 100 \% \]  (1)

The method of sampling using purposive sampling [20], as many as six companies were selected to be respondents, namely:
- PT. Pinago Utama
- PT. Mentari Subur Abadi (MSA)
- PT. Swadaya Bhakti Negaramas (SBN)
- PT. Sentosa Mulia Bahagia (SMB)
- PT. Ita Mugoreben
- PT. Musi Banyuasin Indah (MBI)

Table 1. Environmental policy components related to the PnC ISPO indicator

| Environmental policy components | Description |
|--------------------------------|-------------|
| Environmental policy components | Law No. 32 of 2009 on Environmental protection and management |
| Legality of the legislation     | Government Regulation No. 27 of 2012 on Environmental permits |
|                                 | Government Regulation No. 41 of 1999 on Air pollution control |
|                                 | Government Regulation No. 101 of 2014 on Waste management of hazardous and toxic materials (B3) |
|                                 | Government Regulation No. 82 of 2001 on Water quality management and water pollution control |
|                                 | Government Regulation No. 74 of 2001 on Management of hazardous and toxic materials |
|                                 | Regulation of The Minister of Environment No. 18 of 2009 on B3 Waste management licensing |
|                                 | Regulation of The Minister of Environment No. 14 of 2013 on Waste symbols and labels B3 |
|                                 | Regulation of The Minister of Environment No. 3 of 2008 on Procedures for giving waste symbol B3 |
|                                 | Regulation of The Minister of Environment No. 7 of 2017 on Mobile source emission quality standards for boilers |
|                                 | Regulation of The Minister of Environment and Forestry No. 12 of 2020 on Waste storage B3 |
|                                 | Regulation of The Minister of Environment and Forestry No. 38 of 2019 on Types of business plans and/or activities that must have an analysis of environmental impacts (AMDAL) |
|                                 | Decision of The Environment Minister No. 48 of 1996 on Default noise level |
|                                 | Decision of The Environment Minister No. 50 of 1996 on Default level of smell |
|                                 | Decision of The Environment Minister No. 45 of 2005 on Guidelines for the implementation of environmental management plan (RKL) and environmental monitoring plan (RPL) |
|                                 | Regional Regulations of South Sumatra No. 17 of 2016 on Environmental protection and management |
|                                 | Regulation of The Governor of South Sumatra No. 15 of 2005 on Provision of water and river water quality materials |
|                                 | Regulation of The Governor of South Sumatra No. 17 of 2005 on Raw ambient air quality and noise level |
|                                 | Regulation of The Governor of South Sumatra No. 1 of 2018 on Peat ecosystem protection and management |
|                                 | Muba Regional Regulation No. 3 of 2018 on Environmental protection and management |
| Policy                          | Have an environmental specific policy |
|                                 | Environmental policy refers to government policy |
|                                 | Implementation constraints in the field: |
|                                 | a. Community |
|                                 | b. Government |
|                                 | c. Company |
| Institutional and human resources | Has a special division of environmental management |
| AMDAL and environmental feasibility permits | Have an environment specific program budget |
| Environmental management planning and programs | There are obstacles in obtaining environmental permits |
|                                 | There are obstacles in the implementation of AMDAL |
|                                 | Government oversight of the implementation of AMDAL/Environmental permits |
|                                 | Has an annual plan for forest rehabilitation |
|                                 | Have an environmental management plan (including environmental management activities and environmental monitoring activities) |
|                                 | Environmental monitoring parameters: |
|                                 | a. Soil quality |
|                                 | b. Water quality |
|                                 | c. Air quality |
Environmental policy components | Description
--- | ---
Periodic environmental governance realization report (month/year) | Land High Conservation Value (HCV)  Has HCV Operational Standard Procedure (SOP)  Land High Carbon Stock (HCS)  Has SOP HCS
Land fires | Has a special system of fire prevention and handling  SOP land fire  Engage the local community  Engaging local governments  Reporting
Related to the surrounding community | Social governance SOP  There is a conflict with the community  Assistance programs for the community or Corporate Social Responsibility (CSR)
Peatland processing | There is peatland in the company's area  Peatland management is carried out in accordance with government regulations
Related to government (central and regional) | Given socialization related to environmental policy from the government  Policies that exist now, whether it is sufficient to address environmental issues especially for companies

3. Results and discussion

3.1. General condition
South Sumatra province is one of the largest palm oil producers in Indonesia with an area of 1.1 million ha or 8.31% of the total area of Indonesian palm oil plantations in 2018, for an area of South Sumatra Province of 91,592 km$^2$. Furthermore, Muba Regency is a district with the largest area and palm oil production with an area of 158.5 thousand ha, for the area of Muba Regency of 2,710 km$^2$, meaning about 58.5% of its territory is used for oil palm plantation areas [12][13].

3.2. Environmental policy
Environmental policy aims to achieve sustainable development by taking into account future oriented economic development processes, as well as maintaining environmental sustainability. The implementation phase of environmental policy on oil palm plantations as an overview that the management of oil palm plantations is implemented sustainably [21]. The standard base on the ISPO certification system by applying the laws and components of environmental policy related to Regulation of the Minister of Agriculture No.11 of 2015 on ISPO which is the basis and indicator of PnC ISPO. The application of the laws and regulations and the implementation of ISPO obligations so that oil palm plantations comply with the regulations.

Based on Law No. 32 of 2009 on Environmental protection and management is a preventive instrument in business control or activities so as not to cause pollution or environmental damage. Furthermore, as a special guideline is Government Regulation No. 27 of 2012 on Environmental permits which is the implementation of Article 33 and Article 41 of Law 32/2009. Environmental permits are granted to any person or business entity as well as activities that must be AMDAL or UKL-UPL. The benchmark of a mandatory AMDAL or UKL-UPL activity is followed up based on Regulation of The Minister of Environment and Forestry No. 38 of 2019 on Types of business plans and/or activities that must have an analysis of environmental impacts (AMDAL).

3.3. Principle 1 legality of plantation business
In the first PnC ISPO on the legality of plantation land which includes location permits, plantation business permits, acquisition of business land, land rights, facilities for the construction of surrounding gardens, plantation sites in accordance with the local Spatial and Regional Plan (RTRW), derelict land, and the form of corporate legal entities. The results of the interview are presented in table 2.
Table 2. The results of the interview fulfillment of indicators of the legality of plantation land

| Criteria for legality of plantation land | Pinago Utama | MSA | SBN | SMB | Ita Mugoreben | MBI |
|-----------------------------------------|--------------|-----|-----|-----|---------------|-----|
| Location permissions                    | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Plantation business license             | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Acquisition of plantation business land | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Land rights                             | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Facilities for the construction of surrounding gardens | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Plantation location according to RTRW   | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Derelict land                           | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Land disputes                           | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Legal entity form                       | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |

Achievement (%) 100 100 100 100 88.9 100

a Fulfilled
b Not fulfilled
c Source: Interview (2019)

Based on the results, the fulfillment of environmental policy components related to indicators of the legality of plantation land in the first PnC ISPO, most companies can meet (Pinago Utama, MSA, SBN, and MBI). While Ita Mugoreben there are criteria for land senketa that are not met, so it affects the company's achievement value of 88.9%. Each plantation company must ensure the plantation area is free from disputes between communities, legal entities, or institutions. One form of land dispute is the ongoing claims from local communities and legal entities (fellow companies) regarding the use, limits, and area of land. According to land dispute resolution guidelines can be done through mediation/negotiating or deliberation by involving the relevant agencies, if it cannot be resolved then it is pursued through legal lines. This is evidenced by the dispute resolution document in which there is a map of the disputed land and subsequently reported it. Based on the company's description, land dispute resolution is done through deliberation in accordance with SOP with the aim of remaining intertwined with harmonious relations and communication in order to facilitate and facilitate the resolution of land disputes.

3.4. Principle 2 plantation management
The ISPO certification system requires an plantation management system to achieve profits effectively and efficiently. Good management should have planning, organizing, actuating, and controlling [22]. In the second PnC ISPO there are 16 criteria. It is known that of the six companies, there are three companies that own peatland, namely; MSA, SBN, and SMB. As for the criteria of overlapping with mining land, all plantation companies have no overlap with mining businesses. Specifically Ita Mugoruben and MBI use PnC ISPO related plantation companies that only do plantation bududaya business, this is because the company is not integrated with the plantation processing business. The result is as in table 3.

Table 3. Results of plantation management indicator fulfillment interview

| Plantation management criteria          | Pinago Utama | MSA | SBN | SMB | Ita Mugoreben | MBI |
|-----------------------------------------|--------------|-----|-----|-----|---------------|-----|
| Garden planning                         | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Land clearing                           | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Seeding                                 | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Planting on mineral land                | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Planting on peatland                    | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Plant maintenance                       | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Control of plant disrupting organisms   | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| Harvesting                              | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| FFB transport                           | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
| FFB reception at the factory            | ✓            | ✓   | ✓   | ✓   | ✓             | ✓   |
The achievement value of the interview results, the overall company reached 100 %. This indicates that in the second PnC ISPO concerning plantation management, the company is able to conduct business activities by referring to environmental policies based on the prevailing laws and regulations of either the central or local governments.

Application and maintenance based on the technical guidelines of cultivation in this case the application of Good Agriculture Practices (GAP) as well as the management and utilization of waste becomes very important in the management of oil palm plantations. Agroindustrial development in oil palm plantations as well as palm oil processing, especially cultivation and waste management techniques are policy substances that are a top priority in efforts to manage palm oil plantations optimally and sustainably [21].

3.5. Principle 3 protection against the utilization of primary natural forests and peatlands

The results of the third PnC ISPO interview on the protection of the utilization of primary natural forests and peatlands are presented in table 4.

**Table 4.** The results of the interview fulfillment of protection indicators for the utilization of primary natural forests and peatlands

| Criteria                                  | Pinago Utama | MSA | SBN | SMB | Ita Mugoreben | MBI |
|-------------------------------------------|--------------|-----|-----|-----|---------------|-----|
| Protection against the utilization of primary natural forests and peatlands | ✓             | ✓   | ✓   | ✓   | ✓             | ✓   |
| Achievement (%)                           | 100          | 100 | 100 | 100 | 100           | 100 |

Source: Interview (2019)

From the results it is known that the overall criteria in the environmental policy component related to the company's third PnC ISPO indicator can be met or the achievement value is 100 %. Based on the information of the Ministry of Environment and Forestry (KLHK) of three companies (MSA, SBN, and SMB) that own peatland, MSA has conducted peat ecosystem recovery program by discussing and drafting peat ecosystem recovery plan documents, the next two companies (SBN and SMB) have not discussed and drafted documents due to the lack of calls for recovery orders and have not received recovery orders from KLHK.

While Pinago Utama, Ita Mogoreben, and MBI are known to have no peatland or acreage obtained from primary natural forests, because the area attempted comes from Other Use Areas (APL) and Conversion Production Forest (HPK). This is in accordance with the criteria for the acquisition of plantation business land contained in the PnC ISPO concerning the legality of plantation land.

3.6. Principle 4 environmental management and monitoring

The fulfillment of environmental policy components related to the fourth PnC ISPO indicator on environmental management and monitoring by the company is presented in table 5. The environmental aspect is of the most concern in the management of sustainable oil palm plantations [23].
Tabel 5. Results of interviews fulfillment of environmental management and monitoring indicators

| Environmental processing and monitoring criteria | Pinago Utama | MSA | SBN | SMB | Ita Mugoreben | MBI |
|--------------------------------------------------|--------------|-----|-----|-----|--------------|-----|
| Environmental management and management          | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Environmental permits                            | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| B3 management and B3 waste                       | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Interference from a sedmible source              | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Fire prevention and prevention                    | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Plant maintenance                                | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Biodiversity preservation                        | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Conservation of water sources and quality        | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Protected areas                                  | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Conservation of areas with high erosion potential| ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |
| Mitigation of greenhouse gas emissions           | ✔️           | ✔️  | ✔️  | ✔️  | ✔️           | ✔️  |

Achievement (%)

| Palm Oil Plantation Company | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Interview (2019)

Environmental monitoring activities by companies are usually carried out by referring to environmental parameters compiled by each company. Environmental monitoring activities are carried out on three areas, namely: protected areas, effective and ineffective areas. Furthermore, the implementation of environmental management and monitoring is reported periodically (month/year) to the government (central and regional). In the fourth PnC ISPO on environmental management and monitoring it is known that the entire company has followed the provisions of the environmental policy component related to the PnC ISPO indicator with an achievement value of 100%.

4. Conclusion

Based on the results and discussions, it can be concluded that the level of implementation in this case the achievement of environmental policy components related to the PnC ISPO indicators 1, 2, 3, and 4 in the ISPO certification system by all companies already met the criteria on the first, second, third, and fourth principles. This is evidenced by the acquisition of ISPO (Pinago Utama, MSA, SBN, and SMB) certificates from certification bodies. While Ita Mugoreben and MBI, based on information is still at the stage of the certification process.

The process of strengthening the ISPO certification system continues to be carried out in order to improve and maintain the certification system that is suitable for development and legal needs. In March 2020, the government issued Presidential Regulation No. 44 of 2020 on ISPO. Strengthening the ISPO certification system is carried out as a form of state commitment in sustainable palm oil management.

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