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MORALITY BEFORE KNOWLEDGE

Enhancing farmers' land productivity through sustainable palm oil certification: Strategies for promoting environmental and economic benefits in agricultural practices

Andreas Budi Rahutomo[1], Mahawan Karuniasa[1], Evi Frimawaty[1,*]
[1] *School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.*
*Correspondence: evi.frimawaty11@ui.ac.id

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ABSTRACT

Background: With more than 40% of Indonesia's oil palm land under its management, smallholders still face challenges on the low land productivity and certification achievement. **Methods:** This research aims to develop a certification concept capable to increase the smallholders' land productivity through descriptive statistics, grounded theory, content analysis, and Analytic Hiearachy Process. **Findings:** This research finds that ISPO and RSPO certified smallholders achieved 82% higher land productivity than the average conventional ones, in line with their compliance with certification and consistent GAP application. Fertilisation needs to be prioritised to increase productivity, with the GAP Application and Monitoring (RSPO) and Plant Maintenance (ISPO) as the supporting certification criteria. **Conclusion:** Synergy between ISPO and RSPO has a chance to increasing land productivity through certification compliance, hence accelerating smallholder certification achievement which would reduce deforestation rates from oil palm expansion. **Novelty/Originality of this article:** This study introduces a certification concept that combines ISPO and RSPO standards to enhance smallholder land productivity. It emphasizes the integration of fertilization, GAP application, and plant maintenance as key components for boosting productivity while ensuring certification compliance, offering a novel approach to reducing deforestation rates in Indonesia's oil palm sector.

KEYWORDS: ISPO certification; RSPO certification; smallholder productivity; sustainable palm oil.

1. Introduction

Palm oil has dominated global vegetable oil production, with palm oil (including palm kernel oil) contributing 81.54 million metric tons, or approximately 40% of the total production and distribution of vegetable oils worldwide in 2019/2020 (United States Department of Agriculture Foreign Agricultural Service, 2020). The next highest contributor is soybean oil, with a volume of 57.44 million metric tons, accounting for 28% of the total production and distribution of vegetable oils globally.

Indonesia plays a significant role as the largest producer of vegetable oil in the world, contributing 48.32 million metric tons or 23% of the global vegetable oil production through palm oil products (United States Department of Agriculture Foreign Agricultural Service, 2020). The dominance of palm oil production is due to its superior land-use efficiency, where one ton of oil can be produced from 0.26 hectares of palm oil plantations.

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This differs from rapeseed oil, which requires 1.25 hectares per ton, sunflower oil, which requires 1.43 hectares, and soybean oil, which requires 2 hectares of land per ton (Roundtable on Sustainable Palm Oil, 2020).

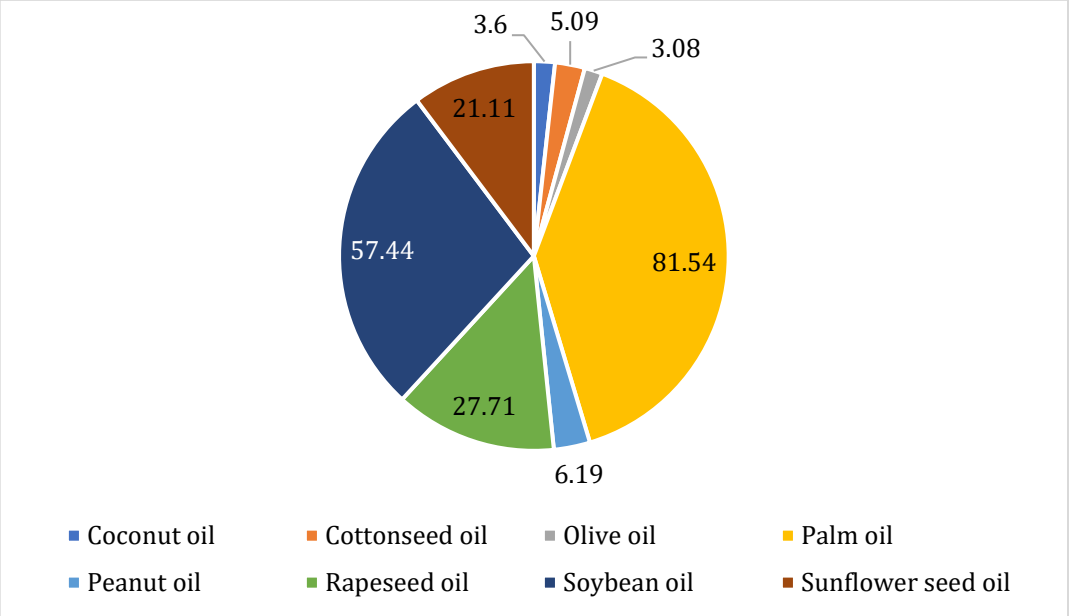


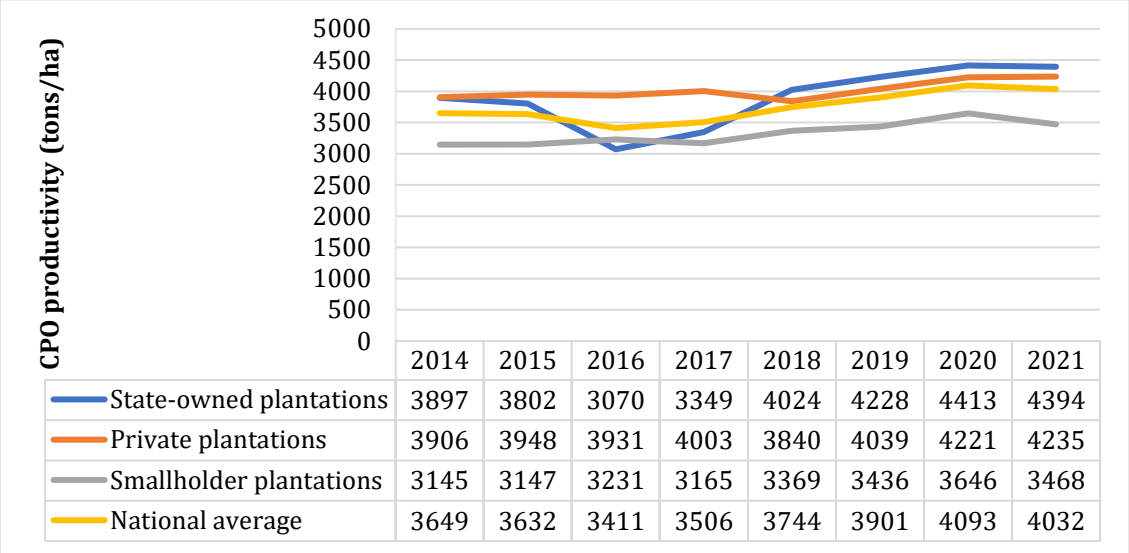
Fig. 1. Proportion of global vegetable oil production and distribution (USDA FAS, 2020)

Forest conversion for palm oil expansion is considered a threat to biodiversity (Cattau, et al., 2016). This poses a fundamental threat to sustainability, which, according to Miller & Spoolman (2016), is the capacity of Earth's natural systems and human cultures to endure, thrive, and adapt to various changing environmental conditions over the long term in the future. This has driven the initiative for sustainable palm oil certification, which, in addition to protecting the environment, is also expected to enhance productivity through the adoption of good agricultural practices. The sustainable palm oil certification initiative, which is voluntary and market-based, was initiated by the Roundtable on Sustainable Palm Oil (RSPO).

The RSPO Principles and Criteria, which serve as the RSPO certification standard, were first adopted by its members in November 2005. RSPO has also developed a traceability scheme for the supply chain of RSPO-certified materials, from upstream (plantations) to downstream (industries) and consumers. This is known as the RSPO Supply Chain Certification System (RSPO SCCS), which was adopted in November 2009 as the certification standard for RSPO-certified product supply chains. This aligns with the statement that sustainability in palm oil trade requires a global supply chain scheme based on socially acceptable and environmentally friendly production (Ayompe et al., 2021). Despite a series of certification initiatives, both market-based and regulatory, the negative impacts of palm oil plantation expansion continue to be felt. Palm oil plantations remain the leading cause of deforestation, accounting for 23% of Indonesia's total deforestation during the period 2001–2016 (Austin et al., 2019). Globally, the low certification rate among smallholders is also reflected in the RSPO certification achievement, which has only reached 445,665 hectares worldwide and 27 smallholder organizations in Indonesia.

Watts et al. (2021) argue that several factors hinder the certification of independent smallholders. One key challenge is their historical exclusion from development planning, such as transmigration programs that helped farmers obtain land legality certificates. Additionally, independent smallholders tend to be weak in terms of organization, unlike plasma farmers. Lastly, the limited reach of agricultural extension programs to independent smallholders further exacerbates the issue. Based on data from the Indonesian Plantation Statistics 2018–2020, published in December 2020 by the Directorate General of

Plantations, smallholder plantations had a Crude Palm Oil (CPO) productivity of 3,369 kg/ha in 2018, while state-owned large plantations produced 4,024 kg/ha, and private large plantations produced 3,840 kg/ha. A more comprehensive overview of the land productivity disparity is presented in Figure 2.



	2014	2015	2016	2017	2018	2019	2020	2021
State-owned plantations	3897	3802	3070	3349	4024	4228	4413	4394
Private plantations	3906	3948	3931	4003	3840	4039	4221	4235
Smallholder plantations	3145	3147	3231	3165	3369	3436	3646	3468
National average	3649	3632	3411	3506	3744	3901	4093	4032

Fig. 2. Comparison of CPO productivity levels
(Directorate General of Plantations, Ministry of Agriculture, 2020; 2022)

Figure 2 shows the comparison of CPO productivity levels from palm oil plantations between state-owned, private, and smallholder plantations, as well as the national average. It is evident that over time, the productivity level of smallholder palm oil plantations has always been below the national average. This gap is also in line with Senawi et al. (2019), who stated that palm oil smallholders have the potential to increase their FFB yields to reach 30 tons/ha/year. Thus, it can be concluded that smallholder plantations face two simultaneous challenges: low productivity and minimal certification compliance. Therefore, the potential increase in land productivity through the implementation of good agricultural practices via certification is expected to serve as a leverage for accelerating sustainable palm oil certification among smallholders.

On the other hand, theoretically, research on palm oil productivity post-certification has been conducted at PT Perkebunan Nusantara V. The study results indicate an increase in Fresh Fruit Bunches (FFB) processing outcomes after the implementation of ISPO compared to before its adoption. This increase in production occurred due to higher yields following the adoption of ISPO (Indonesian Sustainable Palm Oil), attributed to improvements in maturity acceptance and harvesting of sorted FFBs (Arifandy et al., 2018). Another study at the smallholder level found significant differences in harvest outcomes during the most productive phase of palm oil, caused by a lack of additional labor and fertilizer use, despite rising market demand for palm oil (Euler et al., 2016).

Empirically, it is known that the productivity levels of palm oil smallholders remain below ideal conditions. Additionally, amidst efforts to promote sustainable palm oil practices, which will also become mandatory for smallholders through the ISPO Presidential Regulation, it is evident that the level of certification compliance among smallholders is still minimal. Palm oil land productivity, from an agronomic perspective, is influenced by factors such as the use of certified seeds, planting techniques, fertilization, harvesting intervals, and plant mortality. This study analyzes compliance with GAP training participation and the implementation and monitoring of GAP within RSPO, as well as adherence to seed quality, planting techniques, plant maintenance, pest and disease control, harvesting, and fruit transportation within ISPO. Additionally, an analysis of the concept of sustainable palm oil

certification to support improvements in palm oil smallholder productivity is also necessary.

Sustainability, in this context, is closely related to ecology, as it is one of the fundamental principles of ecosystems alongside diversity, interconnection, interdependence, and harmony (Karuniasa, 2020). Rostow (1959) stated that the stages of development consist of increasing investment, greater exposure to modernization, and changes in traditional culture and values, ultimately leading to a more developed society. The concept of development that also prioritizes environmental aspects was first introduced by the international community at the United Nations Conference on the Human Environment (UNCHE) in Stockholm, Sweden, in 1972. The environmental policies of all nations must enhance development and not negatively impact both the present and future generations (Alam, 2005).

According to the Interagency Taxonomic Information System (ITIS), the scientific name of palm oil is Elaeis guineensis Jacq., or literally known as the African oil palm. In general, palm oil belongs to the class Magnoliopsida as a dicotyledonous flowering plant. The species Elaeis guineensis is classified under the Arecaceae family in the Arecales order. Arecaceae is a group of palm plants, which also includes coconut trees. From a cultivation perspective, based on the Kiswanto et al. (2008), palm oil requires an optimal duration of sunlight between 5 to 7 hours per day, with annual rainfall ranging from 1,500 to 4,000 mm and an optimal temperature range of 24 to 28°C. It grows best at altitudes between 1 to 500 meters above sea level, thriving in areas with humidity between 80 to 90% and wind speeds of 5 to 6 km/h to support pollination. The ideal soil types for palm oil include Latosol, Podzolic, Alluvial, Gray Hydromorphic, or Regosol, and it can also grow in river estuaries, coastal plains, and sapric peatlands. The ideal pH level for palm oil is between 5.0 and 5.5, and for optimal growth, it requires fertile soil with flat topography, loose texture, good drainage, and a solum depth of 80 cm without a hardpan layer. The slope of the planting area should ideally be no more than 15°.

Jelsma et al. (2017), in their research in Riau, identified seven typologies of farmers, demonstrating that oil palm farmers are not a homogeneous population. The typologies in the study include local small-scale farmers, local medium-scale farmers, large-scale local farmers, small-scale migrant farmers, medium-scale migrant farmers, small and medium-scale farmers on peatlands, and large-scale investor farmers.This research focuses on smallholder oil palm plantations managed by independent farmers, who have the freedom to choose their crops and manage their plantations (Hidayat et al., 2015). Astuti et al. (2014) stated that proper oil palm planting in the field will result in healthy plants (with no abnormalities, non-productive, or dead plants, minimizing the need for replanting) and uniform growth, allowing the plants to start production quickly (in less than 30 months after planting) with a high initial yield. This is supported by the argument of Herdiansyah et al. (2020), who stated that the planting process is one of the factors affecting productivity. The planting system is also one of the key factors in improving the technical efficiency of oil palm plantations (Abdul et al., 2022).

Certification, in concept, is a process of obtaining or providing official documentation as evidence that something has occurred or been carried out in accordance with applicable standards. Standards are defined as documents established through consensus and approved by a recognized body, which provide rules, guidelines, or characteristics related to activities or their outcomes. Standards are intended for general and repeated use to achieve an optimal level of order within a specific context (ISO/IEC, n.d.). Historically, the development of standards cannot be separated from the advancements of the industrial revolution since the 18th century. Ping (2011) argues that, based on historical tracing, technological innovations are closely linked to the development of standardization. This aligns with the early growth and dynamics of standard development, which was initially centered on efforts to enhance production efficiency within manufacturing systems.

As it has evolved, it has been recognized that certification of standards can contribute to economic development through the efficient allocation of resources. Therefore, reference to voluntary standards in government technical regulations is an effort to utilize social

resources effectively and should be legally supported (Ping, 2011). In line with this, the development of standards and certification has expanded into various sectors, including agriculture. Beyond product quality, certification also aims to ensure that the production systems of commodities adhere to standardized sustainability principles.

In the palm oil sector, sustainability certification is necessary because, in addition to its positive economic benefits, land conversion for palm oil expansion in Southeast Asia has led to various environmental and social issues, such as deforestation, land conflicts, and other social disputes. Furthermore, forest conversion for palm oil expansion is considered a threat to biodiversity (Cattau et al., 2016). This has triggered a heightened awareness among palm oil stakeholders to create an industry that aligns with sustainable development principles.

The definition of sustainable palm oil plantations in Indonesia, according to Presidential Regulation No. 44 of 2020 on the Indonesian Sustainable Palm Oil Certification System (ISPO), is a palm oil plantation system that is economically viable, socio-culturally acceptable, and environmentally friendly based on legal regulations. On the other hand, the Roundtable on Sustainable Palm Oil (RSPO) defines sustainable palm oil production as management and operations that comply with regulations, are economically viable, environmentally friendly, and socially beneficial (Roundtable on Sustainable Palm Oil, 2020). In line with this definition, sustainability in palm oil trade requires a global supply chain scheme based on production that is socially acceptable and environmentally friendly (Ayompe et al., 2021).

In advancing sustainable palm oil development, commodity certification schemes are established to ensure that palm oil cultivation practices adhere to sustainability principles encompassing legal, economic, social, and environmental aspects. These four aspects are detailed in a series of principles, criteria, and indicators outlined in the certification standard documents. Legal compliance in sustainable palm oil certification includes fulfilling business permits, land acquisition legality, and recognition of local community land rights. Economically, the certification standards cover good agricultural practices and organizational management. Social aspects include harmony with local communities, corporate social responsibility activities, and the fulfillment of labor rights. Environmental prerequisites involve protecting local ecosystems, managing waste in accordance with regulations, and reporting on environmental monitoring and management.

In practice, meeting certification prerequisites adopts the philosophy of continual improvement. Continual improvement involves the systematic assessment and documentation of practices to demonstrate real progress beyond the established baseline conditions (Bush et al., 2013). Therefore, complete fulfillment of certification prerequisites from the current state cannot be achieved all at once but must be accomplished incrementally. This research focuses on two common sustainable palm oil certification schemes in Indonesia: the mandatory Indonesian Sustainable Palm Oil (ISPO) and the voluntary Roundtable on Sustainable Palm Oil (RSPO). The analysis centers on certification prerequisites related to Good Agricultural Practices (GAP), as outlined in both ISPO and RSPO standards.

The ISPO certification scheme is mandatory for companies but still voluntary for smallholders, as outlined in the Minister of Agriculture Regulation No. 11 of 2015. The sustainability of palm oil commodities has received special attention from the government, as evidenced by a series of policies aimed at achieving sustainable palm oil development, including: 1) Presidential Instruction No. 8 of 2018 on the Suspension and Evaluation of Palm Oil Plantation Licensing and Enhancement of Palm Oil Plantation Productivity, 2) Presidential Instruction No. 6 of 2019 on the National Action Plan for Sustainable Palm Oil Plantations 2019 – 2024, and 3) Presidential Regulation No. 44 of 2020 on the Indonesian Sustainable Palm Oil Certification System, also known as the New ISPO. The New ISPO states that ISPO certification will become mandatory for smallholders starting in 2025. Therefore, it is essential to assess how certification impacts smallholder productivity.

On the other hand, the RSPO is a non-profit organization established in 2004, comprising stakeholders from palm oil producers, processors, traders, consumer goods manufacturers, retailers, banks/investors, and environmental and social NGOs. Its aim is to

promote the growth and use of sustainable palm oil through a credible global standard (Roundtable on Sustainable Palm Oil, 2020). Consequently, RSPO employs a market-based, voluntary approach involving multiple stakeholders.

Technically, the implementation of sustainable palm oil certification is carried out through audits by designated Certification Bodies. Both plantation companies and palm oil smallholders (in group form) undergoing audits must demonstrate compliance with all standard indicators, whether through documents, interviews, or field inspections. Thus, the adoption of good agricultural practices by smallholders, as one of the requirements for sustainable palm oil certification, has the potential to be linked with the productivity of smallholder palm oil plantations. Both certification schemes, ISPO and RSPO, encompass four aspects: legality, social, economic, and environmental, and also include criteria related to the application of good agricultural practices (GAP). Certification prerequisites that are literally related to the GAP aspect are used as variables in this study to develop a new concept of certification that can enhance land productivity.

Based on the description above, the hypotheses of this study are that the management of palm oil by growers who are certified by both ISPO and RSPO fully complies with RSPO criteria, which include participation in GAP training and the implementation and monitoring of GAP. On the other hand, the fulfillment of ISPO criteria varies in terms of seedling quality, planting techniques, plant maintenance, pest and disease control, harvesting, and fruit transportation. Furthermore, GAP training participation, as specified in RSPO standards, is a criterion that should be prioritized for the implementation of sustainable palm oil certification to support the improvement of land productivity for palm oil growers.

2. Methods

This study employs a quantitative approach with a mixed-methods design (qualitative and quantitative). The quantitative approach is chosen based on the proportion of quantitative analysis regarding certified smallholder data and the productivity of palm oil plantations, as well as the dominant role of expert interview results in this research. The selected research design is the Explanatory Sequential Mixed Methods Design. This design consists of two phases: in the initial phase, the researcher collects quantitative data, analyzes it, and then uses the results of this analysis to plan (or build) the second, qualitative phase (Creswell, 2014). The research activities, including data collection, interviews, and writing, were conducted in adherence to health protocols to prevent the spread of COVID-19. Primary data collection was carried out online with ISPO and RSPO certified palm oil farmers, as well as with expert respondents identified to provide expert judgment on the certification criteria most affecting smallholder productivity. The research was conducted from January to November 2022, with the writing of results completed at the beginning of 2023.

This study involves expert respondents for the Analytic Hierarchy Process (AHP) to develop a synthesis in the form of a concept for sustainable palm oil certification aimed at improving land productivity for growers. The criteria for expert respondents in this study include individuals with a comprehensive understanding of sustainable palm oil management, particularly in relation to growers. The AHP respondents are drawn from a diverse group of individuals, including certified ISPO and RSPO palm oil growers, who are selected based on the results of the earlier descriptive statistical analysis. These growers, as practitioners in the field, are chosen from personnel in palm oil grower associations. Additionally, stakeholder experts are included, such as researchers in the field of palm oil cultivation, those specializing in sustainable palm oil certification, institutions providing support for sustainable certification, and officials from relevant agencies or organizations involved in managing sustainable palm oil practices. Experts or academics, including lecturers and researchers from universities focusing their research on the palm oil commodity, are also involved as respondents in this study.

The variables identified in this study represent the three dimensions of sustainable development in the technical management of sustainable palm oil, encompassing the social, environmental, and economic aspects outlined in the ISPO and RSPO certification standards. The research variables focus on the certification criteria related to GAP (Good Agricultural Practices), covering the social aspect, which includes participation in GAP training, as well as the implementation and monitoring of GAP. The environmental aspect (artificial) involves factors such as seed quality, planting techniques, plant maintenance, pest and disease control, harvesting, fruit transportation, use of certified seeds, fertilization, harvesting intervals, plant mortality, and planting practices. Meanwhile, the economic aspect is represented by palm oil productivity.

Quantitative research involving descriptive statistical analysis was conducted on the population, which includes all palm oil plantation institutions in Indonesia in 2020 that have obtained ISPO certification, totaling 20 institutions (Directorate General of Plantations, Ministry of Agriculture, 2020), and those that have obtained RSPO certification, totaling 26 institutions (Roundtable on Sustainable Palm Oil, 2020). Descriptive statistical analysis was performed on the productivity values of these certified plantations compared to the general productivity values of palm oil plantations in Indonesia, using secondary data from the Directorate General of Estate Crops, Ministry of Agriculture. The audit reports for certification in 2020 were used to obtain productivity data for ISPO and RSPO certified plantations. The productivity data for both certified and conventional plantations were taken cross-sectionally within the statistical range of 2019 to 2020.

The analysis of palm oil management by growers is examined through the fulfillment of RSPO criteria, including participation in GAP training and the implementation and monitoring of GAP, as well as ISPO criteria, which include seed quality, planting techniques, plant maintenance, pest and disease control, harvesting, and fruit transportation. The qualitative method used is content analysis, which determines the presence of specific words or concepts within a text or collection of texts. The researcher measures and analyzes the presence, meaning, and relationships of these words and concepts and draws conclusions from the information presented in the text. Content analysis is performed on the ISPO certification standards for growers as outlined in the Minister of Agriculture Regulation No. 38 of 2020 and the RSPO certification standards detailed in the 2019 Smallholder Standard. Content analysis is focused on the criteria and sub-criteria of ISPO and RSPO related to the research variables. Additionally, content analysis is conducted on the audit reports of ISPO and RSPO certification for the relevant plantation institutions. This analysis is carried out to identify how well growers meet the ISPO and RSPO audit criteria that are the research variables.

Generating a concept of sustainable palm oil certification for improving smallholder productivity. The final quantitative method is the Analytic Hierarchy Process (AHP), conducted to obtain a synthesized concept of sustainable palm oil certification for enhancing smallholder productivity in alignment with ISPO and RSPO certification requirements. According to Forman & Gass (2001), the three main functions of AHP are structuring complexity, measurement on a ratio scale, and synthesis. AHP allows for the hierarchical structuring of complex elements into homogeneous groups of factors, enabling a clearer understanding of intricate problems. Measurement on a ratio scale is essential to represent proportions and serves as the foundation for physical measurement and synthesis. This process involves paired comparisons of hierarchical factors to obtain rather than establish ratio scale measurements, which can then be interpreted as final ranking priorities or weights. Ratio scales are necessary because the priorities or weights of elements at each hierarchy level are determined by multiplying the priorities of elements at that level with the priorities of parent elements. Finally, synthesis occurs after the analysis phase, which involves breaking down material or abstract entities into their component parts, and integrates these parts into a cohesive whole.

3. Results and Discussion

3.1 Fulfillment of ISPO and RSPO criteria related to factors affecting smallholder productivity

The research employed a qualitative method of content analysis to assess the fulfillment of ISPO and RSPO certification standards. Content analysis was conducted on secondary data sourced from ISPO and RSPO regulations and certification standards, as well as audit reports. Efforts to request access to ISPO audit reports were made to the Directorate General of Plantations of the Ministry of Agriculture, which manages the ISPO certification scheme. However, due to the transition of ISPO management following the enactment of Ministerial Regulation No. 38 of 2020, which involved restructuring from the ISPO Commission Secretariat to the ISPO Committee Secretariat, access to these reports was not granted. This transition created a new governance structure for ISPO certification, leading to a gap or vacancy in the management of ISPO's database.

In response, the researcher interviewed personnel from the National Standardization Agency or the National Accreditation Committee (BSN/KAN), who oversee the accreditation of ISPO certification bodies. Nevertheless, access to the audit report documents was still not possible due to data confidentiality principles. Following BSN/KAN's guidance, the researcher then contacted the smallholders directly to obtain the audit report documents. It was found that all ISPO audit reports were well-archived by the smallholders and were accessible to the researcher.

The ISPO certification standards for smallholders refer to Ministerial Regulation No. 38 of 2020. In this document, GAP aspects are listed under Principle 2, "Application of Good Agricultural Practices." Specifically, the textual substance containing words and meanings related to factors affecting productivity, is included in Seedling (Sub-Criteria 2.3.2), Planting Techniques (Verifier 2.3.3), Plant Maintenance (Sub-Criteria 2.3.5), Harvesting (Sub-Criteria 2.3.7), Pest Control (Sub-Criteria 2.2.6), and Fruit Transportation (Sub-Criteria 2.3.8).

The RSPO certification standards for smallholders refer to the 2019 Smallholder Standards for Sustainable Palm Oil Production, which were approved by the RSPO Board of Governors and adopted by RSPO Members at the 16th Annual General Assembly on November 6, 2019 (RSPO, 2019). Specifically, the textual substance containing words and meanings related to factors affecting productivity is detailed under Criterion 1.3 "Smallholders Implement Good Agricultural Practices (GAP) on Their Farms." Achievement Milestone A for this criterion requires GAP Training Participation, while Achievement Milestone B requires GAP Implementation and Monitoring.

The content analysis conducted has limitations, including the use of audit reports from only one audit period. One certification cycle for ISPO and RSPO spans five years, during which post-initial certification audits (surveillance audits) are conducted annually to ensure consistent adherence to standards. Due to constraints in time scope and data availability, the analysis was limited to one surveillance audit report per certification body (totaling four audit reports). Consistency in meeting ISPO and RSPO standards would be more representative if the analysis were conducted over multiple periods within one certification cycle for both ISPO and RSPO. However, this analysis provides a general overview of how the high productivity levels achieved by smallholders align with their efforts in meeting ISPO and RSPO requirements.

One factor that systematically contributes to the comprehensive fulfillment of certification by these smallholder groups is the routine internalization of sustainable palm oil cultivation practices among their members. Based on the content analysis of audit reports, the smallholder groups conduct regular member meetings every one to three months to provide socialization on various aspects, including good agricultural practices, environmental impact management, work procedures, organizational governance, and corrective actions in preparation for upcoming routine certification audits. This systematic activity aligns with the philosophy of continual improvement, which is the essence of certification. Furthermore, the intrinsic benefits of certification, such as the proven increase

in productivity highlighted by this research, could drive behavioral changes among smallholders. This is expected to result in a higher enthusiasm to achieve sustainable palm oil certification.

Despite efforts to improve regulations and adopt synergistic approaches to accelerate certification and increase land productivity, Indonesia also needs to enhance the international market's acceptance of ISPO, as many companies still prefer RSPO (Choiruzzad et al., 2021). Furthermore, beyond certification schemes, the global norms for sustainable palm oil in the Global Framework of Principles for Sustainable Palm Oil (GFP-SPO), promoted by the Council of Palm Oil Producing Countries (CPOPC), have yet to gain recognition from consumer countries. Permatasari (2022) argues that this is due to the CPOPC being entirely comprised of producer countries, namely Indonesia and Malaysia, with Colombia, Ghana, Honduras, and Papua New Guinea set to follow.

Therefore, the synergy between ISPO and RSPO could serve as an entry point to create common, yet stricter, criteria for implementing GAP in the ISPO and RSPO certification schemes. The findings of this study align with Jafari et al. (2017), who argue for the need to adopt shared sustainability criteria between ISPO and RSPO to produce an integrated, credible, and globally accepted certification program. This study's conclusion, which shows that the productivity of ISPO and RSPO-certified farmers is significantly higher than the national average, could also be a solution for market acceptance. Increased productivity can lead to more efficient land use, further reducing the pressure of palm oil cultivation on forest cover. The removal of the negative image of palm oil due to deforestation is believed to be a significant attraction for Global North consumer countries to engage and support the synergy between ISPO and RSPO, which is ultimately expected to result in recognition and market acceptance. Thus, rather than offering a premium price, sustainable palm oil certification that boosts farmer productivity could provide access to premium markets. On the other hand, Lee et al. (2019) found that villages with RSPO-certified plantation companies have lower deforestation rates and higher forest protection compared to villages with non-certified plantation companies. This study further supports that argument from the perspective of farmers and certification schemes, where the increase in productivity due to the simultaneous fulfillment of ISPO and RSPO is expected to further reduce deforestation rates.

3.2 The concept of sustainable palm oil certification for increasing palm oil farmers' land productivity

The prioritization of criteria and alternatives for promoting the concept of Sustainable Palm Oil Certification to enhance land productivity was carried out using AHP analysis. The AHP calculations were conducted using Microsoft Excel and an online calculator developed by Goepel (2018). The detailed AHP calculations are presented in Appendix 7. Based on the results of the weight and consistency ratio calculations, all pairwise comparison matrices were found to be consistent, as they have a consistency ratio (CR) value below 0.10.

The top priority criterion for achieving Land Productivity is Fertilization (0.305), followed by Planting (0.246), Use of Certified Seeds (0.215), Harvest Interval (0.136), and Plant Mortality (0.098). At the alternative level, the highest priority, in aggregate, is the Implementation and Monitoring of GAP (0.207), which is part of fulfilling RSPO Certification. The next priority is Plant Maintenance (0.162), which is part of ISPO Certification, followed by Planting Techniques (0.141), Seed Management (0.138), GAP Training Participation (0.133), Pest and Disease Control (0.086), Harvesting (0.074), and Fruit Transportation (0.059). The selection of Implementation and Monitoring of GAP (RSPO) as the first priority and Plant Maintenance (ISPO) as the second priority rejects the fourth hypothesis, which stated that GAP Training Participation (RSPO) would be the criterion that needs to be prioritized.

Laras (2017) highlighted the limitations of the AHP method, including the dependency of the resulting priorities on its primary input, namely expert respondents, which carries the risk of subjectivity. The consistency ratio indicator only reflects the level of consistency

in the choices made by each respondent, not as an indicator of the accuracy or correctness of their choices. Therefore, this study gathered as many expert respondents as possible (17 out of 20 requested individuals agreed), representing academics, practitioners, and farmer advisors. In addition to this weakness, AHP also relies on mathematical calculations and value aggregation without statistical testing. As a result, there is no validity measure for the weighting hierarchy that is formed.

Based on AHP, the criterion that should be prioritized for achieving land productivity is fertilization, with a weight of 0.305, followed by planting with a weight of 0.246. The use of certified seeds follows with a weight of 0.215, then the harvest interval at 0.136, and finally, plant mortality with a weight of only 0.098. This differs slightly from Suratin et al. (2018), who stated that fertilization and certified seeds are the two main factors for increasing productivity. Nevertheless, both this study and Suratin et al. (2018) agree that fertilization is the most important factor. It is important to understand that fulfilling certification, particularly in terms of GAP, is not the only way to improve land productivity. This is because there are internal factors, such as the management of farmer organizations, and external factors, such as the dynamics of the flowering and fruiting cycles of oil palm plants, which are not covered in this study.

Based on the results of descriptive statistical analysis related to the average land productivity, grounded theory regarding the implementation of factors affecting productivity, and content analysis concerning the prerequisites and fulfillment of ISPO and RSPO certification by farmers, the researcher argues that the concept of sustainable palm oil certification for improving farmers' land productivity should integrate elements of both ISPO and RSPO. This synthesis is reinforced by the AHP results at the alternative level, where the top aggregate priority is the Implementation and Monitoring of GAP (0.207), which is part of fulfilling RSPO Certification, particularly in Milestone B. The next priority is Plant Maintenance (0.162), which is part of fulfilling ISPO Certification, specifically Criterion 2.3.5 under the Principle of Good Plantation Practices. Based on these findings, the researcher proposes a concept of ISPO and RSPO certification synergy.

The proposed concept from this study is a collaboration between ISPO (regulation-based) and RSPO (market-based). This collaboration aims to address the argument of Kadarusman & Herabadi (2018), who suggest that the RSPO's multi-stakeholder initiative tends to favor certain interest groups due to asymmetric interactions and an imbalanced control structure among the involved parties. Furthermore, they noted that this creates a paradox in which efforts to involve stakeholders in the multi-stakeholder initiative instead result in the exclusion of certain parties, through a tendency to favor others.

The proposed concept can be seen as reinforcing Suleiman's (2014) argument that the implementation of RSPO has influenced the formation of ISPO within the framework of national regulations. RSPO should be viewed as a system connected to the national legal system, with this connection being realized through parallel, collaborative, or even competitive relationships (Suleiman, 2014). The AHP results from this study suggest that RSPO and ISPO need to collaborate, rather than merely coexist or compete. Since ISPO and RSPO are separate certification schemes, their integration or unification is needed without sacrificing the existence of either. This concept should emphasize the practice of GAP, particularly in fertilization activities. Fertilization is the top priority AHP criterion, which can be seen as a leverage point for the synergy between ISPO and RSPO from an economic pillar perspective.

The collaboration between ISPO and RSPO should be advanced at the multilateral level through the Global Framework of Principles for Sustainable Palm Oil (GFP-SPO), which was established by the Council of Palm Oil Producing Countries (CPOPC) in December 2021. This framework can serve as the primary platform for a comprehensive synergy effort. The document outlines seven guiding principles for achieving sustainable palm oil, which focus on developing partnerships for sustainable development through transparency and collaboration, including with other vegetable oils. It emphasizes upholding peace, justice, and strong institutions by complying with regulations and laws, and investing in innovation and technology to promote the adoption of efficient and best management practices. The

framework also highlights the importance of minimizing net impacts on the environment and ecosystems by efficiently using natural resources, benefiting workers and local communities by improving their living conditions and respecting their rights, ensuring inclusivity for smallholders and low-income consumers, and committing to continuous improvement. Principles one and six above can serve as entry points for linking this research with GFP-SPO.

The implementation of this synergy requires a two-way transformation, where RSPO transforms into a certification scheme based on endorsement and recognition. RSPO could incorporate global voluntary certification principles and criteria that recognize national certification initiatives, such as ISPO and possibly Malaysian Sustainable Palm Oil (MSPO). The transformation of RSPO into an endorsement system should adhere to the principles of GFP-SPO. Conversely, ISPO needs to transform into a national system developed through multi-stakeholder consultations, including international stakeholders such as RSPO as the endorser. For it to be widely effective, ISPO must maintain its legal strength at the national level, but with RSPO, the parent organization, endorsing it while adhering to the multilateral principles of GFP-SPO. Schematically, the proposed institutional arrangement is illustrated in Figure 3.

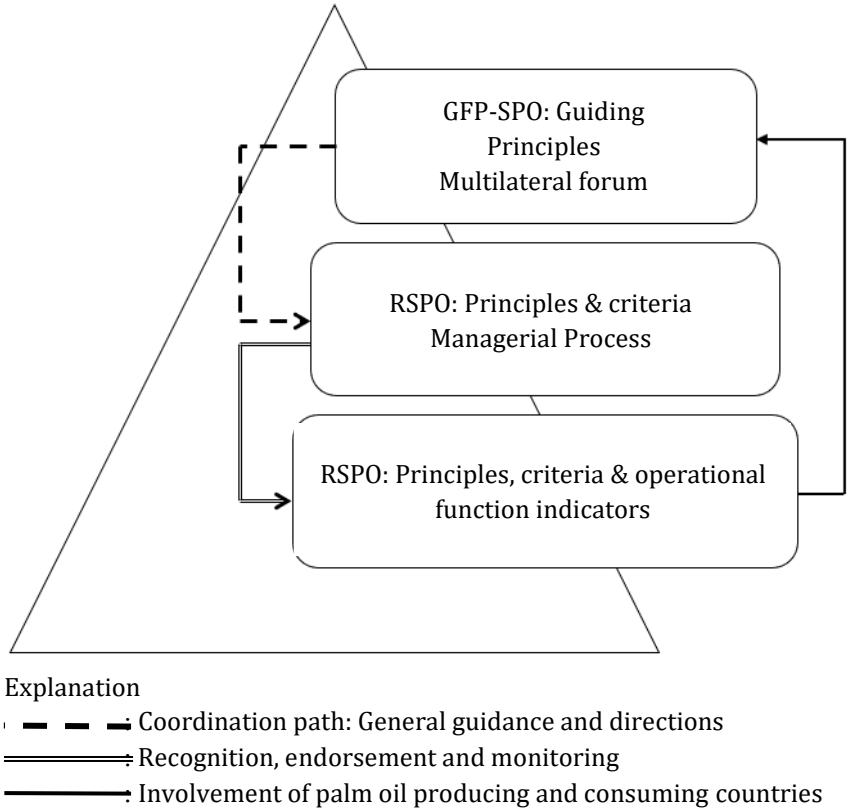


Fig. 3. Integration of sustainable palm oil certification for land productivity improvement

Figure 3 illustrates the hierarchical relationship of the certification governance scheme that integrates ISPO and RSPO under the GFP-SPO framework. The top tier (Tier 1) is multilateral, where CPOPC member governments generate and routinely review the substance of the GFP-SPO Guiding Principles. Members act as the GFP-SPO Steering Committee, consisting of both palm oil-producing and consuming governments managing the global sustainable palm oil guiding principles. The middle tier (Tier 2) is managerial, where RSPO operates in a multi-stakeholder process. In this concept, RSPO standards consist solely of global Principles and Criteria (without indicators), developed based on the GFP-SPO Guiding Principles. RSPO also serves as the endorsing body for national certification schemes in various countries, including ISPO in Indonesia. The bottom tier (Tier 3) is operational, where ISPO certification audits are conducted. In this mechanism,

ISPO consists of Principles and Criteria referring to RSPO, supplemented by detailed elaboration in a set of indicators (or verifiers) according to relevant regulations in the country. The operational alignment of ISPO with RSPO's principles and criteria is validated through an endorsement mechanism by RSPO and is monitored regularly.

According to this scheme, ISPO is a more detailed version of RSPO that is locally specific to Indonesia's jurisdiction. Although it is regulation-based, the development of ISPO at the national level must involve multiple stakeholders, including RSPO. Stakeholders within RSPO include business actors, academics or researchers, civil society organizations, and growers. However, stakeholders in GFP-SPO are government representatives serving as the steering committee. The governments involved should include representatives from both producing and consuming countries to ensure a comprehensive multilateral process that leads to recognition and market acceptance of ISPO-RSPO certified palm oil products.

Through this mechanism, it is hoped that Indonesian palm oil growers will only need to undergo one certification process, ISPO, which, after aligning its substance with an emphasis on fertilization practices, can provide intrinsic benefits in the form of increased land productivity. With ISPO's operations endorsed by the multi-stakeholder management of RSPO, which also adheres to the GFP-SPO guiding principles at the multilateral level, market acceptance for ISPO can be achieved and certification acceleration for growers can be realized. This will positively impact the mass improvement of land productivity, thus collectively reducing the pressure of palm oil expansion on forests.

4. Conclusions

The four palm oil growers with both ISPO and RSPO certifications have met the certification requirements related to GAP, including participation in GAP training and the implementation and monitoring of GAP in RSPO, as well as planting techniques, plant maintenance, pest and disease control, harvesting, and fruit transportation in ISPO. These findings reject the third hypothesis. The concept of sustainable palm oil certification for improving land productivity emphasizes a primary focus on fertilization practices, along with a combination of GAP implementation and monitoring (RSPO) and plant maintenance (ISPO). These findings are inconsistent with the fourth hypothesis.

Further research is needed to evaluate the synergy between ISPO and RSPO from aspects beyond land productivity improvement, such as environmental protection, legal compliance, and social acceptance. This could create a more comprehensive alignment with various scientific perspectives. The findings of this study should be followed up with further research to develop a mathematical and geospatial model that explores scenarios for increasing land productivity among growers while preventing palm oil expansion, thus reducing deforestation rates. The results of such research could be useful for meeting market-based prerequisites, such as regulations from importing countries that require proof of deforestation-free supply chains. These findings also have the potential to align with calculations for voluntary carbon market initiatives based on avoided deforestation scenarios.

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Author Contribution

All authors contributed equally to the conceptualization, methodology, data analysis, and manuscript writing. They collaborated in designing the certification concept, interpreting findings, and ensuring the research's relevance to smallholder productivity and sustainability.

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Biographies of Authors

Andreas Budi Rahutomo, School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.
- Email: andreas.budi@ui.ac.id
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A

Mahawan Karuniasa, lecturer in School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.
- Email: mahawan.karuniasa11@ui.ac.id
- ORCID: 0000-0001-6444-6560
- Web of Science ResearcherID: N/A
- Scopus Author ID: 57205022900
- Homepage: https://sinta.kemdikbud.go.id/authors/profile/6778215

Evi Frimawaty, lecturer in School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.
- Email: evi.frimawaty11@ui.ac.id
- ORCID: 0000-0002-9016-4062
- Web of Science ResearcherID: N/A
- Scopus Author ID: 8128517300
- Homepage: https://sinta.kemdikbud.go.id/authors/profile/6719988