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Strategies to Improve the Competitiveness of Sustainable Palm Oil Commodities in Indonesia

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ABSTRACT

This study examines strategies to improve the competitiveness of sustainable palm oil commodities in Indonesia through a qualitative analysis involving five key informants: a government policymaker, an industry association representative, a sustainability expert from an NGO, an academic researcher, and a smallholder farmer representative. Using in-depth interviews and thematic analysis, the research identifies six central themes influencing competitiveness: strengthening certification and standards, enhancing supply chain transparency, promoting technology and innovation, reforming policies and institutions, fostering stakeholder collaboration with smallholder inclusivity, and pursuing market diversification with value addition. The findings reveal that while certification and compliance with sustainability requirements are essential for international market access, challenges remain in supporting smallholders, improving institutional coordination, and adopting innovative technologies. The study concludes that sustainability should not be viewed merely as a compliance obligation but as a strategic driver of competitiveness. Integrating sustainability principles into policies, practices, and market strategies can position Indonesia as a global leader in sustainable palm oil production.

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1. INTRODUCTION

Indonesia is the world's largest producer and exporter of palm oil, contributing significantly to both the national economy and global commodity markets, with palm oil being widely used in food, cosmetics, bioenergy, and various industrial applications, making it a vital resource for international trade. However, despite its economic importance, the palm oil industry in Indonesia has long faced criticisms related to deforestation, biodiversity loss, labor practices, and greenhouse gas emissions, which have triggered increasing global demand for more sustainable production practices that ensure environmental protection, social inclusivity, and economic viability. The industry's expansion has been linked to environmental degradation and social challenges, yet it remains a cornerstone of Indonesia's economy, providing livelihoods, contributing to national revenue, and supporting regional development. Economically, palm oil generates foreign exchange, strengthens Indonesia's

competitiveness in markets such as India, and has fostered the growth of a middle-income class among farmers, although it still faces challenges like export tariffs and limited market access [1], [2]. Environmentally, the expansion of plantations is a major driver of deforestation, biodiversity loss, and greenhouse gas emissions, though studies suggest most growth occurs on degraded land rather than primary forests [1], [3]. Socially, the sector contributes to rural development and poverty alleviation, but it also exacerbates income inequality [1]. To address these challenges, sustainability interventions such as improving yields and adopting No Deforestation, No Peat, and No Exploitation (NDPE) policies have been recommended [3], [4], with the Indonesian government playing a crucial role in advancing sustainable practices through regulations, policies, and trade agreements [5].

In recent years, sustainability has become a central issue in the palm oil sector, with certification initiatives such as the Roundtable on Sustainable Palm Oil (RSPO) and the Indonesian Sustainable Palm Oil (ISPO) introduced to improve governance and promote responsible production. While these mechanisms aim to enhance the competitiveness of Indonesian palm oil in the international market, their implementation has been uneven, particularly among smallholders who account for nearly 40% of total plantations and face challenges in meeting certification standards due to limited resources, knowledge gaps, and weak institutional support. As a result, the industry continues to face market access barriers, especially in regions with stringent sustainability requirements like the European Union. Smallholders often lack the financial resources required to cover compliance costs and adopt sustainable practices [6], while limited access to information and the complexity of regulations exacerbate knowledge gaps [7]. Additionally, weak institutional frameworks and poor coordination among government bodies further hinder their ability to navigate certification processes effectively [7]. To address these issues, several solutions have been proposed, including harmonizing ISPO and RSPO standards to improve traceability and integrate both local and global sustainability norms [8], providing financial incentives, technical assistance, and regulatory support to ease compliance for smallholders [6], and enacting policy reforms to update regulations, enhance data transparency, and improve fund management for sustainable practices [8].

The competitiveness of sustainable palm oil commodities depends not only on certification but also on broader strategic factors such as innovation, supply chain transparency, market diversification, and supportive government policies, requiring a holistic strategy that integrates economic, environmental, and social dimensions in line with global sustainable development goals and corporate responsibility standards that increasingly shape international trade relations. The Indonesian and Malaysian palm oil industries, as major global players, face both challenges and opportunities in this context, with certification schemes such as the Roundtable on Sustainable Palm Oil (RSPO) and Malaysian Sustainable Palm Oil (MSPO) serving as pivotal mechanisms to promote sustainable practices, though they still face criticism and require stronger acceptance and enforcement to be truly effective [9], [10]. Certification standards must also be adapted to address both large-scale industrial concerns and smallholder realities to ensure comprehensive sustainability across the supply chain [11]. At the policy level, government interventions remain central: in Indonesia, improvements are needed in law enforcement, bureaucratic efficiency, and environmental regulations to strengthen competitiveness [9], while Malaysia has responded strategically through its National Agricommodity Policy and by actively engaging with the European Union to meet strict sustainability requirements [10]. Beyond regulation, innovation in production processes and product diversification are critical to shifting from raw palm oil exports to higher-value derivatives, thereby enhancing economic competitiveness [9], while market diversification is necessary to

mitigate risks tied to heavy reliance on certain markets, especially amid evolving EU regulations [10]. Equally important, transparent supply chains are vital for building trust and satisfying consumer demand for sustainably sourced products, requiring effective communication and monitoring of sustainability practices across all levels of production [12].

Given this background, this study aims to explore strategies to improve the competitiveness of sustainable palm oil commodities in Indonesia. By employing a qualitative analysis through in-depth interviews with five informants representing policymakers, industry actors, and sustainability experts, this research seeks to identify actionable insights that bridge sustainability demands with market competitiveness. The findings are expected to contribute to both academic discourse and practical policymaking, offering guidance for strengthening Indonesia's position as a leading supplier of sustainable palm oil in the global market.

2. LITERATURE REVIEW

2.1 Palm Oil Industry in Indonesia

Indonesia's palm oil industry is a significant contributor to the national economy by generating substantial foreign exchange earnings, supporting regional development, and helping to create a middle-income class among farmers [1], with its competitiveness in the global Crude Palm Oil (CPO) market shaped by factors such as economic growth, exchange rates, and global CPO prices [13]. Despite these economic benefits, the industry continues to face criticism for its environmental and social impacts, particularly deforestation, greenhouse gas emissions, and social inequalities, although research indicates that only a small percentage of plantations are established on primary forest land [1]. In response, the Indonesian government has promoted sustainable practices through the Indonesian Sustainable Palm Oil (ISPO) certification as a key strategy to mitigate environmental damage and improve governance [14], though its effectiveness is hindered by weak governance and structural barriers [15]. Nevertheless, with the government's target to ensure all palm oil companies achieve ISPO certification by 2023, the sector is expected to strengthen its sustainability credentials, reduce CO_2 emissions, and align more closely with international trade policies and consumer preferences that increasingly prioritize environmentally responsible practices [14].

2.2 Competitiveness of Agricultural Commodities

Competitiveness in the palm oil industry is multifaceted, encompassing not only price and production volume but also sustainability, supply chain efficiency, and market access, with global trade dynamics showing that population growth and the import of animal or vegetable fats and oils positively influence competitiveness, while GDP per capita and sustainability certifications such as RSPO may have negative impacts [16]. In Indonesia, key determinants include labor productivity, exchange rates, and market concentration, though government interventions in domestic pricing can sometimes negatively affect competitiveness [17], while in Malaysia, competitiveness is shaped by factor conditions, demand sophistication, related industries, and firm strategy as explained through Porter's framework [18]. More broadly, global economic conditions, importers' policies, and environmental regulations are critical, with economic growth and exchange rates in importing countries enhancing competitiveness, whereas inflation undermines it [19]. At the same time, compliance with sustainability standards has become crucial for entry into environmentally conscious markets, with technological innovation and supply chain efficiency emerging as key factors for sustaining a competitive edge [19]. Furthermore, while Indonesia faces the challenge of adapting policies to align with global trends [17], Malaysia emphasizes the improvement of agronomic practices to boost yields and profitability, which is vital for maintaining

competitiveness amid rising production costs and declining prices [20].

2.3 Sustainable Palm Oil and Certification Systems

The push for sustainable palm oil is driven by the urgent need to address environmental and social issues linked to palm oil production, with certification systems such as RSPO and ISPO designed to ensure responsible practices; however, their adoption remains challenging, particularly among smallholder farmers who face high certification costs, limited technical expertise, and restricted access to crucial information and support [7], [21]. Institutional barriers, including centralized licensing systems and complex bureaucratic processes, further constrain smallholders' engagement with the legal frameworks required for certification [7], while issues surrounding ambiguous land ownership status and the recognition of indigenous land rights add complexity to the process [8]. Despite these obstacles, certification offers significant benefits, such as improved market access and strengthened consumer trust by demonstrating compliance with sustainability standards, which is increasingly demanded by global consumers [8], [11]. Moreover, harmonizing RSPO and ISPO certifications can enhance traceability and reinforce the sustainability of palm oil across the supply chain, ensuring that Indonesian palm oil maintains its competitiveness in environmentally conscious markets [8].

2.4 Challenges in Achieving Sustainability

The implementation of sustainable palm oil practices in Indonesia faces multiple challenges, particularly for smallholders who are central to the sector, with key barriers including financial constraints, fragmented supply chains, weak enforcement of land-use policies, and conflicting stakeholder interests, while international trade regulations such as the European Union's deforestation law add further complexity for exporters. Smallholders struggle to access finance for sustainable practices due to the absence of mandatory policies on sustainable palm oil financing and limited adoption of sustainability policies by smaller financiers, compounded by the lack of financial incentives and administrative barriers in accessing replanting funds [22]. Certification also poses difficulties, as the Indonesian Sustainable Palm Oil (ISPO) process is slow at the smallholder level due to complex land swaps and legal documentation requirements [23], while structural barriers such as weak institutions and overlapping regulations further undermine governance effectiveness [15]. Moreover, knowledge and support gaps hinder progress, with smallholders lacking sufficient understanding of sustainable practices and facing difficulties in obtaining information and assistance for certification, where factors such as farming experience, education, and household size significantly influence ISPO implementation outcomes [7], [24]. In this context, aligning environmental responsibility with economic competitiveness requires a multifaceted approach that addresses financial inclusion, institutional reform, capacity building, and adaptive strategies to meet international market demands [22].

2.5 Strategies to Strengthen Competitiveness

Technological innovation, policy support, multi-stakeholder collaboration, and value addition are key strategies to boost the competitiveness of sustainable palm oil commodities, addressing environmental, economic, and social challenges while fostering a more sustainable industry. Precision agriculture and digital traceability systems enhance efficiency and transparency by optimizing resources and ensuring compliance [25], while high-yield, disease-resistant cultivars and zero-waste milling technologies help maintain ecological integrity [26]. Policy support through stricter regulations, subsidies, and training—exemplified by the Malaysian Sustainable Palm Oil (MSPO) certification and the National Agricommodity Policy—strengthens compliance and aligns with global standards, particularly EU requirements (Naidu et al., 2024). Multi-stakeholder collaboration among private companies, government, and civil society fosters inclusive governance, with dialogue balancing environmental and trade interests

while encouraging demand for sustainable palm oil [10], [27]. Finally, diversifying into downstream industries such as processed foods, biofuels, and oleochemicals reduces reliance on crude palm oil exports and opens new market opportunities [18].

2.6 Theoretical Framework

This study draws upon two key theoretical perspectives: sustainability theory and competitiveness theory. Sustainability theory emphasizes the balance between economic growth, social equity, and environmental protection, which is central to the palm oil industry's long-term viability. Competitiveness theory, particularly Porter's Diamond Model, underscores the role of innovation, market dynamics, and institutional support in enhancing a nation's competitive advantage. By integrating these perspectives, this research investigates how sustainability can be leveraged as a source of competitiveness in the Indonesian palm oil sector.

3. METHODS

3.1 Research Approach

This study employs a qualitative research approach to explore strategies for improving the competitiveness of sustainable palm oil commodities in Indonesia. Qualitative methods are appropriate for this research because they enable an in-depth understanding of perceptions, experiences, and strategies from key stakeholders. Rather than relying on numerical data, the research focuses on rich descriptions and interpretations that capture the complexity of sustainability and competitiveness issues within the palm oil sector.

3.2 Research Design

A case study design was adopted to investigate the Indonesian palm oil industry in the context of sustainability and competitiveness. This design allows the researcher to analyze the phenomenon holistically, considering multiple perspectives from different stakeholders involved in the palm oil supply chain and policy environment. The case study approach also facilitates the identification of both challenges and opportunities in aligning sustainability practices with market demands.

3.3 Informants and Sampling Technique

The study involved five key informants selected through purposive sampling, a non-probability technique chosen to ensure participants had relevant expertise and experience in the palm oil sector. The informants included a government policymaker involved in agricultural and trade regulation, a representative from a palm oil industry association, a sustainability expert from a non-governmental organization (NGO), an academic researcher specializing in agribusiness and environmental studies, and a representative of smallholder farmers engaged in palm oil cultivation. This diversity of informants provided a comprehensive perspective on the strategies needed to strengthen the competitiveness of sustainable palm oil commodities.

3.4 Data Collection

Data were collected through semi-structured interviews, allowing flexibility to explore emerging themes while maintaining consistency across participants. The interview questions focused on current challenges faced by the palm oil industry in meeting sustainability standards, opportunities to enhance market competitiveness through sustainable practices, perceptions of certification systems such as RSPO and ISPO, the role of government policies, technology, and innovation, as well as recommendations for future strategies to strengthen competitiveness. Each interview lasted approximately 60–90 minutes and was conducted either face-to-face or via online platforms, depending on the availability of the informants.

3.5 Data Analysis

The data were analyzed using thematic analysis, following Braun and Clarke's (2006) framework. The process involved six stages: (1) familiarization with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. This method allowed the researcher to systematically identify patterns and draw meaningful insights

regarding strategies to improve competitiveness. NVivo software was used to assist in organizing and coding the interview data, ensuring a structured and rigorous analysis process.

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

The descriptive analysis in this study draws on the perspectives of five informants representing diverse stakeholder groups in the Indonesian palm oil sector: a government policymaker, an industry association representative, a sustainability expert from an NGO, an academic researcher, and a smallholder farmer representative. Collectively, their views provide a comprehensive understanding of the challenges and opportunities in strengthening the competitiveness of sustainable palm oil commodities. The government informant emphasized the importance of regulatory frameworks and the need to align Indonesia's national standards, particularly ISPO, with international sustainability requirements, noting that inconsistent policies and weak enforcement undermine the credibility of Indonesian palm oil in global markets. Strengthening institutional coordination and providing incentives for compliance were seen as crucial steps. Meanwhile, the industry association representative highlighted supply chain efficiency and market competitiveness, pointing out that while large-scale companies are progressing in adopting sustainable practices and certification, many small and medium-sized producers face prohibitive costs and administrative burdens. This creates a dual challenge of ensuring inclusivity while meeting the sustainability expectations of global buyers.

The NGO sustainability expert underscored the significance of environmental and social accountability, stressing that issues such as deforestation, land rights, and labor conditions remain major obstacles to global recognition of Indonesian palm oil as sustainable, with credibility hinging on transparent practices and stronger monitoring systems. Similarly, the academic researcher emphasized the role of knowledge and innovation, noting that research in precision agriculture, digital traceability, and efficient downstream processing remains underutilized, even though technological integration could help reduce environmental impacts while enhancing productivity and competitiveness. Finally, the smallholder farmer representative expressed concerns over financial and technical barriers, explaining that smallholders often lack access to affordable financing, training, and information on sustainability standards. While they recognized the potential benefits of certification, they stressed that without external support from government and industry, smallholders risk continued marginalization in global sustainable palm oil markets.

4.2 Key Themes from Thematic Analysis

Thematic analysis of the interview data revealed several interconnected themes that explain the strategies needed to enhance the competitiveness of sustainable palm oil commodities in Indonesia. These themes reflect the shared and contrasting perspectives of the five informants, encompassing policy, industry practices, environmental concerns, and smallholder realities.

4.2.1 Strengthening Certification and Standards

All informants consistently emphasized the importance of certification systems—both international (RSPO) and national (ISPO)—as a gateway to global markets. Certification was viewed as a signal of credibility and a means to meet international buyer requirements. However, challenges such as high certification costs, complex auditing processes, and limited access to training were reported, especially for smallholders. The government informant underscored the need for state-backed subsidies and simplified procedures to increase certification uptake, while the NGO expert stressed that certification must go beyond formality and ensure genuine compliance with sustainability principles.

4.2.2 Enhancing Supply Chain Transparency

Supply chain transparency emerged as a key theme across stakeholders. Informants noted that consumers and regulators in Europe and other markets demand proof that palm oil is produced without deforestation or social exploitation. The academic informant highlighted the potential of digital traceability tools such as blockchain and satellite monitoring to ensure accountability. Industry representatives added that greater transparency could reduce reputational risks and strengthen trust with international buyers.

4.2.3 Technology and Innovation as Drivers of Competitiveness

Informants stressed that technology adoption can bridge the gap between sustainability and competitiveness. Examples mentioned included precision agriculture to optimize input use, drones for monitoring plantations, and waste-to-energy technologies in palm oil mills. The academic researcher emphasized that research and development (R&D) collaboration between universities, companies, and government could accelerate innovation. However, the smallholder representative pointed out that access to technology is uneven, requiring targeted training and financial support to make innovations more inclusive.

4.2.4 Policy and Institutional Reform

Weak policy coordination and inconsistent enforcement were identified as persistent barriers. The government informant acknowledged that overlapping regulations between ministries often create uncertainty for producers. Both the NGO and industry representatives argued that aligning ISPO with international standards would reduce trade barriers and improve Indonesia's reputation. Stronger institutional frameworks, combined with monitoring and sanctions for non-compliance, were seen as essential to building a credible and competitive palm oil industry.

4.2.5 Collaboration and Smallholder Inclusivity

The majority of informants emphasized that smallholders must be central to any competitiveness strategy, as they account for around 40% of plantation area. Collaborative models involving government, industry, NGOs, and financial institutions were highlighted as critical to providing training, access to credit, and group certification schemes. The smallholder representative stressed that without such support, farmers remain excluded from premium markets, perpetuating inequality in the industry.

4.2.6 Market Diversification and Value Addition

Finally, informants identified the need to move beyond crude palm oil exports toward value-added products such as oleochemicals, biofuels, and processed foods. Diversifying products and markets would reduce dependency on volatile commodity prices and strengthen Indonesia's bargaining power. Industry representatives argued that by combining sustainability certification with downstream processing, Indonesia could not only secure global market access but also achieve higher economic returns.

4.3 Discussion

The findings of this study highlight that a combination of structural, institutional, and market-related factors influences the competitiveness of Indonesia's sustainable palm oil commodities. The six themes identified—certification, supply chain transparency, technology and innovation, policy reform, collaboration and inclusivity, and market diversification—demonstrate that competitiveness cannot be achieved through a single intervention, but rather through a holistic and multi-stakeholder approach.

First, the role of certification in the palm oil sector aligns with the literature on sustainability governance, where certification serves as a "passport" to access environmentally conscious markets; however, as highlighted by informants, financial and technical barriers make certification largely inaccessible to many smallholders, reinforcing findings that inclusivity is critical to the success of such systems. In Indonesia, for example, smallholders manage about 98% of coffee plantations yet remain underrepresented in certification programs that are increasingly treated as prerequisites for global market access [28], while in ISPO,

powerful actors dominate the process, often prioritizing their interests and further marginalizing smallholders [29]. Institutional support plays a decisive role in overcoming these barriers, as shown by economic groups of smallholders in Indonesia and Malaysia that achieve higher certification rates and secure better prices through organized structures [30]. Effective government policies and industry initiatives are also essential, particularly in light of EU measures promoting deforestation-free supply chains, which must remain fact-based and inclusive to prevent trade conflicts and ensure smallholder participation [31]. Despite the sector's overall growth, inequalities in ownership and profit-sharing persist, with many farmers who adopt Voluntary Sustainability Standards (VSS) still struggling financially due to low demand and minimal price premiums for certified products [32].

Second, supply chain transparency has become a critical requirement in international trade, with importing regions such as the European Union enforcing stricter deforestation regulations that directly impact Indonesia's palm oil exports. The findings of this study align with Porter's theory of competitiveness, which highlights innovation and adaptation to market requirements as essential drivers of competitive advantage. By adopting digital traceability systems, Indonesia can position its palm oil industry as both sustainable and technologically advanced, thereby meeting international demands for accountability. Furthermore, technology and innovation were identified as dual drivers of efficiency and sustainability, with tools such as precision agriculture, satellite monitoring, and downstream processing reducing environmental impacts while boosting productivity. This resonates with sustainability theory, which asserts that long-term competitiveness depends on balancing economic growth with ecological and social responsibility. However, the disparity in access to innovation between large-scale producers and smallholders underscores the need for inclusive capacity-building programs to prevent widening inequalities.

Third, policy and institutional reform emerged as a crucial theme, as weak coordination among government agencies and inconsistent enforcement undermine the credibility of Indonesia's palm oil governance. Aligning ISPO with international standards and strengthening enforcement mechanisms would not only improve global acceptance but also ease trade tensions with importing countries, confirming earlier studies that highlight institutional quality as a key enabler of competitiveness in commodity markets. Collaboration and inclusivity were also strongly emphasized, with smallholders needing greater access to training, finance, and group certification to participate fully in sustainability initiatives. This reflects broader sustainability discourse that positions social inclusion as a core element of sustainable development, where collaborative governance among government, corporations, NGOs, and smallholders can foster shared responsibility and resilience in the industry. Finally, the theme of market diversification and value addition stresses the importance of moving beyond crude palm oil exports, supporting evidence that downstream industries such as oleochemicals and bioenergy can deliver higher economic returns and strengthen bargaining power internationally. By integrating sustainability into value-added production, Indonesia can further differentiate its products and reinforce its global competitive position.

5. CONCLUSION

The results of this study show that strengthening the competitiveness of Indonesia's sustainable palm oil commodities requires a multidimensional and collaborative approach. Certification schemes such as RSPO and ISPO remain vital for securing global market access, but inclusivity and financial support must be expanded to ensure smallholder participation. Equally, supply chain transparency through digital traceability tools has become critical in meeting international buyer expectations and reducing reputational risks. Technological innovations in agriculture and processing can

enhance productivity while minimizing environmental impacts, but targeted capacity-building initiatives are needed to close the gap between large corporations and smallholders. Policy and institutional reforms are also essential, particularly in ensuring regulatory consistency, strengthening enforcement, and aligning national standards with international sustainability frameworks.

In addition, collaborative governance involving government, corporations, NGOs, academia, and farmers is necessary to foster shared responsibility and inclusivity across the sector. Diversifying markets and investing in value-added downstream products such as oleochemicals and bioenergy can further reduce dependency on crude palm oil exports and enhance Indonesia's bargaining position in global trade. In conclusion, sustainability must be framed not as an external burden but as a strategic advantage. By embedding sustainability into certification, innovation, policy reform, inclusivity, and value-added production, Indonesia can reinforce its role as a global leader in sustainable palm oil while balancing economic growth with social equity and environmental stewardship.

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