

*Review Article*

## **The Future of Oil Palm Smallholders Toward Greater Sustainability: A Systematic Literature Review**

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### **ABSTRACT**

Oil palm (*Elaeis guineensis*) has been widely used in various products, namely, food, fuel, feed, and pharmaceuticals (4Fs), ultimately cementing the significant roles of the palm oil sector in Malaysia's economic growth, extensive rural development, political stability, and now directly in sustainable development agenda. In the context of the palm oil sector, smallholders significantly contribute to almost 30% of the total oil palm planted areas in Malaysia. However, the participation of oil palm independent smallholders (OPISH) has remained limited and far behind compared to private business entities in achieving greater sustainability. Due to the unforeseeable global trends and rising public concern over this sector's sustainability issues, smallholders are now urged to produce certified sustainable palm oil. These issues have motivated this systematic literature review to be undertaken by critically analysing existing studies on sustainability efforts implemented by

the smallholders according to the PRISMA (Preferred Reporting Items Systematic Reviews and Meta-Analysis) guidelines. As per the findings of this systematic review, four main themes emerged: land settlement schemes, agricultural policy and strategies, heterogeneity of the smallholders, and sustainability certifications. The theoretical implication of this study is that these crucial themes are highly relevant in providing a foundation for a conceptual framework

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that portrays a complete picture of holistic sustainability practices amongst OPISH. Concerning practical implication, these identified themes provide significant insights in designing effective strategies and specific incentives as the palatable solutions for OPISH to implement sustainability practices that will transform the palm oil sector towards a sustainable future.

*Keywords:* Malaysia, oil palm smallholders, PRISMA, sustainability, systematic literature review

## INTRODUCTION

The contribution of the palm oil sector to Malaysia's economy is indisputable. It drastically helped reduce the country's poverty rate by lifting smallholders' income and reducing rural-urban disparities by providing comprehensive resettlement opportunities, especially in the rural areas (Alain & Patrice, 2014; Cramb & McCarthy, 2017). On average, the palm oil industry contributed 5% to 7% of Malaysia's GDP, with annual export revenue averaging RM 64.24 billion for the last five years (Nambiappan et al., 2018). Over the last century, this golden crop has been the bedrock of Malaysia's economy, while innovations are widely acknowledged for the palm oil sector's future frontier expansion.

However, the success story of this sector had been negated by numerous sustainability issues concerning labour well-being, periodic haze, loss of biodiversity, and deforestation (Cramb & Curry, 2012; Cramb & McCarthy, 2017; Kushairi et al.,

2018; Nambiappan et al., 2018; Pye, 2019). Recently, citing the alleged use of forced labour, the United States had announced its ban from importing palm oil from the Malaysian company Sime Darby Plantation Berhad, which led to an immediate fall of 3.5% of shares in the company (Nikkei Asia, 2021). To mitigate these issues, Malaysia has now geared to make the entirety of oil palm growers operating in the country to be sustainability certified by upholding its commitments to responsible agriculture and human rights through the Malaysian Sustainable Palm Oil (MSPO) certification scheme (Kumaran, 2019).

The oil palm independent smallholders (OPISH) is often characterised as the Achilles heel of the palm oil sector because they are economically vulnerable groups lacking financial, compliance, and technical capacities (Jelsma et al., 2019). However, they are also under great pressure to adhere to and obtain the sustainability certification scheme for their oil palm farms (Senawi, 2019). In the context of Malaysia, OPISH is defined as oil palm growers who own or are the legal occupier or lawful representative of oil palm plantations less than 100 acres (Senawi, 2019). It is well recognised that OPISH is significantly contributing to palm oil production in Malaysia as well as other palm oil-producing countries such as Indonesia (Abazue et al., 2015; Choy & Albanya, 2017; Santika et al., 2019). Therefore, this study focuses on OPISH given their significant roles, vulnerabilities, and challenges in the palm oil sector development.

In facilitating a comprehensive systematic literature review, this present study is guided by the question: What themes influence sustainability practices amongst OPISH? Thus, the objective of this study is to systematically and critically identify the themes that will help enhance sustainability practices amongst OPISH. This study is among the first to systematically review studies in finding the themes pertaining to OPISH and their sustainability practices by selecting targeted scholarly works using the Preferred Reporting Items Systematic Reviews and Meta-Analysis (PRISMA) method. Furthermore, the themes that emerged from this thematic analysis demonstrate the need to place equal importance on all themes that will help the OPISH, policymakers, authorities, and industry stakeholders in moving forward to sustain the palm oil industry ecosystem. Importantly, these relevant themes are sustainability certification, agricultural policy and strategies, smallholders heterogeneity, and land settlement schemes.

This study consists of seven sections. After the brief introduction, the second section describes the evolution of the palm oil sector and the conceptualisation of the sustainability dimension in the context of OPISH. The third section specifies the PRISMA method. The fourth section systematically reviews, synthesises, and discusses the literature on sustainability practices implemented by OPISH. The fifth section crystallises the theoretical and practical implications. The sixth section describes the limitations and future research

agenda. Lastly, the conclusion of this study and recommendations are drawn.

## **BACKGROUND OF THE STUDY**

### **Research Context: The Evolution of the Palm Oil Sector in Malaysia**

In Malaysia, oil palm manufacturing could be traced back to 1871, when the oil palm seed was introduced from West Africa and was later planted in Malaysia as an ornamental plant (Basiron & Chan, 2004). Henri Fauconnier planted the first commercial palm oil estates in Tennamaran Estate, Selangor, Malaysia, in 1917 and laid the foundation for the development of the palm oil sector (Basiron & Chan, 2004; Nambiappan et al., 2018). According to the Ministry of Plantation Industries and Commodities (MPIC) data, as shown in Figure 1, the gradual growth of oil palm planted areas from 2010 till 2018 ranged between 1% and 3% per year. This data reflects the consistent government policy to sustain the industry while protecting the natural forest from massive expansions of oil palm plantations. In this connection, the planted areas have productively reached 5.8 million hectares, reflecting the palm oil sector's significant role in the country's socio-economic development, particularly in the rural areas.

Presently, OPISH in Malaysia is grouped through the Sustainable Palm Oil Cluster (SPOC). There are two-pronged missions of SPOC; the first mission is to assist OPISH in obtaining the MSPO certification. The second mission is to facilitate the establishment of cooperatives

or “Sustainable Oil Palm Growers Cooperative (KPSM)” (Omar et al., 2012). As of December 2020, 63 KPSMs were established in Malaysia with core activities including (i) group selling of oil palm to the

mills and (ii) group purchase of agricultural inputs, especially fertilisers, to reduce the cost of production (Malaysian Palm Oil Board [MPOB], 2020; Senawi, 2019).

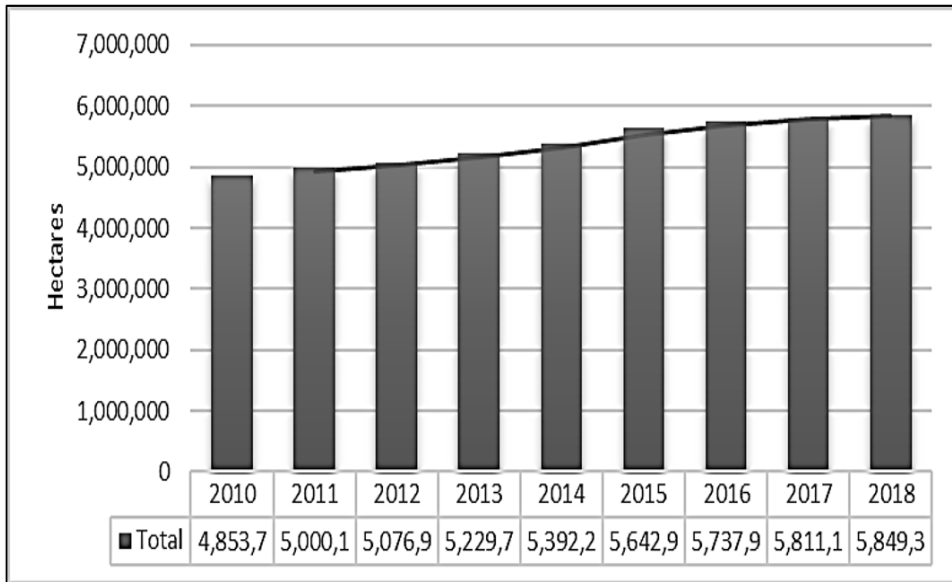


Figure 1. Malaysia oil palm planted areas in hectares from 2010 till 2018

Source: MPIC (2019)

**The Conceptualisation of Sustainability Dimensions in the Context of Oil Palm Independent Smallholders (OPISH)**

The emergent attention and fundamental theory of a sustainable development concept began three decades ago, during the high-level meeting of the World Commission on Environment and Development in 1987. After ten years since the Brundtland Report, Elkington (1998) coined the sustainable development phenomenon as the triple bottom line (TBL) approaches that emphasised the needs of long-term balance initiative between people (equality

in society), the planet (the quality of the environment), and profit (a prosperous economy).

In the context of sustainability in the palm oil sector, it is generally defined based on a set of principles and criteria that are agreed and discussed upon in meetings with various stakeholders to balance the three multidimensional sustainability elements, which are economic growth, social well-being, and environmental protection (Senawi, 2019; Silva-Castañeda, 2012). Therefore, in this systematic review, sustainability practices are conceptualised

to balance the three of Elkington's TBL dimensions: social, economic, and environmental.

Concerning the social dimension of sustainability in an oil palm plantation, it positively and significantly influenced the OPISH's social position, the quality of life, health status, and education quality (Abazue et al., 2015). However, it is argued that the social dimension of sustainability practices was being perceived as minimal compared to the economic and environmental dimensions. This argument is due to the difficulties and sensitivities of gaining access to information related to labour practice issues such as forced labour, child labour, passport confiscation and gender discrimination (Jamaludin et al., 2018).

In terms of the economic dimension, most OPISH believed that the smallholding plantation scheme had significantly improved their economic sustainability while reducing poverty through improved employment opportunities and job creation compared to any other economic activity they previously engaged in (Abazue et al., 2015). Besides, oil palm cooperatives establishment by OPISH has contributed to the local economic system by consolidating oil palm production. This oil palm production was then sold to the millers with higher prices by increasing the economies of scale and bargaining power (Ador et al., 2016; Omar et al., 2012). Consequently, the increment prices of oil palm sold by the cooperatives help the OPISH to sustain their income despite the fluctuations of palm oil price in the global market.

The environmental dimension revolved around the extensive conversion of tropical rainforests to oil palm monocultures (Cramb & McCarthy, 2017; Pye, 2019). Besides, the significant loss of biodiversity and endangered species such as orangutans and Malayan tigers were also threatened by unsustainable palm oil production (Cramb & McCarthy, 2017; Pye, 2019). On this matter, it was empirically revealed that the majority of OPISH were concerned about ecosystem destruction (Abazue et al., 2015, 2019). However, they were constrained from doing more to stop it because they must plant and grow oil palm to support and care for their dependents (Abazue et al., 2015). It indicates a major trade-off between economic and environmental aspects associated with the development of oil palm farms or plantations owned by OPISH. The next section describes the methodology used to retrieve evidence about the sustainability practices amongst OPISH.

## METHODOLOGY

This section illuminates the method used to retrieve previous studies related to OPISH and sustainability practices examined by previous scholars, as illustrated in Figure 2 (Moher et al., 2009). This study used the PRISMA method, systematically searching studies from electronic journal databases using pertinent keywords. This study affirmatively selected the PRISMA method because it provides advantages in assessing a large database consisting of scientific literature in a specified time (Sierra-Correa &

Kintz, 2015). Thus, this protocol warrants a rigorous search of prevalent literature related to sustainability practices implemented by OPISH. This study heavily relied upon two leading scientific journal databases, namely, Scopus and WOS, on the condition that these databases were accessible to the authors through their institution’s library subscription. Thus, these two leading databases permitted a plethora of recent publications such as Wiley, Science Direct, Emerald, and Springer allowing relevant

literature to be synthesised (Munodawafa & Johl, 2019; Shaffril et al., 2018).

**PRISMA Review Process**

The review process began in May 2020 until June 2020, and the next subsection elucidates the four stages involved, namely identification, screening, eligibility, and inclusion. Figure 2 illustrates the PRISMA flow diagram for the review process and literature search on OPISH and sustainability practices.

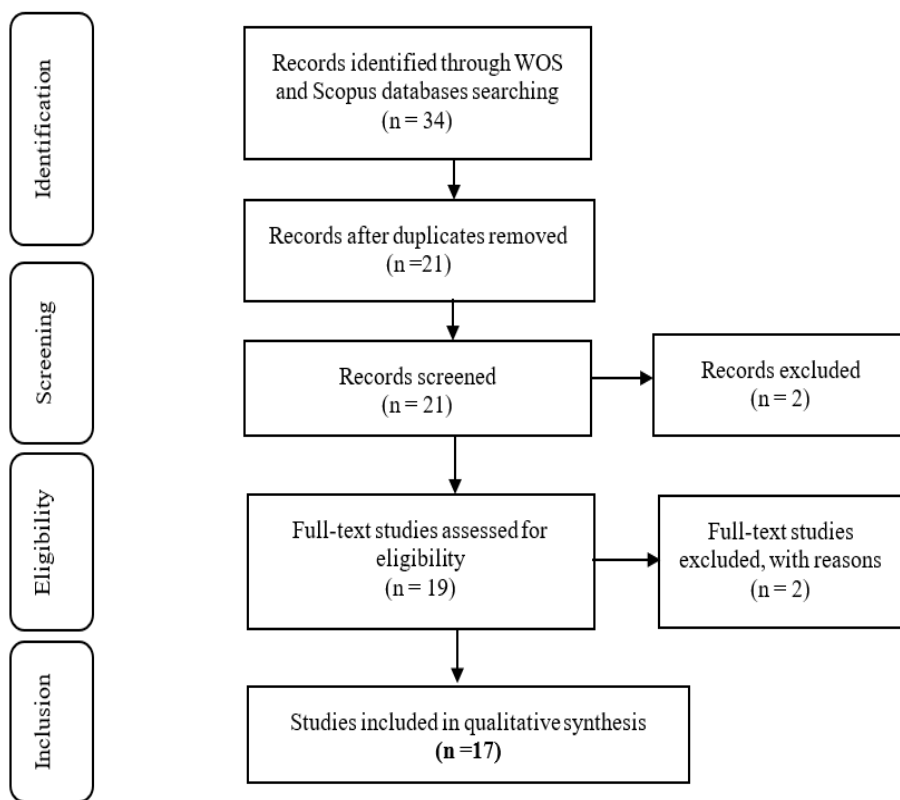


Figure 2. The PRISMA flow diagram for the review process and literature search on OPISH and sustainability practices

Source: Adapted from Moher et al. (2009)

**Identification**

The summarised keywords for searching information were limited to sustainability practices amongst OPISH and oil palm cooperatives, as exhibited in Table 1. The cooperative establishment and its crucial role for clustering OPISH in Malaysia motivate its selection. Furthermore, the cooperative establishment has often been recommended as the best way for agricultural input distribution, enhancing the deliverability of extension services to

encourage sustainability certification while optimising oil palm productivity (Parveez et al., 2021). After merging the search results from the two databases as of June 2020, the results were recorded into one list in Microsoft Excel format, with 34 studies obtained. Combining both databases' publication records into one list was crucial because duplicate studies were expected to be discovered (Munodawafa & Johl, 2019). Subsequently, 13 duplicated studies were removed.

Table 1  
*Keywords for searching information*

Databases	Keywords used	Total
Scopus	TITLE-ABS-KEY (("oil palm cooperative*s" OR "oil palm co-op*s" OR "oil palm smallholder*s") AND ("sustainability" OR "sustainable" OR "social sustainability" OR "environmental sustainability"))	17
Web of Science	TOPIC: (("oil palm cooperative*s" OR "oil palm co-op*s" OR "oil palm smallholder*s") AND ("sustainability" OR "sustainable" OR "social sustainability" OR "environmental sustainability"))	17

*Source:* Authors' compilation

**Screening**

Initial eligibility and exclusion criteria were determined. First, this study only selected peer-reviewed research studies with empirical data, while conference proceedings, book series, and chapters were excluded. Consequent to this, a chapter in the book by Chalil (2013) had to be excluded. Second, this study

excluded non-English publications to avoid ambiguity. Third, the research trend was observed in the Scopus and WOS databases involving the implementation of sustainability practices in the context of OPISH and oil palm cooperatives. Furthermore, in November 2013, the Malaysian Standard, MS 2530:2013 series, or generically called the MSPO Standard,

was launched, which served as a starting point to ensure that Malaysian palm oil was produced responsibly and sustainably (Kumaran, 2019). This line of reasoning justified that a sufficient period to select the studies for this review was seven years from 2013 to June 2020. Subsequently, one study by Susila and Bourgeois (2006) pertaining to the contribution of the oil palm production to economic development, poverty alleviation, and income distribution in Indonesia had to be excluded as it was published in 2006 in *Moussons: Recherche en Sciences Humaines sur l'Asie du Sud-Est*, but was updated as 2013 publication. Finally, studies indexed in social science, business, management and accounting, economics, finance, multidisciplinary, environmental science, and agricultural science were selected. As a result, 19 studies were included to assess the title and abstract.

### **Abstract Assessment**

At this stage, only the remaining 19 studies as identified in the review protocol were chosen for this abstract analysis. Out of the 19 studies selected, two studies were excluded as they did not comply with the objective of this study (Nchanji et al., 2016; Ngan et al., 2019). One study was conducted by Nchanji et al. (2016), who investigated the efficacy of intercropping method by OPISH rather than sustainability practices. The other study by Ngan et al. (2019) examined sustainability indicators for promoting circular economy in the palm oil industry as the case study. Therefore, 17 studies were reviewed for the final in-depth

qualitative synthesis and thematic analysis, summarised in Appendix A.

### **Data Abstraction and Analysis**

The remaining 17 studies were assessed and analysed based on their objectives relevant to achieving this study's aim. For quality assessment, the journal impact factor and citation frequency had been considered, reflecting the quality of the selected studies that went through rigorous review to be accepted into publications (Silva & Memon, 2017). Next, after quality assessment, the selected studies were synthesised to gather the data from these studies. The data were extracted by reading through the abstracts. The full-length review of studies (in-depth) was then conducted using a content analysis approach to distinguish themes related to sustainability practices. The first author curated the themes established based on the factors that support the sustainability practices amongst OPISH, while other co-authors coded selected studies randomly. Finally, the authors discussed the results to address any discrepancies during the analysis (Haider et al., 2018; Shaffril et al., 2020). Once data had been synthesised, organised areas around the themes would be drawn and presented as the results and discussion of this study.

## **RESULTS AND DISCUSSION**

The 17 selected studies have been organised according to the method of data collection: nine studies conducted field surveys (Begum et al., 2018; Choy & Albanya,



2017; Hutabarat et al., 2019; Jelsma et al., 2017, 2019; Moulin et al., 2017; Sarwosri et al., 2020; Schoneveld et al., 2019a, 2019b), while five studies conducted case studies, expert interviews and semi-structured interviews (Ernah et al., 2020; Hidayat et al., 2015, 2018; Hutabarat et al., 2018; Martens et al., 2020), one study employed both survey and semi-structured interviews (Brandi et al., 2015), one study used a matching method (Santika et al., 2019) and one study reviewed empirical research projects (Glasbergen, 2018). Concerning geographical context, 15 studies were conducted in Indonesia, and two were performed in Malaysia, given that these two countries were identified as the two largest palm oil-producing countries (refer to Appendix A). Drawing from the thematic analysis of the 17 selected studies from 2013 to 2020, we discovered that four themes, namely, sustainability certification, agricultural policy and strategies, the heterogeneity of the smallholders, and land settlement schemes, had influenced the sustainability practices amongst the OPISH.

As a result of this thematic analysis, the first theme that emerged was sustainability certification that influenced sustainability practices amongst OPISH (Brandi et al., 2015; Ernah et al., 2020; Glasbergen, 2018; Hidayat et al., 2015, 2018; Hutabarat et al., 2018, 2019; Martens et al., 2020). Ernah et al. (2020) revealed that OPISH, which adopted sustainability certification, yielded more than 15% with fewer pesticides and chemical fertilisers compared to OPISH who applied the conventional agricultural

practices. It was asserted that implementing the best practices in the agricultural sector could be demonstrated through third-party independent certification systems (Jelsma et al., 2019; Kumaran, 2019). However, OPISH was often neglected in certification systems, given that most of them in poverty were usually not reached by certification schemes, and they were located in an area where a cooperative did not exist (Hidayat et al., 2018; Martens et al., 2020). Thus far, voluntary certification schemes have reached approximately 30% of the oil palm cultivated area globally, which indicated that its footprint would never completely reach 100% of the certification system (Kumaran, 2019). It was suggested that sustainability certification must balance economic interests, social benefits, and environmental protection harmoniously; therefore, OPISH who were vulnerable should be given additional incentives to prevent marginalisation (Glasbergen, 2018; Hidayat et al., 2018). Based on their suggestions (Glasbergen, 2018; Hidayat et al., 2018), the government and private entities are urged to consistently assist OPISH, who lack resources to reduce transaction costs and improve their awareness and understanding. Thus, they can be better integrated into the certification process.

Based on this thematic analysis finding, it revealed that the agricultural policy and strategies emerged as the second theme that influenced sustainability practices amongst OPISH (Choy & Albanya, 2017; Jelsma et al., 2019; Moulin et al., 2017;

Santika et al., 2019; Sarwosri et al., 2020). Among the most critical agricultural policy and strategies were the use of high-quality fertilisers and the adoption of the latest technology, which could improve the productivity of oil palm plantations, leading to the economic sustainability of OPISH (Choy & Albanya, 2017). However, it was argued that the surrounding community with the oil palm development was associated with the reduced rate of social and environmental well-being, although the economic sustainability of OPISH increased due to oil palm development (Santika et al., 2019).

Concerning economic sustainability in terms of the financial capacity of smallholders, it is generally expected that smallholders with larger farms and more capital tend to invest in good agricultural practices (GAP) and sustainability practices. These practices will also improve the social and environmental well-being of the surrounding community. However, this sentiment did not hold because smallholders who owned larger farms and had access to financial capital were not more likely to invest in GAP (Jelsma et al., 2019). This scenario was due to the complex amalgam of factors, namely, lack of access to labour and knowledge, inadequate quality of infrastructure, the illegal status of plantations, and other risks (Hidayat et al., 2015; Jelsma et al., 2019). Consequently, these factors signify that although the agricultural policy allocates substantial financial assistance to OPISH, they are locked in these difficulties that

are not amenable to investment toward sustainability, which leads to limited yield potential.

Importantly, OPISH must be strengthened with knowledge, skills, infrastructure, facilities, advanced agricultural technology, and strong institutional structures with adequate incentives to enhance their capacities toward sustainability. Thus, it is crucial to design robust and feasible agricultural policies and strategies that target OPISH. This step is necessary for building and strengthening their capacities to create significant changes in agricultural practices amongst OPISH for higher productivity and better livelihood. Specifically, the existing agricultural policy has to be improved in terms of intensifying and prioritising the transformation of agricultural extension services, collection and redistribution of revenues from the palm oil industry, regulation of tax compliance, the price premium for sustainable palm oil, and engagements in pro-environmental behaviour (Moulin et al., 2017; Santika et al., 2019; Sarwosri et al., 2020).

The third theme that emerged from this thematic analysis was the heterogeneity of the smallholders (Jelsma et al., 2017; Schoneveld et al., 2019a, 2019b). The OPISH typology was often segmented and identified based on their farms' characteristics such as land size, distance from the road, land legality, and acquisition (Schoneveld et al., 2019a). However, OPISH had diverse socio-economic characteristics depending on their migration status, gender, income sources, and aspirations (Schoneveld et al., 2019a).

For classifying OPISH diversity, Jelsma et al. (2017) examined the differences and similarities of OPISH typology based on the role of oil palm in their livelihoods, land legality, market linkages, and production practices. Building upon these diverse characteristics shows that OPISH is not a uniform population. Therefore, it warrants the urgent need to design intervention support by focusing on their socio-economic characteristics, livelihood portfolios, socio-economic status, and aspirations, instead of their farms' characteristics (Jelsma et al., 2017; Schoneveld et al., 2019b). Thus, a solution that will increase OPISH sustainability should be specifically tailored to their diverse characteristics (Jelsma et al., 2017; Schoneveld et al., 2019a, 2019b).

The fourth theme that influenced sustainability practices was the land settlement schemes. It is important, however, to distinguish between land settlement schemes and OPISH in Malaysia. Regarding the land settlement schemes, it is composed of organised smallholders supervised by the government, regional, or state agencies where the organised smallholders receive a monthly income depending on their development and business model (Kushairi et al., 2018; Shaufique, 2017). In contrast, OPISH managed and financed their oil palm farms independently (Omar et al., 2012; Shaufique, 2017). In this connection, Begum et al. (2018) claimed that the improvement of the social, environmental, and economic dimensions of sustainability could be accomplished through the land settlement schemes. This accomplishment

indicates that OPISH should also be given equal supervision and assistance similar to the organised smallholders in the land settlement schemes to achieve social, economic, and environmental benefits.

Based on this discussion, these four identified themes are central to improving sustainability practices in responding to contemporary sustainability issues and mandatory sustainability certification standards. However, the holistic sustainability practices that are effective and beneficial to OPISH must be implemented beyond the sustainability certification standards. The implementation of the holistic sustainability practices requires inclusion and cooperation of the surrounding community of the palm oil development with strong government support (Santika et al., 2019). Therefore, the conventional and inherited agricultural practices that OPISH commonly applies must be changed toward holistic sustainability practices. In order to ensure no OPISH are neglected toward achieving greater sustainability while attaining higher productivity and better livelihood, it is important to provide specific assistance according to their diverse characteristics.

## IMPLICATIONS OF THIS STUDY

This present study provides one significant theoretical implication. The results confirmed that Elkington's (1987) TBL sustainability theoretical framework is an effective and relevant approach to identify themes for improving sustainability practices amongst OPISH. These identified themes

simultaneously portray a complete picture of holistic sustainability practices along the economic, social, and environmental dimensions. Through the PRISMA method, these identified themes will serve as a foundation in developing a conceptual framework for evaluating sustainability practices amongst OPISH by emphasising their important roles, characteristics, and challenges.

Concerning practical implication, these identified themes, sustainability certification, agricultural policy and strategies, the heterogeneity of smallholders and land settlement schemes, are highly relevant and related to implementing holistic sustainability practices amongst OPISH. These relevant themes provide significant insights for policymaking in designing effective strategies and specific incentives toward achieving greater sustainability. In policymaking, these themes offer inclusive perspectives and suggestions to the agricultural policymakers in finding palatable solutions in mitigating challenges that may hinder sustainability practices. These relevant themes will provide guidance to the effective implementation of a mandatory national sustainability certification scheme or MSPO for the entire oil palm planted area, as well as the provision of motivational and financial incentives. Prioritising these themes in policymaking and implementation will help the transformation of the palm oil sector toward a sustainable future.

## **LIMITATIONS AND FUTURE RESEARCH AGENDA**

This study has two limitations. First, the four themes related to sustainability practices amongst OPISH were obtained from secondary data based on a sample of 17 selected studies from 2013 till 2020 from two major Southeast Asia palm oil-producing countries, Malaysia and Indonesia. Second, the PRISMA analysis method on the selected studies identified only four themes along with economic, social, and environmental dimensions. They are sustainability certification, agricultural policy, and strategies, the heterogeneity of the smallholders, and land settlement schemes.

Due to the above limitations, there are three critical areas for future research. First, since this present study involved secondary data, it is recommended that future research focus on primary data such as surveys or interviews for more explicit and in-depth explanations on sustainability practices amongst OPISH. Second, for wider global perspectives on sustainability practices, research is encouraged to be undertaken on bigger samples of relevant palm oil-producing countries in Southeast Asia (Thailand), South America (Colombia and Brazil), and Africa (Nigeria). Comparative research involving cross-countries samples is crucial for identifying similarities and differences in sustainability practices that will reveal the effective and best practices in the palm oil sector, particularly in OPISH. Third, future research should consider other relevant aspects significantly related to

sustainability practices and OPISH. Such aspects are the governance of the palm oil industry, the organisation level of OPISH, the effectiveness of training and skills development for strengthening OPISH capacity, the trade-offs between economic, social, and environmental dimensions when implementing sustainability practices, and the cost for acquiring sustainability certification.

## CONCLUSION

Using the PRISMA method, this systematic literature review effectively identifies themes that influence sustainability practices among OPISH in line with the TBL sustainability theoretical framework. These four identified themes from this thematic analysis are not new aspects related to OPISH in improving yield and livelihood. However, these central themes are highly relevant in providing information on the complete picture of holistic sustainability practices amongst OPISH that revolve around the economic, social, and environmental dimensions. Hence, these specific themes provide significant insights on characteristics, challenges, and suggestions in enhancing sustainability practices compatible with OPISH toward optimising productivity and reducing negative environmental externalities. These significant insights will guide policymaking by formulating important measures and interventions that are not focused only on financial incentives but also on strengthening the capacities of OPISH. Consequently, the capacities of OPISH will enhance through productive

collaboration with other stakeholders in the palm oil sector, namely ministry, agencies, research institutions, industries, and non-government organisations. This collaboration will avoid conflicts by enabling environments for funding, robust infrastructures, capacity building, and skills development for OPISH to enhance sustainability practices.

This study has highlighted the important themes in influencing sustainability practices among OPISH in mitigating sustainability issues and challenges that affect productivity. In response to these issues, two recommendations are highlighted to help OPISH implement holistic sustainability practices. First, OPISH must consistently empower themselves with knowledge and skills through training and education by the agricultural extension officers. The transfer of the latest knowledge and skills from research institutions to extension officers and then to OPISH are crucial in encouraging sustainability practices. Hence, this study agreed with Ernah et al. (2020), who posited that the roles of extension officers in building the capacities of OPISH are important to promote GAP, sustainability certification standards, and influence the best and emerging practices on sustainability. Second, although OPISH is heavily reliant on the traditional ways of doing things in their farming activities, OPISH should focus on innovative technology such as the adoption of advanced industrial drones, application of precision farming, and mechanisation of harvesting tools. These innovations will help OPISH achieve

higher performance in quality, quantity, and income.

#### Notes:

1. Oil palm, scientifically known as *Elaeis guineensis*, is an indigenous West African plant grown commercially in Malaysia since 1917 (Nambiappan et al., 2018).
2. Palm oil is the oil derived from the fruits of the oil palm tree, including crude palm oil and palm kernel oil.

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**APPENDIX**

**Appendix A**

*The 17 selected studies were included in the thematic analysis of this systematic literature review. The references are listed together with their themes, methods and main findings*

Theme	Authors	Methodology	Main Finding	Recommendation
Sustainability certification	Ernah et al. (2020)	Panel data set and interview on 185 oil palm smallholders collected in 2010, 2012, and 2013 in the District of Merangin, Indonesia.	From the economic dimension perspective, it is shown that the yields of sustainability adopters have been noted to increase between 10 % and 15 % in 3 years. While, from the environmental dimension, it is signified that the application of pesticides was deemed more efficient by the sustainability adopters.	Provision of adequate investment for extension services to promote sustainability certification standards among smallholders by implementing small-scale extension projects.
	Hutabarat et al. (2018)	Case study on Oil Palm Smallholders Association in Ukui District, Pelalawan Regency, Riau Province, Indonesia.	Results have shown that certification generated up to 21 % higher revenues from sales, a certification created up to an 8 % loss of net income per hectare on average per smallholder in the first year after certification, compared to the situation before accreditation.	Minor positive impacts on yields after sustainability certification.

Theme	Authors	Methodology	Main Finding	Recommendation
	Brandi et al. (2015)	The survey was conducted with 196 independent smallholders and 71 semi-structured interviews with smallholders, heads of small smallholder groups, mill and plantation company staff, and experts in Indonesia.	The findings showed three types of relevant antecedent variables for smallholder certification, namely at the level of individual smallholders, smallholder organisations, and at the institutional level. Further, the requirements that are difficult for smallholders to comply with are the land titles, seedlings, pesticides and fertiliser usage, and documentation of certain activities.	It is suggested that extensive and well-structured training should be provided to address the certification gaps, and group certification is found to offer more accessible and feasible for smallholders.
	Hutabarat et al. (2019)	Survey data of 829 smallholders both (certified and noncertified) in Riau, Sumatra, Indonesia.	Significant factors related to smallholders' yields are tree age, plantation on mineral soils, use of good plant material, and applying good harvesting practice.	Certified sustainable smallholders were determined to have a higher annual yield per hectare compared to noncertified smallholders.
	Martens et al. (2020)	This case study involved expert interviews and semi-structured interviews with 25 smallholders in Jambi, Sumatra, Indonesia.	Independent smallholders' motivation to participate in certification schemes seems a proactive risk-reduction approach rather than a reactive one that could help smallholders become sustainable.	Roundtable on Sustainable Palm Oil (RSPO) has failed to meet good governance conditions toward sustainability.

Theme	Authors	Methodology	Main Finding	Recommendation
	Hidayat et al. (2015)	This study conducted semi-structured interviews with 66 certified smallholders (34 scheme smallholders and 32 OPISH) in Indonesia.	Certification encourages the transformation of the fragmented and uncontrolled plantation into an organised one. Certification requires organisational changes which are needed in the process. Consequently, the new organisational structure provides solidarity, training, and innovations, which secures their ability to comply with the production methods.	It concurs that the smallholders do not fully understand certification as a tool to create more sustainable agriculture. Instead, certification is regarded as an economic tool for a better livelihood. The smallholders are less valued at non-economic benefits from certification, such as social and environmental improvements, unless they lead to economic benefits.
	Hidayat et al. (2018)	This study used a policy-driven and problem-driven approach based on the interviews with 45 informants involved in oil palm production and/or Indonesian Sustainable Palm Oil (ISPO) certification.	Different types of smallholders have various reactions to ISPO enforcement. It is worthwhile for ISPO to diversify its strategies and implementation for smallholders.	ISPO's certification process needs a redesign, particularly if it aims to include smallholders who need incentives to comply with the scheme. ISPO requires a more balance between sustainability objectives and economic interests, combined with a more authoritative and better-equipped implementation and enforcement mechanism.

Theme	Authors	Methodology	Main Finding	Recommendation
	Glasbergen (2018)	This paper reflects on various empirical research projects from Indonesia and the Netherlands based on diverse methodologies, including surveys, case studies, interviews, tens of focus groups and observations.	This study emphasised the problems posed to smallholders in the certification process, namely different preferences in certification outcomes that are primarily economically driven rather than social and environmental aspects, smallholder's understanding of certification is low, premium fees from certified commodities are uncertain, and farmers' organisation structures are weak.	Economic sustainability needs to be the basis of sustainable change in palm oil production. Incentives that improve smallholders' output and income are crucial given that low price premiums and unstable prices. Thus, better environmental and social conditions can only be achieved with better economic prospects.
Agricultural policy and strategies	Choy and Albanya (2017)	Survey data of 58 smallholder respondents in Lahad Datu, Sabah, Malaysia.	From the economic dimension perspective, it has shown that the majority of the smallholders have income above the national poverty income level.	Given that their agricultural activities are carried out via sustainable practices, the smallholder's income is viable based on continuous courses, training, and seminars by the agency.
	Jelsma et al. (2019)	Survey data of 231 smallholders included 30–40 smallholders based in Riau, Sumatra, Indonesia.	Results have shown that yields remained poor, and the implementation of good agricultural practices (GAP) are limited based on plantation assessment.	Strategies must be tailored to specific farmers' characteristics to be effective.

Theme	Authors	Methodology	Main Finding	Recommendation
	Sarwosri et al. (2020)	A framed field experiment with 636 smallholders who managed oil palm, rubber, or both were carried out in Jambi Province, Indonesia.	Results have shown that a price premium of 50% has successfully reduced the trade-off, and providing information on environmental conditions to smallholders has been found to affect their decisions about rainforest conservation positively.	Certain policies could mitigate trade-offs between sustainability dimensions at the smallholder level.
	Moulin et al. (2017)	Survey data of 45 oil palm plantation blocks belonging to the oil palm company and 88 smallholders' oil palm plantations in Indonesia (19 scheme, 69 independent). Industrial practices and fresh fruit bunch (FFB) yields were extracted from records of the 2012 inflows and outflows records.	The results have shown that smallholders' practices notably differed regarding the number of agricultural inputs (i.e.: glyphosate and paraquat annual rates). The low inputs were associated with very low yields in smallholders' plantations, and such low yields are not sustainable in economic prospects.	The agronomic knowledge regarding the oil palm cropping system for smallholders is essential to improve oil palm cultivation sustainability. However, increasing this access should increase extension services and capacity building by the relevant agencies to hinder the overuse of fertilisers and herbicides that can pose environmental impacts.

Theme	Authors	Methodology	Main Finding	Recommendation
	Santika et al. (2019)	This study employed a matching method to select villages with no oil palm plantations and villages where plantations had been developed in Indonesia. The five dimensions are used for measuring villagers' well-being, namely basic, physical, financial, social, and environmental.	Results have shown that plantations developed in villages with low to moderate forest cover were associated with improved socio-economic well-being compared to villages without oil palm development. However, the results were contradicted for plantations developed in remote villages with higher forest cover. This finding signified that villages with oil palm plantations were more associated with a reduced rate of social and environmental well-being rather than villages without oil palm development.	This study revealed that villagers are burdened with unsustainable livelihoods, increased socio-economic disparity and environmental issues due to oil palm development, while a small number of elites may take the largest share of economic benefit. Thus, the government is urged to improve spatial land policy for palm oil, fiscal policy on collection and redistribution of revenues, monitoring and regulation of tax compliance, and data sharing and transparencies among different ministries involved in this sector.
The heterogeneity of the smallholders	Jelsma et al. (2017)	Survey data of 231 smallholders in Riau, Sumatra, Indonesia.	Findings demonstrated the seven unique groups of smallholders, which affirmed they are not a uniform population.	This diversity warrants adoption of more actor-disaggregated intervention approaches to promote the upgrading of practices and standards compliance.

Theme	Authors	Methodology	Main Finding	Recommendation
	Schoneveld et al. (2019a)	Plot survey of converted lands containing peat and natural forests for oil palm in Indonesian Borneo.	Results showed how oil palm plantation plots are based on socio-economic characteristics and prior experiences of oil palm growers.	Smallholders on both forested and non-forested peatlands experience the highest regulatory noncompliance levels, the lowest adoption rates of GAP, and the highest fire hazard rates.
	Schoneveld et al. (2019b)	Survey data of 947 randomly selected independent smallholder plots in Kalimantan.	The heterogeneity of independent oil palm smallholders reveals structural compliance gaps, which threatens to restrict smallholder access to formal markets in the future.	Intervention strategies to resolve these compliance gaps can be more impactful when these are adapted to smallholder livelihood assets, portfolios, and processes.
Land settlement schemes	Begum et al. (2018)	Survey data of 50 smallholders in Jerangau, Dungun, FELDA Terengganu, Malaysia.	Environmental –70% of respondents practice a high level of awareness to protect the environment. Economic –80% of the respondents have strongly agreed that it has brought meaningful economic development.	The government’s land settlement schemes have facilitated the sustainability practices, which, in turn, led to a positive outcome for the smallholders.

Source: Researchers’ compilation