

FROM CHALLENGES TO OPPORTUNITIES: LEGAL REFORMS FOR SMALLHOLDERS IN MALAYSIA'S PALM OIL MARKET

Arif Husaini Mohammad Rohimi, Haniff Ahamat
Faculty of Law, Universiti Kebangsaan Malaysia (UKM)
Jalan Tun Ismail Ali
43600 Bangi, Selangor Darul Ehsan

*Corresponding author's email:
a186488@siswa.ukm.edu.my

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ABSTRACT

Malaysia has given a lot of importance to the palm oil industry which is a strong pillar in its economy. The palm oil industry plays a vital role for the country's income and has provided employment for millions of locals (Ritchie & Roser, 2024). The industry has impacted not only economically but also influenced the social and environmental landscapes across the nation (Siti-Dina et al., 2023). The cultivation of oil palm fruits and the process of harvesting them are the activities associated with the upstream part of the palm oil industry (Santosa, 2008). This is one of the critical points, which have a direct implication with the given overall yield of the palm oil and its quality. In this phase, seeds of the oil palm are sowed on the land once it has been prepared and all the vegetation removed. The planted trees require constant management for them to grow healthy and thus require fertilizing, weeding, and pest control (Darras et al., 2019). The fruits of the oil palm trees are harvested and taken to the mills to undergo further processing if and when they have ripened. The quantity and quality of the harvested fruits are crucial factors that determine the final palm oil product's qualities and value. This includes the entire upstream process, from planting to harvesting (Ng et al. 2013).

In this diverse and sophisticated market, smallholders serve essential and yet relatively unseen tasks. Smallholders are farmers who own and manage oil palm cultivation areas of 40.47 hectares (100 acres) or less according to Section

2 of the Malaysian Palm Oil Board (Licensing) Regulations 2005 P.U.(A) 516/2005. They are responsible for about 40% of the total area under cultivation of oil palm thus can greatly influence the production (Yap et al. 2021). Smallholders in the upstream sector of the palm oil industry often face vulnerability and limited bargaining power compared to larger plantation companies (Rival & Levang, 2014). Their lack of awareness of new technologies and best practices, coupled with insufficient financial resources, makes it difficult for them to meet RSPO and MSPO requirements. This places them at a disadvantage, and as global demand for certified sustainable palm oil (CSPO) increases, they risk exclusion from the global CSPO supply chain (Nagiah & Azmi 2013; Rival & Levang, 2014).

Challenges faced by the smallholders in upstream palm oil industry are huge especially in regulatory framework (Marzukhi et al., 2021). It is utmost important for the government to provide an effective market regulation that ensure the sustainability and equitable development of the palm oil industry particularly on the upstream level and for the benefits and protection of the smallholders. Currently, the regulatory framework in Malaysia includes a mix of governmental policies, legal statutes, and industry standards aimed at ensuring the sector's growth while addressing socio-economic and environmental concerns.

A comprehensive and well-structured legal framework that regulate palm oil industry is important in promoting sustainable development of the palm oil industry, especially in the upstream sector where smallholders face various challenges. Several laws and regulations have been implemented by the government to govern the sector including but not limited to: Malaysian Palm Oil Board Act 1998 (Act 582), Malaysian Palm Oil Board (Licensing) Regulations 2005, P.U.(A) 516/2005, Land Acquisition Act 1960, the Environmental Act 1974, and the Malaysian Sustainable Palm Oil (MSPO) standards. These regulations however, although provides a mean of legal basis for the operation and regulation of the sector, their effectiveness in

ensuring smallholders' interests and promoting sustainable practices are still an ongoing debate and subject to improvements.

Although the existence of regulatory frameworks, smallholder still faces difficulties in complying with regulations, accessing financial resources, and maintaining competitive market positions (Marzukhi et al., 2021). Challenges faced by the smallholders are many especially challenges in relation to land rights, lack of government aids, financial instability, middlemen exploitation, lack of market access, cultivation issues, lack of knowledge and skills, labour conditions, environmental compliance, anti-competitive behaviour and fair pricing (Azima et al., 2018; Hussin et al., 2012; Jalil et al., 2014; Ligong & Imang, 2017; Manaf & Choy, 2015; Mazlan et al., 2020; Md Ali, 2021; Rose & Elias, 2021; Shafiai et al., 2020; Shafinah et al., 2013). Smallholders are not only poorly resourced and informed, but it is also problematic for them to comprehend the legal and bureaucratic elements of the sector. This is due to the complexity of the regulatory environment.

There is a need to analyse the legal implementation of the upstream market regulation of the Malaysian palm oil industry, particularly in favour of the smallholders. This will provide a more holistic voice to the ongoing debate surrounding fair growth and sustainable development in the palm oil sector, by analysing the legislation and policies in place, identifying the elements that work and the ones that do not or cannot, and by discussing the impact it has on smallholders. The research will not only inform on-going efforts to improve the regulatory environment and living standards of smallholders in the palm oil sector, but benefits policymakers, industry stakeholders and smallholder communities more broadly.

OVERVIEW OF THE MALAYSIAN PALM OIL INDUSTRY

Malaysia's palm oil industry is a complex landscape where smallholders play an indispensable role. This industry, the second

largest globally, is structured into three distinct levels: upstream, midstream, and downstream. The upstream sector, where cultivation, harvesting, and initial processing occur, is the domain of smallholders (Pahmi et al., 2022). They are the backbone of the industry, contributing significantly to the country's economy and rural development.

The players of the upstream palm oil industry are three: private estates (plantation companies), government schemes, and smallholders. According to Hai (2002), plantation companies that are involved in Malaysia are Kumpulan Guthrie Berhad, Golden Hope Plantations Bhd, Kuala Lumpur Kepong Berhad, IOI Corporation Berhad, Sime Darby Berhad, Kuala Sidim Berhad, Kulim (Malaysia) Bhd, PPB Oil Palms Berhad, Tradewinds (M) Berhad, Highlands & Lowlands Berhad, Austral Enterprises Bhd, Asiatic Development Berhad, TDM Plantation Sdn. Bhd, Hap Seng Consolidated Berhad, United Plantations Berhad, Pamol Plantations Sdn. Bhd., Guthrie Ropel Berhad and IJM Plantations Sdn. Bhd. Private estates, owned by these plantation companies, account for 60% of the total planted area. These companies, varying in size, have significantly contributed to the growth of palm oil production in the last two decades, particularly in Sabah and Sarawak Government schemes, notably FELDA (Federal Land Development Authority), FELCRA (Federal Land Consolidation and Rehabilitation Authority) and RISDA (Rubber Industry Smallholders Development Authority), play a crucial role in rural development and poverty reduction by allocating land to settlers and providing infrastructure and support services. Smallholders, who own smaller plots of land, are vital contributors to the overall production of crude palm oil. These three players collectively drive the cultivation, harvesting, and initial processing of oil palm fruits, forming the backbone of the Malaysian palm oil industry's upstream sector.

Smallholders, defined as those with less than 40 hectares of land, account for a remarkable 40% of Malaysia's total palm oil production (Yap et al., 2021). This demonstrates their essential role in meeting global demand for this versatile commodity. Moreover, palm oil cultivation provides livelihoods for millions of Malaysians, particularly in rural areas where employment opportunities are often scarce (Ahmad et al., 2023). The industry's positive impact extends beyond economics, contributing to infrastructure development, improved living standards, and poverty reduction in rural communities (Er & Siwar, 2015).

However, the path for smallholder is not without obstacles. Independent smallholders in the Malaysian palm oil industry face challenges such as limited access to resources and knowledge, dependence on intermediaries, and difficulties in achieving certification, all of which hinder their productivity and sustainability (Pahmi et al., 2022). Limited access to institutional, technical, and financial support, impede their ability to adopt modern agricultural practices and improve their yields. Additionally, a lack of knowledge and awareness of best practices can lead to inefficient resource use and potential environmental harm. The dependence on intermediaries for selling their produce often results in unfair pricing and limited bargaining power. Furthermore, achieving certification, such as the MSPO, is often out of reach due to the high costs and complex requirements involved. These combined challenges result in lower yields and efficiency compared to larger plantations, further marginalizing smallholders in the industry.

Yietal.,(2018)highlighttheinterdependence among the various layers of Malaysia's palm oil industry, which operates under a weakening oligopolistic market structure especially in palm oil refining industry. At the upstream level which also exhibits oligopolistic tendencies, mostly controlled by a few giant firms that include plantation companies, decisions such as the kind and extent of cultivation, tonnage

production, prices for the raw product among others can greatly affect downstream. More than that, these firms also determine the availability of CPO while controlling market factors that affect the midstream functions like refining and processing. Also, their strategic decisions have an impact downstream in influencing global price setting and trade talks and final consumers' choice of premium products. On the other hand, the requirement of the downstream players, such as consumers and certification authorities, pressures the upstream actors to practice and improve on sustainability standards (Hafizuddin-Syah et al., 2018; Pahmi et al., 2022). This interplay is an indication of how the layers of the palm oil value chain are intertwined to influence another in the production and distribution system and therefore economic and environmental effects as well as regulation (May, 2012).

Understanding these challenges is crucial for a comprehensive analysis of how market regulations impact smallholders. It provides the necessary context to assess the fairness, effectiveness, and potential unintended consequences of legal interventions in the upstream sector. In the following sections, we will delve into the legal framework governing this sector, examining how regulations shape the landscape for smallholders and explore potential avenues for reform to ensure a more equitable and sustainable future for this vital segment of the industry.

MARKET REALITIES OF PALM OIL AND THE SMALLHOLDERS

The Malaysian palm oil industry is a complex landscape with distinct upstream, midstream, and downstream sectors. Smallholders, defined as those with less than 40 hectares of land, play a crucial role in the upstream sector, accounting for 40% of Malaysia's total palm oil production (Yap et al., 2021). This explains why they play a key role in satisfying demand on an international level as well as stimulating the rural economy and combating poverty (Ahmad et al., 2023; Er & Siwar, 2015).

However, smallholders face numerous challenges. Limited access to resources, knowledge, and markets, coupled with vulnerability to price fluctuations and unfair trade practices, hinder their productivity and profitability (Pahmi et al., 2022). These issues are compounded by the current trade regulation measures which when formulated aim at enhancing fair trade and sustainable practices however they have negative impacts on smallholder producers.

The Malaysian Palm Oil Board (MPOB) plays the role of market regulation, setting quality standards, providing smallholder support, and intervening in the market when needed (Mahat, 2012). The MPOB's daily reference price for fresh fruit bunch (FFB) to trigger its buying price scenario, while it is intended to improve on transparency, tends to lag behind actual market signals for fresh fruit bunch and as a result, smallholders operate under the looming threats of bargaining power of mills/dealer (Abiddin et al. 2023). The presence of middlemen in the supply chain further complicates the issue, as they may exploit their position to offer unfavourable prices to smallholders who lack direct market access (Rahman 2020).

The Malaysian Sustainable Palm Oil (MSPO) certification, while beneficial for market access, poses a financial burden on smallholders due to the high costs associated with achieving and maintaining certification (Rahman 2020). Additionally, quality standards, though necessary for ensuring product quality, can be disproportionately burdensome for smallholders who lack the resources to invest in technology and training (Rahman 2020).

The existing legal aspect concerning the upstream sector such as the Malaysian Palm Oil Board Act 1998, MPOB (Licensing) Regulations 2005, and the MSPO Certification Scheme has the fail-safe for the smallholders. Nevertheless, as it stands, there will still be shortfalls in the level of compliance achieved, or lack of it and the increased level of bureaucracy, which

usually puts the smallholder at a disadvantage.

Therefore, most of the smallholders are subjected to formal as well as informal pressures. Apart from them, there is also a legal factor, that is, issues of owning land, problems of government support, fluctuating market prices, and environmental issues (Jalil et al. 2014; Ligong & Imang 2017; Manaf & Choy 2015; Mazlan et al. 2020). Informal challenges include generational renewal issues, lack of knowledge and skills, financial instability, and cultivation issues (Hussin et al. 2012; Jalil et al. 2014; Manaf & Choy 2015; Md Ali 2021; Shafiai et al. 2020; Shafinah et al. 2013). All these challenges rightfully explain why the smallholders are in a situation where they are unable to effectively and efficiently compete for markets and resources with the plantation companies.

To resolve these issues, a combination of strategies is required. It is crucial to turn to the necessity of the changes in the system of market regulation to raise the fairness and transparency prices. Maintaining and supporting the smallholder management cooperatives and associations also aids in the process as well as simplifying the process of certification to MSPO and avails financial and technical support. On the same note, the sustainable practices and environmental issues play a crucial role in sustaining the palm oil industry and smallholders' welfare.

This is a clear call for a change of paradigm on the approach towards the market regulation of Malaysian palm oil industry as proposed in the existing literature. That is why it is crucial to continue focusing on the smallholder sector, unlocking its full potential and providing better conditions for them to work so hard to develop this important segment of the Malaysian economy.

LEGAL FRAMEWORK GOVERNING THE UPSTREAM SECTOR

There are three main regulatory institutions that govern the palm oil market in Malaysia, each with distinct responsibilities. According to Mahat (2012), the Malaysian Palm Oil Board (MPOB) is central, setting quality standards, providing smallholder support, and intervening in the market when needed. The Malaysian Palm Oil Council (MPOC) focuses on marketing and promoting Malaysian palm oil globally, while the Ministry of Agriculture and Food Industries (MAFI) formulates policies, coordinates efforts across agencies, and represents Malaysia internationally. Together, these institutions ensure the sustainable development of the industry, balancing economic growth with environmental and social considerations.

The upstream palm oil sector in Malaysia is governed by a complex web of laws and regulations, each with implications for smallholders. The legal framework that directly protects smallholders' interest of the palm oil industry especially in the upstream level are the Malaysian Palm Oil Board Act 1998 (Act 582), Malaysian Palm Oil Board (Licensing) Regulations 2005, P.U.(A) 516/2005 and the Malaysian Sustainable Palm Oil (MSPO) Certification Scheme. Malaysian Palm Oil Board (MPOB) Act 1998 establishes the MPOB as the regulatory body for the palm oil industry, governing licensing, quality control, research, and development, it also sets and indirect rules for fair trade practices, preventing monopolies and ensuring fair prices for both producers and consumers as it empowers the MPOB to take necessary actions to promote fair competition, protect consumers, and ensure the sustainable development of the palm oil sector. Meanwhile, MPOB (Licensing) Regulations 2005 details licensing requirements for various activities in the palm oil supply chain, including cultivation, processing, and trading. Both the Malaysian Palm Oil Board (MPOB) Act 1998 and (Licensing) Regulations 2005 specifically address smallholders by setting

licensing requirements tailored to their scale of operation. They ensure smallholders have legal recognition and access to the market.

The Malaysian Sustainable Palm Oil (MSPO) Certification Scheme is a mandatory sustainability standard covering environmental, social, and economic aspects of palm oil production. While mandatory for all producers, the MSPO scheme has specific provisions to support smallholders in achieving certification, such as according to Kumaran (2019) the Malaysian government has provided financial assistance to cover MSPO auditing fees for smallholders, growers, and processing facilities. This initiative is part of the government's commitment to support the implementation of MSPO certification and to help reduce the costs associated with obtaining it, recognizing their unique challenges and constraints. As of 27 June 2024, according to MPOCC(2024), there are 571,706.70 hectares of land held by independent smallholders certified under MSPO Part 2 whilst 477,934.60 are held by organised smallholders certified under MSPO Part 3. According to MPOB (n.d.) and Aziz et al. (2021) certified MSPO smallholders in Malaysia receive numerous government benefits that enhance their livelihoods and sustainability practices. These include financial aids, reduced costs for pesticides and fertilizers, and free ongoing technical support. Certification ensures safer working practices and protects smallholders' rights, leading to higher yields and incomes. As suppliers of sustainable palm oil, they gain market access and preferment from certified processing mills. Participation in Sustainable Palm Oil Clusters (SPOCs) enables larger-scale production, while continuous knowledge growth and recognized land rights secure their future in the industry.

In relation to land related legislation, smallholders interest are governed by the National Land Code (Revised - 2020) Act 828, Land Acquisition Act 1960 (Act 486) and State Land Enactments in which in Malaysia each states have its own land laws that complement

the National Land Code and regulate land matters specific to that state. The National Land Code governs land ownership, use, and transactions, including acquisition, alienation, and leasing for agricultural purposes whilst Land Acquisition Act 1960 provides the legal basis for the government to acquire private land for public purposes, including palm oil plantation development.

Additionally, there are several environmental protection legislations that needs to be adhered by palm oil plantation farmers which directly impacts smallholder. The Environmental Quality Act 1974 (Act 127) provides for environmental protection, which regulate activities that may cause pollution or degradation, such as land clearing, waste management, and agrochemical use. Meanwhile, Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, P.U.(A) 362/1987, mandates Environmental Impact Assessment (EIA) for projects with potential significant environmental impacts to identify and mitigate adverse effects. Natural Resources and Environment (Prescribed Activities) (Environmental Impact Assessment) Order 2015, P.U.(A) 195/2015 on the other hand specifies activities requiring EIAs and the assessment process.

In addition, there are many other legislations that indirectly contribute towards smallholder interest. One example is Farmers' Organization Act 1973 (Act 109) which provides provisions and mechanisms that empower and support small-scale farmers, including those in the oil palm sector. By enabling collective action, service provision, and policy influence, the Act indirectly and directly contributes to protecting and promoting the interests of smallholders. On the direct side, Section 15 and Section 16 deals with financial assistance for their welfare and in the advancement of agriculture. Indirectly, this Act supports the smallholders through provisions such as Section 14 that indirectly supports the economic and social interests

of smallholders by establishing a framework for effective leadership, accountability, and transparency within farmers' organizations. Section 4 creates legal basis for forming organizations by the smallholders and Section 9 that would provide for these organizations to also present the smallholders' interests. In further, Section 21 allows the research and representation in the marketplace, which has a positive impact on the smallholders since they receive information and access to market.

In ensuring fair and a level playing field for all market players, promoting competition and benefiting consumers, Competition Act 2010 (Act 712) comes into play (Rahman & Ahamat 2020). In the context of the palm oil industry, competition law plays a crucial role in preventing cartels, monopolies, and other practices that could artificially inflate prices or restrict market access for smallholders and independent mills (Sogen, 2023). By ensuring fair competition, the Act protects the interests of all stakeholders in the palm oil supply chain, contributing to a more sustainable and equitable industry. Competition Act 2010 prohibits anti-competitive agreements through Section 4 of the Act. Section 4(1) of the Act prohibits horizontal agreements (agreements between competitors at the same level of the supply chain) that have the object or effect of significantly preventing, restricting, or distorting competition in any market for goods or services. Whilst Section 4(2) provides examples of horizontal agreements that are considered anti-competitive, including agreements to fix prices, share markets, or rig bids. In furtherance of that, the Act provides for protection of the smallholders from abuse of power by entities in dominant position through Section 10 of the Act in which prohibits companies with a dominant position in the market from abusing their power to the detriment of competitors and consumers. This includes practices like predatory pricing (selling below cost to drive out competitors), exclusive dealing (forcing customers to buy only from them) and tying (bundling products together to restrict consumer choice) (Rahman & Ahamat, 2020).

On the other hand, Pesticides Act 1974 (Act 149) and Pesticides Regulations 1984, P.U.(A) 251/1984 are both legal frameworks that has also impacted in serving smallholder interest. Both of these legislations serves in regulating the use of pesticides to protect human health and the environment (Kennedy et al., 1998), which indirectly benefits smallholders by ensuring safer working conditions and preventing contamination of their land and water sources (Rahman, 2021). Meanwhile, the Occupational Safety and Health Act 1994 (Act 514) is a comprehensive legislation designed to ensure the safety, health, and welfare of all workers, including those on smallholder palm oil plantations (Kennedy et al., 1998). While not specifically targeting smallholders, the act's provisions extend to all workplaces and employees, thus safeguarding the interests of smallholder plantation workers. According to the Department of Occupational and Safety Health (2006), OSHA mandates that employers provide a safe and healthy working environment, ensuring the safety of machinery, equipment, and substances, and providing adequate training and supervision. For smallholders who are also workers, OSHA is particularly crucial as it protects them from hazards associated with agricultural work, such as exposure to pesticides and machinery accidents. By enforcing safety standards and promoting a culture of safety, OSHA contributes to the well-being and productivity of smallholder plantation workers.

To operate legally, smallholder upstream palm oil plantation owners need licenses from MPOB to operate legally. According to MPOB (n.d.), to obtain a smallholder plantation license from MPOB, applicants must be a valid business entity with proof of registration, own or lease land suitable for oil palm cultivation with proper documentation and engage in the sale and transfer of fresh fruit bunches (FFB) from their plantation, which must be less than 100 acres. Additionally, they must obtain the Malaysian Sustainable Palm Oil (MSPO) certification within six months of license approval to ensure compliance with sustainable palm oil production standards.

The aforementioned acts and regulations collectively form a comprehensive legal framework for the upstream palm oil sector in Malaysia, impacting smallholders in various ways. While challenges remain in implementation and enforcement, the existing legal framework provides a foundation for balancing economic development with social and environmental sustainability in the palm oil industry.

THE CHALLENGES

Smallholders are defined as those owning not more than 100 acres of the plantation land and include many plantation farmers within the Malaysia region and the palm oil industry. Nevertheless, they encounter several challenges that can be classified as formal or informal for upstream palm oil market, and which may affect legal structures for regulating the market significantly.

The legal barriers, derived from the system and regulation, are the poor quality of the governmental support, the compromise of land property status, unstableness of the market price, and the issues of environmental responsibility. Smallholders report that government aid is often insufficient and inefficiently distributed (Mazlan et al., 2020). The lack of transparency and accountability in aid distribution raises legal concerns regarding fair allocation and potential corruption. Also gone unsaid is the lack of a specialized body to oversee the plantation's smallholder and give necessary support to farmers (Azima et al., 2018; Jalil et al, 2014).

Another major challenge is in the agrochemical industry particularly pertaining to the pesticides and fertilizer (Carvalho, 2006). The agrochemical industry markets in Malaysia demonstrated a characteristic of oligopoly with monopolistic competition elements as there's traces of oligopoly characteristics which is only a few dominant firms and a high barrier of entry into the market, and monopolistic competition element being companies

differentiate products, have limited price control, and compete with numerous sellers (Onozaki & Yanagita, 2003) as observed from an industrial report from Mordor Intelligence (n.d.) and Dani (n.d.).

In addition to that, according to Taylor and Moss (2013) there is an issue of anti-competitive behaviour as the world fertilizer industry's history of cartels and its current concentrated structure suggests that there is a high likelihood of anti-competitive coordination among major fertilizer producers, potentially leading to practices like price-fixing or output restrictions. The world fertilizer market is controlled by a few powerful players. In addition to that, limited access to fertilizers and the necessity to use lower quality alternatives further hinder smallholder's oil palm output. The cumulative effects of these challenges can lead to food insecurity at both household and national levels, making worse of current existing inequalities in the agricultural sector particularly the oil palm industry. According to Othman and Jafari (2014) Malaysia's heavy reliance on potash in oil palm industry raises competition concerns. The country's dependence on a limited number of global potash producers and exporters with significant market power could potentially lead to anti-competitive practices as these producers and exporters may abuse their position in determining the prices.

This is as well true in the world's pesticides industry. 74% of the world pesticide market share are concentrated on 5 corporations (Tsolomyti et al., 2021). As of now, the companies has went through many mergers and acquisition which lead to world 5 big players namely Syngenta (merged with ChemChina's Adama), Bayer Crop Science (acquired Monsanto), BASF, Corteva Agriscience (formed by the merger of Dow and DuPont), and FMC (which acquired a significant part of DuPont's pesticide business) (Dowler, 2020; Tsolomyti et al., 2021). The concentration on these companies is significant and can determine the world's pesticide industry

trajectory. The ability of determination may lead to anti-competitive behaviour and abuse of power. Although their conduct is controlled to some extent by the world regulatory bodies, consolidation in the pesticide industry could harm competition, leading to higher prices and fewer choices for smallholders in the palm oil industry.

The effect of the market concentration especially on Malaysia's pesticide market are significant as local companies are dependent on these world players, these lead to abuse of their dominant power on these local companies which impacts smallholders who at the same time are dependent on the supplier.

Furthermore, the lack of enforcement and supervision in the industry may lead to anti-competitive behaviour such as abuse of dominance or collusion among agrochemical suppliers or parties having stakes in the industry such as the middlemen (Ali et al., 2018). Smallholders are at disadvantage as they had to agree to agriculture middlemen pressures to produce high quality products in which leads to them borrowing money and excessive use of agrochemical on produces that may lead to detrimental effect on consumers (Ali et al. 2018).

Land ownership issues are another major formal challenge. Many smallholders lack clear land titles or face issues related to customary land rights according Manaf and Choy (2015). This is because where there seems to be or are ambiguous borders and/or conflicting claims to title or ownership of land credibility and practice integrity of sustainable investment is likely to be hampered.

Unstable market prices, often influenced by the influx of imported crops and the lack of direct market access, pose a significant challenge for smallholders (Jalil et al. 2014). This has a ripple effect of influencing farmers to plan and invest inappropriately and it results in exploitation from middlemen (Azima et al. 2018; Ligong & Imang 2017; Rose & Elias 2021).

Environmental sustainability is a growing concern in the palm oil industry especially on the upstream level. The large-scale clearing of forests for palm oil plantations by the smallholders and other players in the palm oil industry has led to deforestation, loss of biodiversity, and other environmental problems (Ligong & Imang 2017). These practices have drawn international criticism and raise legal questions regarding the enforcement of environmental laws and regulations.

Informal challenges, stemming from the internal conditions of smallholders, include the reluctance of younger generations to participate in the sector, lack of knowledge and skills, financial instability, and cultivation issues. The aging workforce and lack of succession planning pose a long-term threat to the sustainability of smallholder plantations (Hashim et al. 2020; Saad et al. 2017).

The lack of knowledge and skills among smallholders regarding modern technologies, best practices, and business management hinders their productivity and profitability (Hussin et al. 2012). Many smallholders continue to rely on traditional methods, which can be less efficient and may negatively impact the environment. Additionally, limited understanding of business management principles can make it difficult for them to effectively negotiate contracts, access credit, and navigate the complexities of the market.

Financial instability is a significant challenge for smallholders in the palm oil industry. The volatile nature of global palm oil prices leaves them vulnerable to income fluctuations, making it difficult to plan and invest in their farms (Shafiai et al. 2020). Furthermore, limited access to credit due to a lack of collateral or credit history often forces smallholders to rely on informal lenders, who may charge exorbitant interest rates (Shafiai et al. 2020). This financial precariousness can hinder their ability to adopt modern technologies, improve productivity, and invest in sustainable

practices, ultimately perpetuating a cycle of low income and limited growth potential.

Lastly cultivation issues pose a significant hurdle for smallholders in the palm oil industry. The issues that are raised from this is such as difficulties in obtaining quality seeds and seedlings, pest and disease management, and meeting quality standards, also affect smallholders' productivity and income (Jalil et al. 2014; Manaf & Choy 2015; Md Ali 2021; Shafinah et al. 2013).

IMPACT OF MARKET REGULATIONS ON SMALLHOLDERS

Market regulations in Malaysia, including the Malaysian Palm Oil Board's (MPOB) daily reference price for fresh fruit bunches (FFB), aim to promote transparency and fairness in the market according to MPOB (n.d.). However, challenges remain. The reference price, while helpful, does not reflect real-time market fluctuations, and the lack of a fixed price leaves smallholders vulnerable to bargaining power imbalances with mills and dealers (Abiddin et al., 2023). The existence of middlemen in the supply chain intensifies the problem as they may use information power and control power to offer unfavourable low prices to smallholders (Rahman, 2020). These smallholders are also at the same time are dependent on the middlemen as they do not have access to the wider market. Such tactics are not very transparent and fair in the structures of giving out reasonable prices that ensure the economic stability of smallholders' operations.

Another significant factor concerning the licensing and certification, especially the MSPO certification, is the smallholders' benefits and barriers. At one hand, certification can open doors to premium markets and enhance the reputation of Malaysian palm oil. Nevertheless, their costs of achieving and keeping certifications including audit costs and other compliance measures can be a strong limitation for smallholders (Rahman, 2020). This kind of bureaucracy in certification

may make it even harder for smallholders to partake in certification hence shutting them out of great markets that will boost their economic status.

The quality standards imposed on palm oil production, while necessary for ensuring product quality and safety, can disproportionately affect smallholders. These standards are typically met through procurements in technology and equipment, as well as training; costs that many small farmers cannot afford (Rahman 2020). However, the absence of appropriate physical facilities and the required services contribute more to this problem in the rural regions. This implies that a smallholder might struggle to meet the quality standards required by different markets, consequently reducing their revenue.

Market regulations can significantly influence smallholders' access to buyers and markets. While regulations aim to create a level playing field, in reality however, it is entirely different. Large plantation companies, often have an advantage over smallholders in accessing markets and negotiating contracts due to these large plantation companies' huge ability in economies of scale and resources (Rahman, 2020). The lack of transparency and information asymmetry in the market further disadvantages smallholders, limiting their ability to secure fair prices for their produce (Mohanty, 2006). This unequal access to markets and limited competition can perpetuate the cycle of poverty and marginalization of smallholders in the palm oil industry.

THE WAY FORWARD

To ensure smallholders interests are put at the highest pedestal, the challenges faced need to be addressed. Smallholders face numerous challenges, particularly in the upstream sector where cultivation, harvesting, and initial processing occurs. The challenges faced by the smallholder on daily basis include limited access to resources, knowledge, and markets, as well as vulnerability to price fluctuations and unfair

trade practices (Pahmi et al., 2022). A significant factor contributing to these challenges is the existing market regulation framework. While aimed at ensuring fair trade and sustainable practices, the current regulations often inadvertently disadvantage smallholders. For instance, the daily reference price for fresh fruit bunches (FFB) set by the Malaysian Palm Oil Board (MPOB), while intended to promote transparency, often fails to reflect real-time market fluctuations, leaving smallholders vulnerable to bargaining power imbalances with mills and dealers (Abiddin et al., 2023). Additionally, the MSPO certification, while beneficial for market access, poses a financial burden on smallholders due to the high costs associated with achieving and maintaining certification (Rahman, 2020). Further, quality standards, though necessary for ensuring product quality, can be disproportionately burdensome for smallholders who lack the resources to invest in technology and training (Rahman, 2020).

To truly empower smallholders and create a sustainable and equitable palm oil industry, we need to rethink our approach to market regulation. This involves a multi-pronged strategy that addresses the root causes of the challenges smallholders face. A more dynamic pricing mechanism that reflects real-time market conditions and a minimum guaranteed price for FFB would go a long way in ensuring fair compensation for smallholders. Equally important is creating a centralized platform that provides transparent and accessible market information, empowering smallholders with the knowledge they need to make informed decisions and negotiate better deals.

In addition, strengthening smallholder cooperatives and associations is crucial. The government has through MPOB created Sustainable Palm Oil Growers Cooperative (KPSM) under Sustainable Palm Oil Clusters (SPOC) to aid in improving production and quality of FFB produced (Senawi et al., 2019). This should be strengthened and further improved as suggested by Plantation and Commodities

Minister Datuk Seri Johari Abdul Ghani (Khoo, 2024). At the same time, by providing financial and technical assistance, this empowers smallholder. These organizations act as a collective voice for smallholders, enabling them to negotiate better prices, access credit, and invest in technology and infrastructure. Lastly, streamlining the MSPO certification process especially in documentation processes. The government should standardize the documentation requirements across different agencies and departments, eliminating redundancies and making it easier for smallholders to comply and making it more affordable for smallholders would ensure they are not excluded from premium markets due to financial constraints.

By adopting these reforms, we not only uplift the livelihoods of millions of smallholders but also lay the foundation for a more resilient and sustainable palm oil industry in Malaysia. It's a path towards shared prosperity, where the backbone of our palm oil industry, the smallholders, are fairly recognized and rewarded for their invaluable contribution.

CONCLUSION

In summary, the palm oil industry, as one of the main pillars of our national economy, faces challenges, particularly at the upstream level where smallholders are a huge contributor. Even though current market regulations aim to ensure fair trade and sustainable practices, they often without intention or accidentally create obstacles for smallholders due to factors such as price volatility, limited market access, and the financial burden of certification which are at times needed for purposes of ensuring sustainable practices in the palm oil industry are followed as to not endanger the palm oil industry from possible boycott or actions bearing consequences from not adhering to the sustainable practices guidelines.

However, it is important to acknowledge the positive efforts made by the Malaysian government and relevant agencies empowered

by the government in addressing these issues. Initiatives taken by the government to ensure the competitiveness and sustainability of the palm oil industry especially in the upstream level like the Malaysian Sustainable Palm Oil (MSPO) certification scheme, though challenging for some smallholders to implement, have set a benchmark for sustainable palm oil production. MSPO has led to enhancement of the industry's reputation and opened doors to premium markets. Government-led programs providing financial assistance and technical support to smallholders demonstrate a commitment to their welfare and long-term viability. Additionally, ongoing efforts to streamline certification processes and improve transparency in the market are steps in the right direction.

Building on these positive developments, further reforms are imperative to fully empower smallholders and create a truly sustainable and equitable palm oil industry in Malaysia. A dynamic pricing mechanism that reflects real-time market conditions, coupled with a minimum guaranteed price for FFB, would ensure fair compensation for smallholders. In addition to that, there need to be an establishment of a centralized platform providing both transparent and accessible market information in which would empower smallholders with the knowledge to make informed decisions and negotiate better deals. Additionally, strengthening smallholder cooperatives and associations through financial and technical assistance would amplify their collective voice, enabling them to negotiate better prices, access credit, and invest in technology and infrastructure. Last but not least, streamlining the MSPO certification process and making it more affordable would ensure that smallholders are not excluded from premium markets due to financial constraints. These reforms, while ambitious, are achievable through collaborative efforts between the government, industry stakeholders, and smallholders themselves. It is imperative to recognize that the sustainability of the

palm oil industry is intrinsically linked to the well-being of smallholders. By prioritizing their needs and empowering them through equitable market regulations, Malaysia can foster an inclusive and prosperous palm oil sector. Furthermore, a thriving smallholder community contributes to rural development, poverty reduction, and environmental conservation, aligning with the nation's broader sustainable development goals.

In conclusion, the journey towards a sustainable and equitable palm oil industry in Malaysia requires a paradigm shift in market regulation. This entails not only addressing the immediate challenges faced by smallholders but also fostering an enabling environment where they can thrive. By embracing a holistic approach that combines economic incentives, knowledge empowerment, and collective action, Malaysia can ensure that its palm oil industry remains a global leader while safeguarding the interests of its smallholder community. The path forward is one of collaboration, innovation, and a steadfast commitment to a future where the palm oil industry serves as a model of sustainability and shared prosperity.

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REFERENCES

- Competition Act 2010 (Act 712).
- Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, P.U.(A) 362/1987.*
- Environmental Quality Act 1974 (Act 127)
- Farmers' Organization Act 1973 (Act 109).
- Land Acquisition Act 1960 (Act 486).
- Malaysian Palm Oil Board (Licensing) Regulations 2005, P.U.(A) 516/2005.*
- Malaysian Palm Oil Board Act 1998 (Act 582).
- National Land Code (Revised - 2020) Act 828.

- Natural Resources and Environment (Prescribed Activities) (Environmental Impact Assessment) Order 2015, P.U.(A) 195/2015*
- Occupational Safety and Health Act 1994 (Act 514).
- Pesticides Act 1974 (Act 149).
- Pesticides Regulations 1984, P.U.(A) 251/1984.*
- Abiddin, N. Z., Ghazali, M. F. M., Yahya, S. I., Jantan, N. & Halim, N. H. A. (2023). Exploring the wellbeing and challenges faced by smallholder plantation farmers in Malaysia: A systematic review. *Environment and Social Psychology* 8(1). <https://doi.org/10.18063/esp.v8.i1.1574>
- Ahmad, M., Ismail, R. & Ghani, F. (2023). Review on socioeconomic and sustainability of oil palm plantations among rural communities in Malaysia. *IOP Conference Series: Earth and Environmental Science*, p.012054.
- Ali, A., Noah, R. M. & Abd Malik, S. (2018). Legal Implications on Mismanagement of Agrochemicals in Smallholders' Agro Production in Malaysia. *Journal of ASIAN Behavioural Studies* 3(7), 59-66.
- Azima, A., Er, A., Lyndon, N. & Yew, V. W. (2018). Mendepani kekangan inovasi dan teknologi dalam kalangan pekebun kecil sawit di Sabah. *Geografia. Malaysian Journal of Society and Space* 14(2), 56-67.
- Aziz, N. F., Chamhuri, N. & Batt, P. J. (2021). Barriers and benefits arising from the adoption of sustainable certification for smallholder oil palm producers in Malaysia: A systematic review of literature. *Sustainability* 13(18), 10009.
- Carvalho, F. P. (2006). Agriculture, pesticides, food security and food safety. *Environmental science & policy* 9(7-8), 685-692.
- Dani, R. (n.d). Malaysia Agrochemicals Market. Malaysia Agrochemicals - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019 - 2029. https://www.researchandmarkets.com/reports/5318462/malaysia-agrochemicals-market-share-analysis?srsId=AfmBOorZ14lrS4tdXO898CBkQgG1Dz-DB4LXQYJc3GPbGp8_gVQKm-r
- Darras, K. F., Corre, M. D., Formaglio, G., Tjoa, A., Potapov, A., Brambach, F., Sibhatu, K. T., Grass, I., Rubiano, A. A. & Buchori, D. (2019). Reducing fertilizer and avoiding herbicides in oil palm plantations—ecological and economic valuations. *Frontiers in Forests and Global Change* 2, 65.
- Dowler, C. (2020). Revealed: The pesticide giants making billions on toxic and bee-harming chemicals. <https://unearthed.greenpeace.org/2020/02/20/pesticides-croplife-hazardous-bayer-syngenta-health-bees/#:~:text=Its%20members%20Syngenta%2C%20Bayer%20Crop,the%20world%20by%20agrochemical%20turnover.> [9 July].
- Er, A. & Siwar, C. (2015). Penanaman sawit lestari dan impak sosioekonomi. *e-BANGI* 10: 57-80.
- Hafizuddin-Syah, B., Shahida, S. & Fuad, S. H. (2018). Sustainability certifications and financial profitability: An analysis on palm oil companies in Malaysia. *Jurnal Pengurusan* 54(2018), 143-154.
- Hai, T. C. (2002). The palm oil industry in Malaysia. *WWF, Malaysia:*
- Hashim, F., Bakar, K. A. & Stapa, S. H. (2020). Analisis appraisal mengenai keterlibatan generasi muda Felda dalam industri kelapa sawit. *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 5(11), 257-271.
- Health, D. O. O. S. A. (2006). *Guidelines on Occupational Safety and Health Act 1994.*
- Hussin, M. R. M., Asaari, M. H. a. H., Karia, N. & Ali, A. J. (2012). Small farmers and factors that motivate them towards agricultural entrepreneurship activities. *Journal of Agribusiness Marketing*, 5, (December 2012), 47-60.
- Jalil, N. A., Yusof, R., Yusof, H., Karim, N. a.-H. A., Ismail, K., Yin, K. Y., Razak, A. Z. a. A., Yunus, N. K. Y. & Samsudin, N. (2014). Status Ekonomi Pekebun Kecil Kelapa di Hilir Perak and Perak Tengah: Economic Status of Coconut Smallholders in Hilir Perak and Perak Tengah. *Management Research Journal* 3, 107-119.
- Kennedy, I., Skerritt, J., Johnson, G. & Highley, E. 1(1998). Seeking agricultural produce free of pesticide residues. Proceedings of an international workshop held in Yogyakarta, Indonesia, 17-19 February 1998.
- Khoo, D. (July, 19, 2024). Gov proposes for consolidation of oil palm smallholders to bigger clusters. <https://www.thestar.com.my/business/business-news/2024/03/05/gov-proposes-for-consolidation-of-oil-palm-smallholders-to-bigger-clusters> [9 July].
- Kumaran, S. (2019). The dynamics for mandatory MSPO certification scheme to be successfully implemented. *Journal of Oil Palm, Environment and Health (JOPEH)* 10, 1-7.
- Ligong, S. & Imang, U. (2017). Penglibatan Penduduk Rumah Panjang Kampung Sungai Bawang, Sibu dan Sungai Saeh, Miri, Sarawak dalam Sektor Tanaman Kelapa Sawit: Isu dan Cabaran: Involvement of Longhouse Residents at Kampung Sungai Bawang, Sibu and Sungai Saeh, Miri, Sarawak in Oil Palm Sector: Issues and Challenges. *Geografi* 5(2), 59-68.
- Mahat, S. B. A. (2012). The palm oil industry from the perspective of sustainable development: A case study of Malaysian palm oil industry. *Graduate School of Asia Pacific Studies, Ritsumeikan Asia Pacific University of Japan.* <https://api.semanticscholar.org/CorpusID:131116338>.

- Manaf, A. A. & Choy, E. A. (2015). Isu pemilikan tanah dan implikasinya terhadap produktiviti pekebun kecil: Kajian kes pekebun kecil di Lahad Datu, Sabah (Land ownership issue and its implications for smallholder productivity: The case of oil palm smallholders in Lahad Datu, Sabah). *Geografia* 11(9). Malaysian Journal of Society and Space.
- Marzukhi, H., Mawar, M. Y., Hameed, L. B. M. & Jamil, M. R. M. (2021). Smallholder Farmers in Malaysia's Oil Palm Industry: Issues and Challenges: Petani Pekebun Kecil dalam Industri Kelapa Sawit Malaysia: Isu dan Cabaran. *Journal of Management and Muamalah* 11(2), 157-170.
- May, D. E. (2012). Addressing biodiversity loss when international markets of agricultural commodities are oligopolistic. *Economics and Business Letters* 1(1), 53-57.
- Mazlan, M. N., Saili, A. R., Saili, J., Zulkefli, F., Syahlan, S. & N.A. (2020). Exploring the challenges of pepper smallholder farmers in Sarawak: a qualitative study. *Food Research*, 96-103.
- Md Ali, A. (2021). Industri nenas: peranan dan cabaran dalam penjaan ekonomi Malaysia. *Journal of Economics and Sustainability (JES)* 3(2), 1-15.
- Mohanty, S. (2006). Trade and environment dimensions in the food and food processing industries in Asia and the Pacific. *Regional Study, New Delhi: Research and Information System for the Non Aligned and Other Developing Countries*.
- Mordor Intelligence, M. (n.d). Agrochemical Market in Malaysia Size & Share Analysis - Growth Trends & Forecasts (2024 - 2029). <https://www.mordorintelligence.com/industry-reports/agrochemicals-market-malaysia>
- MPOB. (n.d). *Kriteria dan Panduan Permohonan Lesen MPOB*. Lembaga Minyak Sawit Malaysia (MPOB).
- MPOB. (27, June, 2024). Mandatory MSPO Certification. <https://mspo.org.my/faqs#mandatorymspocertification>.
- MPOB. n.d. Notification on MPOB Daily Fresh Fruit Bunches (FFB) Reference Price at 1% OER. MPOB Daily Fresh Fruit Bunches (FFB) Reference Price [27 June].
- MPOCC. (2024). MSPO Trace: Malaysian Palm Oil Certification Council. <https://www.msopotrace.org.my/Home>.
- Nagiah, C. & Azmi, R. (2013). A review of smallholder oil palm production: challenges and opportunities for enhancing sustainability-a Malaysian perspective. *Journal of Oil Palm, Environment and Health (JOPEH)* 3(12), 114-120. DOI:10.5366/jope.2012.12
- Ng, Y. G., Bahri, M. T. S., Syah, M. Y. I., Mori, I. & Hashim, Z. (2013). Ergonomics observation: Harvesting tasks at oil palm plantation. *Journal of occupational health* 55(5), 405-414.
- Onozaki, T. & Yanagita, T. (2003). Monopoly, oligopoly and the invisible hand. *Chaos, Solitons & Fractals* 18(3), 537-547.
- Othman, J. & Jafari, Y. (2014). Selected research issues in the Malaysian agricultural sector. *Jurnal Ekonomi Malaysia* 48(2), 127-136.
- Pahmi, A. H. B. C. H., Choy, E. A., Rahmi, A. A. B. & Jamean, E. S. B. (2022). Isu dan Cabaran Sektor Hulu dan Hiliran Industri Sawit. *e-BANGI* 19(3), 67-90.
- Rahman, A. (2021). Application of Pesticides Act 1974 in protecting community and environment health in Malaysia from the exposure of pesticides. *Int J Acad Res Bus Soc Sci* 11(15), 144-153.
- Rahman, N. A. & Ahamat, H. (2020). *Competition law in Malaysia*. Kluwer Law International BV.
- Rahman, S. (2020). Malaysian independent oil palm smallholders and their struggle to survive 2020. [https://scholar.google.com.my/scholar?q=Rahman,+S.+\(2020\).+Malaysian+independent+oil+palm+smallholders+and+their+struggle+to+survive+2020.&hl=en&as_sdt=0&as_vis=1&oi=scholar](https://scholar.google.com.my/scholar?q=Rahman,+S.+(2020).+Malaysian+independent+oil+palm+smallholders+and+their+struggle+to+survive+2020.&hl=en&as_sdt=0&as_vis=1&oi=scholar)
- Ritchie, H. & Roser, M. (2024). Palm oil. <https://ourworldindata.org/palm-oil?ref=zadbajoswojezdrowie.com>.
- Rival, A. & Levang, P. (2014). *Palms of controversies: Oil palm and development challenges*. Cifor. <https://doi.org/10.17528/cifor/004860>
- Rose, R. a. C. & Elias, S. A. (2021). Implikasi Kejatuhan Harga Buah Kelapa Sawit Dan Pengaruhnya Terhadap Pendapatan Penduduk Setempat. *e-Jurnal Penyelidikan dan Inovasi*, 56-86.
- Saad, S., Yusof, M. & Lyndon, A. (2017). Peranan Pemimpin Pendapat dalam Penyebaran Inovasi Penanaman Kelapa Sawit. *Jurnal Komunikasi Malaysian Journal of Communication Jilid* 33, 73-88.
- Santosa, S. J. (2008). Palm oil boom in Indonesia: from plantation to downstream products and biodiesel. *CLEAN-Soil, Air, Water* 36(5-6), 453-465.
- Senawi, R., Rahman, N. K., Mansor, N. & Kuntom, A. (2019). Transformation of oil palm independent smallholders through Malaysian sustainable palm oil. *Journal of Oil Palm Research* 31(3), 496-507.
- Shafiai, M. H. M., Ali, S. A. & Yaacob, S. E. (2020). Kesan sikap, faktor halangan dan manfaat tanggapan pekebun kecil sawit persendirian kepada niat menggunakan mikro kredit Islam. *Islamiyyat* 42(1), 3-14.

- Shafinah, K., Sahari, N., Sulaiman, R., Alan, R. & Zakry, F. A. A. (2013). Kebolehcapaian nasihat bagi pengurusan penyakit tanaman oleh pekebun kecil lada hitam, Sarawak: Tinjauan awal (Critical extension services and the plight of Sarawak's black pepper farmers: A preliminary survey). *Geografia* 9(2), Malaysian Journal of Society and Space. ISSN 2180-2491. https://www.researchgate.net/publication/274255017_Kebolehcapaian_nasihat_bagi_pengurusan_penyakit_tanaman_oleh_pekebun_kecil_lada_hitam_Sarawak_Tinjauan_awal
- Siti-Dina, R. P., Er, A. C. & Cheah, W. Y. (2023). Social Issues and Challenges among Oil Palm Smallholder Farmers in Malaysia: Systematic Literature Review. *Sustainability* 15(4): 3123.
- Sogen, D.D. (2023). Implementation of Competition Law In Cooking Oil Price Trading For Public Interest. *Journal Research of Social Science, Economics, and Management* 2(9): 1932–1942–1932–1942.
- Taylor, C. R. & Moss, D. L. (2013). The fertilizer oligopoly: The case for global antitrust enforcement. *The American Antitrust Institute, USA*:
- Tsolomyti, G., Magoutas, A. & Tsoulfas, G. T. (2021). Global corporate concentration in pesticides: agrochemicals industry. *Business Intelligence and Modelling: Unified Approach with Simulation and Strategic Modelling in Entrepreneurship* 8th, 289-297.
- Yap, P., Rosdin, R., Abdul-Rahman, A., Omar, A., Mohamed, M. & Rahami, M. (2021). Malaysian sustainable palm oil (MSPO) certification progress for independent smallholders in Malaysia. *IOP Conference Series: Earth and Environmental Science*, p.012071.
- Yi, C. S., Radam, A., Hassan, A. & Shamsudin, M. N. (2018). Market Structure of Malaysian Palm Oil Refining Industry. *Asian Academy of Management Journal*, 23(2), 125-141.