

# Strengthening National Defense: Dynamics of Mandatory Biodiesel Policy and Renewable Energy Potential in Indonesia's Palm Oil Industry

<sup>a</sup> Mohamad Ikhwan Syahtaria

<sup>a</sup> Republic of Indonesia Defense University IPSC Area, Sentul, Bogor, Indonesia

## ABSTRAK

*Minyak kelapa sawit, sebagai sumber daya alam yang berharga, telah muncul sebagai komponen pilihan utama dalam usaha energi terbarukan. Sejak tahun 2006, pemerintah Indonesia telah mengoptimalkan potensi sumber daya ini dengan mengubah minyak kelapa sawit mentah (CPO) menjadi Fatty Acid Methyl Ester (FAME), komponen kunci biodiesel saat dicampur dengan bahan bakar fosil. Peraturan Menteri Energi dan Sumber Daya Mineral No. 12/2015 menjadi dasar bagi kebijakan biodiesel serta difasilitasi oleh mekanisme pendanaan Badan Pengelola Dana Kelapa Sawit (BPDPKS) telah beroperasi selama lima tahun. Penelitian ini menggali mekanisme kebijakan tersebut, mengevaluasi kesiapannya untuk pasar internasional, tantangan yang dihadapinya, dan potensinya untuk mencapai kemandirian energi dan meningkatkan potensi ekonomi negara. Dengan pendekatan kualitatif dan metodologi deskriptif, studi ini menyimpulkan: 1) Implementasi Biodiesel wajib mematuhi ketentuan Peraturan Menteri Energi dan Sumber Daya Mineral No. 12/2015, namun beberapa arah kebijakan menunjukkan tumpang tindih; 2) Biodiesel Indonesia dihadapkan pada implikasi RED II, proyeksi penurunan penggunaan biodiesel global, dan kebijakan AS untuk mengurangi konsumsi biodiesel. Ini menunjukkan perlunya insentif berkelanjutan; 3) Realisasi dari kemandirian energi, yang merupakan tujuan mendasar dari program biodiesel, masih belum tercapai sepenuhnya.*

## ABSTRACT

Palm oil, a valuable natural resource, has emerged as a viable component of new renewable energy endeavors. Since 2006, the Indonesian government has harnessed this resource's potential by converting crude palm oil (CPO) into Fatty Acid Methyl Ester (FAME), a key constituent of biodiesel when blended with fossil fuels. Minister of Energy and Mineral Resources Regulation No. 12/2015 laid the foundation for the mandatory biodiesel policy, which, facilitated by the Badan Pengelola Dana Kelapa Sawit (BPDPKS) financing mechanism, has been operational for five years. This investigation delves into the policy's mechanics, evaluating its readiness for international markets, the challenges it confronts, and its potential to attain energy independence and augment the nation's economic prowess. Employing a qualitative approach and descriptive methodology, this study concludes: 1) Mandatory Biodiesel implementation adheres to the stipulations of Minister of Energy and Mineral Resources No. 12/2015, yet certain policy directions exhibit overlap; 2) Indonesian biodiesel grapples with the implications of RED II, projected global biodiesel utilization reductions, and US policies aimed at diminishing biodiesel consumption, implying a sustained need for incentives; 3) Energy independence, a central aspiration of the mandatory biodiesel program, remains an aspiration yet to be realized.

## INTRODUCTION

Oil palm is considered a vital economic crop with multifaceted utility. Beyond serving as the primary source for vegetable oil, it contributes significantly to industries such as furniture, paper, and plywood. Understanding the geographical locations of oil palm plantations holds paramount importance. Firstly, this knowledge aids in predicting oil palm yields, a foundational

## ARTICLE HISTORY

Submitted: 09 02 2023

Revised: 12 05 2023

Accepted: 22 05 2023

Published: 13 12 2023

## KATA KUNCI

CPO, Industri, Manajemen, Pertahanan Nasional, Kebijakan

## KEYWORDS

CPO, Industry, Management, National Defense, Policy

commodity for vegetable oil worldwide. Secondly, it sheds light on the growth conditions of oil palm trees, encompassing factors like age and overall health, which intricately shape effective management strategies. Moreover, geographical data underpins the refinement of irrigation systems, aimed at elevating plant productivity (Asante, 2023; Purba *et al.*, 2023; Serrano, 2023).

The majority of oil palm plantations are concentrated in Southeast Asia and Africa. This crop showcases remarkable productivity, yielding more vegetable oil per hectare than other oil-yielding plants. This advantage cements oil palm as a staple in the global vegetable oil supply chain (Dewi, Turisno and Handayani, 2022; Goh and Potter, 2022; Hein *et al.*, 2022). Thus, an in-depth comprehension of the geographical aspects of oil palm plantations facilitates not only yield management but also the optimization of tree growth and the formulation of sustainable developmental strategies.

Table 1 illustrates the leading global producers of palm oil. Nevertheless, in recent times, the transformation of tropical forests into palm oil plantations has cast a shadow on the ecological balance, leading to the depletion of a substantial array of plant and animal species.

**Table 1.**  
**World palm oil production countries**

Country	Production (Tons)
Indonesia	42,869,429
Malaysia	19,858,367
Thailand	3,040,000
Colombia	1,527,549
Nigeria	1,220,000
Guatemala	880,000
Honduras	707,000
Papua New Guinea	578,000
Ecuador	420,000
Ghana	257,280

Source: Our World in Data 2019

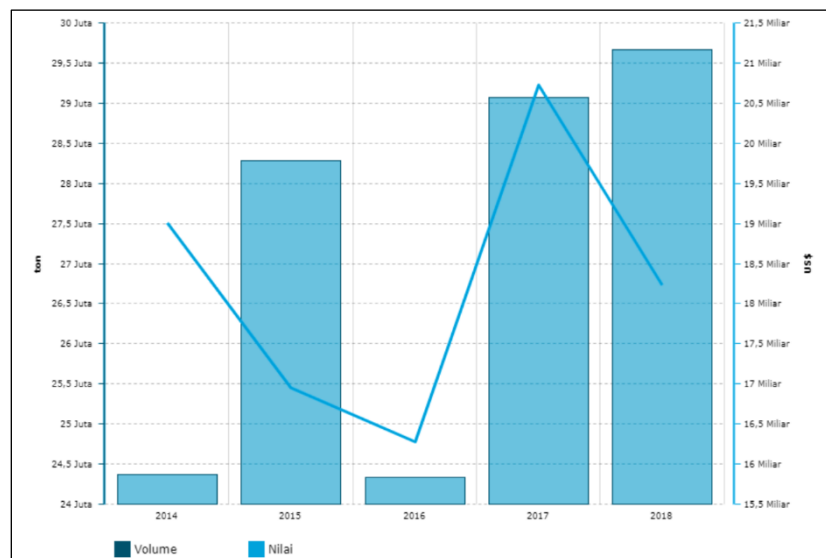
Examining Indonesia's macroeconomic trajectory, the palm oil industry emerges as a pivotal force, intricately involved in bolstering the nation's foreign exchange reserves. Conversely, palm oil stands as the foremost contributing commodity within the non-oil and gas realm, functioning as the driving engine of the national economy, ensuring energy self-reliance, propelling the advancement of the grassroots economic sector, and fostering substantial employment opportunities (Sunarminto, Mijiarto and Prabowo, 2019; Bariyah, 2020; Sibhatu, 2023).

This notion is further affirmed by Bambang Brodjonegoro, the Head of Bappenas within the Advanced Indonesia Work Cabinet, who emphasizes the pivotal role of the palm oil industry in elevating societal well-being. The sector achieves this by providing employment opportunities for a staggering 16.2 million individuals, comprising 4.2 million in direct employment and an additional 12 million in indirect roles (BPDP, 2018). Such profound advantages underscore how Indonesia's oil palm plantations have transcended their agricultural identity to evolve into a cornerstone of the nation's economic fortitude.

In 2018, palm oil production reached an impressive 48.68 million tons, comprising 40.57 million tons of palm oil and 8.11 million tons of palm kernel oil. This substantial output was derived from various sources: 16.8 million tons (35%) from smallholder oil palm plantations, 2.49 million

tons (5%) from large state-owned plantations, and the majority, 29.39 million tons (60%), from expansive private plantations (Rahayu & Sugianto, 2020). An exploration of Indonesia's palm oil production figures reveals a compelling narrative. The trajectory of crude palm oil (CPO) production between 2014 and 2018 exhibits a consistent yearly growth, ranging from 1.35% to 10.96%. This remarkable trend significantly contributed to Indonesia's overall palm oil exports, which surged to 29.6 million tons, marking a 2% increase compared to the previous year (Figure 1) (BPS, 2019).

**Figure 1.**  
**Volume and Value of Exports of Palm Oil and Its Derivatives**



Indonesia's dominance in the global palm oil industry is underpinned by its vast expanse of oil palm plantations, boasting the world's largest production capacity for crude palm oil (CPO). According to a report by the Secretariat of the Directorate General of Plantations under the Ministry of Agriculture, Indonesia's oil palm cultivation covers a staggering 14.48 million hectares (ha). This extensive land area comprises 5.7 million ha dedicated to smallholder plantations, 638 thousand ha allocated to state-owned estates, and a substantial 7.77 million ha designated for private industrial plantations. These sprawling oil palm plantations are strategically dispersed across 22 provinces, with Riau Province emerging as the foremost contributor, accounting for a remarkable 2.74 million ha, equating to approximately 19% of the total land under cultivation. This is closely trailed by the provinces of Central Kalimantan, East Kalimantan, and West Kalimantan, as indicated by the Directorate General of Estate Crops in 2021.

Despite Indonesia's commendable production and trade data, particularly in the non-oil and gas sectors where palm oil plays a significant role, its positive performance has not translated into a substantial increase in state tax revenue. As of 2015, the tax revenue generated from the oil palm plantation sector stood at Rp22.2 trillion, representing a mere 2.1 percent of the overall state revenue (Pradiptyo et al., 2019). This contribution from the palm oil industry to state coffers falls significantly short of its potential, in stark contrast to the remarkable daily sector turnover of Rp1.2 trillion (Lestarida, 2020).

The efficacy of policies and regulations governing this sector in bolstering state revenues is hindered by several challenges. These challenges encompass instances of non-compliant

companies evading tax obligations, lax land management practices, overlapping permits, and complications with the European Union. Beyond these issues and factual observations, it becomes imperative to accord precedence to the advancement of the Crude Palm Oil (CPO) industry as a downstream industrial strategy. This strategic pivot is essential to fortify Indonesia's trade prowess, thereby transcending its role as a mere exporter of raw materials (Mangeswuri, 2019). Consequently, a thorough reevaluation of the export levy policy, alongside its associated derivative products, is a recurrent necessity. The core objective is to invigorate the growth and progression of the downstream CPO sector within the nation's borders.

Enshrined within the Regulation of the Minister of Energy and Mineral Resources No. 12/2015 are the guidelines governing the incremental stages of biodiesel blending. The outlined objectives encompass achieving a 30% blend rate by both January 2020 and January 2025 for micro-enterprises, non-public service obligation (PSO) transportation, and the commercial sector. However, this well-intentioned endeavor encountered a novel quandary due to the production cost of biodiesel surpassing its market selling price. In response, the government introduced subsidies for biodiesel producers, designed to serve as a compelling incentive for sustained biodiesel production. This pivotal initiative is articulated in the Regulation of the Minister of Energy and Mineral Resources No. 26/2015.

The allocation of biodiesel subsidies plays a pivotal role in advancing Indonesia's 2025 objective of integrating biodiesel into its energy matrix. To effectively realize this goal, a strategic amalgamation of policies is essential, involving:

- a) Phasing out diesel subsidies to align with market prices,
- b) Expanding the mandate of biodiesel blending into non-PSO transportation, industrial, and power plant sectors, aiming for a minimum 10 percent blend to establish market stability,
- c) Imposing an environmental tax of no less than 5 percent on diesel, supplementing value-added and vehicle fuel taxes,
- d) Enforcing a baseline biodiesel subsidy of IDR 2,000 per liter (Rambe et al., 2019).

This comprehensive policy mix harmonizes fiscal incentives, regulatory expansion, and environmental levies to both foster biodiesel adoption and fulfill Indonesia's energy ambitions.

The implementation of these subsidies is poised to yield a positive impact on the escalating demand for biodiesel, setting off a chain reaction that secures market stability. Consequently, this lays the foundation for the sustained provision of incentives to palm oil industry entities engaged in biodiesel production. Notably, biodiesel production has witnessed a substantial 30.7% surge up until 2028, driven by the influence of the subsidy policy. The government's allocation of subsidies has exhibited a fluctuating yet upward trajectory, signifying growing support.

Within the scholarly framework of this investigation, the primary objective is to meticulously deconstruct the operational intricacies that underlie the implementation of biodiesel subsidies. A concurrent aim is to critically evaluate Indonesia's level of readiness in addressing challenges that emanate from the compulsory biodiesel program, all while discerning the resilience exhibited by biodiesel incentives in the dynamic landscape of evolving interests. The overarching aspiration is to systematically gauge the efficacy of these incentives in skillfully navigating the unpredictable currents of demand, thereby charting a resolute course towards the coveted destination of energy self-sufficiency.

## Literature Review

While oil palm trees have their origins in West Africa, their most prosperous cultivation as an industrial crop has taken root in South-East Asia. The journey began in the early 1870s when it was initially introduced to the region as an ornamental plant. Table 1 illustrates that Indonesia and Malaysia stand at the forefront of commodity production, collectively responsible for approximately 84 percent of the global palm oil output in 2022. Notably, Indonesia alone contributes nearly 60 percent to the worldwide supply (Asante, 2023).

In the prominent oil palm producing nations, this agricultural sector plays a significant role in bolstering their respective national economies, as evidenced by the research of Hashemvand Khiabani and Takeuchi (2020). Notable figures presented by Purnomo et al. (2020) indicate that oil palm accounted for 17 percent of Indonesia's agricultural GDP in 2014. In 2017, Indonesia's palm oil exports amounted to \$23 billion, offering livelihoods to 2 million smallholders and engaging 7.8 million agricultural workers. Meanwhile, in Malaysia, the oil palm industry serves as a pivotal catalyst for agro-industrialization. Ranking as the fourth largest contributor to the national economy, it has also played a pivotal role in elevating agrarian livelihoods.

Between the two nations, Malaysia has demonstrated the most remarkable prowess in diversifying its oil palm sector. The trajectory of palm oil processing in Malaysia has been nothing short of remarkable since the 1970s. This transformation is evident in the sharp decline of crude palm oil exports from 70 percent in the early 1970s to less than one percent by 1995, as reported by Asante, (2023), as cited in Nambiappan et al. (2018). The evolution is further underscored by the fact that since the late 1980s, Malaysia has consistently maintained surplus refinery capacity, making it a net importer of crude palm oil to sustain its operational refinery potential. A significant portion of these imports is sourced from Indonesia, where the downstream processing sector is comparatively less developed, as outlined by Nambiappan et al. (2018).

The pronounced influence of Indonesia and Malaysia within the global oil palm industry is vividly portrayed by their substantial input to worldwide production. Strikingly, this stands in stark contrast to the scenario involving African nations. Despite the crop's indigenous roots in West Africa and the favorable agro-climatic landscape prevalent there, only Nigeria and Ivory Coast secure positions within the top ten oil palm producing countries. However, the divergent trajectories shaped by the policy pursuits of Indonesia and Malaysia underscore the critical significance of viewing the sector's performance through a political economy lens

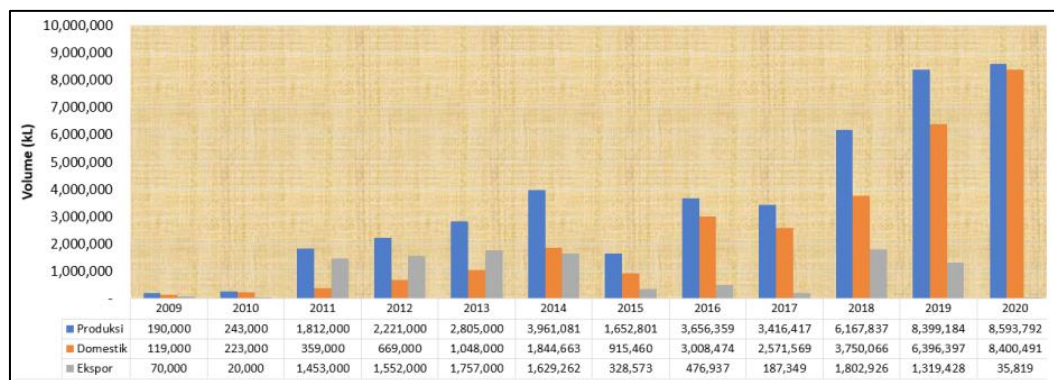
## RESEARCH METHODS

The present study is methodologically grounded in a qualitative approach. This research framework is informed by an interpretive stance that seeks to comprehensively delve into the intricate nuances of phenomena associated with the subject under examination. This encompasses a holistic exploration of behaviors, perceptions, motivations, actions, and other dimensions relevant to the research context. The data gleaned from this approach is subsequently translated into descriptive narratives, meticulously tailored to the specific contextual milieu. To achieve this, a diverse array of natural methods is employed in alignment with the methodological guidance articulated by Moleong (2018).

Qualitative research methodology is adopted to probe into the intricate fabric of the subject matter. This paradigmatic approach is deeply rooted in interpretation, allowing for a comprehensive exploration of various phenomena associated with the research theme. These

encompass a holistic investigation of behaviors, perceptions, motivations, actions, and other dimensions relevant to the research context. The data generated through this method is then meticulously transcribed into descriptive narratives that organically blend with the unique contextual setting. To achieve this, a diverse range of organic methodologies is employed, guided by the scholarly insights provided by Moleong (2018). The empirical evidence pertaining to the actualization of biodiesel implementation reveals a noteworthy trend. Dating back to 2009, approximately three years subsequent to the initiation of the Mandatory Biodiesel Program, the assimilation of national palm oil production into the domestic market remains markedly robust (Figure 2) (ESDM, 2022). Despite biofuels possessing immense potential as a vanguard among new and renewable energy sources (EBT), their comprehensive integration remains an ongoing endeavor in Indonesia. The government of Indonesia has strategically devised a biodiesel supply framework to bolster the national industry, accompanied by the enforcement of biodiesel blending mandates. Nevertheless, in the course of its evolution, the stipulated obligatory benchmarks have yet to be fully met, primarily attributed to the limited traction observed within the domestic Biofuels (BBN) market, which has yet to ignite significant entrepreneurial interest.

**Figure 2.**  
**Realization of Biodiesel Implementation**

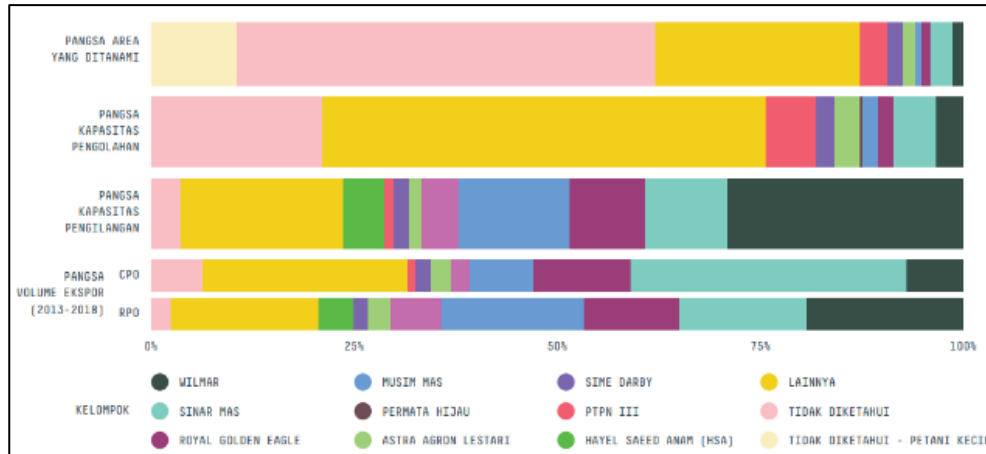


The Ministry of Energy and Mineral Resources (ESDM) has meticulously recorded investments in the ambit of biodiesel plant expansion or establishment for the year 2020, accounting for a total of 1.2 million kL of biodiesel, with a projected upsurge to 2.7 million kL in the ensuing year. In congruence, statistical data curated by the Indonesian Biofuel Producers Association (Aprobi) elucidates that the cumulative volume of biodiesel production up until the conclusion of the third quarter in 2020 has surged to a formidable 6.4 million kL. Against this backdrop, the stipulated objective for the volumetric output of biodiesel throughout the entirety of 2020 stands at an ambitious 9.5 million kL, thereby reflecting a prospective annual growth of approximately 14% vis-à-vis the production tally of 8.3 million kL recorded across the preceding year (APROBI, 2020).

Palm oil management companies in Indonesia exert a profound cascading influence across all dimensions of their operational spectrum. As depicted in Figure 3, these entities, including palm oil groups and entrepreneurs, wield dominance over the complete supply chain, spanning production, processing, refining, and eventual export stages. Although encountering an obstacle in a singular stage might yield limited repercussions, strategic support at specific points amplifies the holistic impact, benefiting the company as a whole. This phenomenon is reflected in contemporary scholarly discussions, particularly in the theory of state choice, wherein economic

agents serve as a wellspring of inspiration, guiding public servants in their pursuit of optimizing interests (TRASE, 2020).

**Figure 3.**  
**Dominance of Palm Oil Processing Activities in Indonesia**



The Regulation of the Minister of Energy and Mineral Resources No. 12/2015 represents the third iteration of amendments to the pre-existing Regulation of the Minister of Energy and Mineral Resources No. 32/2008, which pertains to the establishment, utilization, and commercial administration of biofuels and alternative fuels. Serving as a pivotal juncture, this regulation constitutes the genesis of the government's proactive strategy aimed at expediting the adoption of Biofuels for National Energy (BBN). Succinctly put, The Minister of Energy and Mineral Resources Regulation No. 12/2015 establishes an imperative mandate for specific industrial sectors, necessitating the utilization of biodiesel and bioethanol biofuels as constituents within the fuel matrix, adhering to a predetermined compositional blend from 2015 to 2025 (Peraturan Menteri ESDM No.12/2015, 2015). This orchestrated progression of blending stages is meticulously devised to orient Indonesia towards steadfast energy security, while concurrently discouraging any divergence from the overarching trajectory and impeding the realization of self-reliance within the biofuel domain. A comprehensive outline of the targeted blending phases for biodiesel and bioethanol is delineated in Table 2.

**Table 2.**  
**Minimum Obligation Stages of Biodiesel (BD) and Bioethanol (BE) Utilization**

Type/Sector	Apr-2015		Jan-2016		Jan-2020		Jan-2025	
	BD	BE	BD	BE	BD	BE	BD	BE
Household	-	-	-	-	-	-	-	-
PSO Transportation	15%	1%	20%	2%	30%	5%	30%	20%
Non PSO Transportation	15%	2%	20%	5%	30%	10%	30%	20%
Industrial and Commercial	15%	2%	20%	5%	30%	10%	30%	20%
Power Plant	25%	-	30%	-	30%	-	30%	-

The advent of the Palm Oil Plantation Fund Management Agency (BPDPKS) via Government Regulation No. 24/2015 is widely acclaimed by all stakeholders invested in the palm oil industry. This pioneering initiative is perceived as a watershed moment, breathing new life into the Indonesian oil palm sector, particularly for smallholder plantations. Currently, smallholder plantations encompass a substantial 43% of the expansive 16.3 million hectares of oil palm

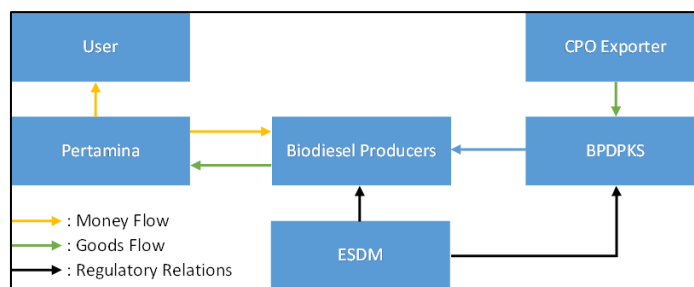


cultivation across Indonesia. With BPDPKS in place, a beacon of renewed optimism emerges for a significant portion of oil palm cultivators, ushering in a novel era of possibilities. Envisioning the trajectory ahead, this initiative is poised to catalyze transformative developments within the realm of small-scale plantations, effectually elevating farmers into the realm of self-reliance and improved well-being.

However, despite being a major palm oil producer, Indonesia's commitment to effectively managing the palm oil industry, especially downstream activities, has raised concerns. Even though environmental observers closely monitor both the upstream and downstream aspects, Indonesia's policies and regulations for the palm oil sector still involve various ministries and institutions at central and local government levels. This fragmented approach can lead to overlapping and conflicting measures in palm oil management. This concern was highlighted by the Chairman of the Indonesian Biofuel Producers Association (Aprobi) (2020), who noted, "Many ministries and institutions still handle different aspects of palm oil in Indonesia. For instance, at Aprobi, we report data to various authorities like the Directorate General of Trade, Industry, Oil, and Gas, as well as EBTKE (Renewable Energy and Energy Conversion). Sometimes, these data sources overlap due to differing standards, causing timing disparities."

The way BPDPKS manages funds can be understood through Figure 4, which I obtained from the official website of an expert. In this figure, it's explained that the money isn't immediately given to biodiesel producers who meet the standards. The funds are handed over after the producers fulfill the biodiesel procurement requirements at transfer points managed by Pertamina and AKR. For payments from BPDPKS to Biofuels Business Entities (BU BBN), these need to be made monthly after BPDPKS verifies the transactions. Also, companies dealing with biodiesel must report their monthly distributed volume to both the Director-General of Renewable Energy and Energy Conservation (EBTKE) and the Director-General of Oil and Gas (Saputra et al., 2022).

**Figure 4.**  
**Mechanism of Indonesia's Biodiesel Subsidy Fund**



Subsequently, towards the culmination of 2019 or in proximity thereof, a conundrum emerged concerning the funding of the Badan Pengelola Dana Perkebunan Kelapa Sawit (BPDPKS). This conundrum arose in temporal proximity to a directive issued by His Excellency the President of the Republic of Indonesia, Joko Widodo, advocating for the imposition of a 30% admixture of diverse palm oil amalgams into the realm of Bahan Bakar Nabati (BBN) commodities. This presidential directive was ostensibly predicated upon the contemporaneous descent of global petroleum prices juxtaposed against the ascendant trajectory of Crude Palm Oil (CPO) valuations, thereby engendering a pronounced disjunction in the valuation of these two commodities. Evidently, this intricate conjuncture first manifested in November 2019, a juncture which subsequently precipitated a protracted decline in petroleum prices culminating in their nadir in May 2020.



Concerning the government's strategic intentions, there exists a multitude of conjectures regarding potential assertive actions linked to the extent of the Indonesian government's commitment to actualizing the integration of biodiesel. Greenpeace's report in 2020 highlighted the forthcoming acceleration of this policy. As delineated by the conclusions drawn from deliberations in late 2019, the proposed enactment of the B50 initiative was initially anticipated to be effectuated in the early months of 2021, a projection met with a plethora of apprehensions. Subsequently, this blueprint underwent further revisions, resulting in a recalibration towards the B40 benchmark slated for implementation by mid-2022.

A comprehensive examination encompasses the ramifications Indonesia would confront upon the adoption of this course of action, as outlined by the LPEM FEB UI in 2020:

The analytical findings underscore that macroeconomic dimensions, inclusive of trade equilibrium and incentives associated with biodiesel, manifest an intricate impact trajectory, contingent upon the dynamic parameters of the crude palm oil (CPO) and diesel market conditions.

Environmental considerations materialize, notably underscored by the prospective expansion of arable acreage, particularly the encroachment upon forested regions. These consequences, unless accompanied by the imposition of stringent moratorium policies and vigilant on-site oversight, might become conspicuous.

The well-orchestrated trajectory of biofuel development in Indonesia intertwines with a fundamental quandary: biodiesel's current classification as a bioenergy source presents a critical opportunity to diminish reliance on imported fossil fuels and propel economic growth through job creation, yet it concurrently illuminates a paradox. The sourcing of biomass for bioenergy, epitomized by palm oil as the primary feedstock, holds promise for ecological deterioration if not subject to meticulous management, thus amplifying concerns about environmental sustainability and societal fairness. This complexity is exacerbated by the existing cost differential between biodiesel and conventional diesel, prompting the provision of incentives to biodiesel producers through the utilization of export levies imposed on palm oil producers via the BPD PKS (Oil Palm Plantation Fund Management Agency).

Recognizing the potential vulnerability of relying solely on a single market, Indonesia has taken proactive measures to diversify its export avenues, a forward-looking approach essential for mitigating future threats. This strategic shift becomes particularly pertinent when assessing the sustainable trajectory of Indonesian biodiesel exports, which harbor considerable promise. Indonesia's strategic pivot has manifested in the exploration of new biodiesel markets, with countries such as China, India, the United States, Australia, and South Korea emerging as focal points. A watershed moment in this trajectory is encapsulated by Indonesia's resolute stance in pursuing a legal recourse against the European Union through the World Trade Organization (WTO), following the persistence of objections despite prior communication. Remarkably, the WTO adjudged in favor of Indonesia, deeming the European Union's conduct inconsistent with established trade principles, thereby underscoring the significance of Indonesia's calculated maneuvering on the global stage (Sylvana et al., 2020).

Indonesia's unwavering commitment to enhance the quality of its palm oil commodities, including biodiesel, does not imply a seamless journey devoid of challenges. On the contrary, these challenges stem from the inadequacy of well-structured policies at various stages—ranging from process design, formulation, organization, to execution—that are essential to facilitate coherent upstream and downstream activities. Pertinently, on the upstream front, such as the provisioning of raw materials, the potential menace of uncontrolled land clearing

looms large if the Palm Oil Replanting (PSR) and replanting programs falter, potentially unraveling detrimental consequences. A comprehensive examination of obstacles encountered in the compulsory biodiesel implementation reveals a stratified classification based on stakeholder tiers, intertwined with the dynamics of varied sectors, offering a reservoir of potential solutions as elucidated in Table 2 (Haryana, 2018).

**Table 2.**  
**Identification of Problems in BBN Development**

Stakeholder	Constraints	Progress
Directorate General of New Renewable Energy and Energy Conversion	<p>The distribution of BU BBN Biodiesel is uneven (more biodiesel plants are located in WIB);</p> <p>Improving the quality of fuel, diesel and biodiesel;</p> <p>Increased knowledge for field implementers in handling and storing;</p> <p>Limited advice and facilities at TBBM;</p> <p>There is a problem with the mode of transportation (limited transportation ships);</p> <p>There is still resistance from end-users such as ship transportation modes and mining;</p> <p>Conducting massive socialization to increase understanding/awareness of the importance of using biodiesel.</p>	<p>Positive economic growth signals in the first quarter of 2020 show that Eastern Indonesia contributed to investment realization outside Java. This data is expected to solve the obstacles to the production and distribution of KTI. The government will also conduct B30 testing on sea freight, heavy equipment, agricultural machinery, and railways. Then SNI Biodiesel will be revised.</p>
Raw Material Processing Manufacturers and Industries (GAPKI)	<p>There are negative campaigns from several major export destination countries;</p> <p>The struggle for palm oil as a strategic commodity for plantations is still long;</p> <p>Palm oil FFB prices are still low;</p> <p>The dynamics of international issues that urge the selling value and economic value of palm oil to fall;</p> <p>Restrictions on oil palm land;</p> <p>There is no incentive policy for the BBN raw material supply industry;</p> <p>The anti-dumping movement abroad;</p> <p>Palm oil has not yet become a strategic industry (mindset).</p>	<p>Indonesia is still trying to get worldwide recognition for Indonesian biodiesel and palm oil quality. It is followed by development and progress that will continue to be achieved.</p>

Refinery Industry	Refinery production commodities are also needed for oleochemicals, food, etc.; The fulfillment of raw materials determined by the market price mechanism is quite influential.	The government must have the correct and specific calculation of palm oil raw materials to meet all sectors.
Biofuel Manufacturers (APROBI)	The selling price of biodiesel as a diesel mixture is low; Have not gotten subsidies on economical prices; It needs support for increasing production capacity; Target of 26% emission reduction (0.038 Gton of energy and transportation); The interests of fuel importers who prefer fuel imports over developing biofuels; Biofuel development in KTI is complex due to site conditions; There has been no firm penalty for parties who do not implement the mandatory; There is no commitment to mixing non-PSO; Technology development is poorly coordinated; No significant research funding.	The need for support for increasing biodiesel production capacity, the need for a vital penalty in implementing biofuels, the development of limited and overlapping technologies, and the policy of reducing GHG emissions at home and abroad. Fluctuations in world oil prices. Low selling price. The current biofuel production capacity is still below the target need for biofuels as mixed fuels. The development of BBN must be in line with the restrictions on fuel imports.
Mixing Industry and Distributor of BBN and Fuel (Pertamina)	The purchase price of biodiesel is higher than that of fuel; It is necessary to develop infrastructure, especially for distribution; There is still a low and limited mixed industry of BBN and fuel (33 distribution stations).	The location of the new distribution station is Sumatra with 19 units, Java with 7 units, Bali with 1 unit, Kupang with 1 unit, Kalimantan with 8 units, Sulawesi with 6 units, and Papua with 2 units.
Industries That Use BBN as a Fuel Mixture (Gaikindo)	There has been no engine standardization to use biodiesel mixture fuel above 10% according to WWFC; There is no incentive for the automotive industry to use biodiesel and diesel mixtures; Regulatory implementation requires coordination between policymakers and stakeholders.	It is still being pursued so that the complete mechanism for the use of biodiesel in Indonesia can run smoothly.

Regarding Indonesia's imperative biodiesel policy, irrespective of the prevailing circumstances and attained milestones, it can be asserted that the necessity for domestic biodiesel is poised to

perpetually surge in the coming years. Indonesia's recent strategic objective, aimed at sustaining the 30% BBN (Biodiesel Blending Mandate) implementation, is set to span a minimum of three years, extending through 2022. This concerted effort projects a twofold surge in Indonesia's anticipated diesel demand by 2025 (as illustrated in Table 3), ascending from 39.66 million kiloliters in 2016 to 79.28 million kiloliters (Purba, 2018). In light of this, it is imperative for the government to secure a robust supply of raw materials for this mandatory program, mitigating the risk of any potential future raw material deficit. The significance of this mandatory policy in Indonesia is underscored by the relatively nascent global landscape of the biodiesel industry. It's worth noting that Indonesia stands out as the solitary nation that has not only embraced but boldly executed the incorporation of FAME (Fatty Acid Methyl Ester) at a 30% blend into diesel fuel. This pioneering decision stands poised to catalyze a paradigm shift on the international stage, positioning Indonesia to garner considerable global recognition and capture the attention of energy experts across the globe. In support of this endeavor, the government has designated 20 fuel and Biodiesel Blending Mandate (BBN) biodiesel suppliers, including key players such as PT. Wilmar Nabati Indonesia with a capacity of 1.37 million kL, PT. Wilmar Bioenergi Indonesia with 1.32 million kL, PT. Musim Mas with 882 thousand kL, and PT. Cemerlang Energi Perkasa with 483 thousand kL, thereby fortifying Indonesia's strategic footing in this emerging sector.

**Table 3.**  
**Projected Solar Demand and Biodiesel Needs in 2025**

Years	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>Solar Needs</b>	39.66	42.83	46.26	49.96	53.95	58.27	62.93	67.97	73.40	79.28
<b>PSO</b>	19.83	21.42	23.13	24.98	26.98	29.14	31.47	33.99	36.70	39.64
<b>Non-PSO</b>	19.83	21.42	23.13	24.98	26.98	29.14	31.47	33.99	36.70	39.64
<b>Mandatory Diesel Needs</b>	B20	B20	B20	B20	B30	B30	B30	B30	B30	B30
	7.39	8.57	9.25	9.99	11.19	17.48	18.88	20.39	22.02	23.78

To date, the trajectory of mandatory biodiesel implementation, from its inception to the present, has remained relatively unmarred by technical impediments. The Indonesian government has zealously undertaken multifaceted initiatives in pursuit of the nation's aspiration for energy self-sufficiency. However, the nucleus of challenges encountered in the biodiesel blending mandate (BBN) crafted from sustainable sources within Indonesia reveals a web of interconnected impacts that reverberate across diverse sectors. This is evident as the BBN's implementation intricately influences a spectrum of sectors. Notably, Table 4 delineates the crux of the challenges encountered during the execution of the B30 policy in 2020, providing an insightful snapshot into the prevailing dynamics (Ditjen EBTKE, 2021).

**Table 4.**  
**The Main Problems of B30 in 2020**

	Issue	Status/Description
<b>Infrastructure</b>	It is necessary to add a storage tank from BU BBN as an additional buffer if the production volume exceeds the needs of the fuel BU, as well as a reception tank from the fuel BU such as the Balikpapan shore terminal.	Several BBN BU's have added agile storage. The Balikpapan shore terminal is in the finalization stage before commissioning and distribution.

<b>Quality</b>	Improvements to the B100 specification for mixing in the B30 led to many B100s being off-spec at the beginning of channeling.	BU BBN has been able to maintain quality up to the point of handover of BU BBM, so this problem has been reduced.
<b>Logistics</b>	Many biodiesel transport ships have not used Nitrogen Blanketing for distribution, so they are vulnerable to off-spec. Use of trucks with Non-ODOL (Over Dimension Overload) specifications.	Most BU BBN have used vessels with Nitrogen Blanketing. PT Pertamina (Persero) has also provided relaxation of the time for using non-ODOL trucks.
<b>Demand</b>	The decrease in diesel demand nationally causes a decrease in the volume of biodiesel utilization. Besides, that biodiesel production cannot be matched with BU BBN and the time of import and distribution of B30 from BU BBM.	The reduced absorption volume from biodiesel cannot be compensated in the following months. It is expected that additional production capacity from BU BBN, which will expand the plant, can be realized soon.
<b>Incentive</b>	The volume of channeling is getting bigger and bigger. The difference between HIP Biodiesel and HIP Diesel is increasing. The need for incentive funding is growing. Cashflow difficulties in BU BBN because incentives have not been paid by BPD PKS.	Discussions have been carried out through the BPD PKS Steering Committee and produced several policies to overcome the lack of funds, including: Imposition of progressive export levy tariffs on CPO and its derivatives. The elimination of VAT on the distribution of biodiesel. Subduing the amount of CPO conversion into biodiesel.

Biodiesel incentives stand as a testament to the Indonesian government's concerted endeavors aimed at elevating the national palm oil management framework. Transitioning from the erstwhile utilization of tax funds allocated within the state budget, the government now taps into levies generated from palm oil export activities, along with providing bailouts to pertinent associations that align with government directives pertaining to mandatory biodiesel implementation. The proactive presence of BPD PKS, orchestrating incentives and other strategic initiatives, has substantially bolstered the inherent value of palm oil, consequently precipitating a resurgence in CPO (Crude Palm Oil) production and potentially imparting an upward pressure on global CPO prices. The trajectory of CPO prices has demonstrated a continuous upward trajectory since the pronouncement of the mandatory biodiesel policy, a trend magnified by the current economic landscape. Notably, the cost of diesel fuel has witnessed a decline of 55.34%, notably amid the pandemic, with a shift from Rp8,000.00 to Rp5,150.00, illustrating the dynamic pricing dynamics in the context of current global conditions. The policy tools governing palm commodity prices and markets exhibit notable gaps, alongside the need for stronger law enforcement to foster biodiesel development. Alternatively, it can be posited that the financial framework underpinning BPD PKS remains relatively fragile, necessitating continued government intervention. The provisions for penalties against policy violations by biodiesel distributors, as stipulated in Article 29 of Presidential Regulation No. 61/2015 and Minister of Energy and Mineral Resources Regulation No. 25/2013 concerning the incorporation of biofuels into transportation fuel, are entrenched. However, in practice, the efficacy of these sanctions

remains suboptimal, highlighting the imperative for policy refinement through rigorous enforcement. Rectifying administrative and governance aspects of distribution and usage within the community should thus emerge as an initial governmental priority. The incentive-laden policies fortifying the mandatory biodiesel program, while pivotal, introduce a fresh set of challenges, notably in the form of potential threats to the trade balance. This phenomenon contrasts with the envisaged outcomes and aims of the biodiesel mandate, which are geared towards curbing the influx of fossil oil imports to conserve the nation's foreign exchange reserves. This can be discerned through the decline in the prospects for both CPO and biodiesel exports after establishing a domestic target market. The elevated importance of domestic consumption resulting from the ambitious program rollout underscores the determination of concerned stakeholders to diligently advance through each developmental stage. However, the predominant focus on upstream concerns, both domestically and internationally, accentuates the complexity surrounding palm oil-fueled BBN implementation in Indonesia. Consequently, harmonizing upstream and downstream activities becomes pivotal for an effective palm oil management mechanism. Navigating the price fluctuations that afflict various commodities, intensifying their vulnerability, is a critical challenge for developing economies like Indonesia, which significantly relies on primary commodity exports. In this context, export taxes emerge as a potent tool within trade policy to mitigate these challenges. The strategic deployment of export tax policies is envisaged to not only enhance terms of trade but also mitigate export revenue volatility. Should biodiesel emerge as a central commodity of focus, it necessitates the establishment of palm oil as a national priority. Notably, palm oil's status has yet to be accorded such recognition within Indonesia's roster of priority industries, which remains a noteworthy endeavor.

Viewed through an economic-political lens, biodiesel policies can be categorized into two distinct groups: those related to governance quality and those aligned with macroeconomic strategies. The Indonesian government has demonstrated a commendable standard of governance, exemplified by its resolute implementation of the mandatory 30% FAME (Fatty Acid Methyl Ester) blending policy with diesel—the sole nation to do so. However, the extent of transparency in this pursuit has been questioned by researchers, suggesting that despite the government's advancements, complete transparency might still be a goal. The attainment of this transparency milestone could pave the way for more straightforward resolution of economic-political dynamics in the future, thereby facilitating smoother pathways for investment within the bioenergy sector. At its core, the imperative for mandatory biodiesel underscores Indonesia's concerted effort to mitigate dependence on petroleum imports, a primary driver of significant burdens on the state budget, especially in terms of fuel subsidies. The government's orientation towards harnessing new renewable energy by integrating petroleum with vegetable oils emerges as a pragmatic means of capitalizing on existing opportunities while optimizing potential to attain energy self-sufficiency. This approach not only aligns with national interests but also aligns with global imperatives by contributing to the reduction of greenhouse gas emissions. With the government's target to achieve a 29% reduction by 2030, Indonesia stands poised to make a substantial and multifaceted contribution on the global stage. The strategic initiatives undertaken by the government in implementing mandatory biodiesel policies thus far are distinctly marked by a considerable level of assertiveness, indicative of an approach that confronts and addresses issues perceived as obstructive or hindering. This stance becomes particularly evident in the accelerated trajectory of the mandatory biodiesel program, marked by an array of varying blending levels that necessitate significant volumes of crude palm oil (CPO). The government's forward-looking blueprint, encompassing the envisaged development of B100 and green fuels derived from palm oil, introduces a nuanced interplay of opportunities and risks. Among these potential hazards, environmental considerations loom prominently,

particularly the vulnerability to environmental risks emanating from land expansion. The expansion of oil palm plantations carries the potential to trigger heightened greenhouse gas emissions, stemming both from land conversion and the intrinsic emissions tied to the biodiesel production process. In essence, this scenario encapsulates a metaphorical boomerang, defying the very essence of biofuels as a means to curtail greenhouse gas emissions, thereby challenging the aspiration of fostering a more sustainable environment.

## CONCLUSIONS

Palm oil presents substantial prospects for societal well-being, aligning with government objectives and human sustenance. However, these prospects must be balanced with meticulous management, particularly given the intricate upstream-downstream dynamics and the array of substantial challenges associated with palm oil. Key takeaways and conclusions can be distilled as follows:

The enforcement of Indonesia's mandatory biodiesel policy, guided by Minister of Energy and Mineral Resources Regulation No. 12/2015, is closely intertwined with the establishment of the Oil Palm Plantation Fund Management Agency. This agency oversees fund management across the entire spectrum of activities, from upstream to final stages. The funds, derived from palm oil tax levies and their derivatives, are allocated to several critical programs, encompassing research and development, replanting, promotion, infrastructure, and human resource education. Notably, the biodiesel incentive fund mechanism, with substantial funding, involves stakeholders such as the Director-General of Oil and Gas, the Director-General of EBTKE (New and Renewable Energy and Energy Conservation), BDPKS, BU BBM (Fuel Business Unit), and BU BBN (Biodiesel Business Unit).

Indonesia remains steadfast in its pursuit of elevating biodiesel to a superior downstream palm oil product. Within this phase, various hurdles are encountered, spanning infrastructure, quality, logistics, demand, and incentives. The government's drive to optimize biodiesel adoption includes plans to expand and establish new biodiesel production facilities. However, these initiatives experienced delays attributed to the pandemic-induced challenges. At present, Indonesia is engaged in fostering an open-ended and perpetually sustainable fund management mechanism. Despite this ambition, the Oil Palm Plantation Fund Management Agency encountered fiscal challenges, culminating in its first-ever deficit in 2020. As a result, government intervention was necessitated, involving an injection of 2.78 trillion rupiah from the state budget to support upstream activities. Additionally, the government is endeavoring to enhance the levy system through PMK No. 191/PMK.05/2020 to better position the mechanism for future scenarios. The mandatory biodiesel program policy presents a dual-edged potential, offering opportunities for the trade balance while concurrently harboring the risk of a deficit. This susceptibility arises if Indonesia fails to navigate the intricate interplay between supporting this policy and preserving the avenues for CPO and biodiesel exports. The ensuing challenge finds its roots in environmental considerations, wherein the scenario of Indonesia not achieving a surplus poses complications. Sustaining the export of palm oil commodities and their derivatives hinges on effectively orchestrated replanting initiatives or the exploration of new cultivation grounds, as some oil palm trees have reached maturity. However, this course of action appears contradictory to the imperative of environmental preservation, given the looming specter of deforestation associated with palm oil production. In the final analysis, it is imperative for Indonesia to establish a centralized and integrative national institution that brings together an array of stakeholders, institutions, and associations within the palm oil sector. Such an institution, established at the level of Presidential Regulation, would serve as a linchpin for orchestrating a harmonious convergence of strategic initiatives across disparate domains,



including ministries, institutions, and local governance structures. By encapsulating and unifying the intricate tapestry of policies that steer the palm oil industry, this institution would translate them into a cohesive framework, seamlessly aligned with the broader National Policies on Palm Oil Industry. This orchestrated cohesion, in turn, holds the potential to galvanize Indonesia's ascendancy in the global palm oil landscape, generating ripples that extend to regional economic vitality, poverty alleviation, the empowerment of smallholder oil palm plantations, and the perpetual bedrock of economic autonomy encompassing energy resilience and food security. The establishment of such a national institution stands not only as a strategic imperative but also as a cornerstone of Indonesia's sustainable trajectory within the global palm oil arena, ushering forth a more prosperous and resilient future.

## REFERENCES

- APROBI. (2020). *Produksi Biofuel Naik di Masa Pandemi, Aprobi : Kami Juga Heran - APROBI*. <https://www.aprobi.or.id/id/produksi-biofuel-naik-di-masa-pandemi-aprobi-kami-juga-heran/>
- Asante, K.T. (2023) 'The politics of policy failure in Ghana: The case of oil palm', *World Development Perspectives*, 31. Available at: <https://doi.org/10.1016/j.wdp.2023.100509>.
- Bariyah, N. (2020) 'Developing a model of employment creation in border region: Gaharu cultivation and honey bee farming in Bengkayang, West Kalimantan, Indonesia', *Biodiversitas*, 21(11), pp. 5237–5247. Available at: <https://doi.org/10.13057/biodiv/d211127>.
- BPDP. (2018). *Industri Kelapa Sawit Indonesia Serap 16,2 Juta Pekerja - Beranda*. <https://www.bdpd.or.id/Industri-Kelapa-Sawit-Indonesia-Serap-16-2-Juta-Pekerja>
- Dewi, I.G.S., Turisno, B.E. and Handayani, E. (2022) 'Policy on Forest Land Use Change for Oil Palm Plantations in Lamandau Regency, Central Kalimantan Province, Indonesia', *Environment and Ecology Research*, 10(4), pp. 461–466. Available at: <https://doi.org/10.13189/eer.2022.100404>.
- Ditjen EBTKE. (2021). *Laporan Kinerja Ditjen EBTKE Tahun 2020*. <https://www.esdm.go.id/assets/media/content/content-laporan-kinerja-ditjen-ebtke-2020.pdf>
- ESDM. (2022). *Laporan Kinerja DITJEN EBTKE 2021*. In *Kementrian Energi dan Sumber Daya Mineral* (Vol. 4, Issue 1).
- Goh, C.S. and Potter, L. (2022) 'Bio-economy for sustainable growth in developing countries: The case of oil palm in Malaysia and Indonesia', *Biofuels, Bioproducts and Biorefining*, 16(6), pp. 1808–1819. Available at: <https://doi.org/10.1002/bbb.2381>.
- Haryana, A. (2018). *Biomass Utilization as Renewable Energy for Optimization of National Energy Mix*. In *Bappenas Working Papers* (Vol. 1, Issue 1). Kementerian Perencanaan Pembangunan Nasional (Bappenas). <https://doi.org/10.47266/BWP.V1I1.9>
- Hashemvand Khiabani, P., & Takeuchi, W. (2020). Assessment of oil palm yield and biophysical suitability in Indonesia and Malaysia. *International Journal of Remote Sensing*, 41(22), 8520–8546.
- Hein, L. et al. (2022) 'Effects of soil subsidence on plantation agriculture in Indonesian peatlands', *Regional Environmental Change*, 22(4). Available at: <https://doi.org/10.1007/s10113-022-01979-z>.
- Lestarida, R. (2020). *Pengaruh Ukuran Perusahaan, Kepemilikan Institusional, Kepemilikan Keluarga, Dan Gender Diversity Terhadap Agresivitas Pajak Dengan Corporate Governance Sebagai Variabel Moderasi* [UIN Syarif Hidayatullah Jakarta]. <http://repository.uinjkt.ac.id/dspace/handle/123456789/51860>

- LPEM FEB UI. (2020). *Risiko Kebijakan Biodiesel dari Sudut Pandang Indikator Makroekonomi dan Lingkungan*. [https://www.greenpeace.org/static/planet4-indonesia-stateless/2020/11/cc19cf62-laporan-biodiesel-lpem\\_bahasa-indonesia\\_final.pdf](https://www.greenpeace.org/static/planet4-indonesia-stateless/2020/11/cc19cf62-laporan-biodiesel-lpem_bahasa-indonesia_final.pdf)
- Mangeswuri, D. R. (2019). Hambatan Ekspor Minyak Sawit Ke Uni Eropa Dan Upaya Mengatasinya. *Info Singkat*, 11(8), 19–24. [https://berkas.dpr.go.id/puslit/files/info\\_singkat/Info\\_Singkat-XI-8-II-P3DI-April-2019-220.pdf](https://berkas.dpr.go.id/puslit/files/info_singkat/Info_Singkat-XI-8-II-P3DI-April-2019-220.pdf)
- Moleong, L. J. (2018). *Metodologi Penelitian Kualitatif* (38th ed.). PT Remaja Rosdakarya.
- Nambiappan, B., Ismail, A., Hashim, N., Ismail, N., Shahari, D. N., Idris, N. A. N., et al. (2018). Malaysia: 100 years of resilient palm oil economic performance. *Journal of Oil Palm Research*, 30(1), 13–25.
- Pradipto, R., Saputra, W., Nugroho, A., & Hutami, A. (2019). Ketika Kekayaan Alam Tidak Menyejahterakan: Pembelajaran dari Pencegahan Korupsi Sektor Sumber Daya Alam. *Jurnal Antikorupsi INTEGRITAS*, 5(2), 49–63. <https://doi.org/10.32697/integritas.v5i2-2>.
- Purnomo, H., Okarda, B., Dermawan, A., Ilham, Q. P., Pacheco, P., Nurfatriani, F., et al. (2020). Reconciling oil palm economic development and environmental conservation in Indonesia: A value chain dynamic approach. *Forest Policy and Economics*, 111, Article 102089
- Purba, K.F. et al. (2023) 'Foresight Strategy for Sustainable Oil Palm Development in East Halmahera Indonesia', *International Journal of Sustainable Development and Planning*, 18(7), pp. 2167–2175. Available at: <https://doi.org/10.18280/ijstdp.180720>.
- Rahayu, S. W., & Sugianto, F. (2020). *Implikasi Kebijakan dan Diskriminasi Pelarangan Ekspor dan Impor Minyak Kelapa Sawit dan Bijih Nikel Terhadap Perekonomian Indonesia*. 16, 224–236.
- Rambe, K. R., Kusnadi, N., & Suharno, S. (2019). Dynamics of Indonesian Palm Oil Biodiesel Policy Development. *Jurnal Sosial Ekonomi Pertanian*, 15(3), 239–252.
- Saputra, W., Sulistyanto, S., & Isnaini, K. N. (2022). Analisis Kerentanan Korupsi dalam Kebijakan Subsidi Biodiesel di Indonesia. *Integritas: Jurnal Antikorupsi*, 7(2), 279–290. <https://doi.org/10.32697/integritas.v7i2.815>
- Serrano, A. (2023) 'Restructuring palm oil value chain governance in Colombia through long-term labour control', *Journal of Agrarian Change*, 23(3), pp. 547–567. Available at: <https://doi.org/10.1111/joac.12528>.
- Sibhatu, K.T. (2023) 'Oil palm boom: its socioeconomic use and abuse', *Frontiers in Sustainable Food Systems*, 7. Available at: <https://doi.org/10.3389/fsufs.2023.1083022>.
- Sunarminto, T., Mijiarto, J. and Prabowo, E.D. (2019) 'Socioeconomic and cultural impacts of oil palm plantation development in Indonesia', in *IOP Conference Series: Earth and Environmental Science*. Available at: <https://doi.org/10.1088/1755-1315/336/1/012008>.
- Sylvana, Y., Firmansyah, Y., Wijaya, H., & Angelika, M. (2020). The Role of the WTO in Mediate Dispute Palm Oil Between Indonesia and the European Union. *International Journal of Social Science and Religion (IJSSR)*, 1(3), 233–250. <https://doi.org/10.53639/IJSSR.V1I3.16>
- TRASE. (2020). *Kepemilikan dan Dominasi Korporasi pada Rantai Pasok Minyak Kelapa Sawit di Indonesia*. <http://resources.trase.earth/documents/infobriefs/Infobrief9IND.pdf>