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Research Paper

Policy Strategy to Stimulate Indonesia's Palm Oil Downstream Industries

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Abstract

The Indonesian government has prioritized downstream industrial development to enhance the economic value of domestically produced palm oil. This initiative targets three strategic sectors: oleo-food, oleochemicals, and bioenergy. The advancement of these industries entails more than an expansion of upstream production; it requires a nuanced understanding of each sector's absorption and production capacities. This study employs the Analytic Hierarchy Process (AHP) to assess investment characteristics and competitiveness within these downstream sectors. The findings identify six critical policy factors to stimulate investment: tax incentives, the establishment of special economic zones, improved plantation productivity, favorable pricing for fresh fruit bunches (FFB), enhanced access to agroindustrial financing, and the integration of upstream and downstream operations. These elements are essential for fostering a conducive investment climate and advancing the transformation of Indonesia's palm oil sector to support broader national economic development goals.

Keywords: Analytic hierarchy process; oleo-food; oleochemical; bioenergy.

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1. Introduction

Over the past century, oil palm has transformed from an agroforestry crop cultivated by smallholders into the most significant vegetable oil source worldwide, contributing 73 million tons, or 35%, of global production (Khor et al., 2023). Global demand for palm oil continues to rise, and this demand has been met by the expansion of oil palm plantations (Ayompe et al., 2021). Investment in oil palm plantations can stimulate local economies, create employment, and reduce poverty (Obidzinski et al., 2014). The development of downstream industries aims to strengthen and deepen industrial structures. Downstream industrial programs seek to increase the added value of raw material products, enhance industrial structures, and provide opportunities for employment and business growth within the domestic economy.

Through downstream industries, we expect that exported commodities will no longer be raw materials but rather derived or finished products. This transition contributes to higher product prices and increased foreign exchange earnings. Ministry of Industry (2021) has stated that successful downstream industrialization requires several prerequisites, including: (1) a long-term, collaborative-integrative mindset from stakeholders; (2) assurance of raw material supply availability; (3) regulation of land availability through spatial planning regulations for Industrial Development Zones (IDZ) and Industrial Zones (IZ); (4) assurance of industrial financing availability; (5) assurance of technology utilization through regulations and incentives; (6) availability of energy, infrastructure, transportation, and logistics; and (7) certainty of non-overlapping regulations, thereby creating an effective business climate.

Initially, the government's program to promote the downstream palm oil industry began in 2010-2011 with the issuance of Finance Minister Regulation No. 128/2011, replacing Finance Minister Regulation No. 67/2010. This policy aimed to impose higher export duties on upstream palm oil products, thereby increasing export revenues and profits by leveraging market forces to provide cheaper raw materials, which in turn lowered production costs compared to competing countries (Irawan & Soesilo, 2021; Liefert & Westcott, 2016).

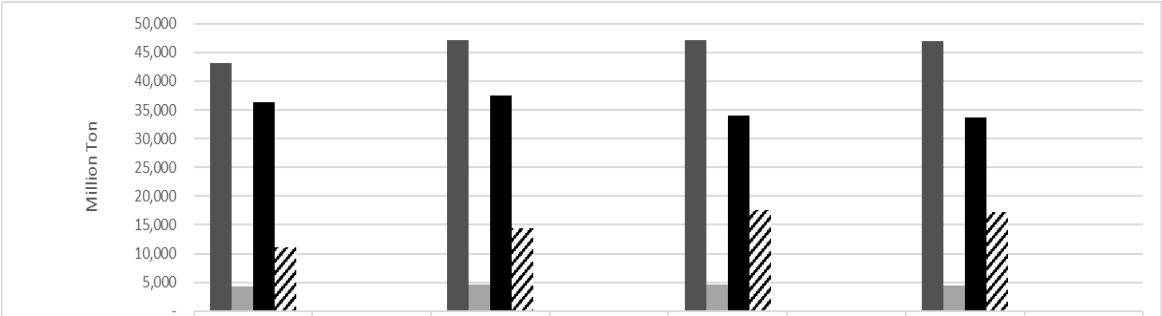
The national policy focus for the downstream industry is the palm oil agroindustry, encompassing oleo-food, oleochemicals, and biodiesel, as outlined in Government Regulation No. 14/2015 on the National Industrial Development Master Plan (RIPIN) 2015-2035 and Presidential Regulation No. 74/2022 on the National Industry Policy 2020-2024. Through these regulations, the government aims to make Indonesia the global hub for palm oil derivative production and consumption by 2045, with the country setting global CPO price benchmarks. The government also targets the production of at least 200 types of palm oil derivatives domestically by 2030. The current roadmap for the development of Indonesia's downstream palm oil industry refers to three main regulations: (1) Law No. 4/2014 on Industry; (2) Government Regulation No. 14/2015 on the National Industrial Development Master Plan (RIPIN) 2015-2035; and (3) Presidential Regulation No. 74/2022 on the National Industry Policy (KIN) 2020-2024.

Downstream industries involve the processing of raw materials into value-added products through complex manufacturing processes. For the domestic industry, the downstreaming of Crude Palm Oil (CPO) requires additional resources. At the same time, policies that aim to restrict raw material exports are implemented to meet domestic needs in various forms. By reducing reliance on imported finished goods, downstreaming can enhance export opportunities while decreasing imports (Husin et al., 2023).

Matupalesa et al. (2019) describe the downstreaming of the palm oil industry through the use of hub-and-spoke companies within industrial zones. In this hub-and-spoke model, one or more companies serve as anchors or Bonded Zone Entrepreneurs (PKB) and are surrounded by companies that provide inputs or receive outputs generated. These anchor companies act as the hubs, while other companies integrated with them function as spokes. Additionally, Manansang (2024) states that there are four Special Economic Zones (KEK) focused primarily on palm oil processing: KEK Sei Mangkei in North Sumatra, KEK Maloy Batuta Trans Kalimantan (MTBK) in East Kalimantan, KEK Sorong in Southwest Papua, and KEK Arun Lhokseumawe in Aceh. As of 2024, there were 37 business players in these zones, with a cumulative investment realization of IDR 21.9 trillion and the creation of 6,247 jobs. The achievements and ripple effects of palm oil development in these zones are significant, for example, in KEK Sei Mangkei, downstream palm oil exports reached IDR 5.4 trillion in 2023.

Ensuring a reliable and sustainable supply of fresh fruit bunches (TBS) from independent smallholders is crucial for the continuity of downstream palm oil processing operations. Moreover, the industry faces the challenge of balancing economic growth with environmental concerns, as the rapid expansion of oil palm plantations has been linked to deforestation and biodiversity loss in certain regions (Human Rights Watch, 2019).

Furthermore, research and development activities and technological advancements have helped oil palm crops increase yields and reduce inputs, thereby maximizing oil production on smaller land areas compared to other food crops (Basiron, 2007). The palm oil industry plays a strategic role in Indonesia's economy, as the country is the largest global producer of palm oil (Bello & Raman, 2017; Yoo et al., 2019). Palm oil is the second-largest contributor to national export revenue after coal mining. In addition to its national contribution, Sipayung (2024) shows that the growth of palm oil production (CPO) has a positive and significant impact on the growth of Regional Gross Domestic Product (PDRB) in palm oil-producing regions. Regional economic growth is highly responsive to increases in palm oil production.



	2018		2019		2020		2021	
CPO Production	43,108	91.0%	47,180	91.0%	47,034	91.2%	46,888	91.4%
PKO Production	4,280	9.0%	4,648	9.0%	4,549	8.8%	4,412	8.6%
Total Export	36,333	76.7%	37,430	72.2%	34,007	65.9%	33,674	66.1%
Domestic Consumption	11,055	23.3%	14,398	27.8%	17,576	34.1%	17,262	33.9%

Figure 1. Total Indonesian Palm Oil Production And Exports From 2018-2021 (In A Million Tons)
Source: Indonesian Palm Oil Association / *Gabungan Pengusaha Kelapa Sawit Indonesia* (GAPKI), 2022

In 2021, 66.1 percent of palm oil production was exported and 33,9 percent was domestic consumption (Figure 1). Furthermore, Indonesia exported 25.53 million tons of Crude Palm Oil (CPO) (HS Code 1511) worth USD 26.66 billion in 2021 (UN Comtrade, 2022; Statistics Indonesia (BPS, 2022). This made Indonesia the largest exporter of palm oil globally, accounting for at least 54.7 percent of the global market in 2021. By 2022, Indonesia's oil palm plantation area had reached 15.3 million hectares, consisting of 548,311 hectares owned by state-owned enterprises (SOEs), 8.57 million hectares owned by private plantations, and 6.21 million hectares owned by smallholders, with a CPO production volume of 46.81 million tons (Directorate General of Estates, 2024). Based on the Harmonized System (HS) classification of palm oil, the largest export in 2022 was Other Palm Oil (HS 15119000), which accounted for 81.79 percent of total palm oil exports from Indonesia. Additionally, Crude Palm Oil (HS 15111000), Other Palm Oil Kernel (HS 15132900), and Crude Palm Kernel Oil (HS 15132110) contributed 13.13 percent, 4.67 percent, and 0.41 percent, respectively, to the total export value of USD 26.33 billion (BPS, 2023).

The economic impact of palm oil on Indonesia's economy can be substantial when considering its derivative products, which are recorded under HS codes 1513, 1516, 1517, 3826, and oleochemicals. Exports of CPO and its derivatives collectively generated USD 36.2 billion, which represents 19 percent of Indonesia's 2021 State Budget (APBN). Furthermore, the labor-intensive nature of the palm oil industry makes it crucial for the national economy, employing approximately 2.67 million smallholders and 4.42 million plantation workers (Ministry of Agriculture, 2021). The Indonesian government seeks to maintain a steady supply of palm oil, as the industry significantly contributes to the country's economy and provides employment for millions (Sitepu et al., 2020).

The development of the downstream palm oil industry in Indonesia presents a significant opportunity for the country to increase the added value of its palm oil products and improve its competitiveness in global markets (Witjaksono et al., 2023). However, Indonesia's palm oil industry still

faces complex challenges. At the agricultural level, issues such as limited investment in replanting, low productivity, and poor product quality persist (Azahari, 2018). The greatest threat is that palm oil exports remain dominated by crude (CPO) or simple processed forms under HS Code 1511. However, if further downstream product diversification is pursued, there would be more added value and greater product variety (Rachman et al., 2024). Figure 1 shows that 66% of Indonesia's CPO production is exported globally. In contrast, the share of local palm oil derivatives in downstream industries, including oleochemicals and biofuels, remains low, accounting for only 30% of total palm oil exports combined.

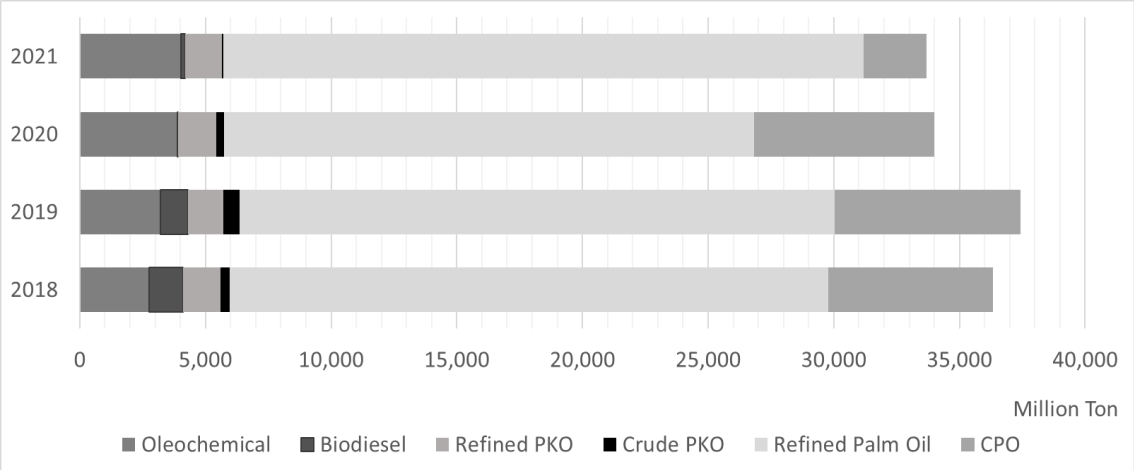


Figure 2. Indonesian Palm Oil Exports Classified Into Common Derivatives Products From 2018-2021 (In A Million Tons)
Source: Indonesian Palm Oil Association / *Gabungan Pengusaha Kelapa Sawit Indonesia* (GAPKI), 2022

Another challenge facing Indonesia's palm oil industry is the volatility of CPO prices in international markets and the negative campaigns spread by non-CPO vegetable oil-producing countries. The palm oil market is volatile, affected by unpredictable price fluctuations, supply shortages, and other unexpected shocks (Tyson et al., 2018). Indonesia's CPO prices have shown an upward trend over the last two years, accompanied by relatively high volatility (as shown in Figure 2). This situation impacts at least two channels: the price paid to farmers for fresh fruit bunches (TBS) and the downstream processing industry. The surge in global CPO prices makes export more attractive to producers than selling it domestically, thereby disrupting the availability of CPO in the domestic market, which is a crucial input for downstream industries. Additionally, the negative campaigns targeting not only CPO products but also derivatives such as olein, fatty acids, stearin, and biofuels are becoming more widespread. These threats affect the competitiveness of Indonesian palm oil products in global markets and hinder investment in the downstream palm oil sector.

Moreover, the rise in CPO prices can be attributed to the implementation of the Domestic Market Obligation (DMO) policy by the government, which aims to restrict CPO exports. This policy mandates producers to allocate a required portion of their production for domestic consumption. A DMO of 30% means that producers must reserve 30% of their production for the domestic market. Typically, a ratio system is used in the DMO, meaning that as the DMO increases, export restrictions also increase, which in turn affects global CPO supply. When the Indonesian government raises the DMO, it also causes an increase in international CPO prices (Husin et al., 2023).

The focus of the government's attention has been divided among various priority industries, resulting in insufficient concrete steps to focus on optimizing the development of any one specific industry. While the government aims to develop the downstream palm oil industry, this effort lacks integration between the upstream and downstream sectors. The palm oil industry should be recognized as a strategic sector with high added value. If the potential of the palm oil industry is recognized as a strategic sector with high added value, it is certain that Indonesia's palm oil industry will thrive (INDEF, 2024 in (Siregar & Hasibuan, 2024).

In response, the development of the downstream industry has become a strategic policy that should be adopted by the Indonesian government to increase the economic added value from palm oil. Furthermore, downstream CPO also has the potential to attract investment and become a source of new

economic growth. Historically, several forms of policies have been adopted to stimulate the development of palm oil derivative industries in the country, ranging from tax incentives, the development of integrated industrial zones linking upstream and downstream with port facilities, export duties and tariffs, and mandatory policies to increase palm oil content in biodiesel to reduce dependence on imported oil gradually. Most studies on Indonesia's downstream palm oil industry focus on the impact of these policies. On the other hand, these studies neglect the economic sustainability of the downstream palm oil industry, which depends on the absorption capacity and production of local industrial companies.

To establish a country with a solid industrial base by 2035, as outlined in the RIPIN 2015-2035, the industrial structure is divided into five components: flagship industries, supporting industries, upstream industries, basic capital, and prerequisites. The palm oil industry is classified as an upstream industry, a priority sector that serves as the foundation for manufacturing industries and generates raw materials. Therefore, stability in both quantity and price is crucial. The upstream agro-industry, together with supporting industries (such as capital goods, components, auxiliary materials, and industrial services), plays a role in supporting national flagship industries, including food, pharmaceutical, and cosmetic industries, transportation, and energy. This is why oleo-food, oleochemicals, and biodiesel industries are prioritized in the palm oil downstreaming program.

Moreover, the target oleo-food products include complex food products or phytonutrients, such as specialty fats (cocoa butter substitutes), tocopherols, beta-carotene, organic acids, and alcohols from palm oil industry waste. Meanwhile, the prioritized oleochemical commodities include methyl esters (biodiesel feedstock), bioplastics from palm oil industry waste, and essential oils. Some studies have identified factors influencing the development of the oleochemical industry, such as government policies, raw material quality, and the continuity of fresh fruit bunch (TBS) supply (Fajarika et al., 2023; PASPI, 2021). Biodiesel industry priorities include increasing product diversity, such as biodiesel, bioethanol, biojet fuel, biogas from palm oil processing waste, biomaterials for medical devices, and aromatic building blocks based on lignin. The bioenergy industry has recently become heavily dependent on government-funded programs, and this situation will shift in the coming years to attract more private sector investment.

The development of Indonesia's palm oil downstream industry is not merely a transformation of business scale and the types of goods produced from upstream to downstream producers. Specifically, this transformation is influenced by the absorption and production capacity of the three palm oil downstream subsectors: oleo-food, oleochemicals, and bioenergy. This study explores the investment characteristics and competitiveness in Indonesia's oleo-food, oleochemical, and bioenergy sectors. Understanding the dynamics of these subsectors is essential to identify investment opportunities in Indonesia's palm oil downstream industry.

2. Methods

The study on investment and intra-industry competitiveness of CPO derivative products in Indonesia employed a mixed-method approach, combining both qualitative and quantitative methods. The initial phase of the research involved an exploration of various arguments and relevant considerations to gain a comprehensive understanding of the complexity of the issues under investigation. This process was conducted through in-depth discussions with key stakeholders using the Focus Group Discussion (FGD) method. During the Focus Group Discussion (FGD), the questions centered on: (1) factors influencing upstream palm oil farmers/producers in transforming their business scale and product output to support palm oil downstreaming; (2) factors affecting the enhancement of production capacity in downstream CPO industries (oleo-food, oleochemicals, and bioenergy); and (3) appropriate strategies for developing downstream CPO industries, based on multiple criteria and expert assessments. Based on the insights obtained from this exploratory phase, the Analytic Hierarchy Process (AHP) was identified as the most appropriate method to analyze and map priorities within a complex decision-making framework. Thomas L. Saaty developed this method in the 1970s to assist the decision-making process by considering objectives, criteria, sub-criteria, and alternative solutions that will be offered in a structured hierarchical series (Sipahi & Timor, 2010). In practice, AHP is carried out by pairwise comparisons to measure the degree of relative importance between elements or factors at each hierarchical level. Sipahi & Timor (2010) added that the AHP technique will focus on the lowest level of the hierarchy, where this line will usually contain an evaluation of the best options from the alternative solutions offered. Apart from that,

AHP provides a way or technique for decision-makers to change subjective assessments into more scientifically objective measures.

Saaty (2008) states that the results of in-depth interviews or focused group discussions with expert sources can be arranged into an arrangement of problems or goals to be achieved, choice of criteria, and alternative solutions in a tiered hierarchy. Ranking or weighting in AHP is done by comparing elements in the same hierarchy by giving a degree of importance score in the form of a number on a scale of 1 to 9 (as illustrated in Table 1). The rules used are based on the mechanism for calculating matrix numbers in mathematics (Saaty & Shang ,2011; Suharjito & Marimin ,2012).

Table 1. Pairwise Comparison

Scale	Degree of Importance
1	Equally important
3	Slightly more important
5	More important
7	Very important
9	Absolutely important
2,4,6,8	Compromise or intermediate value

Source: Saaty & Shang (2011); Suharjito & Marimin (2012)

Furthermore, the indicator used to state that an AHP model is effective is by measuring the Consistency Ratio (CR) value. The CR value is obtained by comparing the Consistency Index (CI) with the IR (Index of Random Consistency) matrix value. The calculation in AHP is declared correct if the CR value obtained is less than 0.1. Preparation of the AHP model which is the basis for this study was based on focused group discussion activities. The selection of sample respondents or sources was carried out purposively. The respondents were selected based on their expertise in each field with various academic and professional backgrounds so that they could provide comprehensive answers to the problems raised in this study. Furthermore, the respondents were representatives of stakeholders such as government, business sector and academics. The details of respondent or sources was presented in table 2.

Table 2. List of AHP Respondent and Discussant

Stakeholders	Representatives
Government	1. Director of Agricultural and Forestry Product Exports, Ministry of Trade
	2. Director of Forest and Plantation Products Industry, Ministry of Industry
Business sector	1. PT. P (State-Owned Company)
	2. Indonesian Palm Oil Entrepreneurs Association / *Gabungan Pengusaha Kelapa Sawit Indonesia* (GAPKI)
	3. Indonesian Oleochemical Producers Association / *Asosiasi Produsen Oleochemical Indonesia* (APOLIN)
	4. PT. S, Tbk (Private Company)
Academics	Indonesian Palm Oil Society / *Masyarakat Perkelapasawitan Indonesia* (MAKSI)

Apart from using the AHP method, the information in this study was also obtained through a literature review. The literature review method is a way to identify, evaluate, and interpret research that is available and relevant to a particular field or topic. The literature review method is divided into three main stages, namely planning, conducting (conducting research) and reporting (reporting). The literature search in this study began by selecting articles related to the palm oil industry from several academic, regulatory, and mass media databases. Then, a review was carried out on these articles to obtain relevant information to complement the previous AHP findings.

3. Results and Discussions

Focus Group Discussion (FGD) identified several key determinants influencing investment decisions in Indonesia's downstream palm oil industry. These determinants include market prospects, investment costs, product value added, technological complexity, labor absorption capacity, and sustainability of palm oil practices. In addition, the FGD uncovered a variety of opportunities and challenges related to investment, such as high global demand for crude palm oil (CPO) exports, the quality of Fresh Fruit

Bunches (FFB), product diversification potential, regional investment regulations, local government revenue contributions, and the urgency to promote sustainable agro-industrial development.

In the oleo-food industry, participants highlighted the sector's growing domestic market potential, with a compound annual growth rate of 2.94% between 2019 and 2022. The industry contributes significantly to GDP, accounting for approximately 22.94% of CPO GDP, thereby playing an essential role in the food sector. Moreover, the sector exhibits a high employment multiplier effect, ranging from 4.8 to 7.1, underscoring its socio-economic importance (Ministry of Industry, 2021). However, critical challenges remain, particularly in the value-added downstream processing of CPO into vitamin A and E, which Indonesia continues to import despite its abundant raw material. One major concern is the limited financial benefit received by regional governments from palm oil activities, which reduces their incentive to promote downstream development.

In the oleochemical sector, FGD discussions revealed that derivative products such as fatty acids, surfactants, and esters offer substantial value addition—up to 1000% of the raw FFB value. Nevertheless, the industry faces challenges, including limited product diversification when compared to regional competitors such as Malaysia. While Indonesia currently produces around 32 basic oleochemical and derivative products, Malaysia has developed over 120. Additional barriers include the oligopolistic nature of the global market and health concerns related to production processes, such as hazardous volatile organic compounds released during glycerin processing.

In the bioenergy sector, technological complexity and high investment costs were identified as primary constraints to investment. Although palm biomass—including empty fruit bunches, fronds, trunks, and palm oil mill effluent (POME)—offers substantial potential for biofuels, biogas, and biopower, the need for advanced technology remains a critical barrier. Furthermore, the low quality of FFB from independent smallholders continues to hamper the reliability of supply chains. The discussions emphasized the need for a circular economy approach, whereby by-products such as glycerol and EFB can be converted into value-added products such as ethanol and butanol.

Overall, the FGD yielded strategic policy recommendations to stimulate investment in downstream palm oil industries. These include providing tax incentives, establishing special economic zones (SEZs), improving palm plantation productivity, stabilizing FFB prices, facilitating bank credit for agro-industrial enterprises, and integrating upstream and downstream sectors to enhance efficiency and added value across the industry.

The Analytical Hierarchy Process (AHP) method was employed to prioritize investment policy options by conducting pairwise comparisons among hierarchical decision elements. The AHP results identified the most influential investment determinants, opportunities and challenges, and policy alternatives across the three main downstream subsectors: oleo-food, oleochemicals, and bioenergy.

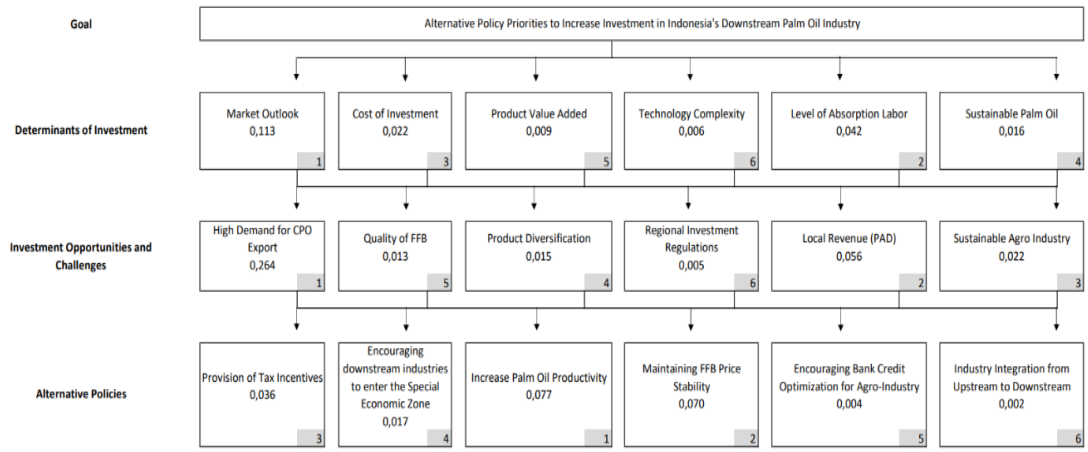


Figure 3. Hierarchical Structure Of Alternative Policy Priorities To Boost Investment In The Oleofood Industry

In the oleo-food sector, AHP results indicate that market prospects and labor absorption are the two most influential factors affecting investment decisions. In terms of opportunities and challenges, high

demand for CPO exports and limited regional government revenue emerged as the most significant considerations. Among policy alternatives, the highest priority was given to enhancing palm plantation productivity and stabilizing FFB prices, which are considered essential for encouraging investments in this sector.

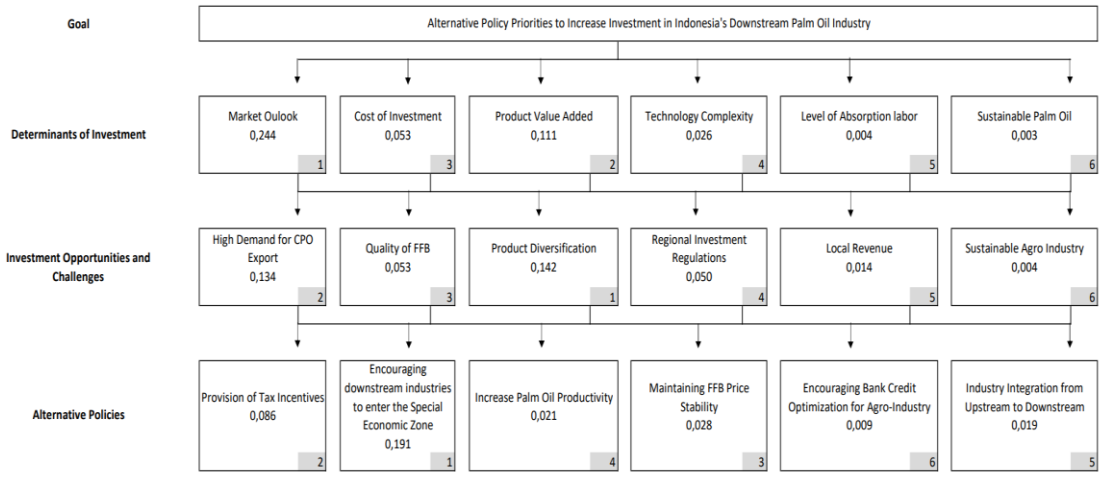


Figure 4. Hierarchy Structure Of Alternative Policy Priorities To Increase Investment In The Oleochemical Industry

In the oleochemical sector, similar to the oleo-food sector, market prospects and labor needs ranked as the top investment determinants. However, the most decisive opportunities and challenges were different, with growing oleochemical export demand and low product diversification taking precedence. Based on AHP weighting, the most preferred policy alternatives were the provision of tax incentives and promotion of industry entry into Special Economic Zones (SEZs). These incentive mechanisms—such as tax allowances, tax holidays, and lower export tariffs for downstream products—are deemed effective in enhancing investor appeal.

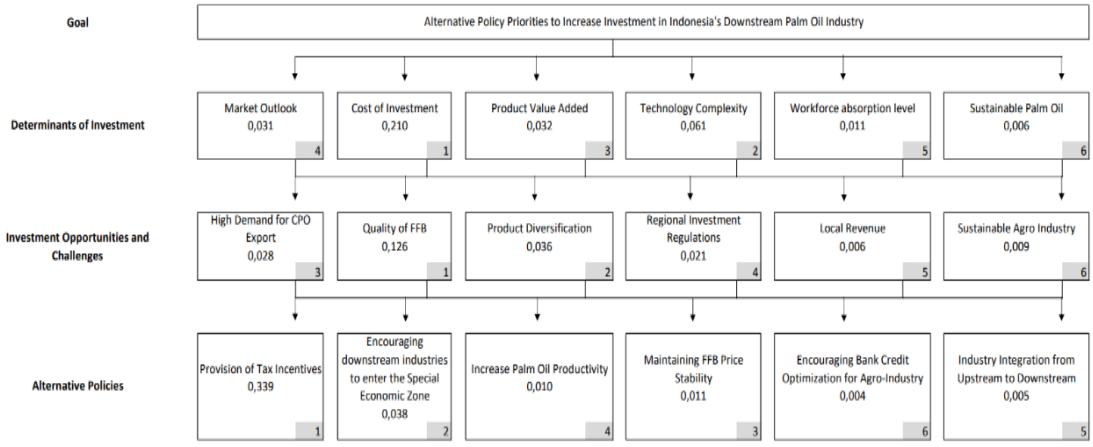


Figure 5. Hierarchy Structure Of Alternative Policy Priorities To Increase Investment In The Bioenergy Industry

In the bioenergy sector, the AHP results revealed that investment costs and technological complexity are the dominant factors influencing investment choices. The most decisive opportunities and challenges in this sector were identified as high FFB quality and product diversification. The top-ranked policy alternatives were tax incentives and development of SEZs, which could be complemented by import duty exemptions and supporting infrastructure development—such as the Palm Biomass Power Plant (PLTBS) project. These measures aim to improve investment attractiveness and competitiveness of the bioenergy sector both domestically and globally.

Conclusion

The integration of FGD and AHP results provided a comprehensive, evidence-based foundation for formulating actionable investment strategies in Indonesia's downstream palm oil industry. The FGD offered in-depth qualitative insights into the contextual realities, stakeholder perceptions, and sector-specific challenges across the oleo-food, oleochemical, and bioenergy subsectors. These discussions helped surface nuanced issues such as regional reluctance to support downstream development due to limited fiscal benefits, technological barriers in bioenergy, and gaps in value-added processing for high-potential products like vitamins A and E. Building upon these qualitative insights, the AHP method quantified the relative importance of key investment determinants, opportunities, challenges, and policy alternatives. This allowed for a prioritized ranking of actionable strategies based on stakeholder preferences and expert judgment, thereby enhancing the objectivity of the policy formulation process.

By aligning the thematic findings from FGD with the priority rankings derived from AHP, the study was able to translate complex, multi-dimensional data into a set of targeted and feasible policy recommendations. For the oleo-food industry, the emphasis falls on improving plantation productivity and stabilizing FFB prices—addressing both production-side concerns and investor expectations on market prospects and employment. In the oleochemical sector, the recommended strategy is to offer tax incentives and facilitate entry into Special Economic Zones, in response to the industry's need for product diversification and export expansion. Meanwhile, for the bioenergy industry, where investment cost and technological complexity are major determinants, the strategy centers on fiscal incentives and infrastructure development within SEZs to reduce barriers to entry and improve technological uptake.

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