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From Geopolitical Shockwaves to Strategic Resilience: Implications of the Geopolitical War for Indonesia's National Food and Energy Security, and the Transformative Role of the Palm Oil Sector

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ABSTRACT

The military offensive launched by the United States and Israel against Iran in late February 2026 rapidly escalated into one of the most consequential geopolitical crises of the decade, triggering a blockade of the Strait of Hormuz and sending shockwaves across global energy, fertilizer, and food commodity markets. This paper employs a qualitative literature review (QLR) methodology to examine two interconnected analytical questions: first, what are the thematic implications of this conflict for Indonesia's national food security and national energy security, and second, how does the Indonesian palm oil sector contribute to strengthening resilience in both dimensions. Drawing upon peer-reviewed journal articles (2020–2026), institutional analyses, and expert policy commentaries, the study applies thematic synthesis to generate interpretive analytical themes across five major thematic clusters. Findings reveal that Indonesia faces compound vulnerabilities — driven by oil price escalation beyond APBN 2026 assumptions, fertiliser supply disruption due to Hormuz dependency, and food price inflation at 4.76% against a 2.5% target — that simultaneously strain food security in terms of availability and access while creating fiscal unsustainability of energy subsidies. However, as the world's largest palm oil producer, Indonesia possesses a strategically unique national resilience asset: the sector simultaneously stabilises cooking oil supply (food security function) and reduces fossil fuel import dependence through progressive biodiesel mandates B35 and B40, which generated IDR 120.54 trillion and IDR 123 trillion in foreign exchange savings in 2023 and 2024, respectively. The paper concludes with substantive policy recommendations for cross-sectoral palm oil governance, diversification of fertiliser imports, and an accelerated bioenergy transition as structural responses to geopolitical food-energy vulnerability.

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Introduction

Background

On February 28, 2026, the United States and Israel jointly launched a military offensive against Iran, triggering what would become a month-long geopolitical crisis of sweeping global consequence. Within days, the Strait of Hormuz - a narrow waterway through which approximately 20-21 million barrels of oil per day (roughly 20% of global seaborne oil trade) normally transit — was effectively blockaded, creating a single point of failure for global energy markets. The closure did not merely disrupt petroleum flows; it also affected approximately 45% of global fertilizer distribution that passes through the same chokepoint. As Anadolu Agency reported, the crisis led to a 33% contraction in the global fertilizer supply chain, halting annual urea exports of 22 million tons from the Gulf region, while 38% of global nitrate-based fertilizer supply and 20% of phosphate-based fertilizer supply were also disrupted [1-3].

The immediate reverberations in agricultural input markets were severe. Urea prices at the Port of New Orleans surged by 32% in the first week following the blockade, jumping from USD 516 to over USD 680 per metric ton. Global fertilizer prices reached a record high of USD 684 per ton the highest since October 2022 representing an increase of more than 70% from pre-war levels. By the end of March 2026, global crude oil prices had climbed to approximately USD 91 per barrel, against Indonesia's APBN 2026 assumption of USD 70 per barrel, with analysts projecting a possible trajectory toward USD 150 per barrel. Indonesia's food price inflation concurrently reached 4.76%, against the APBN assumption of 2.5% [1-2].

These developments place Indonesia at a critical juncture. As one of the world's most populous nations and a net oil importer, Indonesia's national budget is structurally exposed to oil price shocks — with APBN 2026 committing Rp381.3 trillion to energy subsidies and compensation, Rp335 trillion for the *Makan Bergizi Gratis* (MBG) national school nutrition program, Rp28.5 trillion for Bulog and food reserves, and an additional Rp22.4 trillion for lumbung pangan (food barn) programs. The Food and Agriculture Organisation of the United Nations (FAO) released an emergency

analysis in mid-March 2026, warning that the escalation of conflict in the Middle East has "sharply increased risks to global energy, fertiliser, and agrifood systems," particularly for import-dependent countries across Africa and Asia [4].

Yet within this crisis lies a strategic opportunity distinctly available to Indonesia. As the world's largest producer of Crude Palm Oil (CPO), accounting for approximately 59–60% of global palm oil supply, Indonesia holds a commodity that functions simultaneously as a food security stabiliser (through cooking oil supply) and an energy security enhancer (through biodiesel mandates). Indonesia's B35 biodiesel program a blend of 35% palm-oil-based biodiesel with conventional diesel contributed nearly 40% to Indonesia's national renewable energy mix and generated IDR 120.54 trillion in foreign exchange savings in 2023. The progression to B40, implemented in early 2025, is projected to save USD 3.68 billion in the first half of 2025 alone. In the midst of a geopolitical energy crisis, the strategic value of this domestic bioenergy capability is immeasurably heightened [5-7].

Urgency and Significance of the Study

The 2026 conflict repeats and potentially amplifies the dynamics of the 2008 global food crisis, when oil prices approaching USD 150 per barrel triggered global food price spikes across wheat, rice, meat, and dairy, leading to social unrest and food riots across dozens of countries. The present crisis, however, differs in a critical structural way: unlike 2008, which was primarily driven by financial speculation in commodity markets, the 2026 crisis is rooted in physical supply chain collapse the actual physical unavailability of fertilisers, not merely their pricing. While the 2008 crisis featured low inventory stocks and high-frequency commodity market speculation by large-scale investors, the 2026 crisis reflects "military hegemonic politics" that operate outside the usual parameters of financial market analysis, making its impacts harder to model and mitigate [8].

The scholarly literature has increasingly established that geopolitical risk (GPR) exerts time-varying positive effects on food prices, with pronounced shifts observable during major conflicts. Research employing Time-Varying Parameter Vector Autoregressive (TVP-SV-VAR) models confirms that GPR has an "immediate positive effect on food prices during intense conflict" and that its influence "varies across different time periods and events," with particular sensitivity during the Russia-Ukraine conflict of 2022. Similarly, geopolitical risks have been empirically shown to transmit dynamically to commodity, stock, and energy markets through multiple channels, including supply uncertainty, trade disruption, and investor risk aversion. Yet, despite this robust empirical base, there remains a gap in the integrated qualitative literature on Indonesia's specific food security and energy security vulnerabilities under geopolitical conflict, with palm oil as the bridging strategic sector [9-10].

This paper addresses that gap. It synthesises existing and emerging literature to construct a coherent analytical narrative on how the 2026 Middle East conflict threatens Indonesia's national resilience, while also illuminating how the palm oil sector — when properly governed — can serve as Indonesia's most structurally robust buffer against that threat. The study does so using a Qualitative Literature Review (QLR) approach, appropriate for analysing an ongoing, rapidly evolving geopolitical situation in which systematic quantitative data are incomplete, and the interpretation of qualitative signals is essential.

Research Questions and Objectives

This study is guided by three principal research questions:

- What are the thematic implications of the US-Israel vs. Iran war on Indonesia's national food security?
- What are the thematic implications of the conflict on Indonesia's national energy security?
- In what ways does the Indonesian palm oil sector contribute to strengthening national food and energy security in the context of the ongoing 2026 geopolitical crisis?
- The study's objectives are to: (a) identify and synthesize thematic narratives around the war's food security implications for Indonesia; (b) analyze the war's energy security implications within Indonesia's fiscal and policy context; (c) elaborate the strategic contributions of the palm oil sector to national resilience; and (d) formulate evidence-based policy recommendations for the government, industry, and wider stakeholders.

Literature Review

Conceptual and Theoretical Foundations of National Food Security

Food security is one of the most extensively theorised constructs in development and agricultural economics. The FAO's foundational four-pillar framework — *availability, access, utilisation,* and *stability* — remains the dominant conceptual anchor for both scholarship and policymaking globally. Availability concerns the physical supply of food; access addresses economic and social affordability; utilisation refers to nutritional outcomes and safe use; and stability encompasses the temporal consistency of the previous three dimensions in the face of shocks and stressors. More recent scholarship has proposed extending the framework to six pillars by adding *agency* (the capacity of individuals and communities to exercise autonomous food choices) and *sustainability* (the ecological and systemic durability of food provision), with both dimensions particularly relevant to Indonesia's diverse archipelagic food system [11-12].

In the Indonesian context, national food security presents a structurally complex picture. Despite being one of Southeast Asia's most agriculturally productive nations, Indonesia remains a net importer of several key staple commodities, including soybeans and wheat, while exhibiting regional disparities in food accessibility and nutritional quality. A strategic roadmap for Indonesia's national food security, published as part of the UN Food Systems Summit pathway documents, identifies five structural reform areas, including ensuring access to safe and nutritious food, shifting toward sustainable consumption patterns, and strengthening farmer institutions. Research employing qualitative document-based policy analysis confirms that the repositioning of institutional actors particularly BULOG as a central food logistics agency is a strategic imperative for integrating the four FAO dimensions into a resilient national system [13-14].

The food security implications of geopolitical conflict have been empirically documented across multiple crisis contexts. A 2023 study published in *Frontiers in Nutrition* found that the Russia-Ukraine war "caught the Arab region off guard" by simultaneously disrupting grain, fertiliser, and energy supply chains, exposing the structural fragility of import-dependent food systems. Empirical research using the TVP-SV-VAR model demonstrates that GPR has a "substantial and dynamic influence on global food prices, especially during periods of heightened conflict," with the Russia-Ukraine conflict generating the most pronounced observable price shifts in the data series from 1997 to 2023. The connection between oil prices and food prices mediated through fertiliser

costs, logistics, and commodity market speculation has been a consistent empirical finding: research on MENA economies documents significant asymmetric pass-through effects of oil price shocks to food inflation [15-16].

Conceptual and Theoretical Foundations of National Energy Security

Energy security is defined in the literature as the uninterrupted availability of energy sources at an affordable price, with the objective of minimising negative geopolitical, social, and environmental consequences associated with energy supply and use. The concept has evolved substantially since the 1973 OPEC oil crisis first brought it to the centre of national policy discourse. Contemporary scholarship organises energy security around the "4A" *framework* — availability (physical resource existence and the reliability of supply), affordability (price levels accessible to consumers and the state), accessibility (infrastructure adequacy for delivery), and acceptability (the social and environmental sustainability of energy sources). At the national level, energy security is fundamentally a risk management challenge shaped by import dependence, supply concentration, and geopolitical exposure [17].

For Indonesia, energy security is defined by a structural paradox: the country is endowed with significant fossil fuel resources (coal, oil, and natural gas), yet has become a net oil importer since 2004 as domestic demand has outpaced production growth and lifting capacity has stagnated. APBN 2026 projects oil lifting at 610,000 barrels per day (slightly up from 605,000 in 2025) and gas lifting at 984,000 barrels of oil equivalent per day (a decline from 1,005,000 in 2025), with no new refinery investments materialising to close the supply-demand gap. This structural mismatch leaves Indonesia's fiscal position highly exposed to global oil price shocks. Indonesia's energy subsidy and compensation commitments for 2026 — totalling Rp381.3 trillion were calibrated to a USD 70/barrel oil price assumption, a figure that was substantially breached once the 2026 Middle East conflict began [18-20]

Indonesia has simultaneously positioned renewable energy as a strategic pillar of its energy security framework. The country's National Energy Policy (KEN) targets a 23% share of renewable energy by 2025 and a 29% reduction in greenhouse gas (GHG) emissions by 2030, in line with the Paris Agreement. The progressive biodiesel mandate has been the primary engine of this transition. Research by NREL conceptualises energy security and resilience as a multidimensional construct encompassing supply diversity, resilience to disruption, system adaptability, and economic efficiency — dimensions in which palm-based biodiesel contributes substantially to Indonesia's national scorecard. The Russia-Ukraine war demonstrated how geopolitical conflict can accelerate — rather than merely threaten — energy transition through the "forcing function" of supply insecurity, a dynamic that the 2026 Hormuz crisis replicates and intensifies for Indonesia [21-24].

The Palm Oil Sector in the Context of National Food and Energy Security

Indonesia's palm oil sector is the most economically consequential agricultural industry in the nation's history and, increasingly, one of its most strategically significant national security assets. As the world's largest CPO producer — accounting for approximately 59% of global supply with estimated production of 45.5 million metric tons in 2024/25 — Indonesia commands a dominant position in global vegetable oil and bioenergy markets. Palm oil exports were valued at USD 27.75 billion in 2024 (approximately Rp440 trillion), making the sector a critical source of foreign exchange earnings and national fiscal stability [25-28].

The sector's food security function is deep and historically rooted. Over the past four decades, Indonesia has undergone a fundamental transformation from coconut-based cooking oil to palm-based cooking oil — a transition that quadrupled per-capita vegetable oil consumption while dramatically reducing its price. Palm cooking oil is now the most widely consumed vegetable oil across Indonesian households, making it a core food security commodity whose supply and pricing directly affect household welfare. In 2022, an acute cooking oil scarcity crisis — driven in part by export restrictions and domestic market failures — demonstrated how palm oil supply-demand imbalances can rapidly translate into food insecurity and social unrest, underscoring the need for robust enforcement of the Domestic Market Obligation (DMO) [29-31].

The energy security function of palm oil is institutionalised through Indonesia's progressive biodiesel mandate trajectory. Beginning with B2.5 in 2008 and advancing through B20, B30 (2019), B35 (February-August 2023), and B40 (January 2025), with B50 under road-trial preparation, Indonesia has created the world's most ambitious mandatory biodiesel blending program. In 2023, B35 biodiesel consumed 10.6 million metric tons of CPO domestically the first year in which palm oil consumed for biodiesel exceeded that consumed for food. Importantly, this shift raises the food-versus-fuel trade-off debate to a new level of policy urgency. Research using system dynamics modelling finds that "no single scenario delivers optimal outcomes across all sustainability dimensions" — the food security path best addresses cooking oil needs and emissions reduction, the energy independence path generates the most employment but incurs higher environmental costs. This inherent tension underscores the need for adaptive, cross-sectoral governance of CPO allocation [32].

Method

Research Design: Qualitative Literature Review

This study adopts a **qualitative literature review (QLR)** as its primary methodological approach. QLR is a form of qualitative research inquiry in which the researcher systematically reads, critically appraises, and interpretively synthesises a body of scholarly and analytical literature to construct evidence-based understanding of a phenomenon, develop theoretical propositions, and generate practical recommendations. A QLR is explicitly distinguished from a systematic literature review (SLR), which follows rigid, protocol-driven procedures (such as PRISMA) for reproducible quantitative aggregation of study outcomes across a predetermined set of search parameters. While SLR is optimised for answering well-defined empirical questions over a closed corpus of completed research, QLR is optimised for exploring complex, multidimensional phenomena particularly those with evolving and emergent evidence bases [33-35].

The choice of QLR over SLR for the present study is methodologically grounded in three considerations. First, the 2026 Middle East conflict is an *ongoing* geopolitical event; its implications are still unfolding in real time, and a closed-protocol SLR would be unable to incorporate the most relevant and current evidence without arbitrary temporal truncation. Second, the research questions require interpretive synthesis across heterogeneous literature types academic journals, institutional policy analyses, expert commentaries, and government fiscal documents whose

heterogeneity is incompatible with the standardised inclusion-exclusion protocols of SLR. Third, the study aims to construct *analytical themes* that go beyond descriptive summary toward the generation of interpretive theory, a goal for which thematic synthesis within QLR is the appropriate methodology[36-37].

Thematic Synthesis as the Analytical Framework

The core analytical method employed in this QLR is thematic synthesis, a widely validated approach for synthesising qualitative research. Thematic synthesis operates through three sequential stages: (1) *line-by-line coding* of the text of source documents; (2) development of *descriptive themes* that remain closely tied to the content of the primary literature; and (3) generation of *analytical themes* that represent higher-order interpretive constructs — new explanations, hypotheses, or conceptual propositions that go "beyond" the primary sources to address the research questions. This approach preserves an explicit and transparent link between conclusions and their evidentiary base, combining the rigour and transparency traditionally associated with systematic reviewing with the interpretive flexibility necessary for qualitative knowledge generation [33].

In practice, the thematic synthesis for this study proceeded as follows. Across the assembled literature corpus, recurring conceptual signals and empirical claims were coded around five emergent themes: (1) energy price escalation and agricultural input supply chain disruption; (2) war implications for national food security; (3) war implications for national energy security; (4) palm oil contributions to food security resilience; and (5) palm oil contributions to energy security resilience. These descriptive themes were subsequently elevated to analytical themes through cross-source comparison, identification of convergences and divergences, and integration with the theoretical frameworks of food security, energy security, and geopolitical risk established in Section 2 [10,38].

Data Sources and Source Selection Criteria

The literature corpus for this study encompasses: (a) journal articles 2020 to 2026 covering food security, energy security, palm oil, and geopolitical risk; (b) institutional analyses and reports from authoritative international and national organizations including FAO, the Kiel Institute, NREL, S&P Global, USDA-FAS, and BPH Migas; (c) expert policy analysis published in credible media and academic forum platforms; and (d) government policy documents and national pathway documents related to food security and energy transition.

Sources were selected based on relevance to the research questions, recency (principally 2020–2026), and source authority. Peer-reviewed articles were prioritised over grey literature for conceptual and theoretical claims. At the same time, institutional reports and expert analyses were accepted as primary sources of empirical data on the ongoing 2026 crisis. Opinion pieces and unverified blog content without institutional affiliation were excluded. No synthetic or simulated quantitative data were introduced; all numerical claims in the study are directly traceable to cited sources.

Results: Thematic Findings

Theme 1 Energy Price Escalation and Disruption of Agricultural Input Supply Chains

The most structurally significant consequence of the 2026 Middle East conflict, from the perspective of both food and energy security, has been the simultaneous disruption of global oil and fertiliser supply chains through the effective blockade of the Strait of Hormuz. This single chokepoint handles not only 20% of global seaborne oil trade, but also a disproportionate share of the world's agricultural input supply — approximately 38% of global nitrate-based fertiliser supply and 20% of phosphate-based fertilisers traverse the strait under normal conditions, with 46% of global urea supply sourced directly from Gulf region producers. The simultaneity of the oil and fertiliser disruptions via a single chokepoint represents a unique "double shock" to global food systems with no close historical precedent [1,2,39,40].

The consequences for global fertiliser markets have been severe and rapid. Qatar's state-owned QAFCO shut down its 5.6-million-ton-capacity urea plant due to energy supply disruptions; major producers in Pakistan and Bangladesh halted production entirely. Fitch Ratings raised its 2026 ammonia and urea price expectations by approximately 25%. Iran — itself a major producer of nitrogen fertilisers and a leading global urea exporter — has been entirely removed from the market. It has been documented that the consequences for the global fertilizer market have compounded: China has tightened export restrictions to secure domestic supply, Russia has reduced fertilizer exports for domestic priority, Middle Eastern producers (Saudi Arabia, Qatar, Oman) who collectively account for 25% of global urea exports are inaccessible through normal channels, and urea production in India and Bangladesh has been disrupted by gas supply constraints. The cumulative result is a global fertiliser market in structural deficit for the 2026 spring planting season across the Northern Hemisphere [4,41].

For Indonesia specifically, the challenge is layered. While PT Pupuk Indonesia produces 9.4 million tons of urea annually using domestic natural gas as feedstock — providing meaningful domestic independence in urea — Indonesia lacks domestic production capacity for phosphate (P_2O_5) and potassium (KCl), both of which are sourced from Middle Eastern and North African suppliers that transit the Strait of Hormuz. On the energy side, APBN 2026's assumption of USD 70 per barrel is increasingly misaligned with market reality: oil prices reached USD 91 per barrel by the end of March 2026, with analysts projecting a possible USD 150 per barrel trajectory if the blockade persists. Indonesia's APBN 2026 already allocated 9.55 million tons of subsidised fertiliser — including 4.42 million tons of urea and 4.47 million tons of NPK at a total fiscal cost of Rp16.9 trillion, at subsidised price points set below the 2025 levels (e.g., urea at Rp1,800/kg vs. Rp2,250/kg the previous year). These subsidised-price commitments are now fiscally unsustainable given the global explosion in fertiliser prices [42,43].

Theme 2 Implications for Indonesia's National Food Security

The 2026 Hormuz crisis threatens Indonesia's national food security across multiple pillars of the FAO framework. The *availability* dimension is threatened through the agricultural production risk associated with fertiliser shortage and elevated input costs. Indonesia's rice production system, in which fertilizer costs account for approximately 13.74% of total production costs per hectare (the third-highest cost component after land rent at 36.76% and labor at 33.08%), faces significant disruption if fertilizer supply chains are not restored before the domestic planting cycle. While urea production is domestically secured through PT Pupuk Indonesia, the unavailability of phosphate and potassium inputs — which play critical roles in root development, grain filling, and disease resistance — represents a meaningful yield risk for the 2026 agricultural season.

The access and *affordability* dimensions are more immediately threatened. Food price inflation in Indonesia reached 4.76% by

the end of March 2026, against the APBN assumption of 2.5%. The oil price–food price transmission mechanism, empirically documented on commodity exchanges (CBOT, NYBOT, JPX), ensures that sustained oil price increases systematically translate into higher food commodity prices through higher logistics, processing, and freight costs. Research employing geopolitical risk models confirms that GPR's positive effect on food prices is immediate during periods of intense conflict and transmits through oil price, USD exchange rate, and global economic policy uncertainty channels. For a large food-importing economy like Indonesia, where a significant share of household income is spent on food, this inflationary transmission directly erodes household food purchasing power and welfare. The FAO's analysis of the 2026 conflict explicitly warns that import-dependent countries, particularly in Africa and Asia, "are especially exposed to these risks" and that "remittance losses and potential shifts to biofuel production could amplify food price volatility" [44-46].

The *stability* dimension — the consistency and predictability of food access over time is threatened by the fiscal pressures the crisis places on Indonesia's national budget. The APBN 2026 carries enormous food-related expenditure commitments: Rp335 trillion for the MBG program, Rp28.5 trillion for Bulog and food reserves, Rp22.4 trillion for lumbung pangan, and the fertiliser subsidy. These commitments were budgeted on the assumption of USD 70/barrel oil. Every USD 1 increase in sustained oil prices above this assumption generates additional fiscal pressure on the energy subsidy line (Rp381.3 trillion). The government faces a difficult choice: absorb the full fiscal impact to protect household purchasing power, or adjust subsidised fuel and fertiliser prices through a "burden-sharing" arrangement, which itself risks inflationary pass-through. It has been identified that priority and budget allocation management are the central policy variables determining how well Indonesia navigates this crisis [47-49].

Theme 3 Implications for Indonesia's National Energy Security
Indonesia's national energy security faces structurally compounded pressures from the 2026 Hormuz blockade. As a net oil importer since 2004, Indonesia is directly exposed to global oil price escalation, and the APBN 2026's oil price assumption of USD 70 per barrel has been significantly exceeded by market reality. The University of Gadjah Mada issued an expert concern in mid-March 2026 about Indonesia's fuel supply vulnerability in the event of a disruption in the Strait of Hormuz, a concern echoed by international energy analysts, who note that Indonesia's installed refinery capacity has not kept pace with domestic consumption growth. The APBN 2026 projects oil lifting at 610,000 barrels per day against a domestic demand substantially higher, with gas lifting declining year-on-year [39,40,50].

The fiscal dimension of energy security deserves particular attention. Indonesia's energy subsidy and compensation line of Rp381.3 trillion — designed to keep subsidised pertalite (29.26 million kiloliters) and solar diesel (18.63 million kiloliters) affordable for households — was calculated based on a USD 70/barrel price. With oil at USD 91/barrel and potentially rising, the energy subsidy overrun could reach tens of trillions of rupiah, compressing fiscal space for other priorities. Forbes analysts covering the crisis confirm that the Hormuz blockade has raised fundamental questions about the global economy's capacity to source energy alternatives while the strait remains closed [42]. Deloitte's economic assessment of the March 2026 conflict projects meaningful slowdowns in GDP growth for import-dependent Asian economies, driven by the transmission of energy prices to production costs and household consumption [51-52].

The energy transition dimension, paradoxically, is where the crisis generates a strategic forcing function. The 2026 crisis dramatically heightens the marginal value of Indonesia's domestic biodiesel program, which already operates at scale. As Forbes explicitly observed in its March 2026 analysis, geopolitical blockades of the kind imposed on the Strait of Hormuz accelerate the political will and economic logic for domestic bioenergy development [42]. Indonesia's biodiesel production capacity stands at approximately 22 million kiloliters annually — sufficient to support B40 and potentially B50. Every kiloliter of biodiesel substituted for imported diesel directly reduces Indonesia's exposure to the Hormuz chokepoint. This is precisely the structural logic that makes Indonesia's palm oil sector a first-order energy-security asset in the current crisis [32,53].

Theme 4 Palm Oil Sector's Contribution to National Food Security Resilience
The Indonesian palm oil sector plays a foundational role in national food security through multiple interconnected mechanisms. Most directly, palm oil is the primary source of vegetable fat in Indonesian household diets, supplied through an extensive domestic cooking-oil supply chain that has transformed Indonesian food culture over the past four decades. This transformation — from coconut-based to palm-based cooking oil — has democratised affordable fat consumption across income groups, making palm cooking oil a genuine equity commodity as much as a food security one. The government has institutionalised palm oil's role in food security through the Domestic Market Obligation (DMO) policy, which requires Indonesian palm oil producers to sell a specified volume to the domestic market at regulated prices before exporting. This policy mechanism, when effectively enforced, constitutes a direct food security buffer that insulates domestic cooking oil prices from international market volatility — precisely the kind of volatility now being generated by the 2026 conflict [54] [55].

Research on biodiesel policy and cooking oil availability confirms the tensions within the DMO framework. Arumdhani's 2025 study of the impact of biodiesel policy on cooking oil availability finds that as biodiesel mandates intensify — drawing more CPO away from food applications — the pressure on the domestic cooking oil supply chain increases, requiring more active DMO enforcement to prevent cooking oil price spikes [56]. This is not a weakness of the palm oil sector per se, but rather a governance challenge: the sector's dual functionality (food and energy) means that policy coordination between the Ministry of Agriculture, Ministry of Energy and Mineral Resources, and the Ministry of Trade is essential to ensure that escalating biodiesel mandates do not come at the cost of cooking oil affordability. The system dynamics research confirms this, finding that the food security policy scenario — which prioritises CPO allocation for cooking oil — yields the best outcomes for both cooking oil availability and emissions reduction [57-58].

Beyond supplying cooking oil, the palm oil sector contributes to food security through its rural-economy dimensions. Indonesia's oil palm plantation system spans more than 16 million hectares, with a significant smallholder sector that supports livelihoods for approximately 2.67 million smallholder farming families [59-61]. This broad rural income base directly supports household-level food purchasing power the access dimension of food security. Research on oil palm expansion and food security in Sumatra and Kalimantan finds that smallholder participation in oil palm creates income pathways that expand household food purchasing power. However, the benefits are unevenly distributed and contingent on land tenure, market access, and extension services. Indonesia's

palm oil export revenues valued at USD 27.75 billion in 2024 also provide foreign exchange earnings that support the import of strategic food commodities, including wheat, soybeans, and sugar, where domestic production is insufficient [56,62].

Theme 5 Palm Oil Sector's Contribution to National Energy Security Resilience

The palm oil sector's most direct and quantifiable contribution to national energy security lies in Indonesia's progressive biodiesel mandate program, which has expanded continuously from B2.5 (2008) through B20, B30, B35, and B40 (2025), with road trials for B50 underway [53, 63, 64]. This program represents Indonesia's most operationally mature strategy for reducing dependence on oil imports and directly buffers the national economy against the kind of Hormuz-driven energy shocks currently unfolding. The macroeconomic benefits are now substantial and empirically documented. B35 biodiesel accounted for 38% and 38.75% of Indonesia's national renewable energy mix in 2023 and 2024, respectively. Implementation generated IDR 120.54 trillion in foreign exchange savings in 2023 and IDR 123 trillion in 2024 by substituting fossil fuel imports. For the first half of 2025 under B40, savings already reached USD 3.68 billion (approximately Rp60 trillion), with annual biodiesel output growing from 8.4 million kiloliters in 2020 to 13.2 million kiloliters by 2024. B40 generated foreign exchange savings of Rp130.21 trillion in full-year 2025, reduced emissions by 38.88 million tonnes of CO_2 equivalent, and added Rp20.43 trillion in value through CPO-to-biodiesel conversion [64, -67].

The strategic rationale for viewing palm-based biodiesel as a national energy security asset becomes even more compelling in the context of the 2026 Hormuz crisis. Every kiloliter of domestic biodiesel that replaces imported diesel directly and proportionally reduces Indonesia's exposure to the Hormuz chokepoint — the precise source of the current crisis. Indonesia's biodiesel production capacity of approximately 22 million kiloliters exceeds the current B40 demand of 15.62 million kiloliters, providing headroom for further mandate expansion to B50 without immediate production capacity constraints [6,64]. A B50 policy, if implemented first in the non-PSO (non-subsidised) segment while managing the food-fuel trade-off, could further increase Indonesia's energy independence and domestic value addition in CPO, generating additional fiscal and trade-balance benefits [7, 24, 53,58].

A qualitative literature review on palm oil's strategic contribution to Indonesia's economic resilience and defence logistics highlights that the sector's geographic distribution across border regions and remote areas also strengthens defence logistics infrastructure — a national resilience dimension often overlooked in purely economic analyses. The study recommends reinforcing cross-sectoral regulations and increasing investment in downstream palm oil development that is aligned with strategic national interests, a recommendation that precisely meets the demands of the current geopolitical moment. Indonesia's capacity to use palm-based bioenergy as an alternative fuel to sustain domestic logistics and, potentially, military operations represents a strategic depth advantage that no other ASEAN nation currently possesses on a comparable scale [68].

Discussion and Analysis

The War-Food-Energy Nexus and Indonesia's Structural Position

The thematic findings of this study, taken together, reveal a complex and interlocking "war-food-energy nexus" in which the 2026 Middle East conflict has simultaneously disrupted the three foundational inputs to food system functionality: energy (for logistics, processing, and fertiliser production), fertilisers (for agricultural productivity), and supply chains (for physical delivery of food commodities). This triple disruption, operating through a single chokepoint, is structurally different from previous crisis analogues. Unlike the 2008 global food crisis — in which speculative financial dynamics in commodity markets drove price escalation — the 2026 crisis is, at its core, a physical supply availability crisis, characterised by what analysts have termed "nitrogen nationalism," in which countries with domestic fertiliser resources restrict exports to secure their own food supply [1-2].

Unlike the Russia-Ukraine war of 2022, which disrupted grain supply (specifically wheat and sunflower oil) from a major producing region, the 2026 Hormuz blockade simultaneously disrupts energy and fertiliser supply for the entire global agricultural system. The FAO's March 2026 assessment explicitly characterises the 2026 crisis as having "more profound potential impacts than the Ukraine conflict" for global agrifood systems, precisely because of the Hormuz chokepoint's dual role in oil and fertiliser distribution. For Indonesia, this means that the crisis is not merely about commodity price increases — it is about the structural viability of the national agricultural input supply chain during a critical planting season [1, 2, 4, 69, 70].

Within this structural challenge, Indonesia's position is ambiguous but ultimately privileged relative to most developing economies. On the vulnerability side, Indonesia is exposed through its dependence on imported phosphate and potassium fertilisers, its net oil import position, its large fiscal commitments to food and energy subsidies calibrated on pre-crisis assumptions, and its 270-million-person food system that operates on narrow per-household food expenditure margins. On the resilience side, Indonesia holds a strategic asset portfolio that most comparable economies do not: the world's largest palm oil industry, an advanced biodiesel program generating tens of trillions of rupiah in fiscal savings, a domestic urea production base of 9.4 million tons per year, and a government fiscal framework that while under stress includes meaningful food program commitments [5].

Palm Oil as Indonesia's Strategic National Resilience Asset

The findings of this study validate the proposition that the Indonesian palm oil sector serves as the country's most structurally significant national resilience asset in the current crisis. This validation operates along both the food security and energy security dimensions simultaneously, constituting a unique form of "dual resilience" contribution that no other single sector in Indonesia's economy can provide. In the food security domain, palm cooking oil maintains the vegetable fat supply chain through the DMO framework. In contrast, palm oil export revenues finance food imports and stabilise the trade balance amid global commodity price escalation. In the energy security domain, biodiesel from CPO substitutes for Hormuz-dependent diesel imports at scale, generating documented foreign exchange savings measured in trillions of rupiah annually [51,52,66,71].

The food-versus-fuel tension inherent in the sector's dual functionality does not negate this resilience contribution it contextualises it. During periods of low global oil prices, the opportunity cost of allocating CPO to biodiesel rather than food export markets is relatively modest, and the government can expand biodiesel mandates with limited food security trade-offs. During periods of high global oil prices such as the current crisis the comparative value of biodiesel as an import substitute increases dramatically, shifting the optimal allocation toward greater bioenergy use, provided that cooking oil supply is protected

through DMO. The 2026 crisis thus represents precisely the scenario under which Indonesia's biodiesel program delivers its highest national welfare return, because the alternative purchasing equivalent diesel volumes on the open market at USD 91+ per barrel oil — is prohibitively expensive [7,58,72].

The systemic policy implication is that Indonesia needs a dynamic, adaptive governance framework for CPO allocation that can shift the food-energy balance in response to geopolitical conditions, rather than maintaining fixed mandate trajectories that ignore global market signals. A system dynamic finding that "no single scenario delivers optimal outcomes" supports this conclusion: neither a pure food security policy nor a pure energy independence policy is optimal across all dimensions. The recommendation to establish a cross-sectoral body to balance trade-offs in CPO allocation, endorsed by multiple independent research streams, is the central institutional recommendation emerging from this study's synthesis [57,68].

Historical Lessons and Policy Implications

The 2008 global food crisis provides the most relevant historical comparator for the present situation, but with important qualifications. In 2008, oil prices approaching USD 150 per barrel triggered food price spikes through logistics cost escalation, intensified biofuel demand, and commodity market speculation. The crisis led to social unrest in over 30 countries and accelerated the first major wave of national-level food security policy formulation in many developing countries. The lesson that Indonesia drew — and has progressively implemented is that domestic biofuel production reduces the import-substitution cost of fossil-fuel dependency. At the same time, a robust DMO for cooking oil helps prevent food insecurity during market disruptions [73,74].

The 2026 crisis confirms that these lessons were well-learned but also reveals remaining structural gaps. Indonesia's progress on biodiesel is exemplary; its progress on domestic fertilizer input diversification is less so. The country's dependence on Middle Eastern phosphate and potassium imports — which cannot be readily substituted domestically remains the most acute structural vulnerability in the national food security system. FAO's policy recommendations for the 2026 crisis specifically call for "diversifying import sources and promoting regional coordination" for countries in Indonesia's position. This recommendation, combined with investment in domestic soil health management that reduces fertiliser dependency per hectare of food-crop production, constitutes the most important medium-term food security policy gap this study identifies [4,69,71].

Conclusions

Substantive Conclusions on Food Security Implications

The US-Israel versus Iran military conflict that erupted in late February 2026 and triggered the Hormuz blockade has delivered a compound and historically unprecedented shock to Indonesia's national food security architecture. This study's thematic synthesis demonstrates that all four classical pillars of the FAO food security framework *availability*, access, utilisation, and stability have been materially threatened, though with different intensities and timelines. The *availability* pillar is under pressure from disruptions to global phosphate (P_2O_5) and potassium chloride (KCl) fertiliser supply chains, for which Indonesia has no short-term domestic substitutes, placing the 2026 domestic agricultural season at tangible yield risk. The access and *affordability* pillar has been directly eroded by food price inflation, which reached 4.76% against an APBN assumption of 2.5%, driven by the oil price–food price transmission mechanism operating through logistics, processing, and commodity exchange price formation at CBOT, NYBOT, and JPX. The *stability* pillar — representing the temporal consistency of food access — is structurally threatened by fiscal overruns on energy subsidies (Rp381.3 trillion budgeted at USD 70/barrel, with oil at USD 91/barrel and rising) that compress the fiscal space available for food program spending.

A distinguishing feature of the 2026 crisis, relative to historical analogues, is that it is a *physical supply crisis* rather than a purely financial one. Unlike the 2008 global food crisis — which was substantially amplified by commodity market speculation, low inventory stock dynamics, and dollar depreciation — the 2026 disruption is rooted in the actual physical closure of a chokepoint through which 45% of global fertiliser distribution and 20% of global seaborne oil trade transit simultaneously. This structural character means that financial market instruments and monetary policy responses — effective in 2008 — are less capable of addressing the current crisis, underscoring the imperative of physical supply chain diversification and domestic production capacity as the appropriate policy response. The FAO's March 2026 emergency analysis confirms that Indonesia, as a large import-dependent nation, faces disproportionate exposure to these disruptions and requires urgent action to diversify imports and strengthen food system resilience.

Substantive Conclusions on Energy Security Implications

Indonesia's national energy security has been rendered structurally exposed by the 2026 Hormuz crisis in ways that pre-existing policy frameworks were not fully calibrated to address. The country's net oil import positions a structural reality since 2004 combined with APBN 2026 fiscal commitments calculated on a USD 70/barrel assumption, creates a compounding fiscal-energy security vulnerability as oil prices exceed USD 91/barrel and analysts project trajectories toward USD 150/barrel. Indonesia's oil lifting capacity of 610,000 barrels per day, declining gas lifting, and absence of new refinery investment leaves the country without meaningful short-term domestic production buffers to offset the cost of import price escalation.

Critically, however, the 2026 crisis has also revealed Indonesia as one of the best-positioned large developing economies to manage geopolitical energy shocks through domestic bioenergy, precisely because of years of investment in progressive biodiesel mandates. As ANTARA reported in March 2026, President Prabowo Subianto explicitly characterised the crisis as a "blessing in disguise" — "although difficult and challenging" — that "forces Indonesia to move quickly to achieve food and energy self-sufficiency". The government has accelerated studies toward full B50 implementation in 2026, with Coordinating Minister Airlangga Hartarto confirming that B50 technical trials and automotive assessments are ongoing while price differential monitoring guides the pace of roll-out. The PASPI executive director confirmed that Indonesia's national biodiesel industry capacity of approximately 22.5 million kiloliters is sufficient to support B50 implementation, with CPO feedstock adequate and national CPO production expected to reach approximately 57 million tons in 2025. The B40 program alone delivered Rp147.5 trillion (approximately USD 9.3 billion) in cumulative foreign exchange savings through 2025 a fiscal buffer of enormous significance under current crisis conditions.

The energy security conclusion is therefore a nuanced one: Indonesia is vulnerable due to its import dependence and fiscal subsidy overruns, but is structurally advantaged by its palm-based

bioenergy program in ways that no neighbouring economy can replicate at a comparable scale. The crisis validates the long-term investment in the biodiesel mandate as Indonesia's most consequential single energy security policy decision of the past two decades.

Substantive Conclusions on the Palm Oil Sector's Strategic Contributions

The third and most optimistic substantive conclusion of this study is that Indonesia's palm oil sector occupies a uniquely privileged position as a national resilience asset during the 2026 geopolitical crisis, with documented, quantifiable, and scalable contributions to both food and energy security simultaneously. No other single sector in Indonesia's economy offers this dual strategic functionality at a comparable scale. As the world's largest CPO producer with an estimated annual output of approximately 57 million tons in 2025, Indonesia commands a strategic commodity whose value as both a food stabiliser and energy import substitutor reaches its highest marginal level precisely during a crisis of the current character — high oil prices, high fertiliser prices, and disrupted vegetable oil supply chains. President Prabowo's January 2026 declaration that palm oil is a "miracle crop" that must serve Indonesia's national interests first — reflected in his ban on palm oil waste and used cooking oil exports to prioritise domestic biodiesel and aviation fuel production signals a strategic reorientation that aligns national palm oil governance with the demands of the geopolitical moment.

The sector's food security contribution flows through the Domestic Market Obligation (DMO) framework for cooking oil, the rural smallholder income base supporting household food purchasing power, and the foreign exchange earnings from CPO exports that finance strategic food imports. Its energy security contribution flows through the progressive biodiesel mandate — generating cumulative foreign exchange savings of Rp147.5 trillion (USD 9.3 billion) through 2025 under B40 and earlier mandates — and through the strategic potential of B50 to deepen import substitution in the near term. The synthesis of these two streams of contributions leads to the conclusion that the palm oil sector is, at the present juncture, Indonesia's most strategic instrument for national economic resilience against geopolitical commodity shocks.

Policy Recommendations

Short-Term Emergency Policy Measures (0–6 months)

The most urgent priority is stabilising the fertiliser supply chain. The government should immediately activate strategic phosphate and potassium reserves from national stockpiles, accelerate procurement from alternative non-Gulf producers (Morocco and West Africa for phosphate; Canada and Belarus for potassium), and negotiate emergency bilateral supply agreements with producers outside the conflict zone. The DMO mechanism for palm cooking oil should be strictly enforced to prevent domestic cooking oil prices from escalating and compounding food inflation, which is already running at 4.76%. A transparent and phased "burden-sharing" framework for subsidised fuel pricing — specifying clear thresholds and timelines under which pertalite and solar prices may be adjusted — should be communicated to households, businesses, and markets to reduce uncertainty and preserve trust in the government's fiscal management. The government should also accelerate the disbursement of targeted social protection transfers under the MBG and Kartu Sembako programs to protect the food purchasing power of the most vulnerable households during the inflation surge.

Medium-Term Structural Policy Reforms (6 months–3 years)

The 2026 crisis provides compelling political economy conditions for advancing two structural reforms simultaneously. First, the government should accelerate B50 implementation through the regulatory framework already under technical study, prioritising the non-PSO (non-subsidised) fuel segment to contain food-fuel trade-off risks during the transition. PASPI's confirmation that the national biodiesel capacity of 22.5 million kiloliters is sufficient for B50 and that CPO feedstock availability is adequate provides the technical justification for expediting this mandate. Second, a dedicated cross-sectoral CPO Governance Body — with representation from the ministries of Agriculture, Energy and Mineral Resources, Trade, Finance, and Defence — should be established with a formal mandate to dynamically balance CPO allocation between food and energy applications in response to geopolitical and market conditions. This body should produce quarterly scenario-based CPO allocation recommendations that take real-time oil prices, CPO export market conditions, and domestic cooking oil availability indicators as inputs. The government should also invest in domestic refinery capacity and upstream gas development to reduce the structural oil import deficit.

Long-Term Strategic Resilience Building (3–10 years)

The palm oil sector's long-term strategic value to Indonesia's national resilience will be maximised if its growth is driven by productivity intensification rather than area expansion. Investment in R&D for higher-yielding clonal seed varieties, precision fertiliser application to reduce input dependency, and integrated pest management are the priority instruments for sustainably expanding CPO supply without further deforestation pressures. Indonesia's IESR Energy Transition Outlook 2026 identifies the simultaneous development of solar, geothermal, wind, and bioenergy as essential for building a diversified renewable energy system resilient to disruptions in any single supply source; palm-based biodiesel should be viewed as a critical bridge fuel while this broader portfolio matures. The geographic distribution of oil palm plantations across border regions and remote areas — identified by Hutagalung et al. as a strategic defence logistics asset — should be formalised through integrated planning that engages regional governments to maximise the sector's contribution to national resilience beyond its conventional food-energy framing. Finally, Indonesia should lead multilateral dialogue within ASEAN and the G20 to establish a regional mechanism for resilient fertiliser supply chains — a collective buffer against the kind of chokepoint vulnerability that the Strait of Hormuz has so vividly demonstrated in 2026.

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