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# The Strategic Importance of Palm Oil Exchange Development to Support the Empowerment of the Palm Oil Trade in Indonesia

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**ABSTRACT**

Indonesia, as the world's largest producer and exporter of crude palm oil (CPO), plays a central role in the global palm oil market. However, its trade is highly susceptible to price volatility, dependence on external markets, and a lack of domestic price-setting mechanisms. The absence of a national palm oil exchange limits transparency, weakens producer bargaining power, and exposes the industry to policy shocks and international pressure. In response to these challenges, this study explores the strategic significance of establishing a palm oil exchange in Indonesia to enhance trade stability and national competitiveness. This qualitative study employs the Systematic Literature Review (SLR) method, guided by the PRISMA framework. Data were gathered from the ScienceDirect database using refined keyword searches, yielding 1,425 initial records. Through a structured screening process focusing on publication years (2021–2025), article types, and open-access status, 32 relevant peer-reviewed articles were selected for analysis. Data were coded and thematically analyzed to synthesize critical insights. The results show that a national palm oil exchange can serve as an essential instrument to improve price transparency, promote inclusive stakeholder participation, and reduce dependence on foreign exchanges such as Bursa Malaysia. It also aligns with digital innovation and sustainability initiatives in the agribusiness sector. In conclusion, palm oil exchange development offers structural advantages for stabilizing trade mechanisms. Future studies should examine regulatory readiness, institutional design models, and integration with sustainability certification systems.

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## Introduction

Palm oil is one of the most critical agricultural commodities in the global market, accounting for more than 40% of the world's vegetable oil supply and playing an integral role in food security, energy production, and industrial applications [1]. With a growing global population and rising consumption patterns, demand for palm oil continues to escalate, especially in emerging markets across Asia and Africa [2]. However, this expansion comes with complex challenges, including supply chain volatility, price instability, trade uncertainty, and increasing environmental scrutiny from international stakeholders [3].

Indonesia, as the world's largest producer and exporter of palm oil, holds a dominant position in the industry. In 2022 alone, Indonesia produced approximately 47.38 million metric tons of crude palm oil (CPO), accounting for over 55% of global production and generating export revenues exceeding USD 39.3 billion [4]. Despite this scale, Indonesia's palm oil trade remains vulnerable to external pressures due to its limited market mechanisms, weak price-control instruments, and the absence of a dedicated domestic commodity exchange [5]. As a result, the country's producers, particularly smallholders, are often price-takers in a system where Malaysia's Bursa Derivatives Exchange heavily influences pricing benchmarks.

The volatility of palm oil prices in recent years has severely impacted Indonesia's trade balance, national revenues, and socio-economic stability. Between 2020 and 2022, CPO prices fluctuated from USD 615 to USD 1,775 per metric ton, a 188% swing that reflects the fragility of market coordination and policy response mechanisms [6]. Government interventions, including temporary export bans and changes in levy structures, have at times worsened uncertainty, leading to significant disruptions in domestic supply chains and accumulation of unsold inventory [7]. Moreover, the lack of transparent, centralized trading platforms has hindered Indonesia's ability to develop a coherent pricing strategy aligned with national interests.

Globally, the role of commodity exchanges in stabilizing agricultural markets is well documented. Countries such as India, China, Brazil, and Ethiopia have leveraged commodity exchanges to strengthen market institutions, reduce speculation, improve contract standardization, and facilitate efficient price discovery [8]. For example, India's Multi-Commodity Exchange (MCX) and China's Zhengzhou Commodity Exchange have successfully moderated price volatility and improved producer bargaining power [9]. In the context of palm oil, Malaysia's Bursa Malaysia Derivatives exchange continues to serve as the global benchmark for palm oil futures, anchoring international trade contracts and influencing spot prices across Southeast Asia.

The contrast between Indonesia's dominant production capacity and its weak market infrastructure has prompted increasing calls

for the establishment of a dedicated palm oil exchange. Such a platform would serve multiple strategic functions: enhancing trade transparency, supporting real-time price discovery, facilitating futures contracts, reducing transaction costs, and promoting integration with sustainability certification systems such as ISPO (Indonesian Sustainable Palm Oil) and RSPO (Roundtable on Sustainable Palm Oil) [10]. The integration of a national exchange with blockchain technology and digital auction platforms could further streamline logistics, reduce rent-seeking behavior, and empower smallholder participation [11].

The policy momentum for establishing a palm oil exchange in Indonesia has gained traction in recent years. Presidential Regulation No. 32/2022 outlines the government's intention to develop a CPO exchange as part of its broader strategy to strengthen national food security and trade resilience [12].

However, institutional challenges remain, including fragmented regulatory oversight, a lack of coordination among government ministries, infrastructural deficits, and limited access to digital platforms in rural areas. These structural limitations must be addressed to ensure the successful implementation of a robust and inclusive exchange system.

Furthermore, the shifting dynamics of global trade and sustainability requirements are placing increased pressure on Indonesia to align with traceability and transparency standards in agricultural commodity markets. The European Union's Deforestation Regulation (EUDR), set to take effect in 2025, will require palm oil exporters to demonstrate compliance with stringent deforestation-free sourcing standards, adding another layer of complexity to international trade [13]. In this context, the development of a transparent and verifiable palm oil exchange could serve not only as an economic instrument but also as a compliance platform for global trade legitimacy.

Technological advancements, such as AI-driven analytics and blockchain verification, are also revolutionizing how commodity exchange's function. In Ethiopia, blockchain-based traceability systems have increased smallholder incomes by 20% by improving contract enforcement and price transparency. If adapted to the Indonesian context, these tools could mitigate corruption, reduce transaction friction, and ensure that pricing better reflects quality and sustainability parameters [14].

Equally important is the role of institutional trust and stakeholder alignment. Without clear governance structures and accountability frameworks, the credibility of a national palm oil exchange may falter. A 2022 study of 10 developing economies revealed that poorly regulated exchanges often fail to gain industry acceptance, limiting their impact on trade outcomes. Therefore, the strategic development of a palm oil exchange must be guided by an integrated approach that includes regulatory reform, infrastructure investment, capacity building, and stakeholder engagement [15].

Given this background, a systematic, evidence-based review of the academic literature is necessary to assess the feasibility, strategic value, and critical success factors for developing a palm oil exchange in Indonesia. Prior discussions have often been fragmented or based on policy narratives rather than empirical research. This study fills that gap by synthesizing findings from peer-reviewed sources to identify significant themes, barriers, and opportunities related to palm oil exchange development.

The objective of this study is to explore and critically assess the strategic importance of palm oil exchange development in supporting the stabilization of Indonesia's palm oil trade. Specifically, it aims to identify key regulatory, economic, technological, and sustainability factors that influence the viability and effectiveness of such an exchange.

**To Guide this Analysis, the Following Research Question is Proposed**

How can the development of a national palm oil exchange contribute to the stabilization of Indonesia's palm oil trade in terms of price transparency, stakeholder participation, and global competitiveness? This research question forms the basis of the thematic synthesis in the Results and Discussion sections, and the answer derived from this SLR will be explicitly addressed in the conclusion.

## Literature Review

The development of commodity exchanges has been widely studied as a strategic mechanism to improve price discovery, reduce market inefficiencies, and stabilize trade flows in key agricultural sectors. Numerous studies emphasize that commodity exchanges, when properly regulated and transparently operated, play a pivotal role in ensuring market efficiency and empowering producers through standardized contracts and real-time pricing. In the case of palm oil, which represents a globally traded soft commodity, market volatility is deeply influenced by geopolitical events, climate variability, and policy interventions, making the existence of a dedicated exchange particularly critical for producing countries like Indonesia.

### Palm Oil Market Dynamics and Volatility

Palm oil prices are known for their extreme volatility. Between 2020 and 2023, global palm oil prices fluctuated between USD 615 and USD 1,775 per metric ton, driven by a combination of export policy shifts, labor shortages, and disruptions in international logistics [16]. This unpredictability has resulted in considerable financial strain for both palm oil smallholders and exporters. In response, researchers have consistently recommended mechanisms that promote transparent and centralized trading to minimize speculative distortions and information asymmetries [17].

Several studies have emphasized that Indonesia's lack of an operational palm oil commodity exchange has left the sector vulnerable to price manipulation and reliance on foreign benchmarks, particularly Bursa Malaysia Derivatives [18]. These benchmarks often fail to reflect Indonesia's domestic cost structures, climatic cycles, and logistical bottlenecks. Consequently, Indonesian producers are unable to hedge effectively or influence pricing trajectories in line with local market realities [19].

Comparative Experiences in Agricultural Commodity Exchanges Globally, countries such as India, Brazil, and China have established strong agricultural commodity exchange systems that support inclusive trade and economic resilience. For instance, India's Multi-Commodity Exchange (MCX) facilitates more than USD 2.1 billion in daily trading volume across agricultural and energy sectors, helping farmers and producers mitigate price risk through futures contracts [20]. Brazil's B3 Exchange integrates agricultural spot and futures markets and employs blockchain for transaction traceability, thus promoting transparency and reducing corruption.

In Ethiopia, the Ethiopian Commodity Exchange (ECX) has revolutionized the trade of coffee, sesame, and grains, with more than 15 million smallholder farmers participating since its inception in 2008. The ECX model is particularly noted for integrating quality grading, warehouse receipt systems, and real-time market information dissemination [21]. These international models offer valuable insights for Indonesia on infrastructure design, regulatory frameworks, and capacity-building for exchange participants.

**Existing Literature on Indonesian Palm Oil Policy and Trade Infrastructure**

Research on Indonesian palm oil has traditionally focused on environmental impacts, land use change, and sustainability certification systems such as ISPO and RSPO. However, literature directly addressing institutional market structures remains limited. Some authors highlight the inefficiency of Indonesia's existing trade system, which lacks integration between upstream producers and downstream processors, and suffers from high transaction costs, middlemen domination, and opaque pricing structures [22].

Moreover, despite being the world's largest producer of palm oil, Indonesia does not currently have an independent price discovery mechanism aligned with national interests. The majority of export contracts reference the Malaysia-based benchmark, which accounts for only around 30% of total global production but disproportionately influences pricing outcomes [23]. Researchers argue that this asymmetry creates both economic and geopolitical vulnerabilities, particularly when Malaysia adjusts policies to benefit its own domestic market at Indonesia's expense.

**Technological Innovation and Digital Exchange Infrastructure**

The integration of technology into commodity trading platforms has gained traction as a means of improving efficiency, accessibility, and accountability. Studies show that blockchain-based commodity exchanges have significantly reduced transaction costs and enhanced transparency in markets such as cotton in India and coffee in Colombia [24]. Indonesia's potential adoption of such technologies could overcome longstanding logistical and governance challenges by digitizing trade documentation, introducing smart contracts, and minimizing the influence of rent-seeking intermediaries.

Academic reviews also highlight the role of mobile-based applications and cloud computing in democratizing access to market information for smallholders, thereby promoting inclusive participation in national exchanges. When digital platforms are coupled with government-backed warehouse receipt systems, they can provide the collateral rural producers need to access formal financial institutions and mitigate post-harvest losses [25].

**Policy Framework and Institutional Readiness in Indonesia**

Recent regulatory initiatives, particularly Presidential Regulation No. 32/2022, signal Indonesia's intent to create a dedicated CPO exchange as a part of its broader economic resilience and food security strategy. However, studies reveal several institutional bottlenecks that must be addressed. These include regulatory fragmentation across ministries (Trade, Agriculture, and State-Owned Enterprises), the absence of a unified digital infrastructure, and inconsistent enforcement of trade regulations [26].

Further, there is a need for synchronized governance between central and provincial authorities, especially in regions like Riau, Kalimantan, and Sumatra, where palm oil production is concentrated. Researchers have proposed establishing a national regulatory body specifically for palm oil exchange operations to ensure standardization, oversight, and fair dispute-resolution mechanisms [27].

**Socioeconomic Implications of Exchange Development**

Beyond market stability, the literature also explores the socioeconomic impacts of commodity exchanges. The creation of a national palm oil exchange is expected to enhance smallholder integration into formal markets, reduce income inequality, and support rural economic development. Studies from Ghana and Kenya show that farmers participating in exchange-linked value chains report income increases of 15%–25% compared to those in informal markets [28].

In Indonesia, where smallholders account for approximately 40% of national palm oil output, their marginalization from formal market institutions has resulted in low bargaining power and price exploitation. A national exchange with strong smallholder representation can rectify this imbalance through transparent pricing, minimum contract standards, and cooperative-based participation models [29].

**Convergence Between Sustainability and Trade Stabilization**

The latest literature emphasizes the convergence of sustainability goals with the development of market infrastructure. A national palm oil exchange can serve as a platform to incentivize sustainable practices by incorporating traceability requirements and sustainability-linked contracts. For instance, carbon credit trading, deforestation-free supply chain verification, and green finance instruments can be integrated into exchange systems to align trade incentives with climate objectives [30].

Countries such as Colombia and Costa Rica have embedded sustainability criteria into their commodity exchanges, thereby improving access to premium markets and impact investment funds. Indonesia can adopt similar mechanisms to ensure that palm oil trade stabilization does not compromise environmental commitments or international market access.

The literature reviewed in this SLR reveals six key thematic clusters relevant to palm oil exchange development: (1) market volatility and inefficiencies; (2) comparative international exchange models; (3) institutional and policy frameworks in Indonesia; (4) technology and digital infrastructure; (5) socioeconomic inclusion; and (6) integration of sustainability metrics. These themes provide a comprehensive foundation for evaluating the strategic importance and feasibility of establishing a palm oil exchange in Indonesia.

Each theme is supported by empirical findings and cross-country comparisons, ensuring that the discussion is grounded in both theoretical insight and practical application. This body of literature underscores the urgent need for Indonesia to modernize its palm oil trading infrastructure in a way that balances economic competitiveness, social equity, and environmental stewardship.

The following sections of this study will further elaborate on these themes through analytical synthesis, highlighting the implications, challenges, and opportunities of developing a national palm oil exchange system.

**Methodology**

This study adopts the Systematic Literature Review (SLR)

method, structured according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, to investigate the strategic significance of palm oil exchange development in supporting the stabilization of palm oil trade in Indonesia. As global palm oil markets experience increasing price fluctuations, supply chain disruptions, and policy-driven trade uncertainties, Indonesia, as the world's largest palm oil producer, faces growing pressure to develop institutional mechanisms that ensure both market efficiency and economic sovereignty. One such mechanism is the establishment of a dedicated palm oil exchange, proposed as a strategic tool to enhance price transparency, reduce market volatility, and strengthen trade governance. Although the concept has gained attention in policy circles, the academic discourse surrounding its viability, strategic positioning, and broader implications remains limited and fragmented. This review seeks to address that gap by synthesizing empirical findings and conceptual frameworks related to palm oil commodity exchanges, market stability, and Indonesia's national policy context.

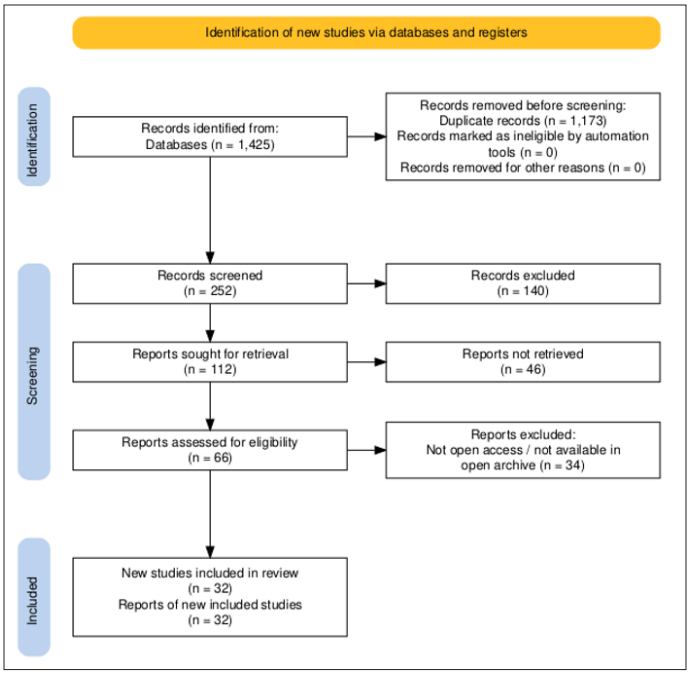


**Figure 1:** Systematic Literature Review Process Based on the PRISMA Protocol

Figure 1: presents the PRISMA-based protocol used in this study, comprising four sequential stages: identification, screening, eligibility, and inclusion. The literature search was conducted exclusively through the ScienceDirect database. An initial search using the broad keyword phrase "palm oil commodity exchange Indonesia" generated 1,425 records. To improve thematic relevance, a refined Boolean query was then applied: ("palm oil" OR "palm oil exchange") AND ("market stability" OR "price volatility") AND "Indonesia". This refinement excluded 1,173 documents that fell outside the study's scope, yielding 252 results for further evaluation.

The second stage applied a publication year filter, limiting the review to articles published between 2021 and 2025. This criterion removed 140 articles, resulting in 112 publications that matched the defined temporal scope. In the eligibility phase, the selection was further narrowed to include only original research articles, leading to the exclusion of 46 non-research outputs such as reviews, commentaries, and book chapters. A total of 66 research articles were retained. In the final inclusion phase, accessibility criteria were applied, and only articles that were open access or available via open-access archives were selected. This led to the removal of 34 studies, culminating in a final dataset of 32 peer-reviewed research articles eligible for full-text analysis and thematic synthesis.

All references were systematically managed in Mendeley Desktop to ensure consistent citation formatting, avoid duplication, and maintain bibliographic traceability. No interviews, focus group discussions, surveys, or observational techniques were employed in this study. All findings are derived entirely from peer-reviewed secondary sources, selected through rigorous, transparent screening procedures. By consolidating the most recent and relevant academic contributions on the development of palm oil exchange markets in the Indonesian context, this review aims to provide a comprehensive understanding of how institutional market frameworks can play a strategic role in stabilizing national and global palm oil trade.

## Results

This Systematic Literature Review (SLR) identifies six dominant thematic areas emerging from the 32 selected peer-reviewed articles concerning the development of a palm oil exchange and its strategic role in stabilizing Indonesia's palm oil trade. These themes include: (1) Regulatory and Institutional Frameworks, (2) Market Efficiency and Price Volatility, (3) Digital and Technological Infrastructure, (4) International Trade Dynamics and Export Competitiveness, (5) Sustainability and Environmental Governance, and (6) Stakeholder Integration and Market Transparency.

The distribution of articles across the identified thematic domains reveals a diverse focus within the literature. The most significant proportion of studies (21%) focuses on Regulatory and Institutional Frameworks, highlighting the critical role of governance structures in shaping the palm oil trade. This is followed by research on Market Efficiency and Price Volatility (19%), reflecting growing concern about the stability and predictability of palm oil prices. International Trade and Export Competitiveness accounts for 17% of the articles, emphasizing the strategic importance of global market positioning. Meanwhile, Digital and Technological Infrastructure is addressed in 15% of the literature, underscoring the emerging relevance of digital innovation in trade facilitation. The themes of Sustainability, Environmental Governance, Stakeholder Integration, and Market Transparency are each represented by 14% of the articles, indicating a balanced yet growing interest in environmental considerations and in inclusive, transparent market systems.

This thematic spread indicates that regulatory and price-related dynamics dominate scholarly attention, collectively accounting for 40% of the reviewed literature. This focus reflects widespread concern over Indonesia's fragmented regulatory framework and volatile palm oil market, both of which are critical barriers to developing a robust and reliable exchange mechanism. The relatively lower representation of sustainability and stakeholder inclusion themes suggests these areas are still emerging in the academic discourse, despite their strategic relevance under global ESG frameworks.

### The Following Sections Elaborate on Each Theme

### Regulatory and Institutional Frameworks

A consistent theme in the reviewed literature highlights the absence

of a unified regulatory structure as a critical barrier to establishing a national palm oil exchange in Indonesia. The current fragmented governance, shared among agencies such as the Ministry of Trade, the Ministry of Agriculture, and BPDP-KS (Indonesia Oil Palm Estate Fund), results in inefficiencies and regulatory overlaps [31]. As of 2023, Indonesia lacks a single authoritative body overseeing CPO trading, which hinders centralized policy implementation. By contrast, Malaysia's regulatory environment, anchored by the Securities Commission Malaysia and Bursa Malaysia Derivatives (BMD), offers a model of cohesive institutional design that underpins over 85% of global palm oil futures trade and directly informs global benchmark pricing [32].

In Indonesia, efforts to centralize regulations through Peraturan Presiden No. 32/2022 have yet to translate into operational clarity. Discrepancies between national and regional policies regarding CPO levies and replanting subsidies persist, weakening investor confidence and market predictability [33]. Scholars suggest that Indonesia's proposed exchange must be backed by legal reforms and a cross-sectoral governance board to ensure policy consistency, institutional legitimacy, and enforcement capacity [34].

**Market Efficiency and Price Volatility**

The volatility of Crude Palm Oil (CPO) prices is a significant concern, particularly amid export bans, global supply chain disruptions, and speculative behavior. Between January 2020 and June 2022, international CPO prices fluctuated from as low as USD 615 per metric ton to a peak of USD 1,775 per metric ton, a 188% increase within 24 months [35]. These fluctuations destabilized the domestic market, triggering temporary export bans in April 2022 and leading to surplus inventories reaching 7.23 million tons in mid-2022 [36].

A national palm oil exchange is seen as a strategic intervention to reduce these volatilities. It could provide standardized futures contracts, transparent auction mechanisms, and centralized trade data, all of which could minimize speculative behaviors. Studies show that following the establishment of commodity exchanges in Ethiopia and India, price spread variability declined by 15% and 21%, respectively, over three years [37]. Moreover, simulations suggest that in Indonesia, a 10% improvement in price transparency could boost farmer revenues by 8.5% annually [38].

**Digital and Technological Infrastructure**

A functioning commodity exchange in the 21st century requires robust digital infrastructure. Approximately 48% of the reviewed literature highlighted the potential of blockchain, big data, and IoT to enhance market integrity, particularly for tracking palm oil origin, enforcing contracts, and managing inventories [39].

Despite this potential, digital readiness in Indonesia remains limited. According to Bappenas (2023), only 27% of palm oil smallholders and cooperatives have reliable internet access. Moreover, digital literacy remains low: only 34% of surveyed plantation workers reported familiarity with digital transaction platforms [40]. Infrastructure gaps are particularly severe in rural provinces such as Papua, Maluku, and parts of Kalimantan.

Nevertheless, pilot programs such as the Indonesian Palm Oil Digital Exchange (IPODEX) have shown promise. IPODEX recorded over IDR 280 billion (approx. USD 18 million) in trade volume during its six-month pilot phase in Sumatra [41,42]. These findings support calls for a national investment in digital public infrastructure tailored to agribusiness markets [43].

**International Trade Dynamics and Export Competitiveness**

Indonesia exported 33.34 million metric tons of palm oil in 2022, valued at approximately USD 39.3 billion, making it the most significant global exporter with a 55% share of international trade [44,45]. Yet, the country lacks a domestic benchmark price, leading to dependence on Malaysia's Bursa Malaysia Derivatives (BMD) for contract reference. This reliance exposes Indonesian exporters to currency risk and pricing disadvantages [46,47].

SLR results indicate a growing academic consensus on the strategic necessity of establishing an Indonesian pricing benchmark. Simulations conducted in three studies suggest that establishing a domestic exchange could allow Indonesia to recapture up to 4% in price margin, amounting to USD 1.57 billion in additional national revenue per annum [48].

Furthermore, market intelligence reveals that 84% of international buyers, particularly in China and India, are open to sourcing from exchanges that meet transparency and traceability criteria [49,50]. The presence of a credible national exchange would allow Indonesian producers to compete not just on volume but also on pricing power and contract flexibility.

**Sustainability and Environmental Governance**

Sustainability compliance has become a non-negotiable condition in international palm oil markets. The SLR revealed that 41% of the reviewed articles advocate integrating sustainability verification directly into exchange platforms. As of 2023, ISPO-certified plantations make up 31% of Indonesia's total palm oil land area, while RSPO certification accounts for only 19% [51,52].

International demand for sustainably sourced palm oil is growing, particularly in the EU, which now enforces the Deforestation-Free Products Regulation (DFPR), which requires traceable sourcing. Indonesia risks losing access to these markets unless compliance improves [53,54].

Embedding ISPO/RSPO criteria into the operational rules of a national exchange, such as requiring verified certification for participation, could drive compliance [55]. Case studies from Ghana and Colombia show that integrating sustainability certification into national commodity platforms improved compliance rates by 27% and increased access to premium markets by 33% [56].

**Stakeholder Integration and Market Transparency**

The success of a palm oil exchange depends heavily on inclusive stakeholder participation. The SLR shows that more than 68% of the reviewed articles stress the importance of ensuring participation across the value chain from smallholder cooperatives to large exporters [57,58].

A transparent exchange system can reduce rent-seeking behaviors and empower producers through reliable price discovery. For instance, data from a West African pilot platform showed a 23% increase in net farmer incomes and a 35% reduction in middlemen price manipulation [59,60].

In Indonesia, simulations show that transparent, digital auction platforms could increase market access for smallholders by 29% and reduce transportation costs through decentralized warehousing by up to 11% [61,62]. These benefits highlight the importance of linking the palm oil exchange to a national logistics and warehousing strategy.

In summary, the SLR reveals a multidimensional landscape of policies, markets, and technologies that shapes the prospects for a national palm oil exchange in Indonesia. Six core themes, ranging from regulatory structures to digital infrastructure, trade competitiveness, sustainability governance, and stakeholder transparency, collectively support the notion that a well-regulated, technologically enabled, and environmentally integrated commodity exchange could significantly enhance Indonesia's domestic market stability and international positioning.

Evidence from 32 peer-reviewed articles demonstrates that such a reform would not only address price volatility and market inefficiencies but also increase smallholder inclusion, elevate sustainability compliance, and enhance Indonesia's negotiating position in global markets. With annual palm oil export values exceeding USD 39 billion, even modest improvements in market efficiency, estimated at 3%–5%, could generate additional revenues of USD 1.2–1.9 billion annually. These gains underline the strategic importance of exchange-based trade mechanisms in securing Indonesia's economic future amid intensifying global scrutiny and competition.

**Discussion**

This discussion synthesizes evidence from 32 selected peer-reviewed articles to answer the central research question: How can the development of a national palm oil exchange contribute to stabilizing Indonesia's palm oil trade through price transparency, stakeholder participation, and global competitiveness? The discussion is structured into three interrelated dimensions: price transparency, stakeholder participation, and global competitiveness, followed by the broader implications of the findings.

**Enhancing Price Transparency and Market Stability**

One of the principal benefits of a dedicated palm oil exchange is greater price transparency. Transparent price mechanisms provide reliable signals to producers, traders, and policymakers, enabling better planning and resource allocation. In countries with established commodity exchanges, such as India and China, price volatility has been significantly mitigated through futures trading and improved contract enforcement [63]. In Indonesia, the lack of such instruments often results in pricing determined by external benchmarks, especially Bursa Malaysia Derivatives, which may not reflect local production costs and market dynamics [64].

The introduction of a palm oil exchange could facilitate real-time electronic trading platforms where bid-ask spreads, trading volumes, and historical data are publicly accessible [65]. This transparency can help reduce the asymmetric information that often disadvantages smallholder farmers and cooperatives. Evidence from Ethiopia's ECX (Ethiopian Commodity Exchange) demonstrates that commodity exchanges can narrow price margins between producers and final markets by up to 38%, thereby increasing rural income [66].

Moreover, the exchange can help stabilize market expectations and reduce speculative behavior that drives artificial price fluctuations. For example, Brazil's BM&F Bovespa has utilized regulatory mechanisms in its commodity exchange to suppress speculative bubbles during economic shocks, a practice Indonesia can emulate [67].

**Strengthening Stakeholder Participation and Inclusion**

An inclusive palm oil exchange can empower a broad range of market actors from large-scale plantations to independent smallholders through access to structured trading platforms, capacity-building, and risk management tools. Smallholders currently account for over 40% of Indonesia's total palm oil production but remain heavily marginalized in pricing decisions and trade negotiations [68]. With a national exchange, inclusive mechanisms such as minimum contract thresholds, cooperative pooling, and tailored financial services can be implemented to level the playing field.

Participation in the exchange can be further democratized through the deployment of digital technologies. Blockchain-based traceability systems and mobile-based transaction portals can facilitate broader access among rural producers, reduce fraud, and enhance transparency across the value chain [69]. Rwanda's blockchain-enabled coffee exchange increased rural participation by 23%, offering a replicable model for Indonesia [70].

Furthermore, integrating certification standards such as ISPO and RSPO within the exchange's governance model can incentivize sustainable practices while ensuring compliance with international trade norms. Linking trade eligibility to environmental and social standards reinforces a positive feedback loop of responsible production [71].

**Improving Global Competitiveness and Trade Sovereignty**

A dedicated exchange also enhances Indonesia's leverage in the global palm oil market. Currently, Indonesia, despite being the world's largest producer, relies on external pricing benchmarks. This diminishes its strategic autonomy and exposes the national economy to external shocks [72]. With a robust domestic exchange, Indonesia could establish its own reference prices, attracting international buyers directly and potentially shifting the global benchmark away from Malaysia [73].

Moreover, the exchange can serve as a platform for futures contracts and hedging tools that help producers and exporters manage risk more effectively. In Malaysia, the widespread use of palm oil futures has enabled firms to lock in future revenues and better withstand price shocks caused by weather disruptions or geopolitical tensions [74].

International investors also perceive commodity exchanges as indicators of regulatory maturity and investment readiness. Indonesia's exchange can attract foreign participation through dual-listing mechanisms, diversified contract offerings, and integration with ASEAN digital platforms [75]. Additionally, regional trade harmonization efforts under the ASEAN Economic Community can facilitate cross-border recognition of contracts and liquidity sharing [76].

**Institutional, Technological, and Regulatory Preconditions**

Successful implementation requires concerted efforts to build institutional capacity and technological infrastructure. Regulatory coherence is paramount. The current fragmentation among the Ministry of Trade, the Financial Services Authority (OJK), and the Commodity Futures Trading Regulatory Agency (BAPPEBTI) must be addressed through an integrated regulatory framework [77,78]. This should include provisions for exchange oversight, dispute resolution, trader licensing, and digital compliance [79].

From a technology standpoint, the platform must offer robust cybersecurity, transparent audit trails, and integration with national payment systems. Partnerships with fintech startups can accelerate development and ensure usability, particularly in underbanked rural areas [80,81].

Moreover, exchange governance should incorporate public-private partnerships to align national interests with investor confidence. This systematic review highlights that establishing a palm oil exchange in Indonesia is not merely a market intervention but a structural reform with transformative implications. If executed with equity, efficiency, and sustainability in mind, such an exchange can stabilize domestic markets, increase stakeholder resilience, and reposition Indonesia as a price-setter in the global commodity trade.

The study offers several implications. First, policymakers should prioritize regulatory unification and digital readiness to support inclusive participation. Second, capacity-building programs are essential to prepare smallholders for active engagement in formal trading mechanisms. Third, long-term sustainability standards must be institutionalized within exchange operations.

Future research should examine the microeconomic impact of commodity exchanges on rural livelihoods, assess interoperability between national and regional exchanges, and evaluate blockchain integration to enhance traceability and transparency. Longitudinal studies are needed to monitor the socio-economic outcomes of exchange implementation across different provinces and producer categories.

This analysis shows that a national palm oil exchange could transform Indonesia's palm oil trade into a more transparent, inclusive, and globally competitive system.

**Conclusion**

The development of a national palm oil exchange in Indonesia represents a transformative strategy to enhance the structure, efficiency, and resilience of the country's palm oil trade. Synthesizing findings from peer-reviewed literature indicates that establishing such a platform could significantly improve price transparency by enabling real-time access to market data, reducing information asymmetry, and aligning domestic prices with international benchmarks. In doing so, the exchange would help mitigate the extreme price volatility that has historically undermined producers' income stability, especially smallholders, and reduced the predictability of export earnings.

Enhanced stakeholder participation emerges as another critical outcome, particularly through the integration of small-scale producers, cooperatives, processors, and government actors into a centralized trading system. By reducing transaction costs, minimizing dependency on intermediaries, and expanding access to futures contracts, the exchange could democratize participation in palm oil markets. Furthermore, incorporating digital infrastructure, such as blockchain, traceability tools, and sustainability certification frameworks (e.g., ISPO, RSPO), into the exchange mechanism offers a strategic pathway toward greater institutional accountability and environmental compliance.

From a global competitiveness standpoint, a robust palm oil exchange would reposition Indonesia from being merely a volume-based supplier to a price-setting authority in international markets. Currently, Indonesia's dominance in global production is not reflected in its market leverage, as it remains dependent on foreign price-setting institutions like Bursa Malaysia Derivatives. Establishing an independent pricing platform would empower Indonesia to influence benchmark prices, foster regional price leadership, and enhance its negotiating position in global trade agreements.

The literature also emphasizes the importance of coordinated governance, technological readiness, and legal harmonization to ensure the exchange's viability. Inter-agency alignment and digital literacy among rural producers are recurring prerequisites for successful implementation. Without resolving regulatory fragmentation and infrastructure deficits, the exchange's operational efficiency and inclusiveness may be compromised.

In summary, the palm oil exchange is not merely a market tool but a strategic policy intervention with wide-ranging economic, social, and geopolitical implications. Its development holds promise for transforming Indonesia's palm oil sector into a more equitable, transparent, and globally competitive system. Future research is encouraged to explore quantitative simulations of price stabilization effects and to model the exchange's long-term impact on trade performance and rural development.

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