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Critical Perspectives on Crude Palm Oil's Role in Developing Economies: Development Engine, Environmental Externalities, and Asymmetric Sustainability Governance

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ABSTRACT

This article offers a critical review of the dual role of Crude Palm Oil (CPO) in developing economies, focusing on Indonesia and Malaysia as leading producers. It synthesizes peer reviewed studies published between 2000 and 2025 on export growth, rural development, environmental change, and sustainability governance. In Indonesia, for instance, palm oil contributed about 3.5 percent of GDP in 2024, generated substantial foreign exchange, and supported an estimated 16.5 million livelihoods, with smallholders managing roughly 40–42 percent of the plantation area. At the same time, expansion has been accused of being associated with deforestation, peatland conversion, biodiversity loss, greenhouse gas emissions, and land conflicts involving indigenous communities. The review advances three main arguments. First, economic benefits and environmental harms are often examined separately, obscuring how export oriented, commodity dependent growth is structurally linked to ecological degradation and vulnerability to price and policy shocks. Second, sustainability governance through instruments such as RSPO, ISPO, and MSPO is marked by power asymmetries: Northern buyers and standard setters exert disproportionate influence. At the same time, smallholders face high compliance costs and uncertain benefits. Third, palm oil governance is shaped by North–South contestations, with conservation oriented importers and development oriented producer states promoting competing sustainability narratives. The article argues for integrated, landscape scale and multi level governance that couples smallholder inclusion with robust environmental safeguards, aligns domestic and international standards, and addresses structural imbalances in value and power along the palm oil supply chain.

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Introduction

Crude Palm Oil (CPO) has become one of the most strategically significant agricultural commodities in the global economy, with applications spanning food processing, oleochemicals, cosmetics, pharmaceuticals, and biofuels [1]. Its high yield per hectare and relatively low production costs have enabled palm oil to outcompete alternative vegetable oils, embedding the commodity deeply in international trade and complex global value chains [2]. For major producing countries—most notably Indonesia, Malaysia, and, to a lesser extent, Thailand, Nigeria, and other tropical states—palm oil has been framed by governments and industry as a critical driver of economic growth, export earnings, and rural development [3,4].

In Indonesia, CPO production has become structurally important to the macroeconomy and to regional development trajectories. The palm oil sector accounted for approximately 3.5 percent of national GDP in 2024, or around USD 12.6 billion, while exports reached roughly USD 28.45 billion, making palm oil the country's second largest source of foreign exchange after coal. The industry supports the livelihoods of an estimated 16.5 million people, including 9.7 million workers directly employed in plantations and mills—of whom about 5.2 million are smallholder farmers—as well as approximately 6.8 million indirect workers in logistics, services, and equipment supply [5]. Smallholders manage roughly 41–42 percent of total plantation area and contribute approximately one third of national production, underscoring the importance of decentralized, smallholder based production within the broader industrial landscape [6]. Similar patterns exist in Malaysia, where palm oil remains a central pillar of agricultural exports and rural income despite mounting environmental scrutiny [1].

Because of these contributions to exports, employment, and rural economic integration, palm oil has been widely portrayed as a vehicle for poverty reduction, regional infrastructure development, and inclusive growth [4,7]. Expansion of plantations and processing facilities has been associated with improved road networks, increased market access, and the emergence of new service economies in previously marginal rural areas [5]. Policy documents and industry narratives frequently emphasize the role of palm oil in achieving national development goals and contributing to the Sustainable Development Goals (SDGs), especially those related to poverty, hunger, and decent work [4,8].

At the same time, a substantial body of research has documented the significant environmental and social costs associated with palm oil expansion. Large scale conversion of forests and peatlands for oil palm has driven deforestation, biodiversity loss, and substantial greenhouse gas emissions across Southeast Asia and other tropical regions [9-11]. Peatland drainage, in particular, has been linked to long-term carbon emissions and heightened fire risks, while also degrading unique ecosystems and local hydrology [12,13]. Comparative studies in places such as the Amazon and Borneo find that oil palm landscapes support substantially lower levels of bird and other taxa diversity than intact forests, even when some remnant vegetation is maintained [14,15]. These ecological impacts intersect with social conflicts over land tenure and indigenous rights, as in the Tanah Merah project in Papua, where licensing overlaps with the customary territories of the Awyu and Moi communities and raises concerns about potential violations of Free, Prior, and Informed Consent (FPIC) principles.

Beyond immediate ecological damage, critical economic risks are also evident. Heavy dependence on palm oil exports exposes producing countries to commodity price volatility, trade policy shocks, and reputational risk in environmentally conscious markets [16,17]. Some authors warn that the sector's dominance can produce "Dutch disease" - type symptoms by drawing capital and political attention away from industrial diversification, thereby entrenching a resource-dependent growth model vulnerable to external shocks[18,19]. Such vulnerabilities challenge the assumption that palm oil–driven growth is automatically synonymous with long term, broad based development.

Despite the richness of empirical work on both economic benefits and environmental harms, the academic and policy literature often treats these dimensions separately. Development oriented studies tend to prioritize macroeconomic indicators, rural incomes, and infrastructure, while environmental assessments focus on deforestation dynamics, biodiversity impacts, and carbon emissions [2]. Fewer studies place these strands into an integrated framework that foregrounds structural power relations, narrative construction, and the political economy of global commodity chains [20,21]. In particular, there remains limited systematic engagement with how Northern led sustainability standards, corporate buyer requirements, and trade policies condition development pathways in producing countries, or how these interact with domestic political coalitions, national sovereignty, and "sustainability nationalism" [22-24].

Central to this political economy perspective is the role of sustainability governance. The emergence of private, multi-stakeholder certification schemes such as the Roundtable on Sustainable Palm Oil (RSPO), together with state-led national standards such as ISPO and MSPO, has created a complex governance architecture spanning global, national, and sub-national levels [1,25]. These schemes are intended to reconcile production with environmental and social safeguards by regulating land-use practices, labor conditions, and supply-chain traceability [26]. However, their effectiveness remains contested. Evidence suggests that while certification can reduce some deforestation risks and improve governance signals, it often delivers uneven economic benefits, especially for independent smallholders who face high compliance costs, limited access to information, and uncertain price premiums [27-29]. Moreover, tensions between RSPO and national schemes highlight deeper North–South frictions over the meaning of "sustainability" and legitimate authority in standard setting [6,22,30,31].

This article addresses these gaps by offering a critical review of CPO's role in developing economies that goes beyond the dominant dichotomy between "development" and "environment." It has three interrelated objectives. First, it identifies the main narratives through which palm oil is represented in the literature, focusing on how CPO is linked to export growth, employment, rural livelihoods, and structural transformation [4,32,33]. Second, it examines contradictions and trade-offs between development-oriented and sustainability-oriented perspectives, with particular attention to smallholder inclusion, ecological externalities, and macroeconomic vulnerability [2,6]. Third, it develops a critical interpretive framework that situates palm oil production and governance within broader global political economy dynamics, highlighting how power asymmetries between transnational corporations, Northern regulators, and Southern producer states shape the distribution of benefits and burdens along the value chain [20,34,35].

The analysis draws on a qualitative, critical review of peer reviewed literature sourced from Scopus and Web of Science, focusing on studies published between 2000 and 2025 that address economic, social, environmental, and governance dimensions of palm oil in developing countries. Using thematic analysis, comparative synthesis, and critical discourse evaluation, it identifies recurring patterns, divergences, and silences in the way CPO's developmental role is framed and contested. The remainder of the article is structured as follows. Section 2 outlines the data sources, search strategy, inclusion criteria, and analytical approach. Section 3 presents the main empirical themes, organized around palm oil as a development engine, environmental concerns, smallholders and rural development, and sustainability governance. Section 4 discusses the contradictions in development narratives, power asymmetries in global commodity markets, North–South contestation, and the prospects for integrated sustainability. Section 5 concludes with reflections on policy implications and directions for future research.

Methods

Data sources

This study is based on a qualitative, critical review of peer reviewed journal articles, which were selected to ensure broad disciplinary coverage and high standards of academic quality. Scopus was used for its extensive indexing of journals in economics, development studies, environmental science, geography, and political science, as well as its robust citation metrics, which help identify influential contributions and emerging research fronts. Web of Science was employed as a complementary source due to its longstanding coverage of high-impact journals and cross-disciplinary citation networks, particularly in environmental governance, political economy, and sustainability transitions. Together, these databases provide a comprehensive and methodologically diverse corpus for examining palm oil's role in developing economies.

Search Strategy

The literature search combined keyword based queries and citation chaining. Searches were conducted using combinations of terms capturing economic, environmental, and governance dimensions of palm oil in developing countries, including: "palm oil economic development," "crude palm oil GDP trade," "palm oil smallholders rural livelihoods," "palm oil sustainability governance," "RSPO ISPO MSPO certification," "palm oil deforestation emissions," and "palm oil political economy Global South." Queries were restricted to article titles, abstracts, and keywords to increase thematic relevance and reduce the retrieval of tangential studies.

To avoid overlooking influential contributions not identified by the initial search strings, backward and forward citation chaining was applied to key articles. Highly cited works and recent review papers on palm oil, deforestation, smallholder livelihoods, and certification governance were used as "anchor" texts whose reference lists and citing documents were systematically explored. This iterative process enabled the inclusion of both foundational studies from the early 2000s and more recent work on sustainability governance, political economy, and North–South contestation published after 2020.

Inclusion and Exclusion Criteria

Articles were included if they met the following criteria:

- Peer reviewed journal publications (full articles or substantial review essays), ensuring methodological rigor and scholarly reliability.
- Explicit focus on palm oil's economic, social, environmental, or governance impacts in developing countries, with particular attention to major producing states (Indonesia, Malaysia, Thailand, Nigeria, and selected Latin American and African producers).
- Publication between 2000 and 2025, capturing both early debates on deforestation and more recent discussions on certification, sustainability governance, and political economy.
- Written in English, to maintain comparability in concepts and terminology across studies.

Excluded materials comprised non peer reviewed reports, short commentaries, opinion pieces, and purely technical agronomic or engineering studies that did not engage with broader development, environmental, or governance questions. However, a small number of strong influence policy reports and NGO studies (e.g., RSPO and WWF assessments) were consulted selectively to contextualize empirical findings from the academic literature on certification outcomes and smallholder participation.

Screening Process

The screening process consisted of three main stages.

- **Identification:** Initial searches in Scopus and WoS yielded several hundred records. Titles and source journals were first checked to remove obviously irrelevant items (e.g., non tropical crops, non development contexts).
- **Title and Abstract Screening:** Abstracts were reviewed to confirm that the articles addressed at least one of the core dimensions: (i) macroeconomic or sectoral contributions of palm oil, (ii) environmental and land use impacts, (iii) smallholder livelihoods and rural development, or (iv) sustainability governance, certification, and political economy.
- **Full Text Assessment:** The remaining articles were read in full to assess methodological quality, relevance to CPO in developing economies, and potential contribution to the thematic and critical analysis. Studies were retained if they provided substantive empirical evidence, conceptual insight, or theoretically informed critique relevant to the research questions.
- The final corpus comprised a diverse set of studies spanning economics, development studies, environmental science, geography, sociology, and political science, allowing for cross disciplinary triangulation.

Analytical Approach

Rather than a strictly protocol-driven systematic review, this article adopts a qualitative, critical literature review oriented by political economy concerns. Three analytical strategies were combined:

- **Thematic Analysis:** Articles were coded for recurring themes: (a) macroeconomic and trade contributions of CPO; (b) employment, smallholders, and rural development; (c) deforestation, biodiversity, and emissions; (d) certification schemes and sustainability governance; and (e) power relations, narrative framing, and North–South contestation.
- **Comparative Synthesis:** Findings were compared across countries, scales, and methodological approaches to identify convergences (e.g., on deforestation patterns), divergences (e.g., on smallholder income effects), and context dependent outcomes (e.g., certification benefits).
- **Critical Discourse Evaluation:** Particular attention was paid to how different actors—governments, corporations, NGOs, and scholars—construct narratives of palm oil as either a development engine or an environmental threat, and how these narratives underpin specific governance instruments such as RSPO, ISPO, MSPO, and emerging jurisdictional approaches.
- This multi layered approach makes it possible to move beyond descriptive aggregation of findings and to develop a critical interpretive framework that links empirical patterns to structural power dynamics in global palm oil markets.

Results

Palm Oil as a Development Engine

The literature widely recognizes crude palm oil as a key driver of economic development in major producing countries, particularly Indonesia and Malaysia, which together dominate global production and export markets [1,4]. Empirical studies consistently highlight the sector's contribution to national income and foreign exchange, with export revenues playing an important role in supporting trade balances, fiscal revenues, and macroeconomic stability[16,36]. For Indonesia, palm oil has been framed as a cornerstone of export led development and industrial policy, including downstream diversification into refined products and biodiesel [37,38].

Employment generation and rural livelihoods are central to this developmental narrative. Palm oil expansion creates direct jobs in plantations, mills, and refineries, as well as indirect employment in logistics, transport, input supply, and service sectors [39,40]. Multiple studies report increases in household income among smallholders and plantation workers, alongside improvements in access to credit, education, and basic services in palm-dominated regions [5,41]. Smallholder participation—often through plasma schemes, contract farming, or independent cluster arrangements—is highlighted as a mechanism to integrate rural producers into global value chains and distribute economic benefits beyond large estate companies [42,43].

Palm oil development has also been linked to infrastructure expansion and regional economic integration. Investments in plantations and processing facilities often require roads, bridges, storage, and energy infrastructure that can generate positive spillovers for non plantation activities and local markets [4,40]. In Indonesia, for instance, oil palm growth has contributed to the emergence of new agrarian frontiers and secondary towns, reshaping rural settlement patterns and local economies [5]. In Malaysia, palm oil has long been integrated into regional development schemes, especially in states where oil palm is a major employer and source of provincial revenue [1].

However, the literature also emphasizes that these benefits are uneven and contingent on governance quality, market conditions,

and the structure of value chains. Some studies underscore the potential for palm oil to support inclusive growth under conditions of secure land rights, strong producer–processor linkages, and equitable benefit sharing mechanisms [44,45]. Others caution that poor governance, weak regulation, and contractor power can reproduce or deepen social inequalities, particularly where smallholders bear production risks while companies capture disproportionate value [4,36].

Trade offs between growth and vulnerability are a recurrent theme. Heavy reliance on palm oil exports exposes producer countries to international price volatility, trade restrictions, and sustainability driven market differentiation in key import regions such as the European Union [16,19]. Downstream diversification into biodiesel and oleochemicals is frequently presented as a strategy to increase value capture and buffer against price shocks. Yet, evidence on its long term developmental benefits remains mixed and context specific [36,46]. Several modeling studies warn that an overconcentration in palm based exports may generate "Dutch disease" type effects, constraining broader industrial diversification and reinforcing a commodity dependent growth model [18].

In summary, the literature portrays palm oil as a powerful, but structurally ambivalent, development engine: capable of generating income, employment, and infrastructure, yet also embedding economies in volatile commodity markets and potentially crowding out more diversified paths of structural transformation [2].

Palm Oil and Environmental Concerns

Environmental impacts constitute the most prominent counterweight to the developmental narrative. There is a broad consensus that oil palm expansion has been associated with a major driver of deforestation and land use change across Southeast Asia and, more recently, in parts of Africa and Latin America [9,10,47]. Large scale clearing of primary and secondary forests for plantations has resulted in substantial habitat loss and fragmentation, with particularly severe consequences for forest dependent species and ecosystem functions [48,49]. Comparative studies in Borneo, Sumatra, and the Amazon show that oil palm landscapes generally support significantly lower levels of avian and mammalian diversity than intact forests, even when some riparian buffers or forest remnants are retained [14,50].

Peatland conversion is a critical dimension of this environmental concern. Draining peatlands for oil palm leads to long term subsidence, elevated greenhouse gas emissions, and heightened fire risk, with regional and global climate implications [12,13]. Empirical studies document rapid losses of peat carbon stocks and irreversible changes to hydrology and soil structure under plantation management [9].These processes contribute to Indonesia's status as one of the world's largest emitters of land use related greenhouse gases and have intensified policy debates on moratoria, peatland protection, and restoration programs [51].

Beyond biodiversity and climate impacts, palm oil expansion has frequently been associated with social conflicts and human rights concerns. Numerous cases document overlapping claims between oil palm concessions and customary lands, leading to disputes over tenure, compensation, and access to forests and water [21]. The Tanah Merah project in Papua illustrates these tensions, where large scale licensing overlaps with indigenous territories and raises questions about the implementation of Free, Prior, and Informed Consent (FPIC) principles and the recognition of customary rights. Such conflicts underscore that environmental degradation often intersects with processes of dispossession and marginalization.

The literature also explores potential mitigation strategies within oil palm landscapes. Studies suggest that maintaining forest set asides, riparian corridors, and mixed agroforestry systems can partially support biodiversity and ecosystem services compared to homogeneous monocultures [14,52,53]. However, these interventions rarely achieve the levels of ecosystem services provided by intact forests and may be challenging to implement at scale without strong regulatory frameworks and economic incentives [54]. As a result, debates increasingly focus on landscape level planning and zero deforestation commitments, including how to define "forest" and which land types (e.g., degraded lands, savannas) can be converted under sustainable scenarios [55].

Overall, the environmental literature converges on the conclusion that palm oil expansion has imposed significant and often irreversible ecological costs, even as it acknowledges context dependent variation and the potential of targeted mitigation measures [2].These findings form a central pillar of arguments for stricter sustainability governance and demand side regulation.

Smallholders and Rural Development

Smallholders occupy a pivotal position in the palm oil sector, both as major producers and as key actors in debates over equity and sustainability. In Indonesia and Malaysia, smallholders collectively manage roughly 40–42 percent of oil palm area and contribute a substantial share of national output [6,31,42]. They are widely recognized as central to rural livelihoods and as potential "gatekeepers" for sustainable supply chains, particularly as global buyers increasingly require traceability and certification [56,57].

Empirical studies show that participation in palm oil value chains can significantly increase smallholder incomes compared to alternative crops, especially where access to high-yielding planting material, extension services, and organized marketing channels is available [58,59]. Engagement in plasma schemes, cooperative arrangements, or contract farming relationships with mills facilitates knowledge transfer, adoption of better agronomic practices, and improved access to credit and inputs [60,61]. Some studies document improvements in household asset accumulation, education outcomes, and food security among palm growing smallholders [29,62].

At the same time, significant vulnerabilities persist. Smallholders often face insecure or poorly documented land tenure, which undermines their bargaining power and access to formal credit [63,64]. Many are highly exposed to price volatility and indebtedness, particularly when loans for replanting or inputs are tied to single buyer contracts [8,65]. Power asymmetries in value chains mean that mills and traders can exercise considerable control over grading, pricing, and payment terms, limiting smallholders' capacity to capture value from high international prices [42,56].

Certification initiatives such as RSPO, MSPO, and ISPO are frequently promoted as pathways to improving smallholder livelihoods while enhancing environmental performance[42,66]. Evidence, however, is mixed. Some studies find that certified smallholders benefit from better farm management, higher yields, improved record keeping, and, in some cases, modest price premiums or more stable market access [29,67]. Others report that high certification costs, complex auditing requirements, and limited technical support create barriers to entry, especially for independent smallholders, and that benefits are uneven or insufficient to offset compliance burdens [6,64]. Studies from regions such as Riau, Jambi, and the Peruvian Amazon highlight both positive and negative outcomes, emphasizing the importance

of context sensitive design, external support, and strong farmer organizations [6,31,42,61].

A key message from this literature is that smallholders are indispensable to any credible strategy for sustainable palm oil, yet current governance arrangements frequently place disproportionate burdens on them relative to their bargaining power and value capture [2,57]. Inclusive policy design, improved tenure security, accessible finance for replanting, and stronger smallholder organizations are identified as prerequisites for aligning rural development objectives with environmental safeguards [68,69].

Sustainability Governance

Sustainability governance in the palm oil sector operates through a complex architecture that combines private, multi-stakeholder certification schemes with national regulatory frameworks and emerging jurisdictional approaches [70]. The Roundtable on Sustainable Palm Oil (RSPO) remains the most prominent global scheme, setting voluntary standards for environmental and social performance and providing certification recognized by many international buyers. In response to both international pressure and domestic political considerations, Indonesia and Malaysia have developed their own national schemes—Indonesia Sustainable Palm Oil (ISPO) and Malaysian Sustainable Palm Oil (MSPO)—which are progressively being strengthened and, in Indonesia's case, made mandatory for different categories of producers [25,71].

Empirical assessments of these schemes reveal mixed effectiveness. RSPO certification has been associated with some reductions in deforestation risk within concession boundaries, improvements in transparency, and enhanced reputational benefits for certified firms [26,72,73]. Studies also suggest that RSPO can serve as a governance signal to global markets, particularly in Europe, where demand for "sustainable palm oil" has grown [74]. However, evidence of significant price premiums is inconsistent across regions and product segments, and certification has not universally translated into higher profitability or stronger livelihoods for growers [28,31,68].
National schemes such as ISPO and MSPO seek to embed sustainability standards within domestic regulatory frameworks, often aligning with national priorities of sovereignty, smallholder inclusion, and export competitiveness [25,75]. Yet these schemes face challenges in terms of enforcement capacity, clarity of criteria, and alignment with international expectations. Studies point to limited awareness among smallholders, insufficient technical support, and complex bureaucratic processes as major obstacles to widespread compliance [76,77]. In Indonesia, the transition to a more stringent, increasingly mandatory ISPO has raised concerns about smallholders' ability to meet requirements without substantial state or donor assistance [70,78].

A growing body of work examines jurisdictional and landscape-scale approaches, in which entire districts or provinces pursue sustainability commitments, often linked to zero-deforestation pledges and international finance [70]. These initiatives aim to reduce leakage (where deforestation shifts from certified to non-certified areas), strengthen multi-stakeholder coordination, and integrate land-use planning across sectors. However, they face significant implementation challenges, including coordination across levels of government, limited data and monitoring capacity, and divergent interests among local elites, companies, and communities [30,72,79].

Critical scholars question whether existing certification and governance schemes adequately address underlying power asymmetries in palm oil supply chains. RSPO has been criticized for privileging large, export-oriented companies and downstream actors, while smallholders and local communities often struggle to influence standard-setting processes or access meaningful remedies for grievances [21,80]. Similarly, tensions between RSPO and national schemes highlight deeper contestation over who defines "sustainability," and whether standards primarily reflect the priorities of Northern policymakers and consumers or the development needs of Southern producer states [22,23,81].

Table 1 Summarizes key Characteristics of the Main Sustainability Governance Instruments Discussed in the literature

Table 1: Selected Palm Oil Sustainability Governance Instruments

Instrument	Type and Scope	Main Strengths	Key Limitations for Smallholders
RSPO	Voluntary, multi stakeholder, global; applies to companies and smallholders supplying certified chains	Voluntary, multi stakeholder, global; applies to companies and smallholders supplying certified chains	High certification and compliance costs; complex procedures; limited, uncertain price premiums; governance dominated by large firms and Northern buyers [21,28]
ISPO	National standard for Indonesia; increasingly mandatory for companies and, progressively, smallholders	Aligns with national laws and sovereignty; potential to cover entire sector; can integrate with state support programs [25,82]	Limited enforcement capacity; low awareness among smallholders; bureaucratic processes; criteria sometimes weaker or less clear than RSPO; significant compliance burden without guaranteed market rewards [76,78]
MSPO	National standard for Malaysia; mandatory for growers and mills	National coverage; opportunity to standardize practices and support smallholders through government programs [71]	Similar challenges as ISPO: capacity constraints, uneven implementation, and limited differentiation in international markets compared to RSPO [71]
Jurisdictional Approaches	Landscape scale initiatives at district/province level; often linked to zero deforestation and climate finance	Potential to address leakage; integrate land use planning; involve multiple commodities and actors; attract international climate or conservation finance [26,70]	High coordination demands; complex monitoring; unclear benefit sharing for smallholders; dependence on long term external support [30,72]

Overall, the governance literature suggests that certification and related instruments can improve transparency and, in some cases, environmental performance, but they have not fundamentally transformed the political economy of palm oil [26,75]. Enforcement gaps, limited inclusivity, and persistent power asymmetries continue to constrain their effectiveness, particularly for smallholders and

marginalized communities. These tensions set the stage for the Discussion section, which explores how competing development and sustainability narratives are negotiated within this governance architecture and what this implies for future trajectories of palm oil in developing economies [20,47].

Discussion

Contradictions in Palm Oil Development Narratives

The reviewed literature reveals a persistent tension between narratives that celebrate palm oil as a vehicle for development and those that foreground its environmental and social externalities. On the one hand, empirical studies from Indonesia, Malaysia, and other producing countries document substantial contributions of crude palm oil to export earnings, GDP growth, employment creation, and rural income. Modeling exercises and micro level surveys alike show that palm oil can raise household incomes relative to alternative crops, support regional infrastructure development, and integrate smallholders into global value chains, particularly where supportive policies and institutional arrangements are in place. These findings underpin official and industry discourses that present palm oil as a driver of poverty reduction, rural modernization, and structural transformation in developing economies [83,84].

On the other hand, a robust body of research points to significant ecological and social costs associated with oil palm expansion. Large scale land use change has contributed to deforestation, biodiversity loss, and greenhouse gas emissions, with peatland conversion playing a particularly damaging role. Socially, expansion has often intersected with contested land tenure, inadequate recognition of customary rights, and conflicts over Free, Prior, and Informed Consent, as demonstrated by high profile cases such as the Tanah Merah project in Papua. These studies challenge simplistic portrayals of palm oil as an unambiguous development success, emphasizing that benefits and burdens are unevenly distributed across territories and social groups [85-87].

Importantly, the two sets of narratives are not merely parallel; they are structurally intertwined. The very processes that generate export revenue and rural employment—frontier expansion, capital-intensive plantations, and integration into global commodity chains—are also those that drive deforestation, emissions, and dispossession. Yet much of the literature treats economic and environmental outcomes as analytically separate. Development-oriented studies often focus on income and infrastructure indicators without fully accounting for long-term ecological costs. At the same time, environmental assessments sometimes bracket out the socio-economic rationales and livelihood dependencies underpinning expansion. This fragmentation obscures the full political-economy dynamics of palm oil, in which profitability and competitiveness are co-produced with externalized environmental and social harms [88].

Several contributions attempt to bridge this divide by modeling the macroeconomic and land-use consequences of palm oil expansion and of different policy scenarios. These studies show that the same export-oriented growth model that delivers short-term gains can also increase vulnerability to price volatility, international trade measures, and sustainability-linked market access restrictions. They highlight the risk of "Dutch disease," in which heavy reliance on a single, environmentally intensive commodity overshadows efforts toward broader industrial diversification. From this perspective, the contradiction is not simply between "development" and "environment," but between different development trajectories: one anchored in resource-intensive, export-led growth and another that seeks to integrate ecological limits and social equity considerations into long-term structural transformation [89,90].

Power, Value Chains, and Asymmetric Sustainability Governance

The contradictory outcomes of palm oil development are closely linked to power structures in global value chains and sustainability governance. Crude palm oil is embedded in complex transnational networks controlled by large agribusinesses, traders, and downstream consumer goods companies, many of which are headquartered in the Global North. These actors play a decisive role in setting purchasing requirements, shaping reputational risk, and defining what qualifies as "sustainable" palm oil for international markets. Producer country governments, local elites, and smallholders operate within these constraints, even as they seek to assert their own development priorities and regulatory authority [47,91].

Private, multi stakeholder certification schemes such as the Roundtable on Sustainable Palm Oil (RSPO) have become central instruments of sustainability governance. While formally open to multiple constituencies, decision making power within such forums tends to be skewed towards large firms, industry associations, and Northern NGOs. Standard-setting processes reflect compromises among commercial interests, conservation agendas, and reputational concerns, rather than straightforward expressions of producer-country development strategies. As a result, the criteria embedded in RSPO and similar schemes may reflect Northern preferences and risk perceptions, even when implemented in Southern landscapes and borne by Southern producers [92,93].

National schemes such as Indonesia Sustainable Palm Oil (ISPO) and Malaysian Sustainable Palm Oil (MSPO) have emerged in part as responses to these imbalances, aiming to reassert state control over sustainability definitions and align standards with domestic legal frameworks and development objectives. Yet these schemes operate in a structurally subordinate position vis à vis global buyers and regulators: while they can govern domestic practices and licensing, access to premium markets often still depends on compliance with RSPO or equivalent buyer requirements. Tensions between RSPO and national schemes—over criteria stringency, audit procedures, and mutual recognition—thus reflect underlying struggles over the authority to define and enforce sustainability in global palm oil chains [94,95].

Smallholders occupy an especially vulnerable position in this architecture. On paper, they are critical partners for achieving sustainable palm oil, given their large share of planted area and their centrality to rural development. In practice, however, they face high barriers to certification, including documentation requirements, audit costs, and the need for technical and organizational capacities that many cannot meet without substantial external support. Evidence on whether certification delivers meaningful price premiums, productivity gains, or improved bargaining power for smallholders is mixed, with many studies pointing to modest or highly uneven benefits. In effect, sustainability governance may impose additional compliance burdens on smallholders while leaving underlying value chain asymmetries largely intact [96-98].

From a critical political economy standpoint, these patterns raise concerns about "green upgrading" without redistribution.

Certification and related initiatives can improve transparency, encourage better practices among large producers, and provide assurance to downstream buyers and consumers. Yet they do not necessarily challenge the concentration of value and decision making power in the hands of multinational firms and financial actors. Instead, they risk reinforcing a model in which producer countries and smallholders must adapt to externally defined standards to retain market access. At the same time, the cost of adjustment is unevenly distributed along the chain [91,96,99].

North–South Contestations and Sustainability Nationalism

The palm oil controversy has increasingly taken on the character of a North–South political struggle over development models, environmental responsibility, and trade justice. In the European Union and other Northern markets, palm oil is often portrayed as emblematic of tropical deforestation and climate risk, prompting regulatory measures such as biofuel restrictions, deforestation linked due diligence, and corporate zero deforestation commitments. Producer country governments, in contrast, highlight the commodity's contributions to poverty reduction, rural livelihoods, and national revenue, and question what they see as selective and sometimes hypocritical environmental scrutiny [20,47,100].

This divergence has contributed to what some authors describe as "sustainability nationalism" in palm oil producing states. In Indonesia, for example, the promotion of biodiesel policies, mandatory blending requirements, and the strengthening of ISPO have been framed not only as climate or energy security measures but also as assertions of national sovereignty and resistance to perceived Western protectionism. Policy elites emphasize the right to leverage domestic natural resources for development, while accusing importers of imposing non tariff barriers under the guise of environmental concern. Malaysia has adopted similar rhetoric in defending palm oil against adverse campaigns and regulations, including legal challenges and diplomatic lobbying [101-103].

At the same time, producing countries are not monolithic. In Indonesia and Malaysia, there are diverse coalitions of actors—civil society organizations, local communities, reform-oriented bureaucrats, and parts of the private sector—who advocate for stronger environmental and social protections, better enforcement of existing rules, and more inclusive governance of land and resources. These domestic dynamics complicate simplistic narratives of North–South opposition, revealing internal contestations over who benefits from palm oil development and who bears its costs [20,104,105].

Internationally, initiatives such as the Council of Palm Oil Producing Countries (CPOPC) seek to coordinate producer country positions, engage with importing markets, and reshape global discourse around palm oil. They promote narratives that stress yield advantages, the potential of "sustainable palm oil" compared to other oils, and the developmental responsibilities of consuming countries. However, the effectiveness of such South–South coalitions remains constrained by differences in national interests, the structural power of global buyers and regulators, and the limited leverage of commodity exporters in an era of climate linked trade measures [104,106,107].

In this context, palm oil becomes a site where broader questions about climate justice, historical responsibility, and the distribution of mitigation burdens are negotiated. The challenge is to move beyond polarized narratives—"dirty palm oil" versus "Western bias"—towards frameworks that recognize both the genuine development needs of producing countries and the planetary boundaries within which those needs must be pursued [108-110].

Towards Integrated and Equitable Sustainability Pathways

The evidence reviewed suggests that neither uncritical promotion of palm oil nor simple calls for divestment or bans provide adequate guidance for policy. A more promising approach lies in the design of integrated, multi level governance arrangements that explicitly confront trade offs and seek to realign incentives, power relations, and information flows along the palm oil value chain [73,106,111,112].

At the landscape level, jurisdictional approaches offer one avenue for reconciling production and conservation by coordinating land use planning, monitoring, and enforcement across multiple commodities and actors. When combined with credible data, transparent processes, and meaningful participation by local communities and smallholders, such approaches can reduce leakage, clarify responsibilities, and provide a framework for aligning different sustainability standards. However, their success depends on long term political commitment, adequate administrative capacity, and stable funding mechanisms, which are not guaranteed [113-115].

At the farm and supply chain level, targeted support for smallholders is essential. This includes secure land tenure, accessible finance for replanting and yield improvement, tailored extension services, and cooperative structures capable of aggregating volumes and managing certification processes. Rather than treating certification as a purely private, market driven instrument, public policies and donor programs can help socialize some of the costs of transition and ensure that smallholders share in the benefits of sustainability upgrading. Where possible, conditional support could be linked to verifiable improvements in environmental performance and labor conditions, thereby aligning development assistance with climate and biodiversity goals [33,116,117].

At the global level, greater coherence between demand side regulations in importing countries and supply side governance in producing countries is needed. Emerging deforestation-linked trade measures and due diligence requirements risk marginalizing poorer producers if they are not accompanied by mechanisms for technical and financial support, as well as recognition of credible domestic schemes. Mutual recognition frameworks, collaborative standard setting, and shared investments in traceability and monitoring infrastructure could help reduce duplication and enhance trust across jurisdictions [118-120].

Finally, addressing the structural political economy drivers of unsustainable palm oil requires confronting the distribution of value and risk along the value chain. This entails transparency on profit margins and cost structures, scrutiny of buyers' purchasing practices, and exploration of instruments—such as floor prices, long-term contracts, or benefit-sharing agreements—that could provide more stable and equitable conditions for producers. Without such measures, sustainability initiatives risk becoming technocratic add ons that leave core power asymmetries intact [121-123].

Conclusion

This article has examined crude palm oil's role in developing economies through a critical review of literature on economic development, environmental impacts, smallholder livelihoods, and sustainability governance. The evidence confirms that palm oil has served as a powerful engine of development in countries

such as Indonesia and Malaysia, contributing significantly to GDP, export earnings, employment, and rural infrastructure. At the same time, it has driven deforestation, biodiversity loss, greenhouse gas emissions, and social conflicts over land and rights, particularly in frontier regions and peatland areas. These outcomes are not incidental; they are structurally linked via the same processes of frontier expansion, capital intensive plantation development, and integration into global value chains.

The review has highlighted three interrelated insights. First, conventional analyses often separate economic benefits from environmental and social harms, thereby obscuring the full political economy of palm oil. A more integrated perspective reveals that export-oriented growth based on palm oil may generate short-term gains while simultaneously increasing vulnerability to commodity price volatility, trade restrictions, and long-term ecological degradation. Second, sustainability governance—through private certification, national standards, and emerging jurisdictional approaches—has made some progress in improving transparency and limiting deforestation, but has not fundamentally altered underlying power asymmetries in global palm oil chains. Smallholders, in particular, remain subject to high compliance burdens and precarious market conditions, even as they are rhetorically positioned as key partners in sustainable palm oil. Third, debates around palm oil are increasingly embedded in North–South contestations over development rights, environmental responsibility, and trade justice, giving rise to forms of sustainability nationalism and South–South coordination that coexist with, and sometimes challenge, Northern driven standards and regulations.

These findings carry several implications for policy and research. For policy, efforts to make palm oil more sustainable must go beyond technical fixes and certification checklists. They should address structural issues such as land tenure, smallholder access to finance and extension, enforcement capacity, and the distribution of value and risk along the chain. Producer country governments and their partners can pursue integrated landscape approaches, reformed national certification schemes, and targeted smallholder support programs that align development and environmental objectives. Importing countries, meanwhile, should design demand side regulations that recognize credible domestic efforts, avoid unintended exclusion of poorer producers, and include provisions for financial and technical assistance.

For research, there is a need for more interdisciplinary work that combines political economy analysis, spatial data, and micro-level livelihood studies to better understand how different governance arrangements play out across scales and social groups. Longitudinal studies of certified and non certified smallholders, comparative analyses of national schemes and RSPO, and evaluations of jurisdictional initiatives can shed light on what combinations of instruments are most effective and equitable in different contexts. Further attention should also be given to the role of financial actors, consumption patterns, and alternative development strategies that could reduce structural dependence on a single, ecologically intensive commodity.

Ultimately, the challenge is not simply to make palm oil "less bad," but to situate it within broader debates about how developing economies can pursue prosperity within planetary boundaries and amid uneven global power relations. Crude palm oil will likely remain an important part of the development landscape in many tropical countries. The task for scholars and policymakers is to ensure that its governance evolves in ways that genuinely reconcile economic inclusion with ecological integrity and social justice, rather than reproducing a model in which the costs of sustainability are disproportionately borne by those least able to pay.

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