

From Mandatory Certification to Value-Chain Governance: ISPO and the Transformation of Oil Palm Sustainability in Indonesia

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Submitted: 08 October 2026

Accepted: 15 October 2026

Published: 22 October 2026

Citation: Judijanto, L. (2026). From Mandatory Certification To Value-Chain Governance: ISPO and the Transformation of Oil Palm Sustainability in Indonesia. *Annals of Environmental Science and Natural Resources*, 1(5). 01-15.

Abstract

Indonesia has progressively transformed the Indonesian Sustainable Palm Oil (ISPO) system from a plantation-oriented mandatory certification instrument into a broader governance framework for sustainable palm-oil value chains. This qualitative literature review critically examines how that institutional evolution may contribute to environmental protection, smallholder inclusion, socio-economic development, supply-chain accountability, and international sustainability legitimacy. Rather than treating certification coverage as equivalent to sustainability performance, the review distinguishes formal compliance from substantive additionality. The literature indicates that certification can improve agronomic practices, organizational capacity, conservation safeguards, and selected socioeconomic outcomes, but effects vary substantially according to land legality, farmer organization, livelihood structures, market incentives, enforcement capacity, and landscape context. Independent smallholders remain particularly vulnerable to exclusion because certification presupposes capabilities that many farmers do not possess, including secure documentation, collective organization, finance, technical knowledge, and traceability.

Environmental evidence similarly suggests that certification is potentially beneficial but cannot substitute for effective land-use governance, peat protection, fire prevention, biodiversity conservation, and credible monitoring. Indonesia's 2025 ISPO reform creates an opportunity to move beyond plantation-level compliance toward integrated value-chain governance encompassing downstream processing and bioenergy. The review concludes that ISPO's future credibility will depend on transforming mandatory certification into an adaptive system that combines credible assurance, smallholder support, digital traceability, jurisdictional governance, measurable environmental additionality, social safeguards, and market interoperability.

Key Words: Indonesian Sustainable Palm Oil, ISPO, Palm Oil Sustainability, Sustainability Certification, Smallholders, Environmental Governance, Supply-Chain Governance, Deforestation, Sustainable Agriculture, Indonesia.

JEL Classification: Q18; Q15; Q56; Q57; F18

Introduction

Palm oil occupies an unusually complex position in contemporary sustainable-development debates. It is simultaneously a highly productive vegetable oil, an important source of rural income and employment, a major component of industrial and energy value chains, and a commodity associated with forest conversion, peat degradation, biodiversity loss, greenhouse-gas emissions, land conflicts, and distributional inequality. This combination explains why palm oil cannot be adequately assessed through either a purely economic-development narrative or an exclusively environmental narrative. Sustainability governance must instead recognize the simultaneous production, live-

lihood, ecological, institutional, and political dimensions of the sector [1-3].

Indonesia is central to this debate because the country's palm-oil economy connects large corporate estates, state enterprises, organized outgrowers, independent smallholders, mills, refiners, oleochemical industries, food manufacturers, exporters, and increasingly important bioenergy markets. Oil-palm cultivation has generated measurable benefits for many farming households, including higher consumption, human-capital formation, improved dietary quality, and opportunities for structural transformation. Yet these gains coexist with differentiated land-use

impacts and uneven distribution of benefits within households and communities [4-7].

The environmental debate is equally multidimensional. Historical oil-palm expansion has intersected with forest loss and carbon-rich ecosystems, while fire and peat degradation can generate environmental externalities that extend far beyond plantation boundaries. Satellite-based research, landscape studies, and biodiversity assessments demonstrate that the sustainability challenge therefore involves not only production practices within plantations but also the location of expansion, conservation of remaining natural habitat, protection of riparian and high-conservation-value areas, management of peatlands, and the political economy of land-use licensing [8-11].

Against this background, sustainability certification has emerged as one of the most prominent governance responses. Internationally, the Roundtable on Sustainable Palm Oil (RSPO) became an influential voluntary private-governance mechanism. Indonesia subsequently developed the Indonesian Sustainable Palm Oil system, or ISPO, as a nationally grounded and mandatory approach intended to align palm-oil production with domestic laws and sustainability principles. The resulting governance landscape has never been a simple competition between public ISPO and private RSPO. Instead, both systems coexist with corporate no-deforestation commitments, jurisdictional initiatives, buyer requirements, environmental regulation, land administration, financial institutions, civil-society advocacy, and subnational governments [12-14].

The institutional meaning of ISPO has also changed over time. Early debates focused strongly on whether a mandatory national standard could provide credibility comparable with transnational certification and whether the state possessed sufficient administrative capacity to enforce sustainability requirements. More recent scholarship emphasizes historical institutional development, governance fragmentation, legal inconsistencies, and the importance of embedding certification within broader public institutions rather than considering certification as an isolated technical intervention [15, 16].

A particularly important transition occurred with Presidential Regulation No. 16 of 2025. The regulation replaced Presidential Regulation No. 44 of 2020 and conceptualized ISPO as a system encompassing not only oil-palm plantation businesses but also downstream palm-oil industries and palm-oil bioenergy. This expansion was followed by implementing regulations for plantations and downstream industry, creating the basis for a transition from predominantly plantation-level certification toward a more integrated approach to sustainability across the value chain [17-19].

This development changes the appropriate research question. The central issue is no longer simply whether Indonesian plantations obtain ISPO certificates. It is whether mandatory certification can become a credible institutional mechanism capable of producing environmental and social outcomes that would not

otherwise occur. The distinction is crucial because certification is an institutional output, whereas lower deforestation, improved biodiversity protection, reduced fire risk, higher productivity, stronger smallholder livelihoods, greater gender equity, better conflict resolution, and transparent supply chains are sustainability outcomes.

Evidence from voluntary certification illustrates why this distinction matters. Certification may be associated with conservation set-asides, lower greenhouse-gas emissions, organizational learning, or context-specific reductions in poverty, yet these outcomes are neither universal nor automatic. Baseline livelihood conditions, land history, organizational capacity, geographical context, enforcement, and farmer resources shape the magnitude and distribution of benefits [20-22].

The same insight is particularly important for independent smallholders. Farmers can face high certification costs, unclear land documentation, insufficient extension support, weak organizations, limited access to high-quality planting material, low bargaining power, and difficulties meeting administrative requirements. Such barriers mean that a formally universal standard can produce unequal practical access unless compliance is accompanied by capacity-building, financing, legal facilitation, and organizational support [23-26].

This article therefore conducts a qualitative literature review of ISPO and the broader development of palm-oil sustainability governance in Indonesia. It addresses seven interrelated questions: how ISPO has evolved institutionally; how certification can affect environmental performance; what economic and social consequences are associated with sustainability governance; why smallholders face persistent barriers; how ISPO interacts with private and jurisdictional governance; what value-chain expansion means for traceability and market legitimacy; and what reforms are required to translate mandatory compliance into substantive sustainability outcomes. The contribution of the review is threefold. First, it evaluates ISPO through the concept of sustainability additionality rather than certification coverage alone. Second, it positions smallholder inclusion as a core test of institutional effectiveness rather than a secondary implementation problem. Third, it interprets the post-2025 framework as a potential transition from plantation certification toward integrated value-chain governance, thereby providing a contemporary basis for understanding the future role of ISPO in Indonesian sustainable development.

Literature Review

Sustainability Certification as a Governance Institution

Sustainability certification seeks to convert broad environmental and social objectives into operational principles, criteria, auditing procedures, and conformity decisions. Conceptually, however, a certification scheme can serve several functions simultaneously: it may provide information to markets, establish minimum behavior, facilitate learning, impose accountability, coordinate actors, or signal legitimacy. These functions become particularly complicated in palm oil because the sector combines

transnational markets with territorially embedded questions of land tenure, environmental regulation, local political authority, and rural livelihoods.

Private certification and public regulation should therefore not be understood as mutually exclusive alternatives. shows that relations between ISPO and RSPO have evolved through interaction rather than stable separation, while emphasize tensions involving governance rescaling, state transformation, and institutional incoherence. These findings suggest that ISPO is simultaneously a sustainability instrument, an assertion of public regulatory authority, and a response to international sustainability expectations. Private governance also generates its own contradictions. Corporate sustainability commitments can advance ambitious environmental targets, but implementation creates tensions between commercial competitiveness, supplier inclusion, social goals, and environmental performance. Describe these tensions as paradoxes of goal-based private governance, while demonstrate that Indonesian companies have had to navigate between corporate zero-deforestation commitments and state preferences regarding how sustainability should be governed [27].

ISPO consequently operates within a polycentric governance environment. National ministries, subnational governments, certification bodies, producers, mills, traders, buyers, NGOs, financial organizations, private standards, and local communities exercise overlapping authority. Jurisdictional initiatives represent one response to this fragmentation by attempting to coordinate interventions at landscape or administrative scales rather than limiting sustainability to individual certified supply chains [28].

Historical Institutional Development of ISPO

The emergence of ISPO reflects Indonesia's longer institutional history of plantation development, state-led modernization, international market integration, decentralization, and environmental regulation. Historical-institutional analysis demonstrates that sustainability policies are layered upon earlier arrangements rather than designed on an institutional blank slate. Existing land allocations, plantation licensing systems, state-business relations, local government authority, smallholder development schemes, and historical patterns of agrarian change continue to influence contemporary outcomes.

This path dependence helps explain why certification requirements can appear coherent at the national-policy level yet become difficult to implement locally. Identify structural barriers and governance gaps that can create what they describe as hollow governance, in which formal sustainability expectations are weakened by contradictory or incomplete institutional arrangements. Similarly show that improved spatial information can make illegal plantation development more visible without automatically resolving the political dilemma of what governments should do once historically accumulated illegality is identified [29].

Land-use governance is also shaped by power. Research in Riau

shows that formal institutions operate alongside actor networks and site-level power relations, meaning that sustainability reforms must address not only rules but also who can influence how those rules are interpreted and enforced. Evidence on land conflicts further suggests that institutional weaknesses can leave communities with limited effective pathways for resolving grievances against plantation companies [30, 31].

Smallholder Certification and Institutional Capacity

Independent smallholders constitute one of the most important tests of sustainability certification. Unlike integrated corporate plantations, many small farmers do not possess dedicated compliance departments, mapping systems, internal control mechanisms, legal specialists, or financial reserves for auditing. Certification can therefore create fixed costs that are proportionally much larger for small producers. A recent multi-province assessment likewise shows that smallholder sustainability remains constrained by managerial, institutional, technological, environmental, and economic capacity gaps, reinforcing the need for differentiated support rather than a uniform compliance pathway [32, 33].

Research consistently identifies land legality and documentation as major bottlenecks. demonstrate that farmers historically excluded from government development schemes and extension programs face disproportionate disadvantages in obtaining certification. similarly find that previously organized or scheme-associated farmers often enter certification with advantages in land documentation and group organization that genuinely independent farmers do not possess.

External facilitation is consequently critical. show that NGO support played an important role in enabling independent smallholders to obtain and maintain voluntary certification [34]. further argue that certification requirements can fail when they insufficiently incorporate the micro-level realities and priorities of farmers. Suggest that farmer-field-school approaches may generate stronger economic returns than conventional extension when sustainability practices require learning and behavioral change. Collective organization can reduce some barriers, but it does not eliminate them [35]. Demonstrate that economies of scale can lower certification costs when larger groups of farmers share organizational and audit expenses [36]. Drawing on long-term experience from the Ophir smallholder system, show that farmer organizations can support replanting and resilience, yet the persistence of effective collective action depends on broader institutional support [37].

The economic design of certification therefore matters. find that training and financial incentives influence smallholder willingness to adopt certification, while highlight the importance of evaluating whether expected benefits justify farmers' certification costs. These findings imply that mandatory certification without appropriately designed public support risks producing formal obligations that exceed the capacities of the intended participants. Adoption studies further indicate that institutional conditions and perceived certification incentives shape pro-

ducer participation [38]. Recent evidence from Riau similarly concludes that accelerated ISPO uptake requires bureaucratic reform, mobilization of human and financial resources, and credible incentives for smallholders [39].

Productivity, Replanting and Sustainable Intensification

Smallholder productivity is central to the sustainability debate because low yields can reduce farm income while increasing pressure for area expansion. Yet the relationship between productivity and land conservation is not straightforward. show that greater technical efficiency can interact with incentives for farmland expansion, highlighting potential rebound effects that complicate simplistic assumptions about land sparing [40]. Climate-smart intensification nevertheless remains an important strategy when combined with land-use safeguards. Demonstrate substantial scope for increasing yields through improved management without necessarily relying on further expansion [41]. At the farm level, show that highly intensive input use does not automatically maximize economic performance, emphasizing the need for context-specific recommendations that combine agronomic and economic criteria [42]. Recent panel evidence from independent smallholders in Jambi also shows that adoption of nature-based land-management practices is uneven and that such practices do not automatically generate yield gains, underscoring the importance of context-specific agronomic recommendations [43].

Replanting is particularly important because large areas of smallholder plantations are aging. identify finance, knowledge, high-quality seedlings, and access to public support as major replanting constraints [44]. Find that the design of subsidies influences smallholder willingness to participate in replanting programs and can potentially be linked to biodiversity-enhancing practices [45]. further emphasize resilience to future industry challenges, reinforcing the need to treat productivity renewal, market risk, climate adaptation, and sustainability as interconnected rather than separate agendas.

Environmental Additionality

The environmental legitimacy of certification ultimately depends on whether it contributes to ecological outcomes. Oil-palm expansion has historically been associated with forest conversion, while spatial research demonstrates that expansion into carbon-rich forests creates substantial carbon losses. Political incentives and commodity-market dynamics can also shape deforestation, indicating that plantation-level standards operate within broader political-economic systems.

Certification can nevertheless improve environmental management under certain conditions. find lower greenhouse-gas emissions in certified production than in non-certified production, partly because certified systems can combine higher yields, conservation measures, and improved management of palm-oil mill effluent. Demonstrate that conservation set-asides within certified plantation landscapes can support carbon storage and associated plant diversity, while show that appropriately designed set-asides can enhance the ecological value of oil-palm

landscapes [46]. The benefits should not be overstated. Stress the need to place palm oil's environmental impacts in comparative and contextual perspective, while argue that certification may overlook historical habitat loss when sustainability is evaluated only after plantation establishment [47]. Also show that plantation replanting can significantly alter arthropod communities, illustrating that ecological management is required throughout the plantation life cycle [48].

Peatlands and fires present additional challenges. find that fire in agricultural peatlands can sharply increase greenhouse-gas emissions and alter soil properties. demonstrate that fire prevalence in Kalimantan reflects interactions among climate, land type, industrial land use, and village livelihoods, while show the disproportionate importance of peatland emissions during severe fire seasons. These findings imply that meaningful ISPO environmental performance must be integrated with landscape-level fire and peat governance rather than restricted to audit checklists [49, 50].

Restoration also creates livelihood dilemmas. Show that peatland rewetting can affect smallholder production systems, making local acceptance and livelihood implications central to environmental intervention design. Sustainability governance is therefore strongest when environmental safeguards are paired with viable livelihood transitions instead of assuming that ecological compliance can be imposed without distributive consequences [51].

Social Sustainability, Livelihoods and Equity

Oil palm has contributed to improved welfare for many Indonesian smallholders. Report positive effects on household living standards and reduced exposure to economic risk, partly because oil palm's labor-saving characteristics allow participation in off-farm activities. find improvements in nutrition, educational expenditure, asset ownership, and other dimensions of human-capital formation among adopting households. At a broader structural level, oil palm has contributed to changes in agricultural labor allocation and farm size. Interpret these changes as part of agricultural structural transformation, while find positive effects on certain private goods without equivalent improvements in many community goods. Economic gains at household level therefore do not guarantee broader territorial development.

Certification itself can have differentiated social effects. find that sustainability certification was associated with reduced poverty in villages characterized by market-oriented livelihoods but not in the same way in more subsistence-oriented settings. This indicates that socioeconomic outcomes depend on baseline livelihood configurations and that certification may require complementary development policies. Gender further complicates the picture. show that oil-palm adoption can improve dietary quality while simultaneously changing gendered labor patterns. find that reduced female farm labor can coexist with lower involvement in income-generating decisions, while identify context-specific pressures on women's time use [52]. A credible interpretation of sustainable palm oil must therefore move beyond household

income and examine intra-household agency, unpaid work, decision-making power, and distribution of benefits.

Social legitimacy also depends on land rights and conflict resolution. show that local responses to oil-palm expansion depend not simply on economic vulnerability but also on community embeddedness, expectations, and relationships with land [53]. further demonstrate that many palm-oil conflicts are not resolved effectively through formal mechanisms. Certification systems that verify compliance without providing meaningful grievance pathways therefore risk reproducing formal legality without substantive social legitimacy.

Method

This study employs a qualitative literature review (QLR) and explicitly does not use a systematic literature review or meta-analytic design. The purpose is interpretive synthesis: to identify recurring explanations, contradictions, institutional mechanisms, and thematic relationships across contemporary research concerning ISPO, palm-oil certification, smallholder sustainability, environmental outcomes, and value-chain governance. The method is appropriate because the research questions concern institutional transformation and interacting environmental, economic, political, and social mechanisms that cannot be meaningfully reduced to a single homogeneous effect size. The review prioritizes peer reviewed journal literature published from 2020 to 2026. Earlier scholarship is acknowledged conceptually only where necessary to understand institutional development, while the evidentiary synthesis is anchored in recent studies. The thematic search domain includes combinations of the concepts ISPO, Indonesian Sustainable Palm Oil, palm oil certification, smallholder certification, oil palm Indonesia, deforestation, peatland, fire, biodiversity, livelihoods, gender, land tenure, replanting, jurisdictional governance, traceability, and sustainable value chains.

Sources were evaluated according to substantive relevance, clarity of method, publication quality, and contribution to the review questions. Particular analytical weight was assigned to empirical studies employing panel data, counterfactual designs, spatial analysis, field-based mixed methods, longitudinal institutional analysis, and detailed qualitative governance research. The review also deliberately incorporates studies with contrasting findings in order to avoid constructing sustainability as an artificial consensus. The analytical process combined deductive and inductive thematic coding. Deductive categories were derived from the Stage-1 framework: institutional evolution, certification credibility, smallholder implementation, productivity and replanting, environmental performance, social sustainability, public-private interaction, jurisdictional governance, and value-chain transformation. Inductive interpretation was used

when the literature revealed cross-cutting themes such as historical illegality, distributional consequences, organizational dependence, rebound effects, or tensions between national sovereignty and international market legitimacy. Primary regulations were used to interpret contemporary institutional change but were not counted toward the minimum number of peer-reviewed journal references. Presidential Regulation No. 16 of 2025, Minister of Agriculture Regulation No. 33 of 2025, and Minister of Industry Regulation No. 38 of 2025 are therefore treated as legal-context documents rather than academic evidence.

The method does not claim exhaustive database coverage, PRISMA compliance, or statistical representativeness. This is intentional rather than a methodological deficiency. The objective is to generate a theoretically informed and policy-relevant synthesis that explains how ISPO's institutional architecture can—or cannot—translate certification requirements into substantive sustainability outcomes.

Results: Thematic Findings

Theme 1: ISPO Is Evolving from Certification Toward Sustainability Governance

The literature consistently suggests that ISPO should not be viewed simply as an Indonesian equivalent of a private ecolabel. Its institutional character is rooted in state regulation, national legal requirements, and the political objective of retaining public authority over sustainability governance. Show that ISPO emerged within a contested relationship between domestic state authority and transnational private governance, while demonstrate that current arrangements reflect decades of institutional layering and path dependence. The implication is that ISPO's strength and weakness both arise from its public character. Mandatory status potentially provides far broader jurisdictional reach than voluntary certification, but formal reach has limited value where land administration, subnational implementation, monitoring, extension, and enforcement remain fragmented. demonstrate that institutional gaps can hollow out the practical effectiveness of formally ambitious rules.

The post-2025 reform substantially raises the stakes because ISPO now extends beyond plantations into downstream industry and bioenergy. This expansion could reduce the conceptual separation between production-site compliance and supply-chain sustainability. It could also create new implementation complexity if different ministries, certification bodies, databases, and supply-chain actors are not interoperable.

The evolution is summarized in Figure 1. The figure highlights how the governance scope progressively broadens from plantation-level legality and certification toward downstream integration, traceability, and market accountability.

Figure 1. Evolution of the Indonesian Sustainable Palm Oil (ISPO) System

From Mandatory Certification to Value-Chain Governance



Figure 1. Evolution of ISPO from plantation compliance to value-chain sustainability governance

Figure 1 illustrates that the most important analytical transition is not simply a revision of certification criteria but a change in the scale of governance. Earlier implementation concentrated on whether plantation enterprises complied with national sustainability principles, whereas the emerging framework increasingly asks whether sustainability can be demonstrated across interconnected production and processing systems. The credibility of this transition will depend on whether chain-wide expansion strengthens measurable outcomes rather than merely increasing the number of regulated organizational units.

Theme 2: The Smallholder Problem Is Primarily Institutional, Not Attitudinal

The literature does not support a simple interpretation that low certification uptake among independent smallholders reflects farmer unwillingness. Rather, farmers often confront structural barriers that precede the certification audit itself. Collectively show that land documentation, access to training, organizational history, financial incentives, and prior inclusion in development programs strongly shape certification readiness.

Certification thus contains a hidden prerequisite problem. The standard may formally apply to all farmers, but only farmers possessing certain legal, organizational, technical, and financial assets can realistically demonstrate compliance. show that external facilitation often compensates for missing institutional capacity, while demonstrate that learning within certified value chains can be constrained when farmers have weak incentives or limited opportunities to internalize new practices [54]. Cost is only one element of this barrier structure. question whether the economic case for smallholder certification is sufficiently attractive without external support, whereas show that collective scale can reduce per-farmer certification costs. add that learning-intensive interventions, such as farmer field schools, may produce stronger benefits than conventional information campaigns.

Figure 2 synthesizes the sequential capabilities that independent smallholders need before certification can become realistically attainable. It clarifies that formal conformity assessment should be preceded by secure tenure, legal documentation, collective organization, technical capacity, financing, and traceability support.

Figure 2. The Smallholder ISPO Capability Bottleneck

Certification is the end of a capability-building pathway, not the beginning



Figure 2. The smallholder ISPO capability bottleneck

Figure 2 shows why certification should be interpreted as the end of a capability-building sequence rather than its beginning. When land legality, organization, finance, and extension are unresolved, an audit-centered policy treats symptoms rather than causes. Smallholder inclusion therefore requires a pre-certification development architecture that resolves foundational constraints before formal conformity assessment takes place.

Theme 3: Productivity Improvement Is Necessary but Not Sufficient for Sustainability

Evidence strongly supports improving smallholder productivity, but it also cautions against assuming that higher yields automatically reduce land pressure. Show considerable potential for climate-smart intensification, whereas demonstrate that optimal smallholder performance requires attention to profitability rather than simply maximizing inputs. However, identify the possibility that improvements in technical efficiency can be associated with area expansion when economic incentives encourage reinvestment in additional land.

This creates a critical policy distinction between productivity intensification and land-sparing intensification. ISPO can support the latter only when agronomic improvement is linked to credible restrictions on forest and peat conversion, land-use plan-

ning, and traceability. Otherwise, higher farm profitability could increase rather than decrease incentives for expansion. This logic is consistent with policy proposals that pair productivity improvement with land-use reform and explicit deforestation safeguards rather than treating intensification as a stand-alone conservation mechanism [55].

Replanting provides an opportunity to align these objectives. Show that replanting constraints include knowledge, financing, and access to quality planting material. Find that well-designed subsidies can increase willingness to replant and may be combined with biodiversity-enhancing land-management choices. Emphasize that farmer organizations can support long-term resilience, while demonstrate the importance of strengthening farmer capacity to respond to market, climatic, and production risks [56].

Theme 4: Environmental Benefits Depend on Additionality and Landscape Context

The environmental literature reveals both the potential and limits of certification. Provide evidence that certified palm oil can have lower greenhouse-gas emissions than non-certified production, while demonstrate that conservation set-asides can increase carbon storage and support plant diversity. Further show that the

configuration of set-asides matters for ecological value.

Yet certification cannot erase the environmental consequences of where plantations were originally developed. raise precisely this concern by showing that some subsequently certified plantations occupy landscapes that had previously contained important forest and wildlife habitat. likewise demonstrate that oil-palm expansion into carbon-rich forests creates significant biomass carbon losses.

Environmental credibility therefore requires both contemporaneous compliance and historical-spatial awareness. Certification systems need reliable geolocation, land-cover history, transparent boundaries, and mechanisms for addressing conversion risks. Technologies for plantation mapping and high-resolution monitoring increasingly make this possible, as demonstrated by and emerging farm-level monitoring approaches such as those explored by [57].

Fire and peatlands reinforce the need for landscape governance. show that fire in oil-palm-associated peat systems can elevate greenhouse-gas emissions, while demonstrate that fire occurrence reflects interacting climatic, livelihood, and land-use drivers. show the importance of peatland combustion for particulate emissions during severe fire years. ISPO environmental performance must therefore connect individual certification with hydrological units, fire-prevention institutions, neighboring land users, and regional land management.

Restoration has to address distributional consequences. Demonstrate that peatland rewetting interventions can alter smallholder livelihood opportunities and that farmer perceptions matter for implementation. Environmental additionality will therefore be more durable when ecological requirements are paired with compensation, alternative livelihoods, technical adaptation, and participatory planning.

Theme 5: Socioeconomic Benefits Are Real but Unevenly Distributed

The literature strongly rejects the idea that palm oil is either uniformly beneficial or uniformly harmful to rural development. Find gains in household welfare and reduced downside economic risk, while identify improvements in nutrition, education, and living standards. Further show that oil palm contributes to structural transformation by changing labor requirements and farm organization. However, these gains are not equivalent to comprehensive social sustainability. Show that greater private welfare does not automatically produce equivalent improvements in community goods. find that certification-related poverty outcomes depend on local livelihood structures, demonstrating that the same sustainability instrument can generate different effects across villages. Gendered outcomes reinforce this conclusion. show that oil palm's lower labor requirements for women can reduce agricultural workload while potentially weakening women's role in farm management and income control. Find other contexts in which oil-palm transitions increase women's time pressures. similarly demonstrate that welfare gains and changes

in gendered labor allocation can occur simultaneously [58].

A credible ISPO social pillar should therefore measure more than average income. Relevant outcomes include participation, occupational safety, land rights, grievance mechanisms, women's decision-making power, unpaid work, labor conditions, community infrastructure, and distribution of benefits. Sustainability certification that improves plantation management while leaving structural social grievances unresolved will remain only partially legitimate.

Theme 6: Land Legality and Political Economy Remain Core Constraints

Certification depends fundamentally on legality, yet land legality itself is often historically complex. show that spatial transparency can reveal illegal plantation development but also generate difficult policy choices concerning legalization, environmental protection, and differentiated treatment of companies and smallholders. Demonstrate that site-level actor networks shape control over land, while identify political incentives that influence deforestation dynamics. Land conflict further limits the credibility of a purely documentation-based approach. find that many communities struggle to obtain effective remedies in palm-oil conflicts. Show that community decisions about accepting plantation development reflect long-term social embeddedness and perceptions of future benefits, not merely short-term economic need.

These findings suggest that ISPO should distinguish between administrative legalization and substantive legitimacy. A plantation can possess documentation while remaining embedded in unresolved community conflict, just as a smallholder may lack perfect documentation despite long-standing legitimate occupation. A mature certification system therefore requires legal verification to be connected with conflict resolution, participatory mapping, transparent grievance processes, and differentiated approaches to historical irregularities.

Theme 7: ISPO Functions within a Polycentric Governance System

One of the clearest findings is that no single certification system governs the palm-oil sector. ISPO coexists with RSPO, corporate sustainability commitments, financial criteria, jurisdictional initiatives, environmental regulation, trade requirements, civil-society monitoring, and buyer due diligence. therefore, provides a more useful analytical starting point than a simple ISPO-versus-RSPO comparison: the key issue is how public and private governance interact. Corporate commitments can extend beyond legal minimums, but they may also create fragmented requirements. Show that goal-based private sustainability governance can generate organizational and performance paradoxes. Further demonstrate that companies adapt private sustainability strategies in response to state authority, reinforcing the point that public and private systems are politically interdependent.

Jurisdictional governance offers a potential bridge. Show that jurisdictional initiatives can build coalitions, mobilize resources,

and align market and policy interventions, although results depend heavily on local political and institutional conditions. For ISPO, this suggests that district- or province-level implementation platforms may help solve problems—such as smallholder registration, spatial legality, fire prevention, and extension—that cannot be efficiently addressed farm by farm. More recent systems-based work similarly suggests that locally led jurisdictional approaches can align certification, smallholder intensifi-

cation, deforestation reduction, and market requirements when multi-stakeholder coordination is sufficiently strong [59]. Figure 3 maps the institutional relationships through which ISPO operates within a polycentric palm oil governance system. The diagram emphasizes that national regulation, subnational government, producers, downstream industries, private standards, certification bodies, finance, and markets must interact coherently if sustainability performance is to improve.

Figure 3. Polycentric Architecture for Sustainable Palm-Oil Governance



Figure 3. Polycentric architecture for sustainable palm-oil governance

Figure 3 emphasizes that sustainability performance is produced through interaction among institutions rather than by one standard acting alone. The central policy challenge is interoperability: legal requirements, audit systems, traceability data, farmer-support programs, private commitments, and jurisdictional monitoring need to reinforce rather than duplicate or contradict each other. ISPO's mandatory national reach provides a potential coordinating backbone, but only if the system is open to institutional learning and credible external scrutiny.

Theme 8: The Post-2025 Value-Chain Expansion Creates Both Opportunity and Risk

The expansion of ISPO into downstream processing and bioenergy represents a potentially transformative development. Upstream plantation sustainability alone cannot guarantee the sustainability of a product if chain-of-custody information becomes fragmented after fresh fruit bunches enter mills and downstream processing. Conversely, downstream certification is weak if upstream origin and land-use performance cannot be traced. This

transition creates an opportunity to link production legality, processing, supply-chain documentation, and market claims. It may also improve the institutional basis for demonstrating sustainability to increasingly demanding domestic and international buyers. However, complexity increases as chain-of-custody systems incorporate multiple intermediaries, mills, refiners, derivative products, and bioenergy pathways. Demonstrate the importance of analyzing palm oil through value-chain dynamics because production, income, conservation, trade, and policy interact across different stages of the sector. Certification that moves downstream should therefore avoid reproducing a fragmented sequence of separate audits. The strategic objective should be interoperable traceability capable of linking products back to verified production units and jurisdictional environmental information.

Discussion and Analysis

From Certification Coverage to Sustainability Additionality

The first research question concerned how ISPO has evolved

from plantation certification toward national sustainability governance. The evidence indicates that this evolution is both institutional and conceptual. Historically, ISPO served as a mechanism for integrating Indonesian legal requirements with sustainability criteria, but its effectiveness was constrained by the same administrative fragmentation, land problems, and capacity limitations that affected the underlying regulatory system.

The post-2025 framework potentially changes this logic by extending certification across the value chain. This creates an opportunity to move away from interpreting sustainability as a collection of plantation-level documents and toward a system in which legality, environmental performance, chain of custody, downstream processing, and bioenergy governance are connected. Whether this becomes substantive transformation depends on implementation rather than regulatory language alone. The appropriate performance measure is therefore additionality: what environmental and social improvements occur because ISPO exists that would not otherwise occur? Certification coverage remains useful as an implementation indicator, but it cannot by itself demonstrate lower deforestation, fewer fires, better labor conditions, stronger smallholder livelihoods, or more credible supply chains.

This distinction addresses an important tension in the certification literature. Positive evidence from demonstrates that certification can produce measurable benefits. Critical findings from however, demonstrate why the temporal and spatial baseline matters. A sustainability system must therefore report both conformity and outcomes.

The Smallholder Inclusion Paradox

The second major analytical finding is what may be termed the ISPO smallholder inclusion paradox. Mandatory certification is intended to universalize sustainability expectations, but the farmers most in need of institutional support are often least capable of satisfying certification requirements. The risk is that a policy designed to promote universal sustainability could generate segmented participation if structural inequalities remain unresolved. show that historical inclusion in plantation and extension schemes affects contemporary certification readiness. similarly demonstrate that already organized and documented farmers enjoy substantial advantages. This means that certification can inadvertently reward previous institutional privilege unless public policy compensates for differences in starting conditions.

The solution is not to weaken environmental or social standards for smallholders. Doing so could undermine credibility and create a two-tier definition of sustainability. Instead, public policy should reduce and distribute transition costs through land-registration assistance, mapping, farmer organizations, extension, group-based internal control systems, financial support, replanting assistance, and shared traceability infrastructure. demonstrate that economies of scale can reduce certification costs, while show that training and financial incentives shape adoption preferences. These findings support a model in which certification becomes the culmination of publicly supported capacity

building rather than an administrative hurdle imposed on isolated farmers. The relationship between replanting and certification is particularly promising. Replanting is already a moment when farmers reconsider seedlings, spacing, farm design, financing, and future production. collectively suggest that replanting programs can serve as institutional entry points for improved agronomy, stronger farmer organizations, biodiversity safeguards, and certification readiness.

Environmental Integrity Requires Landscape-Level Governance

The environmental evidence answers the second research question by showing that plantation standards are necessary but insufficient. Avoiding new deforestation and peat conversion depends on accurate land boundaries, historical land-cover data, effective enforcement, and political incentives. Certification cannot compensate for weak spatial governance if new plantations continue to be allocated in environmentally sensitive areas. This is particularly clear from who document carbon losses associated with expansion into carbon-rich forests, and who identify political-economic determinants of deforestation. further demonstrate that even identifying illegality through improved spatial data does not automatically resolve institutional conflicts. ISPO should therefore increasingly integrate farm-level audits with jurisdictional spatial monitoring. Satellite information, concession and smallholder boundaries, peat maps, fire alerts, riparian areas, and forest-cover histories can provide a transparent environmental evidence base. Monitoring innovations such as those illustrated by and show how geospatial technologies can move certification beyond document inspection.

Biodiversity also requires landscape-scale thinking. Conservation set-asides can retain meaningful ecological value, but their effectiveness depends on size, configuration, habitat quality, and management. Replanting can temporarily disrupt biodiversity even within established plantations. Consequently, environmental criteria should address the entire plantation cycle and its surrounding ecological network. Fire and peat governance provide perhaps the strongest example of why individual certification units cannot operate in isolation. Hydrological drainage, smoke transport, and fire risk cross property boundaries. The evidence from Lu et al. (2022), indicates that effective sustainability governance requires coordinated landscape interventions supported by locally acceptable livelihood strategies.

Sustainable Intensification Must Be Conditional on Land Protection

Productivity improvement is frequently presented as a way to satisfy palm-oil demand without additional expansion. The literature supports the importance of reducing yield gaps, but the economic mechanism is not automatically land sparing. Increased profitability can create incentives to invest in additional land, producing a rebound effect. Accordingly, ISPO should link productivity interventions with enforceable land-use conditions. Climate-smart intensification, improved seedlings, nutrient management, extension, and replanting should be promoted on existing legal plantations, while verified zero-conversion

boundaries prevent increased profitability from translating into environmentally damaging expansion. This combination would allow productivity gains to increase income per hectare rather than area under cultivation.

Farm economics also deserves greater attention. demonstrate that maximizing input intensity is not necessarily economically optimal for smallholders. Sustainable intensification therefore requires site-specific nutrient recommendations, integrated pest management, appropriate ground cover, soil and water conservation, and cost-effective agronomic management rather than indiscriminate intensification. Replanting finance is central because farmers may otherwise postpone renewal, experience declining yields, or seek additional land. show that subsidy design influences willingness to replant. Certification policy should therefore be coordinated with replanting finance so that farmers who enter renewal programs simultaneously receive support for legality, sustainable design, biodiversity protection, training, and future traceability.

Social Sustainability Must Move Beyond Average Household Income

The third research question concerned socioeconomic outcomes. The evidence demonstrates substantial developmental benefits from oil palm but also reveals why social sustainability cannot be reduced to aggregate income effects. show meaningful household welfare improvements, but demonstrate that these private benefits do not automatically produce equivalent community-level public goods. The same distinction applies to certification. show that the poverty-related effects of certification depend on local livelihood structures. ISPO should therefore recognize that the same standard can interact differently with market-oriented villages, subsistence communities, transmigration areas, indigenous territories, and long-established plantation regions.

Gender is particularly important. Oil palm can reduce some forms of female agricultural labor while simultaneously shifting decision-making power or increasing unpaid responsibilities. Auditing social sustainability should consequently include gender-disaggregated indicators rather than assuming that household-level economic improvement is equitably shared. Conflict resolution is equally central. demonstrate the limited effectiveness of grievance resolution in many plantation conflicts, while show the importance of local values and social embeddedness in land-use decisions. ISPO's credibility would be strengthened by transparent grievance tracking, participatory mapping, documented resolution timelines, and independent mechanisms for escalating unresolved disputes.

Public and Private Governance Should Be Made Interoperable
The fifth research question concerned interaction between ISPO and other governance systems. The evidence suggests that policy should move beyond competition between national and private standards toward selective interoperability. ISPO has national legal authority and potentially universal reach, whereas RSPO and corporate systems can generate stronger market incentives, buyer engagement, and requirements that extend be-

yond legal minimums. The objective should not be to make the standards identical. Their institutional mandates differ. Instead, overlapping data, audit elements, chain-of-custody information, land maps, and smallholder-support processes could be made compatible to reduce duplication and transaction costs. This is particularly important for smallholders who may otherwise confront multiple standards and documentation systems.

A farmer who has already been geolocated, legally registered, trained, and verified against core sustainability requirements should not have to recreate the same information separately for every program. Interoperability could therefore improve both inclusion and credibility. Jurisdictional approaches offer an institutional space for this coordination. Show that jurisdictional initiatives can create coalitions and mobilize resources across government, markets, and civil society. District-level ISPO implementation platforms could coordinate mapping, farmer registration, extension, fire prevention, grievance resolution, and certification readiness while simultaneously supporting voluntary market initiatives.

International Legitimacy Will Depend on Evidence Rather than Assertion

National ownership of sustainability policy is legitimate and important, but market acceptance depends on external confidence in the quality of implementation. International legitimacy cannot be generated merely by declaring a national standard equivalent to another system. It must arise from transparent, independently credible, and outcome-oriented evidence. This issue has become more salient as deforestation-free trade rules increase expectations for legality, geolocation, and traceability across commodity supply chains, strengthening the case for interoperable jurisdictional and value-chain information systems. Several institutional components are therefore essential. Certification bodies must be competent and sufficiently independent. Audit results and aggregate compliance information should be transparent enough to support accountability. Grievance and sanction systems must operate consistently. Spatial and supply-chain data need to be sufficiently reliable to verify origin.

The extension of ISPO into downstream processing makes traceability especially important. Once certified and non-certified fresh fruit bunches, crude palm oil, refined products, derivatives, and bioenergy streams interact, credible chain-of-custody systems become indispensable. A value-chain ISPO that cannot reliably connect final products to upstream production would expand administrative scope without corresponding market credibility.

Conversely, digital traceability could become one of ISPO's strongest strategic assets. A nationally coordinated system linking producer identity, mapped plantation boundaries, legality, certification status, mill intake, processing stages, and environmental-risk information could generate public-policy benefits beyond certification itself. Such infrastructure could improve planning, smallholder services, monitoring, and market assurance simultaneously.

A Seven-Pillar Roadmap for ISPO Transformation

The synthesis suggests that ISPO requires a transition from an audit-centered certification program toward a performance-oriented sustainability system. Seven mutually reinforcing pillars are proposed. This direction is consistent with recent reviews that emphasize integrated landscape, socio-ecological, and agro-ecological approaches, together with adaptive management, stakeholder collaboration, innovative finance, and sustained capacity building for smallholders [60].

The first pillar is credible assurance. Audit competence, accreditation, conflict-of-interest controls, sanctions, transparent decision-making, and accessible grievance mechanisms should ensure that certification decisions carry institutional weight.

The second pillar is smallholder capability building. Legalization, mapping, extension, farmer organizations, financing, high-quality planting material, replanting, and group certification should be treated as integral components of sustainability policy rather than external social programs.

The third pillar is environmental additionality. ISPO should increasingly report measurable performance related to forest conversion, peat protection, fire, riparian zones, biodiversity, soil and water management, and restoration rather than relying primarily on procedural compliance.

The fourth pillar is integrated digital traceability. Plantation boundaries, producer identities, certification records, mill transactions, processing flows, and sustainability indicators should form an interoperable information infrastructure with appropriate safeguards for data quality and privacy.

The fifth pillar is social legitimacy. Land conflict, labor conditions, gender equity, community participation, benefit distribution, and grievance resolution should become more visible components of sustainability performance.

The sixth pillar is jurisdictional integration. District and provincial governments should become active platforms for solving shared land, fire, smallholder, and monitoring problems rather than merely administrative nodes in a certification chain.

The seventh pillar is market interoperability and adaptive learning. ISPO should engage constructively with voluntary standards, corporate commitments, scientific evidence, and evolving trade requirements while retaining national regulatory ownership.

Figure 4 integrates the preceding findings into a staged pathway from mandatory compliance to substantive sustainability additionality. The roadmap makes explicit that legal obligation must be translated through institutional readiness, credible assurance, smallholder capability, traceability, outcome measurement, and market legitimacy before adaptive governance can emerge.

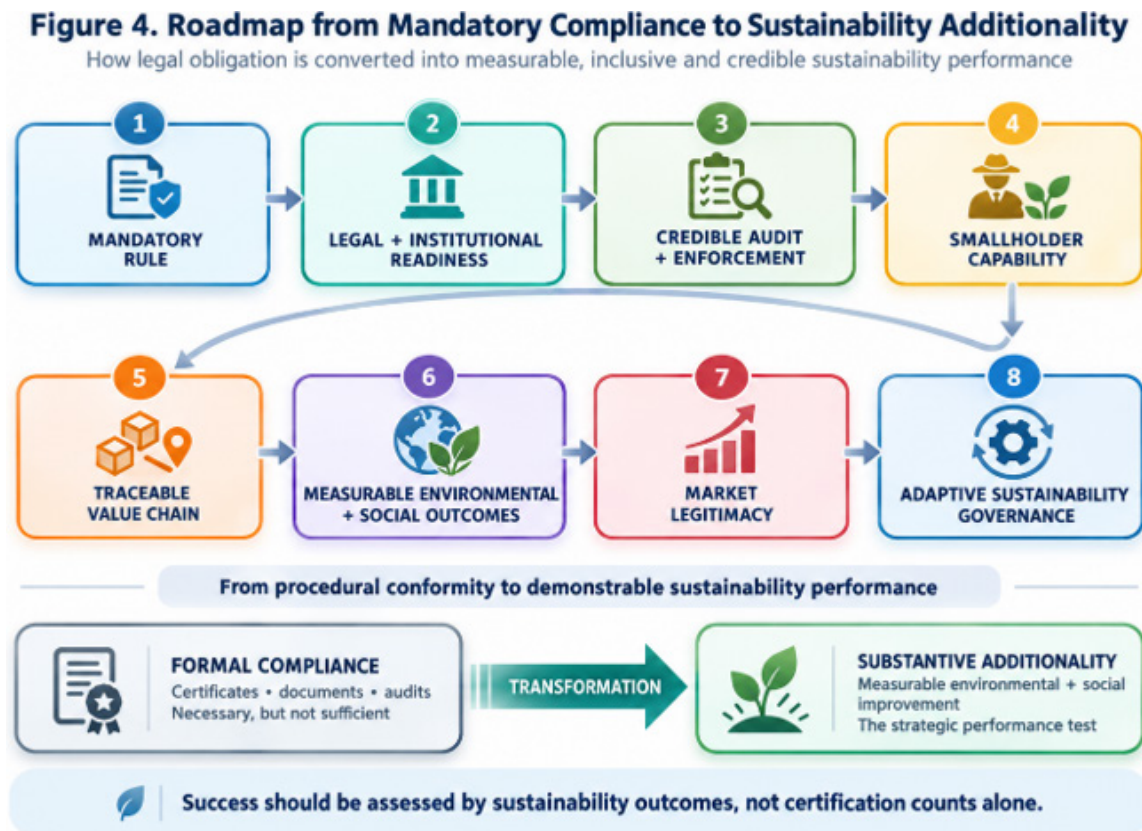


Figure 4. Roadmap from mandatory compliance to sustainability additionality

Figure 4 summarizes the central argument of this review. Mandatory certification is only the starting condition. The strategic destination is a governance system in which legal obligation is converted through institutional capacity, credible assurance, traceability, and outcome measurement into demonstrable sustainability performance. This model provides a basis for assessing future ISPO reform not by the number of certificates alone, but by whether certified value chains become measurably more sustainable, inclusive, and accountable.

Conclusion and Recommendations

ISPO has entered a new institutional phase. Its evolution from plantation-focused mandatory certification toward a framework encompassing plantations, downstream industries, bioenergy, and supply chains creates an opportunity to reposition sustainability governance in Indonesia. The significance of this change lies not in expanding certification bureaucracy but in creating a coherent architecture capable of linking production legality, environmental integrity, social legitimacy, smallholder inclusion, processing, and traceability. The literature demonstrates that certification can contribute to better environmental management, organizational learning, improved practices, conservation safeguards, and selected socioeconomic gains. It also demonstrates that such outcomes are highly conditional. Certification cannot resolve unclear land rights, weak enforcement, poverty, gender inequality, peatland hydrology, fire risk, or landscape conflict simply by incorporating them into an audit checklist. Independent smallholders should therefore become the central test of ISPO effectiveness. Universal sustainability requires differentiated institutional support so that farmers with unequal starting conditions can reach common environmental and social standards. Legal documentation, farmer organizations, extension, replanting finance, high-quality inputs, digital registration, and shared certification infrastructure need to be integrated into the certification pathway.

Environmental credibility similarly requires a transition toward measurable additionality. Forest conversion, peat protection, fire incidence, biodiversity conservation, restoration, soil and water management, and greenhouse-gas performance should increasingly become observable outcomes rather than assumed consequences of certification. Geospatial monitoring and value-chain traceability provide important opportunities for achieving this transition. Finally, ISPO should not attempt to govern Indonesia's palm-oil sustainability transition in institutional isolation. Its greatest strategic advantage is its national mandate; its greatest potential contribution is to use that mandate as a coordinating backbone linking subnational governments, private certification, corporate commitments, financial institutions, smallholders, downstream industries, scientific monitoring, and market requirements.

The long-term success of ISPO will therefore depend on whether Indonesia can transform mandatory certification into credible sustainability governance. That transformation requires closer integration between certification and development policy, stronger coordination between plantation and landscape governance,

transparent and interoperable supply chains, robust social safeguards, and continuous institutional learning. If these conditions are achieved, the post-2025 ISPO architecture could become more than a national certification requirement: it could become the institutional foundation for a more inclusive, verifiable, and internationally credible transition toward sustainable palm oil development.

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