

Restructuring the Business Model of Smallholder Oil Palm Plantations in Forest Areas of Central Kalimantan Province: An Integration of Pestel-Porter Diagnostics and Social Forestry Solutions

Heru Hartako¹, Arman Nasution²

^{1,2}Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

Email: heru.hartako@gmail.com

Abstract

This study aims to diagnose the vulnerability of the smallholder palm oil business model in the forest areas of Central Kalimantan Province and formulate its restructuring strategy through the Social Forestry policy. The land overlap issue covering 179,258 hectares places smallholders at high legal and economic risks following the enactment of the Job Creation Law (UU Cipta Kerja). The research method used is descriptive qualitative through an integrative approach using the Business Model Canvas (BMC), PESTEL, and Porter's Five Forces frameworks. The diagnostic results reveal that the existing business model is highly vulnerable due to macro-regulatory constraints and the smallholders' weak bargaining power against informal markets. As a public governance solution, the Social Forestry policy through the Jangka Benah (transition period) scheme is capable of restructuring the elements of the smallholders' BMC blocks. This transformation alters the Key Resources aspect through long-term land utilization legality, improves Key Partnerships by eliminating middlemen, enhances the bargaining power of the product's Value Proposition, and realizes a sustainable, traceable, and legally compliant smallholder palm oil business model.

Keywords: *Social Forestry, Business Model Canvas, Smallholder Palm Oil, Forest Area, Central Kalimantan.*



A. INTRODUCTION

The transformation of smallholder oil palm plantations that have long been established within state forest areas has evolved into a highly complex national strategic issue. This phenomenon is no longer merely an agrarian problem but has become a multidimensional governance challenge requiring adaptive, strategic, and equitable public policy approaches. In Central Kalimantan Province, the urgency of addressing this issue is particularly significant. According to data from the Central Kalimantan Provincial Plantation Office (2022), approximately 179,258 hectares of smallholder oil palm plantations are located within state forest areas and are directly managed by local communities. The existence of these plantations without formal forestry operational permits has created a profound structural dilemma, placing environmental conservation objectives and forest ecosystem restoration in direct conflict with the livelihoods and economic sustainability of local communities.

As a policy response to overcome this governance impasse, the Government of Indonesia introduced a series of regulatory reforms following the enactment of

the Job Creation Law (Omnibus Law). These reforms include Government Regulation (GR) No. 23 of 2021 on Forestry Administration, further operationalized through the Minister of Environment and Forestry Regulations No. 9 of 2021, No. 9 of 2022, and No. 4 of 2023. These regulations establish the Social Forestry Program integrated with the Jangka Benah (Forest Rehabilitation Transition Period) mechanism. The Jangka Benah mechanism is specifically designed as a sustainable transition framework that grants smallholder farmers legal access to gradually restore forest ecosystem functions through the integration of oil palm cultivation with forestry tree species, thereby maintaining household income while promoting ecological rehabilitation.

Despite the availability of a comprehensive national regulatory framework, the implementation of the Social Forestry Program under the Jangka Benah scheme continues to face substantial challenges, particularly in economic, social, and socio-cultural dimensions. A major obstacle to accelerating this transition lies in the absence of a practical, operational, and validated business model that can be effectively adopted by farmer institutions. Smallholders are expected to shift from an established oil palm monoculture system to a forestry-based agroforestry model; however, they lack clear operational guidance regarding supply chain restructuring, cost management, financing mechanisms, and adaptive business strategies required during the transition process.

This operational gap is further exacerbated by limitations in the existing literature. Previous studies on oil palm plantations within forest areas have largely adopted fragmented perspectives, focusing primarily on technical forest rehabilitation, formal land tenure conflicts, or legal compliance. Comprehensive studies integrating public policy analysis with macro–micro business model design to support the Jangka Benah scheme remain scarce. Consequently, regional stakeholders, particularly the Government of Central Kalimantan Province, lack a strategic blueprint that can serve as an operational reference for formulating effective regional implementation policies.

This study addresses these academic and practical gaps through an integrated analytical framework. Macro-environmental conditions are examined using the PESTEL (Political, Economic, Social, Technological, Environmental, and Legal) framework to assess external environmental dynamics and regulatory changes following the implementation of the Job Creation Law. At the micro level, Porter's Five Forces framework is employed to evaluate the competitiveness of social forestry enterprises and the bargaining position of smallholder oil palm farmers within the market. The findings from these macro and micro analyses are subsequently synthesized using the Business Model Canvas (BMC) to develop an adaptive, legally compliant, and sustainable business model for social forestry. The study ultimately aims to formulate strategic policy recommendations for the Government of Central Kalimantan Province to accelerate the transformation of illegally established smallholder oil palm plantations into legally compliant and sustainable production systems, while contributing to the achievement of the Sustainable Development

Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) and SDG 15 (Life on Land).

B. LITERATURE REVIEW

The literature review in this study is developed to establish a robust theoretical and conceptual foundation for addressing the complexity of smallholder oil palm plantations that have been established within state forest areas. To formulate policy solutions that are not only legally compliant but also adaptive to local economic dynamics, this study integrates perspectives from strategic management, external environmental scanning, and natural resource governance theories.

Systematically, the Business Model Canvas (BMC) is employed as a dynamic strategic tool to diagnose the weaknesses of the existing business model while designing a new value proposition. To ensure that the proposed business model transformation reflects on-the-ground realities, macro-environmental analysis using the PESTEL framework and micro-industry analysis using Porter's Five Forces are applied to identify external pressures, ranging from stringent forestry regulations to the weak bargaining position of smallholder farmers resulting from their dependence on informal supply chains. Furthermore, the Social Forestry policy under the Jangka Benah scheme is introduced as the institutional framework facilitating this transition. Collectively, these concepts provide a comprehensive analytical framework to guide the transformation from conflict-prone and environmentally unsustainable plantation governance toward a business model that is legally compliant, inclusive, and sustainable. The theoretical foundations underpinning this research are discussed in the following sections.

1. Business Model Canvas (BMC) and Business Model Innovation

The Business Model Canvas (BMC) is a strategic management framework used to define, design, and visualize how an organization creates, delivers, and captures value. It comprises nine interrelated building blocks: Customer Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, and Cost Structure. Over time, business models have evolved from static structures into dynamic systems, requiring organizations to continuously innovate their business models in response to disruptions in the external environment (Teece, 2010). Within the context of sustainable land-based industries, the value creation orientation of the BMC extends beyond economic profitability by incorporating social and environmental dimensions to achieve long-term sustainability.

2. Social Forestry Policy under the Jangka Benah Scheme

Social Forestry is a sustainable forest management system implemented within state forests, private forests, or customary forests, where local communities or indigenous peoples serve as the primary management actors (Fisher et al., 2018). The policy aims to enhance community welfare by providing legal access to forest resources while maintaining ecological balance (Maryudi et al., 2012). One of the

most pressing forestry governance challenges in Indonesia is the widespread presence of smallholder oil palm plantations within state forest areas. To address this agrarian and ecological conflict, the Government has introduced the Jangka Benah scheme as a gradual transition mechanism (Diyane A. Sudaryanti et al., 2022). Under this mechanism, forest ecosystem functions are progressively restored through the integration of forestry tree species into existing oil palm plantations using an agroforestry approach. Simultaneously, the scheme provides temporary legal recognition for existing smallholder oil palm plantations established within forest areas, in accordance with prevailing regulations (Rakatama & Pandit, 2020).

3. Macro-Environmental Analysis (PESTEL) and Micro-Industry Analysis (Porter's Five Forces)

Strategic formulation and business model redesign require comprehensive analysis of the external business environment. The PESTEL framework is employed to identify macro-environmental factors beyond organizational control, encompassing Political, Economic, Social, Technological, Environmental, and Legal dimensions (Yüksel, 2012). This framework is particularly relevant for assessing regulatory compliance, legal risks, and the socio-economic dynamics surrounding forest areas. Complementing this approach, Porter's Five Forces framework is applied to examine the competitive structure at the micro level. The analysis evaluates five competitive forces: the threat of new entrants, the bargaining power of suppliers (such as local collectors and intermediaries), the bargaining power of buyers (palm oil mills), the threat of substitute products, and the intensity of rivalry among existing competitors.

4. Access Theory and Natural Resource Governance Institutions

The successful transition of illegally established oil palm plantations toward legally recognized Social Forestry management largely depends on the effectiveness of local institutional arrangements. Access Theory distinguishes between formal legal rights (property rights) and the actual ability to derive benefits from natural resources (ability to benefit) (Ribot & Peluso, 2003). In the context of oil palm plantations located within forest areas, independent smallholders often possess economic access to land but lack legal access, making them highly vulnerable to exploitation within informal supply chains. Consequently, strengthening local institutions, such as cooperatives and Forest Farmer Groups (Kelompok Tani Hutan-KTH), becomes essential. Consistent with Common-Pool Resource Theory, the sustainable management of forest resources requires collectively agreed rules, accountable monitoring mechanisms, and graduated sanctions to prevent environmentally destructive resource utilization.

C. METHOD

This study adopts a descriptive qualitative approach to explore, diagnose, and redesign the business model of smallholder oil palm plantations located within forest areas in Central Kalimantan Province. A descriptive qualitative method was selected because the study seeks to provide an in-depth understanding of the

complex governance issues surrounding public policy implementation and the informal market dynamics experienced by independent smallholder farmers at the local level.

1. Research Design

The research is designed using an integrative framework that combines strategic management tools with industry environmental analysis to bridge the gap between macro-level regulatory compliance and the micro-level economic sustainability of smallholder farmers. The analytical framework consists of three interrelated stages:

- a. Baseline Diagnosis: Mapping the existing business model of smallholder oil palm farmers operating within forest areas by visualizing the nine building blocks of the existing Business Model Canvas (BMC).
- b. Environmental Scanning : Assessing the external macro-environment using the PESTEL framework (Political, Economic, Social, Technological, Environmental, and Legal) while analyzing the micro-industry environment through Porter's Five Forces to identify competitive pressures and market dynamics.
- c. Reconstruction Synthesis (Solution Design): Translating the findings from the environmental analyses into a redesigned business model by developing a Social Forestry Business Model Canvas based on the Jangka Benah scheme.

2. Data Sources and Data Collection Methods

The data used in this study were obtained from secondary administrative, spatial, and policy/regulatory documents related to the presence of smallholder oil palm plantations within state forest areas in Central Kalimantan Province. Data collection was conducted through extensive document analysis, including reviews of sectoral statistical data, official government reports, and relevant legal and policy documents.

- a. The primary secondary data sources integrated into this study include: Legislative, Regulatory, and Policy Documents.

Table 1. Legislative, Regulatory, and Policy Documents and Their Implications for the Study

Legal Basis	Explanation	Relevant BMC Elements	PESTEL Elements	Porter's Five Forces Framework
Law No. 41 of 1999 on Forestry	Provides the legal basis for identifying social forests as part of forest areas and community activities.	Key Resources, Key Activities, Key Partnerships, Value Propositions	Legal, Political, Environmental	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing

				Competitors, Threat of Substitutes
Law No. 18 of 2013 on the Prevention and Eradication of Forest Destruction	Establishes legal provisions for identifying risks and potential legal burdens related to institutional activities that manage social forests within forest areas and imposes compliance obligations and potential sanctions.	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Environmental	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Law No. 39 of 2014 on Plantations	Provides the legal framework governing the relationship between social forestry and plantation businesses (PBS), including opportunities for collaboration or partnerships and market access and quality standards.	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure, Customer Relationships, Revenue Streams	Legal, Political, Economic, Environmental, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Law No. 11 of 2020 on Job Creation (Omnibus Law)	Provides legal opportunities for social forestry to attract investment in forest areas through social forestry schemes.	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Economic, Environmental, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes

Table 2. Policy and Regulatory Documents and Their Implications for the Study

Legal Basis	Explanation	Relevant BMC Elements	PESTEL Elements	Porter's Five Forces Framework
Government Regulation (PP) No. 23 of 2021 on Forestry Administration	Provides the legal framework for communities to obtain Social Forestry (SF) permits and establishes institutional provisions for Village Forests (HD), Community Forests	Key Resources, Key Activities, Customer Relationships	Legal, Political, Economic, Environmental, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of

	(HKm), Community Plantation Forests (HTR), and Customary Forests (HA).			Substitutes
Government Regulation (PP) No. 24 of 2021 on Administrative Sanctions in the Forestry Sector	Regulates legal compliance and the risks of administrative sanctions for oil palm plantations located within forest areas.	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Economic, Environmental, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Minister of Environment and Forestry Regulation (Permen LHK) No. 8 of 2021 on Forest Management and Planning	Provides technical guidelines for social forestry implementation, including the identification of social forests within forest areas and the preparation of forest management plans.	Key Activities, Key Partnerships, Value Proposition	Legal, Economic, Environmental, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Presidential Regulation (Perpres) No. 5 of 2025 on Forest Area Regulation	Serves as the legal basis for implementing forest area regulation, including identifying legal risks associated with forest encroachment and unauthorized land use.	Key Partners, Key Activities, Value Proposition	Legal, Political, Economic, Environmental, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Presidential Regulation (Perpres) No. 28 of 2023 on Agrarian Reform and Social Forestry	Supports land redistribution and expands legal access for oil palm smallholders within forest areas through agrarian reform and social forestry programs.	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Economic, Environmental, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Government Regulation (PP) No. 26 of 2021 on the	Provides a legal mechanism for Social Forestry (SF) to access	Value Proposition, Customer	Legal, Economic, Social	Bargaining Power of Buyers,

Implementation of the Economic Value of Carbon (EVC)	carbon markets and establishes partnerships between SF institutions and carbon business actors.	Segments, Key Partners		Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Director General of Social Forestry and Environmental Partnerships Decree No. 105 of 2024 on the Technical Guidelines for Social Forestry Business Partnerships	Provides operational guidelines for business partnerships between Social Forestry institutions (core/plasma model) and plantation companies (PBS).	Value Proposition, Channels, Revenue Streams, Key Partners, Key Activities	Legal, Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Minister of Agriculture Regulation (Permentan) No. 29 of 2020 on Farmer Corporation Development	Encourages communities to become legal business entities (farmer corporations) as partners of plantation companies, enabling Social Forestry institutions to operate as formal business entities.	Channels, Revenue Streams, Key Partners, Key Activities	Legal, Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes

b. Tabular and Spatial Data Obtained from Relevant Government Agencies.

Tabel 3. Tabular Data from Relevant Government Agencies and Their Implications for the Study

Data Source	Explanation	Relevant BMC Elements	PESTEL Elements	Porter's Five Forces Framework
Oil Palm Plantation Data in Central Kalimantan (2020–2024)	Serves as the empirical basis for assessing the contribution of oil palm plantations to production and the potential for social forestry development.	Key Resources, Key Activities, Customer Relationships, Customer Segments, Revenue Streams	Political, Economic, Social	Rivalry Among Existing Competitors
Public Data on Oil Palm Mills (PKS) in Central Kalimantan (2024)	Identifies the number and distribution of oil palm mills to assess market potential and industrial accessibility.	Key Partners, Channels, Customer Relationships	Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers
Data on Oil Palm	Serves as an indicator	Key Activities, Key	Legal,	Bargaining Power

Plantation Business Licenses (IUP) in Central Kalimantan (2020–2024)	of business legality and identifies partnerships between plantation companies (PBS) and local communities.	Resources, Key Partnerships	Economic, Social	of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Data on Plantation Companies (PBS) in Central Kalimantan (2020–2024)	Provides the basis for analyzing institutional relationships and identifying potential plantation business partners.	Key Partners, Key Activities, Value Propositions, Key Partnerships, Customer Segments	Legal, Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Provincial Commodity Price Data for Oil Palm Fresh Fruit Bunches (FFB) in Central Kalimantan (2020–2024)	Serves as a reference for oil palm selling prices to identify price fluctuations and their implications for business sustainability.	Revenue Streams, Customer Segments, Value Propositions, Channels, Cost Structure	Legal, Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors

Tabel 4. Spatial Data from Relevant Government Agencies and Their Implications for the Study

Spatial Overlay Results	Explanation	Relevant BMC Elements	PESTEL Elements	Porter's Five Forces Framework
Overlay of Oil Palm Plantation Boundaries and Social Forestry (SF) Areas	Identifies oil palm plantations managed by plantation companies (PBS) and those managed by local communities within Social Forestry areas.	Key Resources, Key Activities	Legal, Economic, Technology, Social	Rivalry Among Existing Competitors, Threat of New Entrants
Overlay of Oil Palm Plantations within Forest Areas	Identifies oil palm plantations located inside designated forest areas.	Key Resources, Key Activities	Legal, Political, Economic, Environmental, Technology, Social	Rivalry Among Existing Competitors, Threat of Substitutes
Overlay of Community Oil Palm Plantations within Forest Areas	Identifies community-managed oil palm plantations located within forest areas.	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Economic, Environmental, Technology, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors

Overlay of Community Oil Palm Plantations within Forest Areas with Existing Social Forestry Permits	Identifies community-managed oil palm plantations located within forest areas that have already obtained Social Forestry permits.	Revenue Streams, Customer Segments, Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Economic, Environmental, Technology, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Overlay of Community Oil Palm Plantations within Forest Areas Eligible for Social Forestry	Identifies community-managed oil palm plantations located within forest areas that are eligible for legalization through the Social Forestry scheme.	Key Resources, Key Activities, Key Partnerships, Cost Structure	Legal, Political, Economic, Environmental, Technology, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Overlay of Community Oil Palm Plantations within Forest Areas Eligible for Social Forestry through Additional Social Forestry Areas (for PS Allocation)	Identifies community-managed oil palm plantations located within forest areas that are eligible for legalization through the designation of Additional Social Forestry Areas (APS).	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Economic, Environmental, Technology, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes
Overlay of Community Oil Palm Plantations within Forest Areas Ineligible for Additional Social Forestry Areas (APS)	Identifies community-managed oil palm plantations located within forest areas that are not eligible for designation as Additional Social Forestry Areas (APS), thereby requiring alternative settlement mechanisms.	Key Resources, Key Activities, Key Partnerships, Value Propositions, Channels, Cost Structure	Legal, Political, Economic, Environmental, Technology, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors, Threat of Substitutes

- c. Data from Previous Studies Relevant to This Research, Used to Clarify the Patterns of Economic Activities among Smallholder Oil Palm Farmers Under Existing Field Conditions.

Tabel 5. Data from Previous Studies and Their Implications for the Study

Research Findings	Explanation	Relevant BMC Elements	PESTEL Elements	Porter's Five Forces Framework
Manik (2015)	Demonstrates the significant contribution of oil palm plantations to regional economic growth and the strengthening of market potential.	Revenue Streams, Customer Relationships, Value Proposition	Legal, Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors
KEHATI (2019)	Provides an analysis of the roles of smallholders and the reconstruction of the Indonesian Sustainable Palm Oil (ISPO) certification through institutional strengthening.	Key Activities, Key Partners, Channels, Customer Relationships	Legal, Political, Economic, Environmental, Technology, Social	Rivalry Among Existing Competitors, Threat of Substitutes
Wild & Yuli (2020)	Presents insights into the importance of value-added processing and the efficiency of marketing channels.	Revenue Streams, Cost Structure, Channels	Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers
Ningrum et al. (2024)	Provides empirical evidence on the efficiency of the oil palm value chain.	Cost Structure, Revenue Streams, Key Activities	Legal, Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers, Rivalry Among Existing Competitors
Manik (2025)	Highlights the importance of a sustainable business ecosystem and the role of formal partnerships in enhancing price certainty and market access.	Key Partners, Channels, Customer Segments	Legal, Economic, Social	Bargaining Power of Buyers, Bargaining Power of Suppliers

3. Operational Definitions of Variables / Analytical Instruments

To minimize interpretive bias, the analytical instruments employed in this study are operationally defined as follows:

- a. Existing Business Model Canvas (BMC): A mapping of the nine business model building blocks from Value Proposition to Cost Structure to identify how smallholder farmers operating within forest areas currently manage and sustain their non-compliant oil palm enterprises.

- b. PESTEL Analysis: An analytical framework used to examine the macro-environmental forces affecting smallholder farmers, with particular emphasis on the Political–Legal dimension (including the implications of administrative sanctions under the Job Creation Law), Economic factors (price uncertainty), Social factors (the livelihoods of local communities), and Environmental factors (demands for ecological restoration).
- c. Porter's Five Forces Analysis: An analytical tool used to assess the competitive structure at the micro level, focusing on the strong bargaining power of buyers represented by formal palm oil mills (Palm Oil Mills/POMs) and the dominant role of informal intermediaries and local collectors within the supply chain.
- d. Social Forestry Business Model Canvas (Jangka Benah Scheme): A redesigned Business Model Canvas that integrates legal land-access provisions under Minister of Environment and Forestry Regulation No. 9 of 2021 with an agroforestry-based value proposition to establish a legally compliant, traceable, and sustainable business model for smallholder oil palm farming.

4. Data Analysis Method

Data Reduction: Selecting, simplifying, and classifying data concerning smallholder oil palm plantations established within forest areas, as well as the dynamics of the informal oil palm market in Central Kalimantan, into the PESTEL and Porter's Five Forces analytical frameworks.

Data Presentation: Presenting the business vulnerability profile of smallholder farmers through comparative tables and structured narrative descriptions based on the nine building blocks of the Business Model Canvas (BMC).

Conclusion Drawing (Synthesis and Design): Synthesizing the identified weaknesses across the value chain resulting from macro- and micro-environmental pressures to develop a new business model architecture the Social Forestry Business Model Canvas capable of promoting both sound economic governance and ecological compliance among smallholder farmers at the local level.

D. RESULTS AND DISCUSSION

The discussion begins by examining the anatomy of the existing business model (baseline) using the Business Model Canvas (BMC) to understand how limitations in legal land tenure affect the day-to-day operations of smallholder farmers. It then analyzes external pressures in a layered manner, starting with macro-environmental dynamics through the PESTEL framework, followed by an assessment of the micro-level industry structure using Porter's Five Forces. Based on this comprehensive diagnosis of constraints and external threats, the final section presents a blueprint for restructuring the business model through the implementation of the Social Forestry and Jangka Benah schemes. This restructuring is proposed as a pragmatic solution to restore forest ecological functions while

safeguarding the economic resilience of local communities. The findings and strategic design are presented systematically in the following subsections.

1. Analysis of the Existing Business Model (Existing BMC)

Based on an assessment of the business activities of smallholder oil palm plantations established within state forest areas in Central Kalimantan Province, the study identified an existing business model that operates outside formal regulatory procedures. This business model is characterized by a high dependence on informal networks resulting from the absence of legal land tenure. The baseline business model is summarized using the nine building blocks of the Existing Business Model Canvas (BMC), as presented in Figure 2.

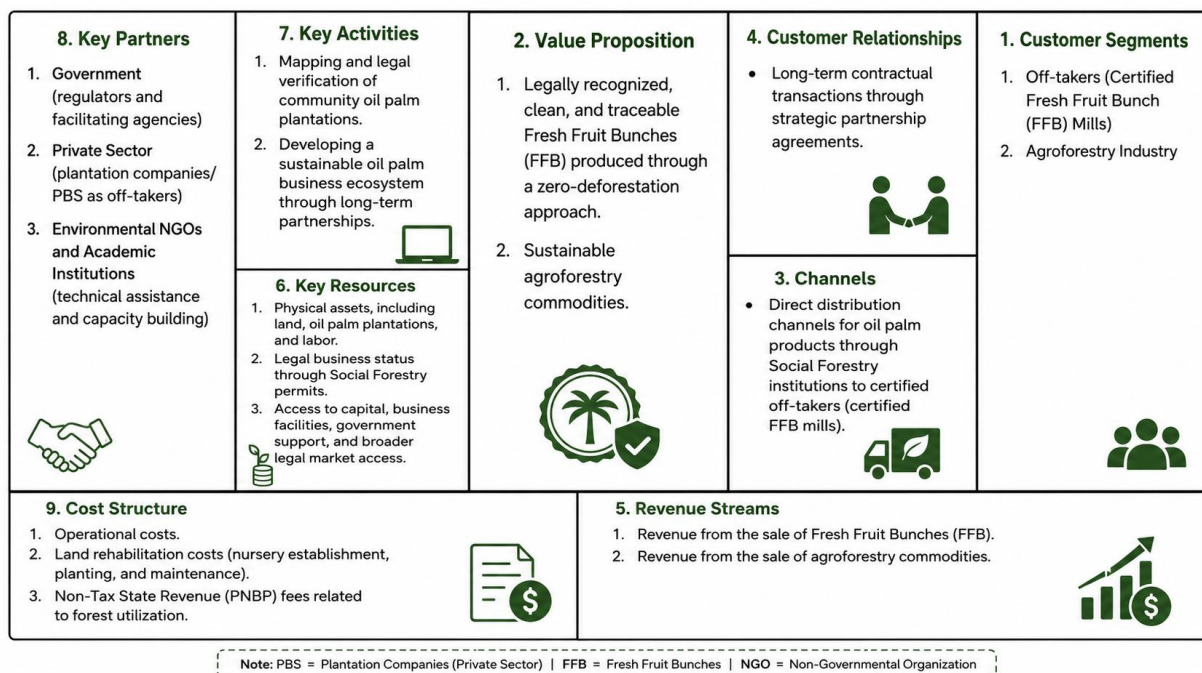


Figure 2. Existing Business Model Canvas (BMC)

A critical interpretation of Figure 2 reveals structural vulnerabilities in the Key Resources and Customer Segments building blocks. Because the plantations are located within state forest areas, smallholder farmers do not have access to a Cultivation Registration Certificate (Surat Tanda Daftar Budidaya-STDB) or ISPO/RSPO certification. These limitations in capital and legal status force them to use uncertified planting materials, resulting in low plantation productivity. The cascading effects extend to the Channels and Customer Segments building blocks, where farmers are unable to sell their Fresh Fruit Bunches (FFBs) directly to formal Palm Oil Mills (POMs) that enforce strict traceability standards. Consequently, the farmers become trapped in a black-market ecosystem controlled by intermediaries (middlemen).

2. Results of the Macro-Environmental Analysis (PESTEL)

The macro-environmental assessment using the PESTEL framework reveals that the existing business model is under considerable pressure from regulatory

changes, market requirements, and broader socio-economic dynamics. The findings are presented below:

a. Politic (P)

The political dimension reflects a dilemma between forestry law enforcement and socio-economic stability at the local level. Furthermore, the issuance of Presidential Regulation No. 28 of 2023 and Presidential Regulation No. 5 of 2025 indicates a shift in government policy dynamics from merely enforcing legal compliance toward prioritizing solution-oriented regulation through Social Forestry, the Jangka Benah mechanism, and Agrarian Reform. This political factor places pressure on the Key Partnerships block of the Existing BMC. Due to the illegal status of their land resulting from its location within state forest areas, farmers are forced to rely on "certain officials/authorities" or "village-based civil society organizations" to safeguard their farming activities.

b. Economic (E)

Based on tabular and spatial data from relevant technical agencies, the area of community-managed oil palm plantations is extensive (with an estimated 179,258 hectares located within state forest areas). This indicates that oil palm plantations within forest areas have become a vital source of livelihood for local communities. However, because these plantations are located within state forest areas, the activities are considered illegal, preventing farmers from fully benefiting from the economic value of their commodities. This macroeconomic factor constrains the Revenue Streams block of the Existing BMC and increases the burden on the Cost Structure. Due to their weak bargaining position resulting from their illegal status, farmers experience underpricing, where FFB prices are reduced by "black market" local collectors through a "risk discount" mechanism. On the other hand, their Cost Structure increases due to high additional distribution costs and security-related expenses.

c. Social (S)

The presence of institutional gaps at the local level and high social dependence on informal actors characterize the social dimension. Supporting studies (Yayasan KEHATI, 2019); (Indri ayu nigrum, 2024) demonstrate that independent smallholder supply chains are dominated by communal informal networks. These social conditions shape the Existing BMC, particularly the Customer Relationships and Channels blocks. The cooperative relationships among farmers, collectors, and local intermediaries are based on informal transactional trust. Local communities socially support and protect these activities to maintain their basic livelihood needs, resulting in a "black market" intermediary network that is highly resilient and deeply rooted within rural villages.

d. Technological (T)

Based on spatial analysis using SPOT 6/7 satellite imagery, combined with overlay analysis involving the forest area map established under Minister of Environment and Forestry Decree No. 6627 of 2021 and the Central Kalimantan Oil Palm Land Cover Data, this finding demonstrates that current mapping technology

has become highly advanced. The advancement of remote sensing technology (satellite imagery) and digital mapping has placed pressure on the Existing BMC, particularly on the Key Resources block (land). Smallholder oil palm plantations located within forest areas have become highly visible and easily traceable by relevant authorities for law enforcement purposes. Consequently, to compensate for these technological risks, the Channels block of the Existing BMC is forced to operate through "black market" local intermediaries. These intermediaries function as a mechanism for "laundering" the origin of Fresh Fruit Bunches (FFBs). Farmers sell their FFBs to intermediaries, who then mix them with FFBs originating from outside forest areas (such as non-forest land with ownership certificates/SHM and Cultivation Registration Certificates/STDB), so that when delivered to Palm Oil Mills (POMs/PKS), the origin records appear legally compliant.

e. Environmental (E)

Global pressures and national legal instruments (Minister of Environment and Forestry Regulation No. 8/2021 on Forest Management) demand zero-deforestation governance and ecosystem restoration through the Jangka Benah mechanism. This environmental issue undermines the Existing BMC, particularly the Value Proposition block. Fresh Fruit Bunches (FFBs) originating from forest areas are perceived as "dirty commodities." As a result, formal Customer Segments, namely compliant Palm Oil Mills (POMs/PKS) with ISPO/RSPO certification, strictly reject FFBs originating from forest areas. This condition forces farmers to channel their FFBs into lower-value market segments, particularly non-certified Palm Oil Mills (POMs/PKS) with less stringent monitoring systems.

f. Legal (L)

The Legal dimension represents the primary driving factor. Based on Law No. 41/1999 on Forestry, Law No. 18/2013 on the Prevention and Eradication of Forest Destruction, and Article 93 of Law No. 11/2020 on Job Creation, strict criminal and administrative sanctions apply not only to smallholder oil palm farmers operating within forest areas but also to local intermediaries who purchase and transport, as well as Palm Oil Mills (POMs/PKS) that receive and process Fresh Fruit Bunches (FFBs) originating from forest areas. This legal factor creates the highest risk of criminalization within the Key Activities and Key Resources blocks of the Existing BMC. The land cannot obtain Ownership Certificates (Sertifikat Hak Milik-SHM) or Cultivation Registration Certificates (Surat Tanda Daftar Budidaya-STDB), preventing it from being used as collateral for bank financing. These legal constraints create a fundamental disruption, forcing the emergence of informal and illegal costs within the Cost Structure block of the Existing BMC to mitigate legal risks.

The PESTEL analysis demonstrates that the macro-environmental conditions are largely hostile toward oil palm plantations located within forest areas, including those managed by local communities. However, due to the strong economic (E) and social (S) drivers, the Existing BMC of community plantations within forest areas does not disappear but instead transforms into a distorted and informal business

model. Therefore, regulatory intervention is required to normalize and restructure the nine building blocks of the BMC.

3. Results of Micro-Industry Structure Analysis (Porter's Five Forces)

While the PESTEL Analysis examines external macro-environmental pressures, the Porter's Five Forces Analysis is used to assess business competitiveness and the micro-level power structure that explains why smallholder farmers occupy a highly vulnerable position within the illegal ecosystem represented by the Existing BMC. The results of the Porter's Five Forces analysis are described as follows:

a. Bargaining Power of Buyers - VERY HIGH (Dominant)

Based on Article 93 of Law No. 11 of 2020, companies receiving Fresh Fruit Bunches (FFBs) originating from forest areas may face legal sanctions. This condition is further reinforced by research from (Yayasan KEHATI, 2019) regarding commodity traceability. Formal and certified Palm Oil Mills (POMs/PKS) are unwilling to bear such legal risks. Consequently, the number of buyers available at the local level becomes highly limited. This factor distorts the Customer Segments block and constrains the Revenue Streams block of the Existing BMC. "Black market" intermediaries and non-certified POMs/PKS gain full control over price determination, reducing farmers' FFB prices under the justification of a "risk discount." Farmers are forced to accept these prices because FFBs are highly perishable commodities.

b. Threat of Substitutes - HIGH

Based on tabular and spatial data from relevant technical agencies, the aggregate supply of FFBs in Central Kalimantan is also supported by plantations owned by large private companies (Perusahaan Besar Swasta/PBS) with official plantation permits, as well as smallholder plantations located outside forest areas. For non-certified POMs/PKS and "black market" intermediaries, FFBs from smallholder oil palm plantations within forest areas, which are considered illegal, can easily be substituted or replaced by legally sourced FFBs from smallholder plantations outside forest areas. This condition causes the farmers' commodities in the Value Proposition block of the Existing BMC to have no uniqueness or bargaining power. When legal FFB supplies are abundant, access for illegally sourced FFBs is automatically restricted.

c. Bargaining Power of Suppliers – HIGH (in terms of input cost burden)

Based on plantation regulations (Law No. 39 of 2014 on Plantations) and government administrative requirements, access to subsidized fertilizers, certified superior seedlings, and replanting programs (BPDPKS) requires ownership of a Cultivation Registration Certificate (STDB) and legally recognized land status with a "clean and clear" designation. Because their plantations are located within forest areas, farmers do not have access to these government-supported agricultural inputs. This condition affects the Key Resources and Cost Structure blocks of the Existing BMC. Farmers are forced to depend on commercial input suppliers in the

open market at significantly higher prices or use uncertified seedlings that result in lower productivity.

d. Threat of New Entrants - VERY LOW

The issuance of Presidential Regulation No. 5 of 2025 on Forest Area Control and increasingly strict digital monitoring based on satellite imagery demonstrate that opportunities for new land clearing are now tightly restricted by law enforcement authorities. From a competitive landscape perspective, the Key Resources block (land) in the Existing BMC is effectively closed to new entrants. Current industry dynamics are entirely focused on resolving the existing issue of smallholder oil palm plantations located within forest areas.

e. Rivalry Among Existing Competitors - HIGH

Based on the spatial data overlay analysis presented in the research methodology, the estimated area of smallholder oil palm plantations located within forest areas in Central Kalimantan reaches 179,258 hectares. This extensive area generates a large volume of illegally sourced FFB production, while the available informal logistics channels to non-certified POMs/PKS are highly limited and narrow, and the processing capacity of non-certified POMs/PKS is also constrained. As a result, intense competition occurs among independent smallholders and local collectors to secure fruit absorption quotas through "black market" intermediaries. This competition pressures the Channels block and increases the burden on the Cost Structure block of the Existing BMC. Collectors or intermediaries with stronger "security networks" are more likely to dominate the market, while smallholder farmers at the local level become the parties bearing the greatest losses in income margins.

The Porter's Five Forces Analysis demonstrates that within the existing ecosystem represented by the Existing BMC, smallholder oil palm farmers operating within forest areas occupy the most disadvantaged position in the industrial structure. The combination of highly dominant Buyer Power (due to limited market access resulting from illegal land status) and burdensome Supplier Power (due to the absence of access to subsidized inputs) results in a business model that generates very limited profit margins for local communities, despite them bearing the highest legal risks. Therefore, Social Forestry is not only an institutional mechanism for resolving land-use conflicts but also a form of economic competitiveness restructuring aimed at transforming the industrial power structure to become more supportive of the welfare of smallholder oil palm farmers within forest areas.

4. Reconstruction of the New BMC through Social Forestry

In response to the findings of the PESTEL and Porter's Five Forces analyses, which indicate that the existing business model is no longer viable and sustainable, this study develops a reconstruction of a new business model. The Social Forestry policy intervention through the Jangka Benah mechanism is employed as the primary driving force in redesigning the nine building blocks of the farmers'

business model. The transformation of the new business architecture is presented comparatively in Figure 3.

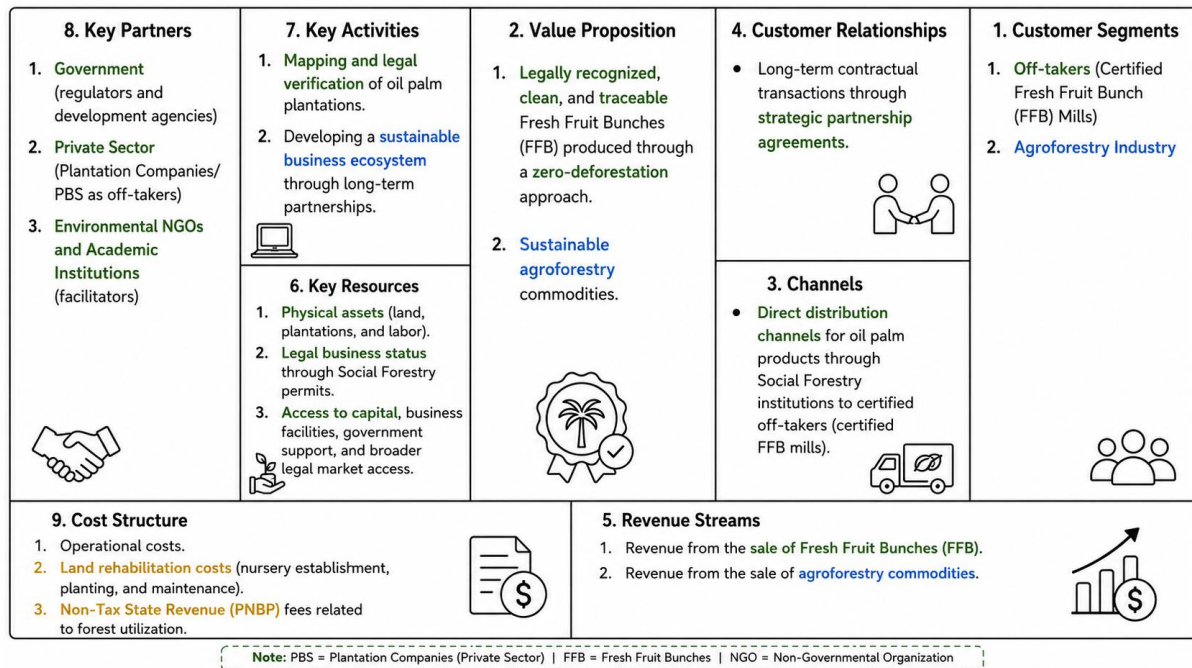


Figure 3. Reconstruction of the Business Model Canvas (BMC) through Social Forestry

The detailed explanation of the reconstruction presented in Figure 3 focuses on the restoration of the Key Resources and Value Propositions blocks. Through the Social Forestry scheme, farmers organized into Forest Farmer Groups (Kelompok Tani Hutan/KTH) obtain Social Forestry Management Approval, providing them with long-term legal access rights to the land for up to 25 years. This legal certainty regarding land tenure automatically transforms the value proposition of their products, as the Fresh Fruit Bunches (FFBs) produced become legally recognized and meet the traceability criteria required by formal markets.

Furthermore, the transformation of the Key Activities block requires farmers to implement the Jangka Benah (agroforestry) approach. Farmers are no longer allowed to cultivate oil palm through a monoculture system; instead, they are required to integrate forestry tree species producing non-timber forest products (NTFPs) within oil palm plantations during a specified transition period. This activity positively affects the Revenue Streams block, as farmers' income sources are no longer solely dependent on oil palm but are diversified through economically valuable forestry commodities. Regarding the Cost Structure block, all informal security-related expenses are eliminated and redirected toward investments in intercropping systems and the fulfillment of official non-tax state revenue (Penerimaan Negara Bukan Pajak/PNBP) obligations, thereby improving business efficiency and legitimacy at the local level.

E. CONCLUSION

Based on the analysis and discussion conducted, this study concludes that the existing business model implemented by smallholder oil palm farmers within forest areas in Central Kalimantan Province is highly vulnerable and no longer sustainable. The macro-level analysis (PESTEL) reveals strong regulatory pressures following the enactment of the Job Creation Law, which threaten the existence of non-procedural plantations through administrative sanctions and penalties. This vulnerability is further intensified by the micro-level analysis (Porter's Five Forces), which confirms the weak bargaining position of independent smallholders due to their acute dependence on informal intermediary networks (peron or local collectors) within the black-market ecosystem, as a consequence of formal Palm Oil Mills (POMs/PKS) rejecting commodities without traceable land origins.

As a public governance solution, the reconstruction of the business model through the Social Forestry policy with the Jangka Benah scheme has proven capable of restructuring the key elements within the nine blocks of the Business Model Canvas (BMC). Overall, the integration of these policies provides an effective middle-ground approach to achieving smallholder oil palm governance that is regulatory-compliant, economically equitable, and environmentally sustainable in Central Kalimantan Province.

REFERENCES

1. Amoussouhoui, R., Arouna, A., Bavorova, M., Tsangari, H., & Banout, J. (2022). An extended Canvas business model: A tool for sustainable technology transfer and adoption. *Technology in Society*, 68(September 2021), 101901. <https://doi.org/10.1016/j.techsoc.2022.101901>
2. BMBF. (2020). *Forest Strategy 2020*. 30.
3. Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42–56. <https://doi.org/10.1016/j.jclepro.2013.11.039>
4. Carlson, K. M., Heilmayr, R., Gibbs, H. K., Noojipady, P., Burns, D. N., Morton, D. C., Walker, N. F., Paoli, G. D., & Kremen, C. (2018). Effect of oil palm sustainability certification on deforestation and fire in Indonesia. *Proceedings of the National Academy of Sciences of the United States of America*, 115(1), 121–126. <https://doi.org/10.1073/pnas.1704728114>
5. Carnell, P. E., Whiteoak, K., Young, M., Critchell, K., Swearer, S., Macreadie, P. I., McIntyre, J., & Treml, E. A. (2025). Prioritising investment in kelp forest restoration: A spatially explicit benefit-cost analysis in southern Australia. *Ecosystem Services*, 74(March), 101739. <https://doi.org/10.1016/j.ecoser.2025.101739>
6. Crago, C. L., Feyzollahi, M., & Harper, R. W. (2025). Solar Power or Forests? A Cost-Benefit Analysis of Forest Land Conversion in the Northeastern United States. *Land Use Policy*, 158(February), 107679. <https://doi.org/10.1016/j.landusepol.2025.107679>
7. Daou, A., Mallat, C., Chammas, G., Cerantola, N., Kayed, S., & Saliba, N. A.

- (2020). The Ecocanvas as a business model canvas for a circular economy. *Journal of Cleaner Production*, 258, 120938. <https://doi.org/10.1016/j.jclepro.2020.120938>
8. de Barros, P. H. B., & Chimeli, A. B. (2026). The impacts of palm oil expansion on deforestation and economic activity in the eastern Amazon. *Ecological Economics*, 239(August 2024), 108739. <https://doi.org/10.1016/j.ecolecon.2025.108739>
 9. District, A. S., Barat, K., Province, K. T., District, A. S., Barat, K., & Province, K. T. (2023). *RSPO P & C Public Summary Report Revision 15 (Nov 2023) RSPO PRINCIPLE AND CRITERIA PUBLIC SUMMARY REPORT* ☒ Initial Assessment ☐ Annual Surveillance Assessment (Choose an item .) ☐ Recertification Assessment (Choose an item .) ☐ Extension of Scope C. 15(47).
 10. Diyane A. Sudaryanti, Hery Santoso, & Hero Marhaento. (2022). *Strategi Jangka Benah Dan Penyelesaian Kebun Sawit Di Dalam Kawasan Hutan*. 2019. <https://sposindonesia.org/dokumen>
 11. Erbaugh, J. T. (2019). Responsibilization and social forestry in Indonesia. *Forest Policy and Economics*, 109(October), 102019. <https://doi.org/10.1016/j.forpol.2019.102019>
 12. Fisher, M. R., Moeliono, M., Mulyana, A., Yuliani, E. L., Adriadi, A., Kamaluddin, Judda, J., & Sahide, M. A. K. (2018). Assessing the New Social Forestry Project in Indonesia: Recognition, Livelihood and Conservation? *International Forestry Review*, 20(3), 346–361. <https://doi.org/10.1505/146554818824063014>
 13. Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, 30(November), 441–473. <https://doi.org/10.1146/annurev.energy.30.050504.144511>
 14. Foundation, C. D. R. (2020). Main report. In *Reforming China's Healthcare System*. <https://doi.org/10.4324/9781315184487-1>
 15. Gao, T., Xiao, K., Zhang, J., Zhang, X., Wang, X., Liang, S., Sun, J., Meng, F., & Huang, X. (2021). Cost-benefit analysis and technical efficiency evaluation of full-scale membrane bioreactors for wastewater treatment using economic approaches. *Journal of Cleaner Production*, 301, 126984. <https://doi.org/10.1016/j.jclepro.2021.126984>
 16. Hasbullah, I. A., Sjarkowi, F., Asmani, N., & Yazid, M. (2016). Socio-entropy system approach for analyzing of social forestry management in Indonesia. *Jurnal Manajemen Hutan Tropika*, 22(2), 126–136. <https://doi.org/10.7226/jtfm.22.2.126>
 17. Hutan, K., Rakatamaa, A., & Panditc, R. (2020). *Meninjau skema perhutanan sosial di Indonesia : Peluang dan tantangan*. 111(1), 1–13.
 18. Indri ayu nigrum. (2024). Efisiensi Rantai Pasok Tandan Buah Segar (Tbs) Kelapa Sawit Di Pt. Sawita Karya Manunggul. *Oryza - Jurnal Agribisnis Dan Pertanian Berkelanjutan*, 9(2), 38–44. <https://doi.org/10.56071/oryza.v9i2.906>
 19. Joyce, A., & Paquin, R. L. (2016). The triple layered business model canvas: A tool to design more sustainable business models. *Journal of Cleaner Production*, 135, 1474–1486. <https://doi.org/10.1016/j.jclepro.2016.06.067>
 20. Kehutanan, E., Kehutanan, E., Schoneveld, G. C., & Brady, M. A. (2025). *Machine Translated by Google Memajukan keberlanjutan minyak sawit untuk mengatasi krisis*

- iklim : Memanfaatkan teori perubahan dan model dinamika sistem di tingkat yurisdiksi*
Machine Translated by Google. 181(November 2024).
21. Kementrian Pertanian. (2018). Statistik Perkebunan Indonesia (Tree Crop Estate Statistics Of Indonesia 2017-2019) Kelapa Sawit (Palm Oil). *Directorate General of Estate Crops, Ministry of Agriculture, Indonesia*, 1–81. <http://ditjenbun.pertanian.go.id>
 22. Kusumadewi, S. D., Purnomo, H., Okarda, B., Azzahra, M., Iswadi, A. M., Puspitaloka, D., Nadhira, S., Irawan, P., & Liswanti, N. (2024). Simulating jurisdictional approach and scenario for sustainable palm oil using value chain dynamic model. *IOP Conference Series: Earth and Environmental Science*, 1379(1). <https://doi.org/10.1088/1755-1315/1379/1/012020>
 23. Ludvig, A., Sarkki, S., Weiss, G., & Živojinović, I. (2021). Policy impacts on social innovation in forestry and back: Institutional change as a driver and outcome. *Forest Policy and Economics*, 122(August 2019), 1–7. <https://doi.org/10.1016/j.forpol.2020.102335>
 24. Manalu, B. T., Febrinova, R., & Rudiyana, E. (2016). Peran Peron dalam Pemasaran Kelapa Sawit di Kecamatan Rambah Hilir Kabupaten Rokan Hulu. *Jurnal Ilmiah Mahasiswa Fakultas Pertanian*, 3(1), 1–11.
 25. Maryudi, A., Devkota, R. R., Schusser, C., Yufanyi, C., Salla, M., Aurenhammer, H., Rotchanaphatharawit, R., & Krott, M. (2012). Back to basics: Considerations in evaluating the outcomes of community forestry. *Forest Policy and Economics*, 14(1), 1–5. <https://doi.org/10.1016/j.forpol.2011.07.017>
 26. Maryudi, A., & Krott, M. (2012). Local Struggle for Accessing State Forest Property in a Montane Forest Village in Java, Indonesia. *Journal of Sustainable Development*, 5(7), 62–68. <https://doi.org/10.5539/jsd.v5n7p62>
 27. Nicoli, M., Borgonovo, E., Di Cosmo, V., Mosso, D., Plischke, E., Savoldi, L., & de Queiroz, A. R. (2025). A framework for global sensitivity analysis in long-term energy systems planning using optimal transport. *Energy*, 338, 138788. <https://doi.org/10.1016/j.energy.2025.138788>
 28. Ogwuiké, P. C. A., Arouna, A., & Ogwuiké, C. O. (2022). Assessment of rice threshing technology characteristics for enhanced rice sector development in Senegal. *African Journal of Science, Technology, Innovation and Development*, 14(5), 1151–1160. <https://doi.org/10.1080/20421338.2021.1924424>
 29. Pek, R., Riedl, M., & Jarski, V. (2017). Innovative approaches in forest management - The application of a business model to designing a small-scale forestry strategy. *Journal of Forest Science*, 63(9), 393–400. <https://doi.org/10.17221/17/2017-JFS>
 30. Pendahuluan, A., & Teknis, B. P. (2021). *OPERASIONAL JANGKA BENAHA*.
 31. Peraturan Pemerintah No. 23 Tahun 2021 Tentang Penyelenggaraan Kehutanan, Peraturan Pemerintah 2 (2021). <https://peraturan.bpk.go.id/Details/161853/pp-no-23-tahun-2021>
 32. Peraturan Pemerintah No. 24. (2021). *Peraturan Pemerintah No. 23 Tahun 2021 Tentang Tata Cara Pengenaan Sanksi Administratif dan Tata Cara Penerimaan Negara*

- Bukan Pajak yang Berasal dari Denda Administratif di Bidang Kehutanan. 085128.*
33. Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor 9 Tahun 2021 tentang Pengelolaan Perhutanan Sosial.
 34. Piabuo, S. M., Hoogstra-Klein, M., Ingram, V., Runhaar, H., Piabuo, S. M., Hoogstra-Klein, M., Ingram, V., Foundjem-Tita, D., Minang, P. A., & Duguma, L. (2025). Sustainability performance of community forest enterprises (CFES) in Cameroon: Pathways to viable business models. *Forest Policy and Economics*, 173(February), 103470. <https://doi.org/10.1016/j.forpol.2025.103470>
 35. Pichler, M., Bhan, M., & Gingrich, S. (2021). The social and ecological costs of reforestation. Territorialization and industrialization of land use accompany forest transitions in Southeast Asia. *Land Use Policy*, 101, 105180. <https://doi.org/10.1016/j.landusepol.2020.105180>
 36. Pramulya, R., Dahlan, D., Asy' Ari, R., Gustawan, A. H., Dzulfigar, A., Novita, E., Sutrisno, A., & Rahmah, D. M. (2025). Assessment of Gayo agroforestry coffee characteristics and carbon stock potential in Mumuger social forestry area, Central Aceh Regency. *Trees, Forests and People*, 20(March), 100818. <https://doi.org/10.1016/j.tfp.2025.100818>
 37. Purnomo, H., Kusumadewi, S. D., Ilham, Q. P., Puspitaloka, D., Hayati, D., Sanjaya, M., Okarda, B., Dewi, S., Dermawan, A., & Brady, M. A. (2021). A political-economy model to reduce fire and improve livelihoods in Indonesia's lowlands. *Forest Policy and Economics*, 130, 102533. <https://doi.org/10.1016/j.forpol.2021.102533>
 38. Purnomo, H., Okarda, B., Juniyantri, L., Kusumadewi, S. D., Puspitaloka, D., Azzahra, M., Nadhira, S., Irawan, P., Liswanti, N., Schoneveld, G. C., & Brady, M. A. (2025a). Advancing palm oil sustainability to address the climate crisis: Leveraging theory of change and system dynamics model at the jurisdictional level. *Forest Policy and Economics*, 181(June). <https://doi.org/10.1016/j.forpol.2025.103594>
 39. Purnomo, H., Okarda, B., Juniyantri, L., Kusumadewi, S. D., Puspitaloka, D., Azzahra, M., Nadhira, S., Irawan, P., Liswanti, N., Schoneveld, G. C., & Brady, M. A. (2025b). Advancing palm oil sustainability to address the climate crisis: Leveraging theory of change and system dynamics model at the jurisdictional level. *Forest Policy and Economics*, 181(June), 103594. <https://doi.org/10.1016/j.forpol.2025.103594>
 40. Rahmad Kurniawan, & Indah Dwi Ristiana Putri. (2022). Sistem Jual Beli Kelapa Sawit oleh Peron CV Ibrahim Putra di Pangkalan Dewa Perspektif Ekonomi Syariah. *CEMERLANG: Jurnal Manajemen Dan Ekonomi Bisnis*, 2(2), 63–78. <https://doi.org/10.55606/cemerlang.v2i2.269>
 41. Rakatama, A., & Pandit, R. (2020). Reviewing social forestry schemes in Indonesia: Opportunities and challenges. *Forest Policy and Economics*, 111(1), 102052. <https://doi.org/10.1016/j.forpol.2019.102052>
 42. Ratner, B. D., Larson, A. M., Sarmiento Barletti, J. P., Eldidi, H., Catacutan, D., Flintan, F., Suhardiman, D., Falk, T., & Meinzen-Dick, R. (2022). Multistakeholder

- platforms for natural resource governance: lessons from eight landscape-level cases. *Ecology and Society*, 27(2). <https://doi.org/10.5751/ES-13168-270202>
43. Ribot, J. C., & Peluso, N. L. (2003). A theory of access. *Rural Sociology*, 68(2), 153–181. <https://doi.org/10.1111/j.1549-0831.2003.tb00133.x>
44. Sahebalzamani, S., & Bertella, G. (2018). Business models and sustainability in nature tourism: A systematic review of the literature. *Sustainability (Switzerland)*, 10(9), 1–15. <https://doi.org/10.3390/su10093226>
45. Sahide, M. A. K., Fisher, M. R., Erbaugh, J. T., Intarini, D., Dharmiasih, W., Makmur, M., Faturachmat, F., Verheijen, B., & Maryudi, A. (2020). The boom of social forestry policy and the bust of social forests in Indonesia: Developing and applying an access-exclusion framework to assess policy outcomes. *Forest Policy and Economics*, 120(August 2019), 102290. <https://doi.org/10.1016/j.forpol.2020.102290>
46. Sirimorok, N., Sahide, M. A. K., Herrawan, H., Faturachmat, F., & Maryudi, A. (2024). Linking commoning with social forestry: An Indonesian case. *Trees, Forests and People*, 18(November), 100737. <https://doi.org/10.1016/j.tfp.2024.100737>
47. Siscawati, M. (2020). Gender and forest tenure reform in Indonesia. *Gender and Forest Tenure Reform in Indonesia*. <https://doi.org/10.17528/cifor/007572>
48. Susanti, A. (2021). Jangka Benah: Alternatif Solusi Persoalan Keterlanjuran Kebun Kelapa Sawit Monokultur di Kawasan Hutan. *Jurnal Ilmu Kehutanan*, 15(1), 1–3. <https://doi.org/10.22146/jik.v15i1.1566>
49. Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2–3), 172–194. <https://doi.org/10.1016/j.lrp.2009.07.003>
50. Thakur, V. (2021). Framework for PESTEL dimensions of sustainable healthcare waste management: Learnings from COVID-19 outbreak. *Journal of Cleaner Production*, 287, 125562. <https://doi.org/10.1016/j.jclepro.2020.125562>
51. Wati, E., Yanti, N., Ilmu, S. T., & Pasaman, E. (2020). Analisis Saluran Pemasaran Tandan Buah Segar (Tbs) Kelapa Sawit Di Kabupaten Pasaman the Analysis of Palm Oil Harvest (Tbs) Marketing Channels in West Pasaman. *Jurnal Apresiasi Ekonomi*, 8(1), 128–134.
52. Willmott, A., Willmott, M., Grass, I., Lusiana, B., & Cotter, M. (2023). Harnessing the socio-ecological benefits of agroforestry diversification in social forestry with functional and phylogenetic tools. *Environmental Development*, 47(June), 100881. <https://doi.org/10.1016/j.envdev.2023.100881>
53. Yayasan KEHATI. (2019). Studi Rantai Pasok TBS Petani Kelapa Sawit Swadaya. *Sposindonesia.Org*. <https://sposindonesia.org/wp-content/uploads/2020/12/Studi-Rantai-Pasok-TBS-Sawit-Swadaya.pdf>
54. Yitbarek, T. W., Wilson, J. R. U., Evans, A., & Dehnen-Schmutz, K. (2025). An analysis of macro-environment factors influencing the governance of tree planting schemes in Africa. *Current Research in Environmental Sustainability*, 10(September), 100302. <https://doi.org/10.1016/j.crsust.2025.100302>
55. Yüksel, I. (2012). Developing a Multi-Criteria Decision Making Model for PESTEL Analysis. *International Journal of Business and Management*, 7(24), 52–66.

<https://doi.org/10.5539/ijbm.v7n24p52>

56. Zeng, B., Fahad, S., Bai, D., Zhang, J., & Işık, C. (2023). Assessing the sustainability of natural resources using the five forces and value chain combined models: The influence of solar energy development. *Resources Policy*, 86(August). <https://doi.org/10.1016/j.resourpol.2023.104079>
57. Zott, C., & Amit, R. (2010). Business model design: An activity system perspective. *Long Range Planning*, 43(2–3), 216–226. <https://doi.org/10.1016/j.lrp.2009.07.004>