

Synergy Between Smallholder Palm Oil Replanting Policies and Green Energy Initiatives: A Study of Impacts and Policies in Indonesia

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Abstract. People's Palm Oil Replanting (PSR) and green energy projects are crucial Indonesian initiatives aimed at achieving economic and environmental sustainability. This study explores the synergies between these programs, analyzing their impacts and interactions within natural resource management and sustainable energy. Using a qualitative case study approach, data were collected through stakeholder interviews, policy document analyses, and field surveys across five major palm oil-producing districts in Indonesia. The findings show that integrating PSR and green energy initiatives can enhance land productivity, reduce carbon emissions, and improve peatland management. PSR projects, focused on rejuvenating aging oil palm plantations and adopting environmentally friendly technologies, support more efficient bioenergy production. Simultaneously, green energy initiatives promote renewable energy use and incentivize sustainable practices. However, challenges such as limited collaboration, budget constraints, and farmer resistance persist. To address these, this study proposes a policy framework including financial support, technical training for farmers, and improved stakeholder communication. By examining the intersection of agricultural and energy policies, this research highlights strategies to achieve sustainability goals and provides actionable insights for policymakers to design integrated, effective approaches that maximize the benefits of these initiatives

1 Introduction

The People's Palm Oil Replanting (PSR) and green energy initiatives are essential elements of Indonesia's sustainable development strategy. The Indonesian government has established the People's Palm Oil Rejuvenation Program, aimed at enhancing the productivity and sustainability of antiquated smallholder oil palm plantations. This initiative seeks to substitute obsolete oil palm cultivars with novel varieties that exhibit

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enhanced productivity and ecological sustainability. Green energy initiatives aim to diminish dependence on fossil fuels and carbon emissions by using renewable energy sources, including bioenergy sourced from palm biomass.

Indonesia, one of the world's largest palm oil producers, faces significant challenges in regulating the environmental impact of oil palm farms. Improperly managed oil palm cultivation has resulted in deforestation, soil degradation, and ecosystem damage, especially fragile peatlands. In the midst of worldwide attempts to combat climate change and maintain environmental sustainability, the collaboration of PSR policies and green energy programs provides possible answers that complement one another. Sustainable palm oil rejuvenation can boost production efficiency and reduce environmental impact, while bioenergy derived from palm biomass can help the move to cleaner energy sources.

However, implementing these two policies in practice frequently finds roadblocks. Key problems include little cooperation among government agencies, insufficient financial support for farmers, and resistance to reform in the plantation sector. Furthermore, the efficient implementation of this policy necessitates a thorough understanding of the synergies and linkages between palm oil rejuvenation and renewable energy production.

This study seeks to investigate and assess the synergy between smallholder palm oil replanting regulations and green energy programs in Indonesia, with an emphasis on the resulting benefits as well as the problems and opportunities encountered during implementation. By examining how these two policies might complement one another, this study hopes to provide beneficial advice for policymakers and stakeholders in developing more successful ways to accomplish holistic sustainability goals. The study of the synergy between Indonesia's People's Palm Oil Replanting (PSR) policy and green energy programs is a critical topic in terms of sustainable development and natural resource management. In this perspective, comparing PSR targets at the national and provincial levels is important for understanding how policies and initiatives are implemented at various levels.

Anugrah's (2023) research on the synchronization of sustainable palm oil policy is a valuable reference to support this research's background. The study employs a qualitative descriptive approach to provide insights on the implementation of sustainable policies in the palm oil sector, which can serve as a foundation for understanding the synergies between PSR policies and green energy projects. Furthermore, Badruzzuhad's (2023) research on the importance of developing a Green Innovation District in Indonesia can provide valuable insights into the synergy between PSR policies and green energy projects. This study intends to propose funding scheme recommendations for the formation of green innovation zones, which can serve as a model for establishing policies that support the growth of green energy in Indonesia.

Taking into account various studies on policies, green energy, and natural resource management, comparing PSR targets at the national and Riau provincial levels can provide a more comprehensive understanding of the impacts and policies required to achieve Indonesia's sustainable development goals in the palm oil and green energy sectors. It is hoped that research on the synergy between PSR policies and green energy projects will contribute significantly to the government's and stakeholders' efforts to achieve Indonesia's sustainable development goals.

Adaptive Collaborative Management (ACM) is a value-added strategy in which individuals or groups who use or manage forests agree to collaborate and design forest management strategies. These methods are then adopted with the understanding that they may not achieve their intended purpose. People must learn jointly from implementation when revisions in plans are discussed (Büscher et al., 2007). Nonetheless, public policies can only exist if there are organisations in charge of their execution, and frontline workers interact with the public, answer people's inquiries, assess their requirements, award benefits, and distribute sanctions (Dussuet and Ledoux, 2019).

Based on the above notion, implementation refers to a variety of activities targeted at attaining the program's goals, and the executive in this position decides how the activities are organized. An executive may effectively and efficiently manage resources, units, and approaches to support program execution, as well as analyse existing plans and instructions that may be conveniently followed for program realization [1].

These millions of people use forest practices based on their local environment and culture, supported by local government institutions that have proven beneficial in maintaining forests and sustaining local livelihoods. However, these practices and structures are frequently invisible to the state, beyond of its control, or simply ignored [2]. Implementation strategies are educational, behavioral, organizational, financial, or regulatory techniques to boost the adoption of appealing innovations in specific audiences, mainly healthcare practitioners or other decision-makers [3].

Goal 11 of the 2030 Agenda for Sustainable Development emphasizes inclusive, secure, resilient, and sustainable cities and human settlements [4]. Urbanization and unplanned urban growth are global concerns that governments are facing [5]. Urban planning has been proved to be ineffective in several poor nations because it is often too ambitious, especially considering administrative institutions' ability to compel its execution [6]. Urban green spaces in Africa are still not considered when designing strategies [7].

Current research on collaborative environmental governance policies (CEGP) implementers focuses largely on the following two aspects: Case studies and theoretical models are utilised to undertake qualitative research on collaborative governance models, coordination procedures, and so on [8]. The key assumption is that citizens will engage in the reforms that are enacted. Advertising Regional engagement demands the activation of local communities, as well as the construction and maintenance of effective communication channels with field administrations. [9]. Until now, the literature on public policy in dictatorships has almost exclusively examined the influence of fiscal and electoral policies on regime support, possibly due to an implicit assumption that policies outside the two regions are unlikely to affect the outcome of elections [10]. Policy implementation is an equally vital policy formulation process in realising policy goals. Even if a policy is well-organized and tidy, its objectives will never be accomplished until it is adequately implemented [11].

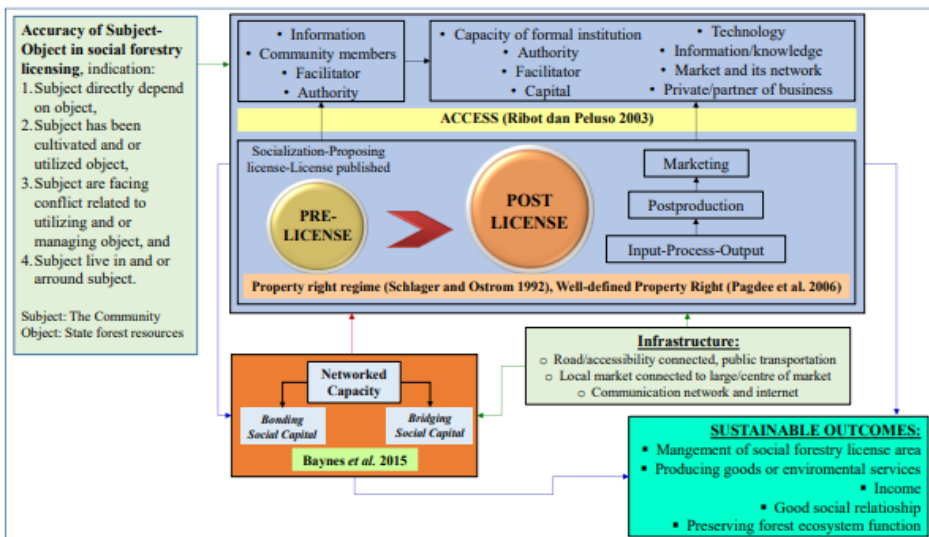


Fig. 1. Relation between community access and other factors in the implementation policy [12]

This component identifies the policy actors and influences their interests.

1. Policy Content This component compares expectations to reality in multiple areas, including interest affected, type of benefits, extent of change envisioned, decision-making site, program implementor, and resource commitment.
2. Policy Development Process This component explores the disparities between what was expected and what was implemented during the policy implementation process. Mazmania's specified characteristics, as well as policy content, dictate how these disparities are examined. This component analyses policy implications, action programs (planned and funded), bureaucratic structure, and communication, as per Edward's idea.
3. The policy context This section identifies a variety of elements that are assumed to influence whether the policy objectives are met. Edward and Grindle's proposed elements of power, interest, and strategy, institutional and regime features, and actor compliance and responsiveness were welcomed.
4. Policy accomplishments. This approach is used to analyse the success of policy implementation, taking into account both the degree of change achieved and the perceived influence on policy objectives. Comparing the outcomes of this identification to the previously stated policy aim [11]

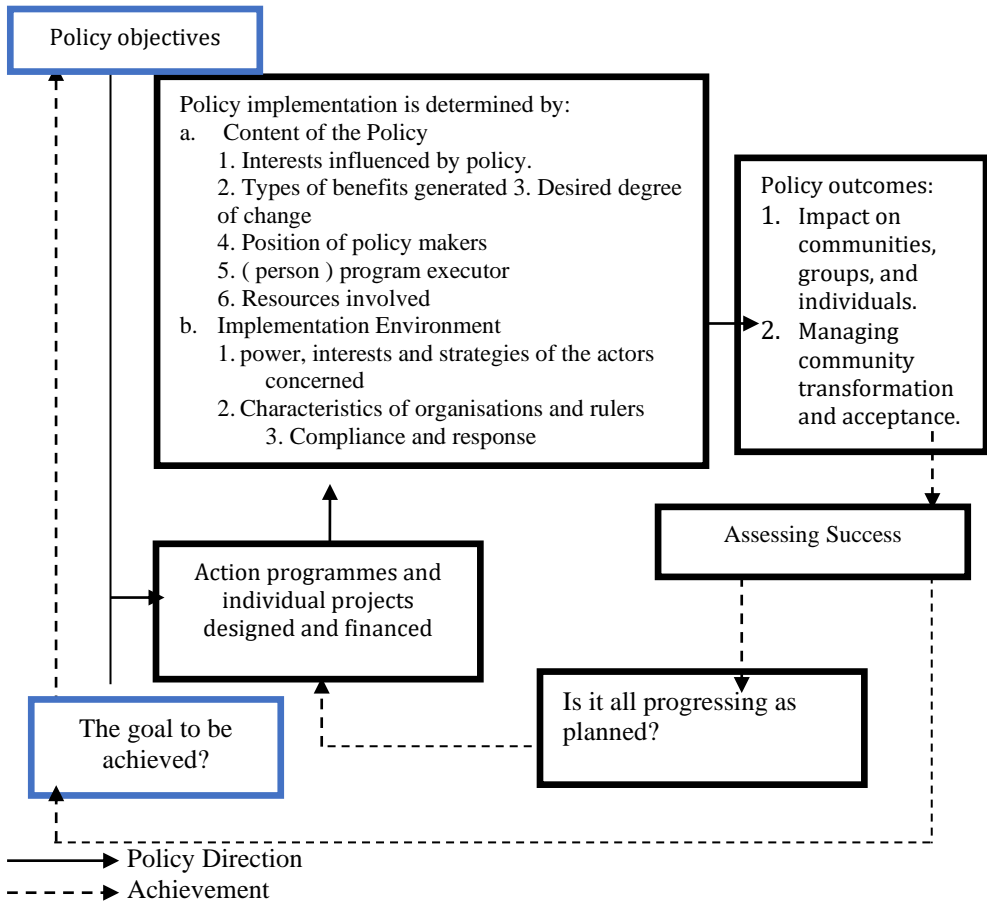


Fig. 2. Merilee S. Grindle's Model for Implementing Policies

2 Method

This study adopts a qualitative approach, using a case study method. Primary and secondary data are gathered through in-depth interviews, observation, and documentation. Key informants were interviewed using the purposive sampling method. The selection of informants or key respondents is deliberate, taking into account people involved in village forest management activities and their comprehension of them. The collected data is separated into two categories: primary data and secondary data. Primary data was acquired through observations and interactions with key informants. Secondary data is obtained through literature reviews, which include sources such as policy documents, reports, scientific journal articles, and mass media pieces. The research was carried out in Indragiri Hilir Regency, Riau Province, Indonesia.

3 Results and Discussion

3.1 Synergy between the people's Palm Oil Replanting Policy and Green Energy Initiatives.

The investigation of the relationship between the People's Palm Oil Replanting (PSR) policy and green energy projects in Indonesia is an intriguing and timely topic in the context of sustainable development. In this respect, comparing PSR targets at the national and provincial levels may shed light on the consequences and strategies needed to achieve sustainable development goals in Indonesia's palm oil and green energy industries. [13] conducted a study on the sustainability of palm oil biodiesel in transportation, which provides major support for this topic.

The study focuses on Malaysia and Colombia's sustainable biodiesel certification structure, biofuel policy, and international cooperation. This provides a valuable perspective for analyzing the influence of biodiesel policies on green energy sustainability in Indonesia. Furthermore, [14] conducted study on the sustainable palm oil certification framework and its impact, which might provide insights into palm oil sector sustainability initiatives. This paper examines sustainable palm oil certification policies in Indonesia and Malaysia, which can be used to better evaluate the influence of PSR policies on environmental sustainability.

In terms of green energy, [15] research on the policy of prohibiting palm oil exports in the middle of the global energy crisis is particularly noteworthy. This study examines how the increase in export tariffs affects Indonesia's export performance and government foreign exchange profits. This is an overview of how palm oil export rules can affect Indonesia's green energy sustainability. Taking into account various studies on policies, green energy, and natural resource management, comparing PSR targets at the national and Riau provincial levels can provide a more complete understanding of the impacts and policies needed to achieve Indonesia's sustainable development goals in the palm oil and green energy sectors. It is hoped that research on the synergy between PSR policies and green energy projects will contribute significantly to the government's and stakeholders' efforts to achieve Indonesia's sustainable development goals.

3.2 Policy Context and Objectives

People's Palm Oil Replanting (PSR) and green energy programs are two key strategies implemented in Indonesia to improve environmental and economic sustainability. PSR is a government program that aims to replace old and inefficient smallholder oil palm

plantations with new, superior, and environmentally friendly kinds. The program attempts to increase yields, improve soil health, and mitigate the harmful effects of decommissioned oil palm plantations. Green energy programs, on the other hand, are concerned with transitioning from fossil fuels to renewable energy. Bioenergy derived from palm biomass is one example. It attempts to minimize greenhouse gas emissions, rely less on fossil fuels, and stimulate the development of greener energy.

The Legal Basis for Smallholder Palm Oil Replanting

1. Plantation Law No. 39 of 2014;
2. Government Regulation No.24 of 2015 for Plantation Fund Collection;
3. Presidential Decree No.66 of 2018 jo. No.61 of 2015 for Oil Palm Plantation Fund Collection and Use;
4. Ministerial Regulation No.18 of 2016 Guidelines for Oil Palm Plantation Rejuvenation;
5. Minister of Finance Regulation No.84 of 2017 for Oil Palm Plantation Replanting Funds BLU BPDPKS.
6. Ministerial Regulation No. 07 of 2019 and No. 15 of 2020 on Human Resource Development, Research and Development, Rejuvenation, and Oil Palm Plantation Facilities and Infrastructure.
7. BPDP-KS President Director Regulations No. Per-7/DPKS/2019, No. Per-8/DPKS/2020, and No. Per-2/DPKS/2021.
8. Kepdirjenbun No.208/Kpts/KB.120/7/2019 replaces No.202/Kpts/KB.120/6/2020.
9. Kepdirjenbun No.189/Kpts/KB.120/10/2022 on Supervision of Oil Palm Replanting for Smallholders with Funds from the Oil Palm Plantation Fund Management Agency.
10. Ministerial Regulation No.3 of 2022 addresses Human Resources Development, Research and Development, Rejuvenation, and Oil Palm Plantation Facilities and Infrastructure.
11. Ministerial Regulation No.19 of 2023 on Human Resources Development, Research, Rejuvenation, and Oil Palm Plantation Facilities and Infrastructure.

Changes in the regulations governing People's Oil Palm Replanting (PSR) are critical to Riau Province's peatland management. Rewetting and paludiculture approaches have emerged as the primary methods for restoring peat swamp ecosystems [16]. Research on the potential carbon storage in peat swamp forests suggests that the carbon content can exceed 50% of the dry weight of biomass, emphasizing the necessity of protecting peat ecosystems as a large carbon reserve [17]. Ecological restoration of peatlands based on independent community groups through revegetation has become an approach used to restore peat ecosystems, which also serve as a major store of carbon stocks (Syahza et al., 2021).

3.3 Synergy and Integration

3.3.1 Potential Synergy

Palm Biomass Bioenergy: One of the most notable synergies between PSR and green energy programs is the use of palm biomass to generate bioenergy. After rejuvenation, oil palm plantation residues like leaves, stems, and other trash can be used to generate bioenergy. This reduces waste while simultaneously increasing the economic value of oil palm crops. For example, biomass waste that would otherwise be discarded can be

converted into bioenergy pellets or briquettes that can be utilized as alternative fuels. Improved Soil Quality and Productivity: Proper oil palm rejuvenation processes can help to enhance soil conditions. Healthy soils promote the growth of more productive oil palm trees while reducing erosion. Increased palm oil production, combined with the use of bioenergy technologies, can boost the energy production and consumption cycle while also adding economic value to the results of replanting.

3.3.2 Positive Environmental Impact

Carbon Emission Reduction: Implementing PSR in an environmentally sustainable manner can help to minimize carbon emissions from outmoded oil palm plants. This, along with palm biomass-based bioenergy production, which replaces fossil fuels, has the potential to reduce overall greenhouse gas emissions. This helps Indonesia meet its international climate change commitments. Peatland Management: PSR can help manage peatlands in a sustainable manner. Forest fires and ecosystem damage can be reduced by using appropriate rejuvenation procedures. The utilization of biomass for bioenergy also contributes to the productive use of peatland waste, decreasing damage and the need to clear new land. The People's Palm Oil Replanting (PSR) strategy can have far-reaching repercussions in a variety of areas, including the economy, society, and the surroundings.

In order to attain sustainability goals in the smallholder palm oil sector, adequate institutional regulations are necessary, as well as encouragement of added value, which can enhance competitiveness. Furthermore, [19] research underlines the necessity of collaboration among numerous organisations, including the government, private sector, and community, in oil palm plantation management rules. In this instance, certifications like ISPO/RSPO are critical to ensuring that PSR policies have a positive economic impact while also taking into account environmental considerations. The impact of PSR policies can also be seen in attempts to boost oil palm farmers' productivity, production, competitiveness, income, and welfare, according to a study by [20]. The PSR program, as a national initiative, intends to assist smallholders in revitalizing their oil palm plantations so that the impact can be seen directly by palm oil industry stakeholders. However, there are hurdles to overcome while implementing PSR regulations, as highlighted in research by [21]. The study demonstrates that cooperative members in Rokan Hilir Regency encounter difficulties in completing the standards for oil palm rejuvenation, emphasizing the need to resolve these concerns in the PSR policy.

Thus, the People's Palm Oil Replanting (PSR) policy can have a positive influence on oil palm farmers' productivity, income, and well-being, but it can also present obstacles in terms of policy implementation and compliance. The collaboration between PSR regulations and green energy programs has the potential to be a significant step toward attaining sustainable development goals in Indonesia's palm oil and green energy industries.

3.4 Obstacles and Challenges in Implementation

The People's Oil Palm Replanting initiative (PSR) in Indonesia is a strategic initiative aiming at enhancing productivity in outdated and inefficient smallholder oil palm plantations while simultaneously mitigating negative environmental repercussions. Despite its enormous potential, the program confronts a variety of challenges and issues that may prevent its execution. The People's Palm Oil Replanting (PSR) strategy in Riau Province has a number of difficulties that must be handled in order to reach long-term development goals.

As stated to [22] research, one of the challenges is limited access to production resources such as superior seeds and fertilizers, which might reduce productivity in

smallholder oil palm plantations. Furthermore, market access and price barriers for Bunches Buah Segar (TBS) pose a challenge to implementing PSR in Riau. According to [23] traditional oil palm farming practices and low plantation yield due to inferior seedlings are other hurdles to the rejuvenation of smallholder oil palm plantations. Riau Province's oil palm replanting operations face additional hurdles, including a lack of market access and the expensive cost of plantation certification.

Furthermore, [24] discovered that low productivity among oil palm farmers, notably in Riau Province, is due to a complex interplay of several variables, both internal and external. In Riau Province, a lack of understanding of appropriate agricultural practices, as well as a lack of access to current agricultural equipment, impedes the implementation of PSR policies. To improve the effectiveness of the People's Palm Oil Replanting policy in Riau Province, efforts must be made to overcome obstacles and challenges, such as providing farmers with better seeds, fertilizers, and modern agricultural technology, as well as improving market access and fair FFB pricing. To build an atmosphere conducive to the success of the rejuvenation initiative, the government, commercial sector, and community must work together. Meanwhile, the hurdles of implementing oil palm replanting include as follows:

1. **Difficulty Obtaining money:** Oil palm growers frequently struggle to secure funds for plantation rejuvenation and bioenergy technology. Without adequate financial assistance, the implementation of this program may be impaired. This issue necessitates specific attention from governments and financial organizations to develop better and more accessible credit plans.
2. **Resistance to Change:** Farmers may be hesitant to implement new approaches due to uncertainty about long-term advantages and lack of knowledge. This necessitates an extensive training program to highlight the benefits of rejuvenation as well as the use of bioenergy technology.
3. **Effective implementation needs collaboration** between government agencies, non-governmental groups, and the corporate sector. Lack of coordination might result in overlapping policies or conflicts of interest. It is critical to create an effective communication forum and coordinate strategies among all parties.

4 Conclusion

The Replanting Program for People's Palm Oil, as well as green energy efforts, have the potential to greatly improve both environmental and economic sustainability. By addressing current issues and implementing the indicated recommendations, these two policies can maximize environmental and economic benefits. Obstacles to PSR implementation include the lack of regulatory harmonization (there are pre-rekomtek and post-rekomtek requirements); the award of 30 million/ha is insufficient to carry out oil palm replanting up to the third (three) year (producing crops); changes in rules are not accompanied by appropriate socialization, resulting in numerous interpretations and the inability of regions and farmers to adopt them; and the preparation of the RAB may not meet the stipulated standards for rejuvenation costs. There is no regulation that governs the appointment mechanism.

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