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# Pineapple (Ananas comosus (L.) Merr.) Cultivation Based on Local Wisdom in Catubouw Village, Arfak Mountains Regency, Indonesia

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ABSTRACT

This study aims to analyze pineapple (Ananas comosus (L.) Merr.) cultivation practices based on local wisdom in Catubouw Village, Arfak Mountains Regency, Indonesia. A descriptive survey method was employed using observation and in-depth interviews with 20 purposively selected farmers. The results indicate that pineapple cultivation is traditionally managed on customary (ulayat) land by nuclear families. The cultivation process includes manual land clearing, the use of local planting materials derived from crowns and suckers, and the application of a traditional planting technique known as "tikam kayu," without standardized spacing or raised beds. Crop maintenance relies on manual weeding without the use of chemical fertilizers or artificial irrigation. Despite minimal technological input, the pineapples produced exhibit distinctive natural sweetness and high quality. These practices are ecologically sustainable and culturally embedded; however, they face significant challenges related to infrastructure limitations and restricted market access, resulting in low farm-gate prices. This study contributes to the development of sustainable agriculture by highlighting the role of local wisdom in supporting environmentally friendly farming systems while identifying key constraints in agribusiness development

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## INTRODUCTION

Agriculture plays a strategic role in Indonesia's economic development, particularly in ensuring food security and improving rural livelihoods. As a tropical country, Indonesia has strong potential for horticultural development, including pineapple (Ananas comosus (L.) Merr.), which has significant economic value in both domestic and international markets.

However, the development of pineapple agribusiness still faces several challenges, including limited infrastructure, low adoption of modern agricultural technologies, and restricted market access. In many rural areas, especially in eastern Indonesia, farming practices remain largely traditional and are strongly influenced by local knowledge systems.

Catubouw Village in the Arfak Mountains Regency represents a unique case where pineapple cultivation is carried out based on local wisdom inherited across generations. Farmers rely on customary land systems, traditional planting techniques, and environmentally adaptive practices. Despite these strengths, the economic potential of pineapple farming has not been fully optimized due to structural limitations.

Previous studies have mainly focused on technical and productivity aspects of pineapple cultivation, with limited attention to the integration of local wisdom and sustainability in mountainous indigenous communities. Therefore, this study fills this gap by examining pineapple cultivation practices through socio-cultural, ecological, and agronomic perspectives.

The objective of this study is to analyze pineapple cultivation systems based on local wisdom as a foundation for sustainable agricultural development.

## LITERATURE REVIEW

### *Pineapple Cultivation and Agribusiness*

Pineapple is a high-value horticultural commodity with strong market demand. Its cultivation involves several stages, including land preparation, seed selection, planting, maintenance, and harvesting. Optimizing these stages can significantly improve productivity and product quality (H. Lestari & Dyah Mustikarini, 2023)

Agribusiness development in pineapple farming requires not only efficient production but also effective value chain management, including post-harvest handling and market access (Mariati et al., 2023).

### *Local Wisdom in Agricultural Systems*

Local wisdom refers to indigenous knowledge systems that guide natural resource management. In agriculture, it plays a crucial role in maintaining ecological balance and sustainability (Gallois et al., 2015).

Traditional farming systems are often characterized by low external input, reliance on natural processes, and adaptive strategies to local environmental conditions. These systems are considered resilient and environmentally friendly (Hadid et al., 2023).

### *Sustainable Agriculture Perspective*

Sustainable agriculture integrates economic viability, environmental protection, and social equity. Practices such as organic fertilization, manual weed

control, and minimal chemical use contribute to long-term sustainability (Firmansyah et al., 2023)

Traditional farming systems, particularly in indigenous communities, often align with sustainability principles, although they are not formally structured (Indrawati et al., 2022)

***Research Gap***

Existing studies largely emphasize technological improvements in pineapple cultivation, with limited exploration of local wisdom-based systems in mountainous indigenous regions.

This study addresses this gap by analyzing how local knowledge contributes to sustainable agricultural practices and identifying constraints in agribusiness development.

Table 1. Comparison of Previous Studies and Research Gap

| No | Author & Year | Focus of Study | Key Findings | Limitations | Research Gap |
|---|---|---|---|---|---|
| 1 | Lestari et al., (2020) | Pineapple productivity improvement | Mulching increases yield significantly | Focus on technical aspects only | Does not consider socio-cultural factors |
| 2 | Indrawati et al. (2022) | Traditional farming systems | Strong role of indigenous knowledge | Limited commodity-specific analysis | No focus on pineapple cultivation |
| 3 | Mariati et al., (2023) | Pineapple agribusiness strategy | Market access affects farmer income | Limited ecological perspective | No integration with local wisdom |
| 4 | Firmansyah et al. (2023) | Organic farming impact | Improves sustainability and soil health | General crop focus | Not specific to indigenous systems |
| 5 | Hadid et al., (2023) | Climate-smart agriculture | Adaptive practices improve resilience | Technology-oriented | Lacks cultural dimension |
| 6 | This Study | Pineapple cultivation based on local wisdom | Integrates ecological, cultural, and agribusiness aspects | — | Fills gap by combining local wisdom + sustainability + agribusiness |

***Conceptual Framework***

The conceptual framework in this study can be seen in Figure 1 below:

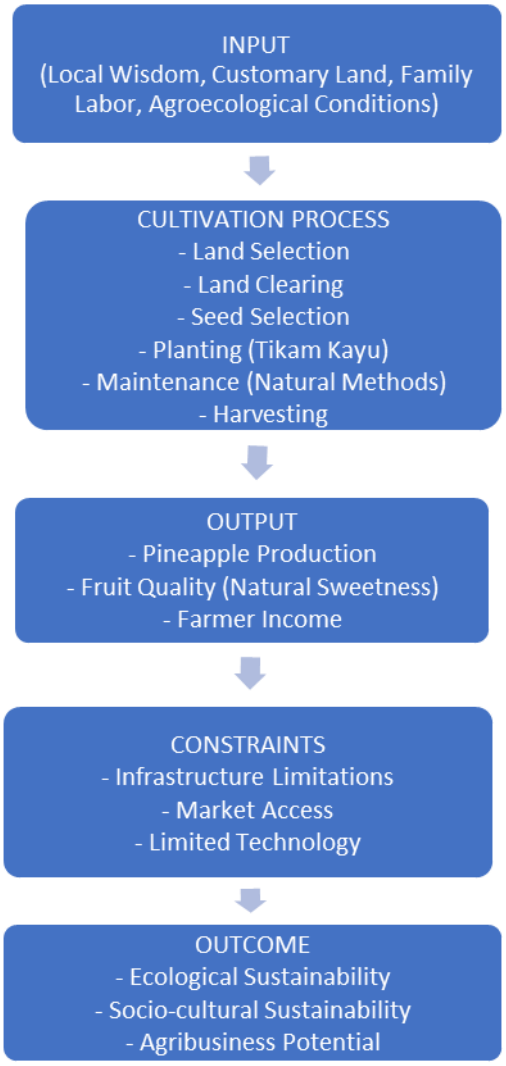


Figure 1. Conceptual Framework of Pineapple Cultivation Based on Local Wisdom

## METHODOLOGY

This study was conducted in Catubouw Village, Arfak Mountains Regency, from October to November 2025. The study location was selected purposively, considering that the area represents a center of pineapple production based on traditional farming systems.

The research employed a descriptive qualitative approach using survey methods. Data were collected through direct observation, in-depth interviews, and documentation. The respondents consisted of 20 farmers selected using snowball sampling, where participants were identified based on recommendations from initial respondents who possessed relevant knowledge of pineapple cultivation practices.

The data collected included both primary and secondary data. Primary data were obtained from field observations and interviews, while secondary data

were gathered from literature, institutional reports, and statistical data from the Central Bureau of Statistics (BPS).

Data analysis was conducted using descriptive analysis techniques, including data reduction, data presentation, and conclusion drawing. To ensure data validity, source and method triangulation were applied.

## RESULT

### *Local Wisdom-Based Pineapple Cultivation System*

The findings show that pineapple cultivation in Catubouw Village is conducted using traditional methods based on local knowledge passed down through generations. This farming system is not solely production-oriented but also reflects the social and cultural values of the community.

Land selection is carried out on customary family-owned land, considering ecological indicators such as soil fertility and natural vegetation. This practice demonstrates local understanding of soil fertility cycles, which aligns with the principles of sustainable agriculture.

Land clearing is conducted manually using simple tools such as machetes and axes. The process involves family members, reflecting a collective labor system based on kinship.

### *Planting and Maintenance Techniques*

Planting is conducted using a traditional technique known as "tikam kayu," which involves making planting holes using wooden sticks without intensive soil tillage. This technique reflects the community's adaptation to hilly topography.

Crop maintenance is carried out without the use of chemical fertilizers or artificial irrigation. Weed control is done manually, while pest control relies on natural methods. These practices indicate that the cultivation system is environmentally friendly and relies on minimal external inputs.

However, the limited use of technology results in low intensity of crop management, which may affect long-term productivity.

### *Harvesting and Marketing System*

Based on research findings, pineapple harvesting in Catubouw Village is carried out by the nuclear family, consisting of a father, mother, and children, and may involve close relatives with close kinship ties. Harvesting takes place on family-owned land within the customary land system, so cultivation and harvest timing are fully under the family's control. This collective involvement demonstrates that harvesting serves not only as an economic activity but also as a family-based social practice (Toansiba et al., 2021).

Harvesting is conducted manually at 12–14 months after planting. The harvested products are partly consumed by households and partly sold in markets in Manokwari.

The main constraint faced by farmers is limited transportation infrastructure and market access. High transportation costs result in relatively low farm-gate prices, reducing the economic value of pineapple production.

These findings indicate that the primary issue lies not in production but in distribution and marketing systems.

## DISCUSSION

The findings of this study reveal that pineapple cultivation in Catubouw Village is strongly rooted in local wisdom and traditional ecological knowledge. Unlike modern intensive agricultural systems, the cultivation practices observed rely on low external inputs and are highly adapted to local environmental conditions.

This aligns with previous studies suggesting that traditional farming systems often exhibit higher ecological resilience due to their reliance on natural processes and indigenous knowledge (Gallois et al., 2015; Hadid et al., 2023). In Catubouw, the use of customary land (ulayat) and family-based labor reflects a socio-cultural system that integrates economic activities with social cohesion. This finding supports (Indrawati et al., 2022), who emphasize that indigenous agricultural systems in the Arfak Mountains are deeply embedded in cultural values and land tenure systems.

From an agronomic perspective, the absence of chemical fertilizers and irrigation systems indicates a low-input farming model. While this may limit productivity compared to intensive systems, it contributes to environmental sustainability. (Firmansyah et al., 2023) argue that reduced chemical input can improve soil health and long-term productivity, which is consistent with the findings of this study. Furthermore, the distinctive sweetness of Catubouw pineapples suggests that natural cultivation methods may enhance product quality, providing a potential competitive advantage in niche markets.

However, despite its ecological and cultural strengths, the system faces structural constraints, particularly in infrastructure and market access. This finding is consistent with (Mariati et al., 2023), who highlight that agribusiness development in rural areas is often hindered by weak value chain integration. In the case of Catubouw, high transportation costs and limited market access reduce farmers' bargaining power and income levels.

This study also highlights a critical paradox: while traditional systems are sustainable, they are often economically marginalized. Therefore, a hybrid approach that integrates local wisdom with appropriate technological innovations is necessary. Such an approach has been recommended by Arifin et al. (2023), who emphasize the importance of combining traditional knowledge with modern agribusiness strategies to enhance rural economic development.

In this context, interventions should not aim to replace traditional practices but rather to strengthen them through adaptive innovations, such as improved post-harvest handling, local agro-processing, and market linkage development. By doing so, pineapple cultivation in Catubouw can evolve into a sustainable agribusiness model that balances ecological integrity, cultural values, and economic viability.

## CONCLUSIONS AND RECOMMENDATIONS

Pineapple cultivation in Catubouw Village is still conducted traditionally based on local wisdom, covering land selection, land preparation, planting, maintenance, and harvesting. This system has proven to be adaptive to mountainous environments and sustainable both ecologically and socially.

However, pineapple farming development still faces challenges, particularly in terms of cultivation technology, infrastructure, and market access. Therefore, policy interventions are needed to integrate local wisdom with technological innovations to improve productivity and farmer welfare.

***Recommendations***

1. Farmers should integrate local wisdom practices with simple technological innovations to improve productivity.
2. Local governments need to improve transportation infrastructure and market access to support pineapple agribusiness development.
3. Pineapple-based agroindustry models should be developed to increase product value.
4. Further research should examine economic aspects and sustainability of pineapple farming systems in greater depth.

## FUTURE STUDY

This research still has limitations so further research is needed related to the topic of Pineapple (Ananas comosus (L.) Merr.) Cultivation Based on Local Wisdom in Catubouw Village, Arfak Mountains Regency, Indonesia to perfect this research and increase insight for readers.

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