

Economic Value Added in Pineapple Processing: A Case Study of the Wak Nur Candy Agroindustry, North Aceh

Imel Marsanda*¹, Meileni Yuningsih², Zulkarnain Tambunan³, Desi Safitri⁴

Agribusiness, Agriculture, Malikussaleh universit, Indonesia

imelmarsanda@gmail.com, desiksp201@gmail.com

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Abstract

The agricultural sector plays a strategic role in the Indonesian economy, particularly through the development of agro-industries based on horticultural commodities such as pineapple. Pineapple is a perishable commodity that requires processing to reduce yield losses and increase the economic value of the product. This study aims to analyze the amount of added value and profits obtained from processing pineapples into candied fruit at the Wak Nur Candied Fruit Agroindustry in Krueng Geukueh, Dewantara District, North Aceh Regency. The research method used is a case study method with primary data collection through interviews and observations, as well as secondary data from relevant literature. Data analysis was performed using the Hayami method to calculate the added value per kilogram of raw material. The results showed that the use of 55 kg of pineapple raw material per month produced 50 kg of candied pineapple per month with a conversion factor of 0.9. The added value obtained was IDR 14,000/kg of raw material with an added value ratio of 51.85 percent, which is classified as high added value. The profit obtained from processing one kilogram of pineapple into candy is Rp5,750 with a profit margin of 41 percent. The results of this study indicate that the pineapple candy agroindustry is capable of providing high added value and profits, making it a potential venture for processing agricultural products to increase the income of business actors.

INTRODUCTION

The agricultural sector remains a key pillar of Indonesia's economy through its contributions to gross domestic product (GDP), employment, and food security. Within this sector, horticultural commodities have received increasing attention due to their economic potential and relevance for agro-industrial development. One such commodity is pineapple (*Ananas comosus* L. Merr), which is widely recognized for its relatively high productivity, nutritional value, and stable market demand (Yusi, 2016). These characteristics make pineapple an important raw material for downstream processing aimed at increasing product utility and market value.

Despite its potential, pineapple is a highly perishable commodity and therefore vulnerable to post-harvest deterioration. Effective post-harvest handling is required to maintain product integrity, quality, and freshness, while reducing damage and extending shelf life (Fahrozi et al., 2021). In many production areas, however, these requirements are not always adequately addressed. The rapid perishability of pineapple after harvest remains a major cause of post-harvest losses (Ningombam et al., 2019). This problem is further intensified by price fluctuations at the farm level, particularly during peak harvest periods when selling prices tend to decline sharply. As a result, farmers' profit margins are reduced, and the economic sustainability of pineapple-producing areas becomes more fragile.

In this context, agro-industrial processing represents an important strategy for reducing post-harvest losses and improving the economic performance of horticultural commodities. Agro-industry serves as a downstream mechanism that transforms primary agricultural products into secondary products with greater utility, higher selling value, and longer shelf life (Ramadhan et al., 2022). Among processed pineapple products, candied pineapple is one of the more relevant alternatives because it applies sugar as a natural preservative to lower water activity and inhibit

microbial growth, thereby improving product durability in the market. From a broader agro-industrial perspective, such processing also contributes to the creation of added value, which is a central indicator in evaluating the economic performance of processing businesses (Faridawaty et al., 2024).

Added value analysis is particularly useful for examining how far processing activities enhance the economic worth of raw agricultural commodities. The Hayami approach conceptualizes added value as being shaped by both technical and market factors. Technical factors include production capacity, technology application, product quality, raw material quality, and supporting inputs, whereas market factors include output prices, labor wages, and raw material prices (Fauziah et al., 2021). Therefore, an assessment of added value is not only relevant for measuring operational efficiency, but also for understanding the profitability and economic viability of agro-industrial enterprises.

Although studies on agro-industrial value added have been conducted in various contexts, empirical evidence at the level of small-scale pineapple-processing enterprises remains limited in specific local settings. This is particularly the case for the Wak Nur candied pineapple agroindustry in Krueng Geukueh, Dewantara District, North Aceh. To date, no study has explicitly applied the Hayami method to examine the value-added structure of this enterprise. As such, the existing literature provides limited evidence on how pineapple processing generates economic returns in this specific regional context. This gap is important because localized studies can offer more grounded insights into the performance of micro-scale agro-industries, especially in areas where agricultural processing is expected to support rural income diversification.

The production of candied pineapple in this enterprise primarily relies on ripe fresh pineapple, granulated sugar, water, and additional ingredients such as food coloring and salt. The selection of raw materials is an important determinant of product quality, particularly in relation to texture and taste, since fresh pineapples with natural sweetness and firm texture are more suitable for processing (Khanom et al., 2016). These production characteristics indicate that the economic outcome of processing depends not only on output prices but also on raw material quality and processing efficiency.

Based on this background, the present study aims to analyze the added value of raw materials and the profit generated by pineapple processing in the Wak Nur candied pineapple business in North Aceh. Specifically, the study evaluates the extent to which processing activities increase the economic value of pineapple and generate returns for the business. By providing empirical evidence from a local small-scale agro-industry, this study contributes to the regional literature on agro-industrial value added and offers a case-based perspective on the economic potential of pineapple processing. However, since the analysis is limited to a single business unit, the findings should be interpreted within the context of the observed enterprise and should not be generalized without caution.

METHODS

This study was carried out in November 2025 in Krueng Geukueh, Dewantara District, North Aceh Regency, over a one-month period. The research object was a small-scale agroindustry processing pineapple into candied pineapple. Both primary and secondary data were used. Primary data were obtained through direct interviews with the business owner and workers, supported by field observations at the production and sales site, while secondary data were drawn from relevant literature and related documents. Data were analyzed using the Hayami value-added approach, which is widely applied to estimate value added generated by agroindustrial processing activities, including processing and marketing value added (Aponno & Siahaya, 2023).

Table 1. Hayami analysis method

No.	Variable	Value
Output, Input, and Price		
1	Output (Kg/month)	A
2	Raw materials (Kg/month)	B
3	Labor (HOK/month)	C
4	Conversion factor (1/2)	$D = A/B$
5	Labor coefficient (3/2)	$E = C/B$
6	Output price (Rp/Kg)	F
7	Average labor wage (Rp/HOK)	G
Revenue and Profit (Rp/kg raw material)		
8	Raw material price	H
9	Other input contributions	I
10	Output value (4 x 6)	$J = D \times F$
11a	Value added (10-9-8)	$K = J - H - I$
b	Value added ratio ((11a/10) x 100%)	$L\% = (K/J) \times 100\%$
12 a	Labor compensation (5x7)	$M = E \times G$
b	Labor share ((12a/11a) x 100%)	$N\% = (M/K) \times 100\%$
13 a	Profit (11a – 12a)	$O = K - M$
b	Profit margin (13a/11a) x 100%)	$P\% = (O/K) \times 100\%$
Balas Jasa Faktor Produksi		
14	Margin (10-8)	$Q = J - H$
a	Labor income	$R\% = (M/Q) \times 100\%$
b	Contribution of other inputs	$S\% = (I/Q) \times 100\%$
c	Profit	$T\% = (O/Q) \times 100\%$

Source: Hayami, et al in Irhas, et al., 2022

The criteria for classifying added value are as follows (Hubeis, 1997, as cited in Irhas et al., 2022): low if the added value ratio is less than 15 percent, moderate if it ranges from 15 to 40 percent, and high if it exceeds 40 percent. Added value refers to the increase in product value resulting from processing, calculated as the difference between the value of the final product and the costs of raw materials, equipment depreciation, and supporting inputs, excluding labor costs (Agros, 2020).

RESULTS AND DISCUSSION

Executive summary. Using the Hayami value-added framework, Manisan Wak Nur's pineapple-candy processing generated IDR 14,000 value added per kg of raw pineapple and IDR 5,750 profit per kg, with a value-added ratio of 51.85%. The allocation of returns shows labor compensation of IDR 8,250/kg (58.92% of value added) and a margin of IDR 19,000/kg distributed across labor (43.42%), other inputs (26.31%), and profit

Results

Table 1 reports the Hayami-method value-added metrics for Manisan Wak Nur (Krueng Geukueh, Dewantara, North Aceh) for the observation period (Nov 2025). Monthly output was 50 kg of pineapple candy from 55 kg of raw pineapple, implying a conversion factor of 0.9 (kg output/kg raw material). The selling price was IDR 30,000/kg of output, raw material price IDR 8,000/kg, and other input costs IDR 5,000/kg raw material. The output value was IDR 27,000/kg raw material ($0.9 \times 30,000$). The value added was IDR 14,000/kg raw material, yielding a value-added ratio of 51.85%. Labor compensation was IDR 8,250/kg raw material (58.92%), and profit was

IDR 5,750/kg raw material (41%). The margin was IDR 19,000/kg raw material, with factor income shares of labor 43.42%, other inputs 26.31%, and profit 30.26%.

Table R1. Key Hayami value-added metrics (Manisan Wak Nur)

Metric	Value
Output	50 kg/month
Raw material input	55 kg/month
Conversion factor	0.9
Output price	IDR 30,000/kg
Raw material price	IDR 8,000/kg (raw material)
Other inputs	IDR 5,000/kg (raw material)
Output value	IDR 27,000/kg (raw material)
Value added	IDR 14,000/kg (raw material)
Value-added ratio	51.85%
Labor compensation	IDR 8,250/kg (raw material)
Labor share of value added	58.92%
Profit	IDR 5,750/kg (raw material)
Profit share of value added	41%
Margin	IDR 19,000/kg (raw material)
Margin shares	labor 43.42%; other inputs 26.31%; profit 30.26%

Source: Primary data processed in 2025

Discussion

In Hayami's framework, value added refers to the incremental economic value generated through processing activities after deducting the costs of raw materials and non-labor intermediate inputs (Hayami et al., 1987). Based on this perspective, the performance of Manisan Wak Nur indicates that pineapple processing generates a substantial economic contribution at the enterprise level. The value-added ratio of 51.85% shows that more than half of the output value is created during the processing stage rather than being embedded in the raw pineapple itself. This finding confirms that the transformation of fresh pineapple into candied pineapple is not only a strategy to extend the shelf life of a perishable commodity, but also an economically significant value-creation activity (Hayami et al., 1987). Furthermore, the profit share of 41% of value added, equivalent to IDR 5,750/kg, indicates that the enterprise is able to generate positive returns after labor compensation, thereby confirming the economic feasibility of this small-scale agroindustrial business.

The allocation of value added in Manisan Wak Nur also reveals a relatively labor-intensive production structure. Labor absorbs 58.92% of value added and 43.42% of the margin, implying that enterprise performance is highly sensitive to labor productivity and workflow efficiency. This pattern suggests that a considerable share of the benefits generated by processing is distributed to labor rather than retained as profit. In small-scale agroindustries, such a structure is common because production activities are often still dominated by manual operations and limited

mechanization. On the one hand, this condition reflects the role of agroindustry in generating employment and distributing income locally. On the other hand, it also indicates that profitability may be constrained if labor use is not accompanied by efficient production management. Thus, the value-added structure of Manisan Wak Nur reflects both the economic potential of pineapple processing and the operational limitations associated with labor-dependent processing systems (Hayami et al., 1987).

When compared with similar pineapple-based agroindustries, the value-added performance of Manisan Wak Nur can be considered relatively competitive. Its value-added ratio is close to that of pineapple dodol processing in Jalancagak, Subang, which reached 55% (Fadhilah et al., 2023), and is substantially higher than pineapple syrup processing in Basarang, Kapuas, which recorded a value-added ratio of 34.29% (Idsan et al., 2025). However, it remains lower than pineapple chips processing in North Tapanuli, which achieved a value-added ratio of 75% (Sianturi et al., 2024). These differences indicate that value-added performance is strongly influenced by the type of processed product, the scale of production, the level of technology applied, and the composition of production costs. In the case of syrup processing, the use of supporting inputs and labor may create relatively high production burdens in relation to output value, thereby resulting in a lower value-added ratio (Idsan et al., 2025). In contrast, pineapple chips may generate a higher value-added ratio because of stronger product differentiation, the use of supporting equipment, and more favorable packaging and market positioning (Sianturi et al., 2024). Likewise, the relatively similar performance between candied pineapple and dodol pineapple suggests that both products are capable of generating high added value, although their profitability remains dependent on cost efficiency and market acceptance (Fadhilah et al., 2023).

From a managerial perspective, the findings imply at least three practical priorities for improving enterprise performance. First, because labor constitutes the largest component in the distribution of value added, improving labor productivity should become a primary concern. Incremental improvements such as task standardization, the use of simple tools for cutting, draining, and packaging, as well as better workflow arrangement, may directly increase the profit component without requiring changes in selling price. Second, other supporting inputs account for 26.31% of the margin, indicating that tighter cost control over sugar, packaging materials, and utilities is necessary. Measures such as bulk purchasing, supplier comparison, and waste minimization may help improve unit margins. Third, the maintenance or improvement of the conversion factor requires greater attention to raw material selection and process control. Consistent ripeness grading, sanitation, and standardized syrup concentration or drying processes may reduce shrinkage and product rejection, thereby supporting both product quality and competitiveness at the existing price level (Hayami et al., 1987).

From a broader policy standpoint, the results suggest that small-scale agro-processing enterprises such as Manisan Wak Nur would benefit from local institutional support. Programs that reduce transaction costs for micro-processors, including training in quality assurance and food safety, access to microfinance for simple equipment, and facilitation of market linkages, are consistent with the broader role of agroindustry in stabilizing income from perishable agricultural commodities (Fadhilah et al., 2023; Idsan et al., 2025). This is particularly relevant in areas where post-harvest losses and price fluctuations reduce the economic returns from fresh commodity sales. By enabling the transformation of raw pineapple into higher-value products, agroindustrial development can contribute not only to enterprise profitability but also to local income diversification and rural economic strengthening (Sianturi et al., 2024).

Overall, the case of Manisan Wak Nur demonstrates that pineapple processing can create substantial value added and positive profits, but the magnitude and distribution of these gains are shaped by labor intensity, supporting input costs, and process efficiency. Therefore, the economic potential of this enterprise lies not only in the existence of value added itself, but also in the capacity of the business to manage resources efficiently and adapt to the cost and market characteristics of the processed product (Hayami et al., 1987; Fadhilah et al., 2023; Idsan et al., 2025; Sianturi et al., 2024).

CONCLUSION

From the results of the research conducted, the following conclusions can be drawn:

1. PT. Mushiro Jaya Group produces baglogs which are then distributed to partners for cultivation. After the mushrooms are harvested, the harvest is sorted, packaged, and sent back to PT. Mushiro Jaya Group to be distributed to business consumers. Transactions with partners use a cash on delivery payment system when baglogs are shipped. Meanwhile, transactions with business consumers are carried out through a pre-order system, with payments made every Friday. The flow of information in the oyster mushroom supply chain at PT. Mushiro Jaya Group includes market information, information on baglog and oyster mushroom product supplies, and price agreements.
2. Overall, the performance of PT. Mushiro Jaya Group's supply chain to producers and business consumers has shown excellent results. However, in channel 2, from producers to business consumers ordering oyster mushrooms, there are still attributes that need to be improved in order to achieve a superior level, namely order fulfillment.

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