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ANALYSIS OF ADDED VALUE AND DEVELOPMENT STRATEGY OF CASSAVA AGROINDUSTRY IN THE CITY OF BINJAI, INDONESIA

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Abstract:
This study aims to analyze the amount of added value obtained from the cassava agro-industry according to the type of downstream product in the study area; to analyze the cassava agroindustry development strategy in the research area. The data analysis method used is the *hayami* method and SWOT analysis. The results showed that the downstream products of cassava agro-industry development in the study area were *Alen-Alen, Mie Yeye, Opak, Rengginang* and Chips. The added value obtained for Alen – Alen products is Rp. 2000/kg(59.3%), Mie Yeye product is Rp. 1,471/kg (49%), Opak products Rp. 1,692/kg (45%), Rengginang products Rp. 2,596/kg (44%) and Chips products of Rp. 2,250/kg (26%). The added value of cassava processing agro-industry products in the research area is still in the low category, because it is below 50%, except for Alen - Alen products and Based on the results of the SWOT analysis, The strategy for developing the cassava agro-industry in Binjai City is in quadrant I, namely the aggressive strategy, which is implemented, namely the SO strategy to increase production to expand markets, take advantage of raw material prices and processed cassava quality and seek opportunities for modern markets and exports of processed cassava.

Keywords: cassava, downstream products, added value, development strategy

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1. Introduction

Indonesia occupies the third position as the share of world cassava production, which is 9.26% with an average production of 23.90 million tonnes (Ministry of Agriculture 2016). On a national scale, cassava occupies the second position as a food crop with a total production of 21,801,415 tonnes (BPS, 2015).

The potential of cassava as a raw material for the food industry has encouraged MSME entrepreneurs to open businesses in the cassava processing sector. The development of the cassava processing industry which is included in the Micro, Small and Medium Enterprises (MSMEs) sector will contribute to the Indonesian economic sector (Herawati, 2006).

In general, cassava is easily damaged, rots quickly, and bulks up. Sweet potato that has been damaged causes the color to change, the taste to be unpleasant, and sometimes even bitter due to the presence of cyanide acid (HCN) which is toxic (poison). Proper processing of cassava will reduce the risk of damage and decay, can extend its shelf life, and can increase its selling value (Rukmana and Yuniarsih, 2001).

Innovations to increase the added value of cassava can be developed through growing agribusiness in production centers. The development of the cassava processing agro-industry has an impact on efforts to diversify products and increase commodity prices due to continuous demand for raw materials (Prianto, 2011).

The City of Binjai shows that the productivity of cassava has increased by 9.675% per year in the 2007-2017 period and its production has increased by 8.52% with the harvested area increasing by 2.69%. However, the abundance of cassava yields during the main harvest caused the selling price of cassava commodities to decline. This is evidenced by the very low price of fresh cassava at the farm level, which is an average of around IDR 1,100 per kilogram.

Table 1: Production Value by Type of Cassava Downstream Product in Binjai City in 2017-2019

Year	Production Value (Rp)				
	Alen- Alen	**Mie Yeye**	**Rengginang**	**Opak**	**Keripik**
2017	1.560.300	2.120.875	1.397.000	5.550.000	23.560.200
2018	949.424	1.518.065	1.185.335	5.469.008	22.754.120
2019	1.376.000	282.425	1.045.351	4.384.208	22.674.280
Total	**3.885.724**	**3.921.365**	**3.627.686**	**15.403.216**	**68.988.600**

Source: Office of Manpower and Industry Trade Binjai City

It can be seen in Table 1 that there is a decrease in the value of processed cassava production such as alen-alen, yeye noodles, rengginang, opaque and chips in Binjai City. The availability of cassava raw materials also greatly influences the selling price of cassava to cassava processed entrepreneurs in Binjai City, then technical factors and market factors are also a problem for cassava processed entrepreneurs in Binjai City, such as influential technical factors are production capacity, amount of material raw materials

used and labor while market factors that influence include output prices, labor wages, raw material prices and the value of other inputs besides fuel and labor.

The high and fluctuating selling price of raw materials also affects the production value of processed cassava such as chili, salt, garlic, cooking oil and others, so as a result business actors also affect the added value of processed cassava agro-industry. Therefore, business actors also depend on the price of materials on the market. As for the selling price of cassava is Rp. 1,200/kg at the farmer's level, but at the business actor's level it can reach Rp. 1,200 to Rp. 3,500 per kilogram and of course the cassava selling price keeps on changing depending on the amount of cassava production. As for the price of Alen - Alen products are sold at Rp. 9,000/Kg, the price of yeye noodle products is sold at Rp. 6,000/Kg, the price of opaque products is sold at Rp. 8,000/Kg, the price of processed rengginang products is sold at Rp. 12,000/Kg, and the price for processed chips products is sold at Rp. 15,000/Kg, the price of this product is subject to change at any time. Then it can also be seen in Table 1 that production values and output prices are greater, namely for chip products, therefore chip products are more profitable than alen-alen, yeye noodles, opak, and rengginang products and must be encouraged to be developed in the future so that they have higher added value.

It is also known that processed cassava products in Binjai City are still in a raw state, so buyers have to fry them again so they can be consumed and processed products also lose their crispness easily. Processed products also do not have packaging, only use plastic asoy or jute in the marketing process. Branding or labeling on allen-alen, yeye noodles, rengginang, opaque and chips packaging is a step in increasing added value by developing breadfruit products and will attract consumer tastes by looking at the quantity of products made. During the Covid-19 pandemic, business actors also caused difficulties in procuring raw materials, some of which had to be purchased from outside the city and the marketing process, which could not also send processed products outside the city due to restrictions in the transportation sector, which made it difficult for business actors and experienced a decrease in income (Murtiningsih dan Suyanti, 2011).

Based on the explanation above, the researcher wants to further examine how much added value is obtained from the processing of various processed products, namely alen-alen, yeye noodles, coin opak or large opak, rengginang, and sweet potato chips in the study area.

2. Research methods

This research was conducted in the City of Binjai purposively, namely based on certain considerations adapted to the research objectives (Singarimbun and Efendi, 1989). The consideration for choosing this research location is because in Binjai City there are several cassava agro-industry business actors. The population used in this study are cassava agro-industry business actors who have raw materials (their own) or who obtain raw materials (from other people). The sampling method used the Slovin method by taking an error tolerance of 15% (0.15), obtained by 31 cassava agro-industry business actors.

The data collected in this study are primary data and secondary data. The data analysis method used to find out how much added value is the cassava agro-industry according to the downstream product type in the study area, the Hayami method is used to calculate added value.

Table 2: Calculation of Value Added by the Hayami Method

I. Output, Input and Price	
1. Total Output/Product (Kg/Production Process)	A
2. Raw Material Input (Kg/Production Process)	B
3. Labor Input (HOK/Production Process)	C
4. Conversion Factor (Kg Output/Kg Raw Material)	D = A/B
5. Labor Coefficient (HOK/Kg Raw Material)	E = C/B
6. Output Price (Rp/Kg)	F
7. Labor Average Wages (Rp/Production Process)	G
II. Acceptance and Profits	
8. Raw Material Input Prices (Rp/Kg)	H
9. Contribution of Other Inputs (Rp/Kg)	I
10. Output Value (Rp/Kg)	J = D x F
11. Value Added (Rp/Kg)	K = J – H – I
- Value Added Ratio (%)	I% = K/J x 100%
12. Labor Income (Rp/Kg)	M = E x G
- Labor Share (%)	N% = M/K x 100%
13. Profit (Rp/Kg)	O = K – M
- Profit Rate (%)	P% = O/J x 100%
III. Reply to Owners of Factors of Production	
14. Margin (Rp/Kg)	Q = J – H
- Labor Income (%)	R% = M/Q x 100%
- Contribution of Other Inputs (%)	S% = I/Q x 100%
- Entrepreneur Profit (%)	T% = O/Q x 100%

Source: Hayami et al., 1987.

Where, the test criteria are:

a) If the added value is > 50%, then the added value is said to be high.
b) If the added value is <50%, then the added value is said to be low.
Then the data analysis method used the SWOT analysis method (Fajar, 2016).

Table 3: SWOT Matrix

OT / SW	**Strengths**	**Weakness**
	Determine 3-5 internal strength factors	Determine 3-5 factors of internal weakness
Opportunities	**Strategy SO**	**Strategy WO**
Define 3-5 external opportunity factors	Create a strategy that uses strengths to take advantage of opportunities	Create strategies that minimize weaknesses to take advantage of opportunities
Threats	**Strategy ST**	**Strategy WT**
Define 3-5 external threat factors	Create strategies that use strengths to overcome threats	Create strategies that minimize weaknesses to avoid threats

Source: Freddy (2014).

Data collection was carried out using the internal strategic factor matrix model, the external strategic factor matrix as shown below:

Table 4: Internal Strategy Factor Matrix and External Strategic Factor Matrix

Rating	**Category**	**Internal Factor**	**External Factor**
4	Very large	Strength	Opportunity
3	Large	Strength	Opportunity
2	Large enough	Strength	Opportunity
1	Not large	Strength	Opportunity
1	Very large	Weakness	Threat
2	Large	Weakness	Threat
3	Large enough	Weakness	Threat
4	Not large	Weakness	Threat

Source: Fauzi (2015).

Table 5: Internal/External Strategy Factor Matrix Table

Strategy Factor Internal External			
Strength / Opportunity	**Rating**	**Weight**	**Scoring (Rating x Weight)**
1. 2. 3. 4. 5.			
Total Strength / Opportunity Weight			
Weaknesses / Threats	**Rating**	**Weight**	**Scoring (Rating x Weight)**
1. 2. 3. 4. 5.			
Total Weakness / Threat Weight			

Source: Freddy (2014).

Based on Table 5 above, the steps taken in determining the strategic factors are to determine the factors that are weaknesses, strengths and opportunities for threats in

column 1, then give each of these factors a weight. Then rank each factor from 4 (very high) to 1 (not great) in column 3 based on the manufacturer's response to that factor. Then, lastly, multiply each factor weight by the rating to get the score in column 4. After that, the results of the analysis in the internal strategic factor matrix table and external strategic factor are assigned to the position matrix.

3. Results and Discussion

3.1 Calculation of added value from the processing of *Alen – Alen, Mie Yeye, Opak, Rengginang* and Chips

a) First, from the added value analysis table of the Hayami Method, it can be seen that the *Alen - Alen* processing margin obtained from the output value minus the input price of raw materials is Rp. 2,125, with a percentage of labor income of 72%, the contribution of other inputs is Rp. 6%, and the entrepreneur's profit is 22%. From the research results, it was obtained that the average amount of added value in *Alen - Alen* processing businesses in Binjai City was Rp. 1,509.22 with an added value ratio of 59.3% (> 50%). If the added value is > 50, then the added value is stated to be high.
b) Second, from the added value analysis table of the Hayami Method, it can be seen that the Yeye Noodle processing margin obtained from the output value minus the input price of raw materials is Rp. 1,790, with a percentage of labor income of 67%, the contribution of other inputs is Rp. 18%, and the entrepreneur's profit is 16%. From the research results, it was obtained that the average amount of added value in the *Yeye Noodle* processing business in Binjai City was Rp. 1,471 with a value-added ratio of 49% (<50%). If the added value is <50 then the added value is stated to be low.
c) Third, from the added value analysis table of the Hayami Method it can be seen that the *Opak* processing margin obtained from the output value minus the input price of raw materials is Rp. 2,206, with a percentage of labor income of 48%, the contribution of other inputs is Rp. 23%, and the entrepreneur's profit is 29%. From the research results, it was obtained that the average amount of added value in the *Opak* processing business in Binjai City was Rp. 1,692 with a value-added ratio of 45% (<50%). If the added value is <50 then the added value is stated to be low.
d) Fourth, from the added value analysis table of the Hayami Method, it can be seen that the *Rengginang* processing margin obtained from the output value minus the raw material input price is Rp. 4,350, with a percentage of labor income of 25%, the contribution of other inputs is Rp. 40%, and the entrepreneur's profit is 35%. From the research results, it was obtained that the average amount of added value in *Rengginang* processing businesses in Binjai City was Rp. 2,596 with a value-added ratio of 44% (<50%). If the added value is <50 then the added value is stated to be low.

e) Fifth, from the added value analysis table of the Hayami Method, it can be seen that the chips processing margin obtained from the output value minus the input price of raw materials is Rp. 6,380, with a percentage of labor income of 16%, the contribution of other inputs is Rp. 65%, and the entrepreneur's profit is 19%. From the research results, it was obtained that the average amount of added value in chips processing businesses in Binjai City was Rp. 2,250 with a value-added ratio of 26% (<50%). If the added value is <50 then the added value is stated to be low.

Table 6: Added Value of Processing *Alen – Alen, Mie Yeye, Opak, Rengginang* and Chips

Variable	**Value**				
I. Input, Output and Price	***Alen - Alen***	***Mie Yeye***	***Opak***	***Rengginang***	***Keripik***
1. Output (Kg)	120	205	98,5	59	43
2. Input (Kg)	320	425	234	140	126
3. Labor (HKO)	4,25	4,425	2,7	2	1,5
4. Conversion Factor	0,375	0,48	0,42	0,42	0,34
5. Labor Coefficient (HKO/Kg)	0,013	0,010	0,012	0,014	0,012
6. Output Price (Rp)	9.000	6.250	8.900	14.000	25.727
7. Labor Wages (Rp/HKO)	115.000	114.500	91.442	75.179	84.727
II. Acceptance and Profits	***Alen - Alen***	***Mie Yeye***	***Opak***	***Rengginang***	***Keripik***
8. Raw Material Prices (Rp/Kg)	1.250	1.225	1.540	1.550	2.400
9. Contribution of Other Inputs (Rp/Kg)	125	319	514	1.754	4.130
10. Output Value (Rp/Kg)	3.375	3.015	3.746	5.900	8.780
11. a. Value Added (Rp/Kg)	2.000	1.471	1.692	2.596	2.250
b. Value Added Ratio (%)	59,3%	49%	45%	44%	26%
12. a. Labor Income (Rp/Kg)	1.527,3	1.192,1	1.055,1	1.074	1.009
b. Labor Share (%)	76%	81%	62%	41%	45%
13. a. Profit (Rp/Kg)	473	279	637	1.522	1.241
b. Profit Rate (%)	24%	19%	38%	59%	55%
III. Production Factor Owner Remuneration	***Alen - Alen***	***Mie Yeye***	***Opak***	***Rengginang***	***Keripik***
14. Margins	2.125	1.790	2.206	4.350	6.380
a. Direct Labor Income (%)	72%	67%	48%	25%	16%
b. Contribution of Other Inputs (%)	6%	18%	23%	40%	65%
c. Company Owner Profit (%)	22%	16%	29%	35%	19%

Source: Primary Data (processed), 2023.

3.2 Strategy for the Development of Cassava Agroindustry in Binjai City

Based on Table 6 after analysis by compiling strategic factors in the SWOT matrix, this matrix produces four possible strategic alternatives, namely the S-O strategy (Strengths-Opportunities), S-T strategy (Strengths-Threats), W-O strategy (Weakness-Opportunities), W-T strategy (Weakness-Threats).

Table 7: SWOT Analysis Matrix

IFAS / EFAS	**Strengths**	**Weakness**
	1) Labor Skills 2) Business Experience 3) Long Lasting Products 4) Affordable Product Selling Prices 5) Products without Food Preservatives	1) Business Capital 2) Packaging 3) Length of Production Process 4) Lack of Promotion
Opportunities	**Strategy S-O**	**Strategy W-O**
1) Raw Material Availability 2) Cheap Prices of Raw Material 3) Processed Cassava Breadth of Marketing	1) Increase Production To Expand Market (S1, S2, S3, S4, S5 and O1) 2) Utilizing Raw Material Prices and Processed Quality of Cassava (S1, S2, S3, S4, S5 and O2) 3) Looking for Modern Market Opportunities and Exports of Processed Cassava (S1, S2, S3, S4, S5 and O3)	1) Improve the appearance of processed cassava products. 2) Cooperate with banking institutions and other institutions.
Threats	**Strategy S-T**	**Strategy W-T**
1) No Training from the Government 2) Absence of Help from the Government 3) Unstable Weather Changes 4) Absence of Business Partners	1) Utilizing a skilled and agile workforce with business experience. 2) Increase knowledge about cassava processing.	1) Conduct independent/internal training for employees even though there is no training from the government. 2) Establish cooperation with other parties.

Source: Primary Data Analysis.

3.3 S-O Strategy

This strategy was created by utilizing the strengths and opportunities as much as possible for the cassava agro-industry development strategy in Binjai City, namely:

1) Increase Production to Expand Market (S1, S2, S3, S4, S5 and O1)
2) Utilizing Raw Material Prices and Processed Quality of Cassava (S1, S2, S3, S4, S5 and O2)

4. Conclusion

1) The downstream products of cassava agro-industry development in the research area are Alen-Alen, Mie Yeye, Opak, Rengginang and Chips. The added value obtained for Alen – Alen products is Rp. 2000/kg(59.3%), Mie Yeye product is Rp. 1,471/kg (49%), Opak products Rp. 1,692/kg (45%), Rengginang products Rp. 2,596/kg (44%) and Chips products of Rp. 2,250/kg (26%). The added value of

cassava processing agro-industry products in the research area is still in the low category, because it is below 50%, except for Alen - Alen products.

2) Based on the results of the SWOT analysis, the cassava agro-industry development strategy in Binjai City is in quadrant I, namely the aggressive strategy, which is implemented, namely the SO strategy to increase production to expand markets, take advantage of raw material prices and processed quality of cassava and seek modern market opportunities and exports of processed cassava.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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