DIVERSIFICATION OF PROCESSED FOODS AS AN EFFORT TO INCREASE THE INCOME OF CASSAVA FARMERS IN BENGKULU TENGAH REGENCY

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Abstract

Cassava is a commodity with high productivity and is profitable to cultivate. Demand for consumption and industrial processing is relatively high, especially as raw materials for processed food. To increase the sales volume of a product, one of the efforts that can be made is to diversify processed products. With a qualitative descriptive method, this study was conducted on farmer groups in the Sungai Suci, Pondok Kelapa sub-district, Bengkulu Tengah Regency. In addition to increasing creativity, diversifying locally processed products increase people's income and help farmers minimize losses due to falling prices during the main harvest. It is hoped that after the diversification of locally processed food products, the community will be able to take advantage of business opportunities from locally processed products based on cassava commodities.

Keywords: diversification, cassava, processed food

1 INTRODUCTION

Cassava is an important food source, meaning for the community's economy. Cassava is a source of local carbohydrates besides rice and corn but cannot be stored long after harvesting. One of the efforts to reduce the losses of cassava farmers during the main harvest is to diversify their yields in the form of durable food. That way, in addition to reducing losses, it can also increase farmers' income. According to Tjiptono [7], diversification is a strategy to develop new products for new markets. Product diversification is an effort made by companies

to diversify products or services by creating products or services by creating new products or services to suit the tastes and needs of consumers to increase sales. Product diversification is an effort to find and develop new products or markets, or both, to pursue growth and increase sales, profitability, and flexibility [8].

Cassava can be processed into various local food products such as chips, rengginang, tape, cassava, cassava flour, modified cassava flour (Modified Cassava Flour or mocaf), tapioca flour, sago kasbi, and cassava. While non-food products for industry such as maltodextrin, glucose, fructose, sorbitol, bioethanol, and various organic acids [5], stated that snack food made from cassava flour in the culinary industry has the potential to continue to increase rapidly with the development of the use of mocaf flour as a flour that can be used as flour substitute for wheat. These processed products are products that can be developed because they have economic value. In addition, these products also have a reasonably long shelf life, making it possible to produce them in large quantities. So far, most processed forms consumed are boiled, fried, and so on, which are not durable, so they cannot be produced in large quantities because they are not durable.

Processing processed cassava will impact farmers' income and added value of cassava products, prolong storage time, and create jobs in rural areas [6]. In addition, processing yields can increase the bargaining power of cassava farmers at harvest time from a decrease in the selling price of fresh cassava [3]. One of the farmer groups in Bengkulu that diversifies cassava into various processed food products is the Sungai Suci Farmers Group in Pasar Pedati Village, Pondok Kelapa District, Central Bengkulu Regency. This farmer group is the center for processing cassava chips in Central Bengkulu Regency. Besides chips, farmers also process cassava into mocaf flour and rengginang mocaf. This study aims to determine the additional benefits and added value of the business of processing chips, mocaf flour, and rengginang mocaf as an effort to increase the income of farmers in these farmer groups.

2 METHODOLOGY

The research was conducted at Sungai Suci Farmers Group, Central Bengkulu Regency, in September 2022. This group was formed in 2008, consisting of 20 farmers who live in Hamlet III Pasar Pedati Village, Pondok Kelapa District. Members of farmer groups cultivate cassava on dry land covering an area of approximately 65 ha. Farmers grow cassava in monoculture with a planting time setting that ensures the availability of fresh cassava raw materials continuously throughout the year for the manufacture of chips, mocaf flour, and rengginang mocaf.

The data collected in this study are data on processing and costs (input) and results (output) of the processing business of three processed cassava products, namely chips, mocaf flour, and rengginang mocaf. Data was collected through focus group interviews or Focus Group Discussions (FGD) and participating observations. The FGD involved 6 respondents, five cassava processing farmers, and one agricultural instructor. The researcher acted as a discussion facilitator by using an interview guide. Meanwhile, participating observations were carried out by observing the process of making processed cassava products.

The data obtained were analyzed descriptively using two methods of analysis. The first analysis method uses MBCR (Marginal Benefit Cost Ratio) to see the additional profit as an indicator of economic feasibility due to an additional variable cost [1], formulated as Equation (1), where: Bn is the n-th income, and Cn is the n-th variable cost.

$$MBCR = \frac{\mathrm{B(n+1)} - \mathrm{Bn}}{\mathrm{C(n+1)} - \mathrm{Cn}} \quad (1)$$

The second analysis is the added value analysis using the Hayami Method to describe the difference between the product value and the cost of raw materials and other inputs but does not include labor [4]. The components of calculating the added value using the Hayami Method are shown in ***Table. 1***.

Table 1. *Components of the calculation of added value using the Hayami Method.*

Variable	Code	Method of calculation
I. Output, input, and price		
Output (kg)	1	
Input (kg)	2	
Labor (org)	3	= 1/2
Conversion factor	4	= 3/2
Labor coefficient	5	
Output price (Rp/kg)	6	
Labor wage (Rp/o)	7	
II. Revenue and profit		
Raw material price (Rp/kg)	8	= 4×6
Contribution of other inputs (Rp/kg)	9	=10-9-8
Output value (Rp/kg)	10	= (11 /10) x 100%
Value added (Rp/kg)	11	= 5 x 7
Value added ratio (%)	12	= (13 /11) x 100%
Labor benefits (Rp/kg)	13	= 11 – 13
Labor share (%)	14	= (15 /11) x 100%
Profit (Rp/kg)	15	
Profit rate (%)	16	
III. Fees for the owner of factors of production	17	= 10 – 8
Margin (Rp/kg)	18	= (13 / 17) x 100%
Labor benefits (%)	19	= (9 / 17) x 100%
Contribution of other inputs (%)	20	= (15 / 17) x 100%
Profit (%)		

Source: Hayami et al. (1987) in Kustiari (2012)

3 RESULTS

Diversification of Cassava in Sungai Suci Farmers Group Pasar Pedati Village is a cassava production center in Central Bengkulu

Regency. This village is one of 17 villages in Pondok Kelapa District, 1 km from the sub-district capital and relatively close to Bengkulu City (the capital of Bengkulu Province), which is only about 15 km. Of the 99 ha of cassava harvested area in Central Bengkulu Regency [2], 65 ha are in Pasar Pedati Village. Pasar Pedati Village consists of 13 RTs dominated by local ethnic groups (Lembak and Rejang Tribes). The number of farmer groups in Pasar Pedati Village is four groups. The Sungai Suci Farmers Group is in RT 3, whose residents are ethnic Javanese, consisting of 20 farmers.

The Sungai Suci Farmer Group was formed in 2008 by the Javanese overseas community, who came in waves and began to live in RT 3 Desa Pasar Pedati in 1985. The first group that came to RT 3, totaling ten families, were workers who were paid to maintain and cultivate the land. Vacant land in the area by the owners who live outside the village. Most Sungai Suci Farmer Group members make a living as farmers and processors of cassava, especially chips. Men work in cultivating activities while women farmers in product processing activities. The produce is sold to middlemen (collectors) who distribute it to markets in Bengkulu City, Central Bengkulu Regency, and other regencies in Bengkulu Province.

Farmers use a local variety of cassava called "Jasmine Yam" as raw material for making chips. Farmers like the Jasmine sweet potato because the harvest time is faster (6 months old plants can be harvested), the tuber shape is straighter with a denser texture (not soft), so it is easy to slice when making chips, the color of the chips is whiter. Ensuring the continuity of the production of the chips required the availability of fresh cassava in sufficient quantities. Therefore, farmers do not plant cassava simultaneously but adjust the cropping pattern so they can always harvest. Usually, the production of chips will decrease during school holidays and the fasting month due to reduced demand from collecting traders. Therefore, it is necessary to diversify processed food products from cassava.

In 2012, the Sungai Suci Farmers Group received the assistance of a unit of mocaf-making equipment from the Bengkulu Provincial

Agriculture Office to diversify processed food products from cassava. Initially, the technology applied was unable to produce mocaf flour with good quality because there was still a cassava aroma from the mocaf flour produced. Improvements in the quality of mocaf flour were then carried out in 2014 through technical guidance from BPTP Bengkulu. The resulting mocaf flour is then used as raw material for local culinary products such as rengginang, pastries, mpek mpek, and sponge cakes. However, mocaf flour and its derivative culinary products have not developed due to marketing difficulties.

At the time of the study, only three processed products from cassava were still produced by the Sungai Suci Farmers Group for commercial purposes, namely cassava chips, mocaf flour, and rengginang mocaf. Chips are produced routinely and sold to traders, while mocaf flour and mocaf rengginang are only produced on a limited basis according to consumer orders. The number of cassava chips produced by the Sungai Suci Farmers Group is 3-5 tons per month, while the production of mocaf flour is only around 50 kg and rengginang mocaf 20 kg per month. Cassava peel waste is used by farmers as cattle feed and solid fertilizer. During the rainy season, farmers sell fresh cassava by wholesale to tape traders when the weather is not favorable for processing cassava chips. The wholesale price of 1 cassava garden stake (about 278 m2) ready for harvest is between Rp. 400,000 – 700,000, depending on the condition of the plant. The flow chart for the utilization of cassava yields in the Sungai Suci Farmers Group is shown in ***Figure 1.***

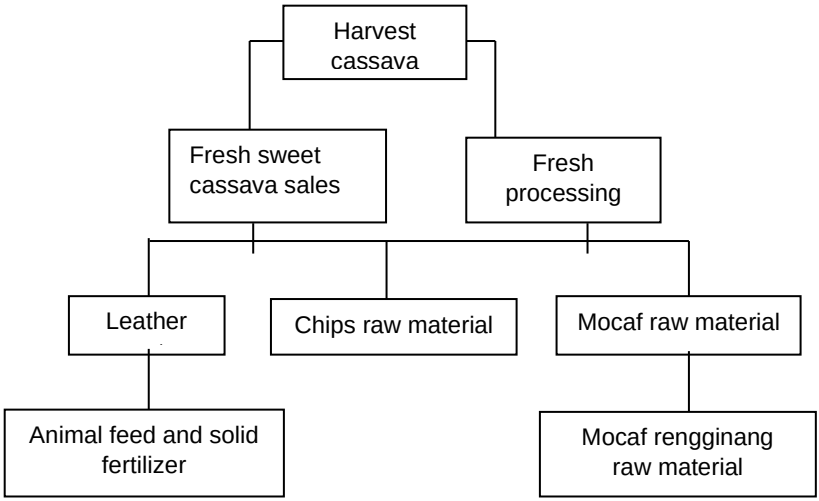

Figure 1. *Flowchart of cassava diversification at the research site.*

3.1 Analysis of Advantages and Added Value of Making Processed Products Made from Cassava Cassava

3.1.1 Chips the Production of Cassava

Chips in Sungai Suci Farmers Group are carried out daily by involving family workers (wife assisted by husband and children). Each family's average production capacity of cassava chips is 45 kg/day from 100 kg of fresh cassava. The continuity of cassava chip production is highly dependent on weather conditions because it is related to drying. Cassava will be processed into chips, first peeled, and washed thoroughly from the remnants of the still attached soil. Next, the cassava is boiled in an aluminum pot for about 20 minutes (until half cooked) on a wood stove. After boiling, cassava is soaked for 12 hours in clean water. The next process is a second wash to remove mucus, then boiling again for about 20 minutes until cooked (cassava begins to break), drained, and cooled. Boiling for two times aims to make the cassava easy to slice, and the appearance of the chips remains white (not yellowed) when dry. After cooling, the cassava is sliced thinly

using a kitchen knife (modified by the farmer) manually and dried in the sun for one day on a parachute covered with plastic waring or tarpaulin. The chips are then put in sacks and stored in a clean and shady place before being sold to collectors who come to the village.

Table 2. *Comparison of cassava chips processing business analysis with fresh sales in Sungai Suci Farmers Group.*

Description	Total	Unit Price (Rp)	Total Price (Rp)
Chips Production Cost (Variable Cost)			
Cassava*	100 kg	0	
Labor	2 HOK	50.000	100.000
Firewood (other inputs)	1 Bunch	3.000	3.000
Total Production Cost	-	-	103.000
Production Result Chips	45 kg	8.000	360.000
B/C Ratio	----------2,50----------		
Sales Profit of Fresh Cassava	100 kg	1.500	150.000
MBCR	----------1,04----------		

* Cassava is not included in variable costs because it results from farmers' crops (farmers do not buy).

Making chips is more profitable for farmers than selling fresh cassava (***Table. 2***). For every sale of 100 kg of fresh cassava, farmers get a profit of Rp. 150,000, whereas if it is processed into chips, the profit becomes Rp. 257,000, with a B/C ratio of 2.5 and an MBCR of 1.04. This means that each additional production cost in making cassava chips of 1 rupiah will generate a profit of 2.5 rupiahs and an additional profit for farmers of 1.04 rupiah compared to the sale of fresh cassava. In reality, the manufacture of cassava chips on a household scale is carried out by farmers themselves by utilizing unpaid labor in the

family. With the technique of calculating added value using the Hayami Method presented in ***Table. 3,*** the production margin of cassava chips is Rp. 6,500/kg with the added value of cassava products obtained by farmers of Rp. 6,433/kg or 80.42% of the sales value. This means that if the farmer processes the chips with unpaid labor from within the family, then from every kg of cassava chips produced by the farmer, a profit of Rp. 6,433. The added value is generated from the compensation for farmer labor of Rp. 1,000/kg and a profit of Rp. 5.433/kg.

Table 3. *Analysis of the added value of the chips-making business in Sungai Suci Farmers Group.*

Variable	Value
of Chips Production Result	45 kg
Cassava Raw Material	100 kg
Labor	2 HOK
Conversion Factor	0.45
Labor Coefficient	0.02
Labor Wage	Rp. 50.000/HOK
Cassava Price	Rp. 1.500/kg
Other Input Donations	Rp. 66.67/kg
Mocaf Flour Production Value	Rp. 8.000/kg
Margin	Rp. 6.500/kg
Value Added	Rp. 6.433/kg
Value Added Ratio	80.41%
Farmer Labor Benefits	Rp. 1000/kg
Profit	Rp. 5.433/kg

3.1.2 Mocaf

flour is an engineering or modification of cassava flour with a fermentation technique that causes changes in the characteristics of the resulting flour in the form of increased viscosity (viscosity), gelation ability, rehydration power, and solubility (ability to dissolve), so its has

a better texture than flour. Tapioca or ordinary cassava flour can substitute for wheat flour [5]. Making mocaf flour is simpler than making chips because it uses a mocaf flour processing machine. Fresh cassava is peeled and washed, then chopped with a chopper machine. After that, the chopped cassava was rewashed before fermented using a BIMO-CF (Biologically Modified Cassava Flour) starter with one gram of starter per liter of water. Fermentation is carried out for 12 hours, then washed and dried in the sun for 2-3 days on para-para waring or tarpaulin. After drying, the cassava sieve is pressed, ground into flour using a machine, and packed in a plastic container. Every production of 1 kg of mocaf flour takes 3 kg of fresh cassava. The analysis of mocaf flour processing business is shown in ***Table. 4***.

Table 4. *Comparison of mocaf flour processing business analysis with fresh sales in Sungai Suci Farmers Group.*

Description	Total	Unit Price (Rp)	Total Price (Rp)
Mocaf Production Cost (Variable Cost)			
Cassava*	100 kg	0	
Labor	1 HOK	50.000	50.000
Other inputs			
Plastic Packaging	33	300	9.900
Starter BIMO-CF	100 gr	70	7.000
Operational Cost Machine	1 kl	3.000	3.000
Total Production Cost	-	-	69.900
Chips Production Yield	33 kg	10.000	330.000
Mocaf Production Profit			260,100
B/C Ratio	----------3,72----------		
Sales Profit of Fresh Cassava	100 kg	1.500	150.000
MBCR	----------1,58----------		

The value of the B/C ratio in the manufacture of mocaf flour at the study site was 3.72 with an MBCR value of 1.58 compared to fresh cassava sales (***Table. 4***). This means that each additional production cost in the manufacture of mocaf flour by 1 rupiah will generate a profit of 3.72 rupiah and an additional profit for farmers of 1.58 rupiah compared to the sale of fresh cassava owned by farmers. The value-added analysis is shown in ***Table. 5***.

Table 5. *Analysis of the added value of mocaf flour production.*

Variable	Value
of Mocaf Flour Production Results	33 kg
Cassava Raw Material	100 kg
Labor	1 HOK
Conversion Factor	0.33
Labor Coefficient	0.01
Labor Wages	Rp. 50.000/HOK
Cassava Price	Rp. 1.500/kg
Other Input Donations	Rp. 603/kg
Mocaf Flour Production Value	Rp. 10,000/kg
Margin	Rp. 8.500/kg
Value Added	Rp. 7,897/kg
Value Added Ratio	79.00%
Farmer Labor Benefits	Rp.500/kg
Profit	Rp. 7.397/kg

The margin obtained from processing mocaf flour is Rp. 8,500/kg with an added value of Rp. 7,897/kg or 79.00% of sales. The added value was contributed by the farmer's labor compensation of Rp. 500/kg, and the resulting profit is Rp. 7.397/kg (***Table. 5***).

3.1.3 Rengginang Mocaf

Rengginang mocaf is a derivative product of mocaf flour. Rengginang dough is made by mixing 33 kg of mocaf flour with 16.5 kg of sago flour. The dough is added with salt and seasoning to taste. Rengginang mocaf is then molded into a round shape using a plastic

filter, placed on a plate, and steamed in an aluminum pan for about 20 minutes.

Table 6. *Comparison of rengginang mocaf processing business analysis with fresh sales in Sungai Suci Farmers Group.*

Description	Total	Unit Price (Rp)	Total Price (Rp)
Production Cost of Rengginang Mocaf (Variable Cost)			
Cassava	100 kg	0	
Labor	3 HOK	50.000	150.000
Contribution of other inputs production of mocaf (33kg)			
Starter BIMO-CF	100 gr	70	7.000
Operational Cost Machine	1 kl	3.000	3.000
Plastic Packaging	33	300	9.900
Production of rengginang mocaf			
Sago flour	16,5 kg	8.000	132.000
Flavoring	20 packs	500	10.000
Salt	2 pcs	2.000	4.000
Firewood	2 Bunches	3.000	6.000
Plastic packaging	99 sheets	300	29.700
Total Production Cost	-	-	341.700
Chips Production Results	49,5 kg	30.000	1.485.000
Advantages of Chips Production			1.143.300
B/C Ratio	----------3,35----------		
Profit from Sales of of Fresh Cassava	100 kg	1.500	150.000
MBCR	----------2,91----------		

After being steamed, the rengginang mocaf is dried in the sun using para-para waring for half a day because if it is dried for too long, the rengginang mocaf will warp. After drying, rengginang mocaf is

packaged in 0.5 kg plastic and sold at Rp. 30,000/kg. A comparative analysis of the rengginang mocaf processing business with sales of fresh cassava is presented in ***Table. 6.*** The B/C ratio of rengginang mocaf processing is 3.35 so it is very feasible to be cultivated on a household scale, with an MBCR value of 2.91. This means that each additional production cost in making rengginang mocaf of 1 rupiah will generate a profit of 2.91 rupiah for farmers compared to the sale of fresh cassava owned by farmers.

Furthermore, the added value obtained from the rengginang mocaf processing business is Rp. 21,244/kg (70.81%) of the selling price of Rp. 30,000/kg. The added value is contributed by the farmer's labor compensation, which is Rp. 4,545/kg, and the resulting profit is Rp. 16,699/kg (***Table. 7***).

Table 7. *Analysis of the added value of the business of making rengginang mocaf.*

Variable	Value
Production Results Rengginang Mocaf	49.5 kg
Cassava Raw Material	100 kg
Labor	3 HOK
Conversion Factor	1.50
Labor Coefficient	0.09
Labor Wage	Rp. 50.000/HOK
The price of raw material for mocaf flour is	Rp. 4.883/kg
Other Input Donations	Rp. 3.873/kg
Rengginang Mocaf Production Value	Rp. 30.000/kg
Margin	Rp. 28.500/kg
Value Added	Rp. 21,244/kg
Value Added Ratio	70.81%
Farmer Labor Benefits	Rp.4.545/kg
Profit	Rp. 16,699/kg

From the data shown in ***Table. 2*** to ***Table. 7***, it is known that the business of processing food products from cassava in the form of chips, mocaf flour, and rengginang mocaf has provided additional benefits and added value for cassava processing farmers compared to cassava sales. Fresh wood so that farmers' incomes increase drastically. The MBCR value and the added value of the three processed products are shown in ***Table. 8.***

Table 8. *Comparison of the advantages and added value of cassava processed food products in the Sungai Suci Farmer Group.*

Cassava products	Variable			
	Sales Value (Rp/Kg)	**MBCR**	**Operating Margin (Rp/Kg)**	**Value Added (Rp/Kg)**
Fresh Cassava	1,500	-	-	-
Cassava Chips	8,000	1.04	6,500	6,433
Mocaf Flour	10,000	1.58	8,500	7,897
Rengginang Mocaf	30,000	2.91	28,500	21,244

Table. 8. shows MBCR and the highest added value obtained by cassava farmers when processing cassava into rengginang mocaf, then mocaf flour, and finally cassava chips.

4 CONCLUSION

With the diversification of food preparations made from cassava on a household scale in Sungai Suci Farmers Group, Pasar Pedati Village, Pondok Kelapa District, Central Bengkulu Regency, it can increase farmers' income, as well as to be able to provide benefits and added value for farmers when compared to selling sweet potatoes. Fresh wood. The highest additional profit and added value resulted from the

processing of rengginang mocaf, respectively, with an MBCR value of 2.91 and an added value of Rp. 21,244/kg, making mocaf flour (MBCR 1.58 with an added value of Rp. 7,897/kg), and cassava chips (MBCR 1.04 with an added value of Rp. 6,433/kg).

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