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Performance analysis of milk processing units to support competitive improvement of the milk processing industry in Padang Panjang City, West Sumatera Province

Rahmi Wati¹, Firwan Tan² Andri¹ Amna Suresti¹ and Tevina Edwin¹

¹ Animal Husbandry Faculty Andalas University, Padang

² Economics Faculty, Andalas University, Padang

Corresponding author e-mail: rwati@ansci.unand.ac.id

Abstract. Dairy cattle productivity has plateaued; average milk production ranges between 8 and 12 liters per day, on a scale of 2-3 maintenance per family breeder breeding. Furthermore, small farms account for 90% of milk production. Permata Ibu's Milk Processing Unit (UPS) in Padang Panjang is one of the business units that processes milk into other derivative products. It produces processed milk pasteurization, yogurt, and other products. The focus of this research was to analyze UPS Permata Ibu's processing performance by calculating the amount of added value and profitability. As measured by the value-added method of performance measurement, the processing of fresh milk into pasteurized milk and yogurt at Permata Ibu milk processing unit generates a variety of added values. Pasteurized milk has better processing performance than yogurt processing, as evidenced by its high added value compared to other processed products, with added value ratios of 22,45 percent and 12,50 percent for pasteurized milk and yogurt, respectively. Based on profitability analysis, it is known that pasteurized milk is still better than yogurt because it has a higher profitability value of 30,30% compared to yogurt, which is only 6,50%. Pasteurized milk processing results in higher profitability and added value than yogurt.

Keywords: Performance Analysis, Competitive Improvement, Milk Processing Industry

1. Introduction

Dairy farming is a livestock business that has the potential to be developed. Dairy cattle are widely distributed throughout Indonesia. West Sumatra Province is one of the provinces involved in the development of the dairy farming industry. Fresh milk is one of the products of dairy farming. Because milk is a perishable product, it must be processed to increase product durability. Thus, the role of the milk processing unit and the milk processing industry is needed in processing fresh milk into processed products. In addition, a milk processing unit is also needed to improve the efficiency and competitiveness of dairy products.

Dairy products such as pasteurized milk, yogurt, kefir and caramel can be made from fresh milk, as well as other derivative. Farmers process milk to add value to the product, which aims to increase the profitability of the business being run and ensure business continuity.

According to [10], Milk contains a variety of food components that stimulate the growth of microorganisms such as bacteria, mold, and yeast. Milk is a perishable livestock food ingredient that needs proper handling due to the growth of these various types of microbes. Processing is one method of dealing with it. Pasteurized milk, yogurt, caramel, kefir, cheese and butter are examples of processed milk products. These processed milk products are extremely popular.



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Padang Panjang City is the center of the dairy farming sector in West Sumatra Province as a milk producer. The development of milk production is determined by the quantity of livestock and the business performance of the livestock. There are currently 28 dairy farmers. They joined a variety of groups spread across all of Padang Panjang. Dairy cattle production in Padang Panjang reached 246.286 liters in 2014, with a value of around IDR 985 million. In 2018, the milk production of dairy cattle increased to 521,730 liters with a value of IDR 3.652 billion. During this moment, the cost of dairy cattle milk production increased by an average of 11.17 percent per year. Table 1 depicts the evolution of its production in Padang Panjang from 2014 to 2018.

Table 1. Development of dairy cattle milk production in Padang Panjang City 2014 – 2018.

Year	Production Amount (liter)	IDR Price Per Liter	Value (IDR ,000)
2014	246,286	4,000	985,144
2015	294,736	4,500	1,326,312
2016	621,180	5,000	3,105,900
2017	572,220	6,000	3,433,320
2018	521,730	7,000	3,652,110
Average	451,230	5,300	2,030,535

Source: Agriculture Department of Padang Panjang City 2019

Milk producers and products are distributed across two sub-districts. In Padang Panjang, there are nine dairy farmer associations, including Permata Ibu, Yuza, Tunas Baru, Harapan Baru, Lembah Makmur, Serambi Karya, Lembu Alam, Parmato Mudo, and Batu Batirai. The Permata Ibu farmer association, located in Ganting, Padang Panjang Timur Sub-District, is one of the dairy farmer associations that process milk. On April 1981, the association was founded with a background in agricultural business and later expanded into the field of dairy farming. Permata Ibu has grown its dairy farming business to produce fresh milk as its primary product. The fresh milk is processed into pasteurized milk in a variety of flavors, and yogurt. They have marketed their fresh milk production in many areas of West Sumatra to Riau Province. Farmers typically prioritize the sale of fresh milk over the sale of processed milk. Furthermore, dairy farmers face several challenges in increasing milk production, such as the relatively small scale of the livestock business, high investment costs for business development, the ability of the cattle to produce milk that is not optimal, and the ability to handle livestock and the production of processed fresh milk that is relatively low [2].

Efforts to increase milk production can be achieved through a policy of accelerated programs to improve livestock productivity and quality [11]. The low selling price at the farmer level presents a challenge in implementing this policy. The low selling price will reduce farmers' motivation to increase milk productivity because the increase in milk production sought by farmers has no impact on their income. Competition is frequently viewed as a driver of a company's economic efficiency; in order to achieve this, businesses will adopt innovations to gain a competitive advantage. The measurement of competitiveness can also be viewed from various perspectives. According to [3], in terms of performance, the increase in competitiveness can be measured. However, from a broader perspective, competitiveness can be measured from its impact until the desired result is obtained. The condition of the company's performance can affect its competitiveness. In other words, competitiveness defines better performance and the right industry structure. [9], analyzed the competitiveness of dairy cattle in Poland. [1] analyzed the competitiveness of dairy cattle in Pujon District, Malang Regency, East Java Province by applying PAM. In this study, to improve the milk processing unit's competitiveness, a

performance analysis was conducted using the added value and profitability approach of the Permata Ibu Milk Processing Unit.

2. Research method

This research was conducted in the city of Padang Panjang in 2020. This location was chosen deliberately because Padang Panjang is the center of milk production. Data collected through a guided interview questionnaire.

The following variables can be used to analyze the performance of Micro Small And Medium-Sized Enterprises (MSME) milk processing businesses in Padang Panjang: the amount of milk produced, sales volume, price of fresh milk, pasteurized milk prices, yogurt prices, number of laborers, labor wages, production costs, and institutions involved.

The analysis of the value-added and profitability of pasteurized milk products and yogurt from the Permata Ibu Milk Processing Unit is used to determine the performance of the milk processing business. The Hayami method is the analytical method used for value-added analysis. The value-added analysis is performed to determine the added value of converting a commodity into another product and to obtain margins from the production factors used during processing activities. [4].

Profitability analysis was calculated by the multiplication between, Marginal of Safety (MOS) and Marginal Income Ratio (MIR) generated based on production data, sales, and production costs. Marginal of Safety (MOS) provides information on how far sales volume may go down so that the company does not suffer losses. The relationship or the difference between a certain level of sales with sales at the level of break-even is a margin of safety for companies in making sales decline. A company that has a large margin of safety is better than a company that has a low margin of safety. Because the margin of safety gives management an idea of how much sales can be tolerated so that the company does not suffer losses but also has not yet made a profit [8].

$$\text{MOS (\%)} = \frac{TR - BEP}{TR} \times 100\%$$

Notes:

MOS : Margin of Safety
TR : Total Revenue
BEP : Break Event Point

The marginal income ratio is also called the contribution margin ratio. The contribution margin ratio is the result of sharing between contribution profit or contribution margin and sales expressed in percent. The contribution margin (CM) is the best measure to use because, at every change in activity, the company's profit or loss will change up to or down CM. CM can be calculated on a per unit and percentage basis [14]. According to [7], the greater the contribution of profits, the greater the opportunity the company will obtain to cover fixed costs and generate profits.

$$\text{MIR (\%)} = \frac{TR - TVC}{TR} \times 100\%$$

Notes:

MIR : Marginal Income Ratio
TR : Total Revenue
TVC : Total Variable Cost

The company's ability to obtain profit (profitability) company can be stated with the following formula [7]:

$$\Pi (\%) = \text{MOS} \times \text{MIR} \times 100\%$$

Notes:

MOS : Margin of Safety

MIR : Marjinal Income Ratio

Π : Business profitability

In addition to the above calculation, there is one parameter called the Degree of Operating Leverage (DOL). DOL is useful to provide a measure of the impact of changes in sales revenue on profits at certain sales levels.

$$\text{DOL} = \frac{TR - TVC}{TR - TC}$$

3. Results and discussion

Permata Ibu is one of the farmer associations that raise dairy farmers and process milk at the Milk Processing Unit. The Permata Ibu association has seven members and 64 dairy cattle, with average milk production of 174.32 liters per day. This organization has sold fresh milk in many areas of West Sumatra to Riau Province.

In production, converting a product from an input to an output involves adding value to it. This added value occurs during the Permata Ibu Milk Processing Unit's production activities, when milk is processed into pasteurized milk and yogurt. The Hayami method of value-added analysis was used in the calculation. Raw materials, outputs, labor inputs, and other input contributions are the main components used in the calculation. The value-added in the processing of pasteurized milk and yogurt is determined per unit of raw material, namely liters. This value-added is calculated during a single production process. Pasteurized milk dairy products necessitate 150 liters of raw materials in one production process, while yogurt requires 30 liters of raw materials. Fresh milk is the primary raw material used in the production of these two products. Pasteurized milk yields 147 liters and yogurt yields 32 liters after going through the milk processing process.

3.1. Value added of processed dairy products in Permata Ibu Milk Processing Unit

Value added is the addition of the value of a commodity due to the functional input applied to the related commodity. The functional input takes the form of a process that changes form (form utility), relocates (place utility), and stores (time utility) [4]. According to [15], value-added is the difference between the cost of production and the cost of raw materials, basic materials, and other supporting materials used to produce the products.

Technical factors include the quantity and quality of raw materials and related inputs, the quality of the product, the application of technology, production capacity, and the use of labor elements. The price of raw materials, the selling price of output, labor costs, investment capital, market information, and other input values are all market factors. The conversion factor, labor coefficient factor, and product value are supporting components in the value-added analysis. The conversion factor represents the amount of output produced from a single input unit. The labor coefficient factor indicates the amount of direct labor required to process one unit of input. The output value of one input unit is represented by the product value [4].

According to the calculation, the added value for pasteurized milk is IDR. 3,300 and IDR. 4,000 for yogurt, with a comparison of 22.45 percent and 12.5 percent for pasteurized milk and yogurt, respectively. This shows that yogurt has a higher added value than pasteurized milk. Also the value of profits and profit margins as Compensation for Factors of Production. So, if one month of yogurt processing is 12 production periods, the use of input per period of 30 liters will produce 32 liters of yogurt per period or 384 liters a month. According to the calculation, the added value obtained is IDR. 1,536,000 per month, and the margin is IDR. 9,216,000 per month.

Based on the results of the calculations above, it is possible to conclude that the business of processing fresh milk into pasteurized milk products and yogurt provides significant added value on an industrial scale. With this calculation, the producers can determine the net profit from milk processing.

The net profit value can be used to estimate the economic life of a business. [12] stated that the opportunities to increase added value can be classified into five major categories:

1. Trade Rents (comes from the scarcity of production or trade policy).
2. Technological Rents (related to asymmetrical commands over technology).
3. Organizational Rents (related to management skills).
4. Relational Rents (related to networks between companies, groups, and alliances).
5. Branding Rents (comes from a famous brand name).

Tabel 2. Value added pasteurized milk and yoghurt.

Variable	Value	Pasteurized milk	Yogurt
I. Output, input dan Price			
1. Output (kg)	(1)	147,0	32,0
2. Raw Material Input (kg)	(2)	150,0	30,0
3. Labour (HOK)	(3)	4,00	4,00
4. Conversion Factor	(4)=(1)/(2)	0,98	1,07
5. Labour Coefficient (HOK)	(5)=(3)/(2)	0,03	0,13
6. Price of Product (IDR.)	(6)	15.000	30.000
7. Wages (IDR/HOK)	(7)	35.000	35.000
II. Revenue and Profit			
8. Raw Material Input (IDR)	(8)	8.000	8.000
9. Other inputs (IDR)	(9)	3.400	20.000
10. Production (IDR)	(10)=(4)x(6)	14.700	32.000
11a. Value Added (IDR)	(11a)=(10)-(8)-(9)	3.300	4.000
11b. Value Added Ratio (%)	(11b)=(11a)/(10)x100%	22,45	12,50
12a. Revenue of Labour (IDR)	(12a)=(5)x(7)	933	4.667
12b. Segment of Labour (%)	(12b)=(12a)/(11a)x100%	28,28	116,67
13a. Profit (IDR)	(13a)=(11a)-(12b)	3.272	3.883
13b. Rate of Profit	(13b)=(13a)/(11a)x100%	99,14	97,08
III. Owner Compensation Factor of Production			
14. Margin (IDR)	(14)=(10)-(8)	6.700	24.000
14a. Direct Labour Income (%)	(14a)=(12a)/(14)x100%	13,93	19,44
14b. Contribution of Other Inputs (%)	(14b)=(9)/(14)x100%	50,75	83,33
14c. Company Profit (%)	(14c)=(13a)/(14)x100%	48,83	16,18

According to [12], the interaction between the level of technology, business management, and the quality of human resource managers, will determine the level of production and income, which will ultimately determine the amount of added value generated. Furthermore, according to [6] the higher the value of the intermediate cost component used, the lower the added value of the product, and vice versa, the lower the cost, the higher the added value of the product.

Hubeis cited in [5] explains the value-added test according to the test criteria as follows:

1. The ratio of value-added is low if it has a percentage < 15 percent
2. The value-added ratio is moderate if it has a percentage of 15 percent - 40 percent
3. The ratio of value-added is high if it has a percentage > 40 percent

According to Hubeis' criteria, the value-added produced by pasteurized milk is moderate, with a percent of the value from 15% to 40%. (22,45 percent). Furthermore, yogurt is classified as low criteria because the value-added is less than 15%. (12.50 percent). This difference could be due to technical

factors such as production volume differences, cost components, and other input contributions. Aside from the difference in production volume, the difference in raw material prices between the two milk processing units influences the amount of value-added obtained from yogurt processing.

3.2. Profitability analysis

Profitability analysis can be applied to a wide range of information objects, including products, product variants, activities, and organizational units. It can be used to determine the causes of a company's profit or loss conditions during a specific accounting period. Profitability is calculated by multiplying the Margin Income Ratio (MIR) by the Margin of Safety (MOS). The greater the MOS and MIR values of a company, the greater the value of the company's ability to make a profit. On the contrary, as it shrinks, the profit obtained shrinks as well [8].

Table 3. Comparison of profitability and DOL of yogurt and pasteurized milk of Permata Ibu Milk Processing Unit in 2019.

No	Uraian	Pasteurisasi	Yoghurt
1	MIR	0,0856	0,3781
2	MOS	0,753	0,803
3	Profitabilitas	0,065	0,303
4	Dol	1,25	1,33

Yogurt has a higher MIR value than pasteurized milk, which is 37.81 percent for Yogurt and 8.56 percent for pasteurized milk. This value indicates that yogurt products can provide 37.81 percent of sales proceeds to cover fixed costs and make a profit each year, while pasteurized milk provides 8.56 percent.

Then, it can be seen that yogurt is the more profitable product because it has more benefits than pasteurized milk. Yogurt products have a higher profitability value of 30.30 percent than pasteurized milk, which has a value of 6.50 percent. As well as the Degree of Operating leverage (DOL), with yogurt having a higher DOL than pasteurized milk. Yogurt has a higher of 1.33 times that of pasteurized milk products, which is only worth 1.25 times. This value is interpreted to mean that for every 10% increase in revenue, profits for pasteurized milk and yogurt will increase by 12.5 percent and 13.3 percent, respectively. Yogurt's high DOL value indicates that it has the potential to earn higher profits if it can increase revenue by increasing sales.

The calculation results also show that yogurt is the main product of Permata Ibu Milk Processing Unit because it has a greater profit which is supported by the number of sales of a product in one year compared to other products that can increase its income.

4. Conclusions and suggestions

4.1. Conclusions

Based on the discussion given previously, the following conclusions are obtained: Yogurt has a higher added value, profit, and profit margin than pasteurized milk based on performance measurement using the value added method approach. Yogurt is still better than pasteurized milk in terms of performance measurement using profitability analysis, with a higher profitability value of 30.30 percent.

4.2. Suggestion

Yogurt has better added value and better profitability than pasteurized milk. Therefore, to increase business profits, the Permata Ibu Milk Processing Unit must increase and develop the sales volume of yogurt in order to maximize profits.

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