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Article

Analysis of Added Value of Brownies Product Using the Hayami Method (Case Study: Syiaghi MSME in Pekanbaru City)

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A B S T R A C T

Syiaghi MSMEs have turned their brownie business into a value-added and competitive venture. This study applies a case study using both primary and secondary data. Primary data was collected through direct observation at Syiaghi MSMEs and interviews with business owners. Secondary data was collected through library studies and other documents. Respondents in this study were determined using the purposive sampling method. Respondents were selected based on the type of brownies marketed (baked brownies), high daily production volume, and marketing to several campuses and stores. The selected respondents were business actors from Syiaghi MSMEs in Pekanbaru City. The analysis of the added value of brownies used the Hayami method. Based on the results of the research conducted on Syiaghi MSMEs, it produced 900 brownie products, total revenue from Syiaghi MSME is IDR 4,500,000 and total profit is IDR 3,030,335.90. It can be concluded that processing flour into brownies provides positive added value. The added value obtained was IDR 398,792 with an added value ratio of 71%, which is relatively high. This indicates that the processing is able to significantly increase the economic value of the product compared to the raw materials. Syiaghi SME is able to manage the production process efficiently through a combination of raw materials, labor, technology, and appropriate packaging. The high added value contributes positively to business profits, production efficiency, and the competitiveness of brownies in the market, making this business viable and promising for further development.

1. Introduction

Agribusiness is increasingly conceptualized as an integrated agrifood value chain that connects input provision, farm-level production, processing, distribution, and final consumption within a single interdependent system. Within this perspective, coordination among actors, governance structures, and overall chain performance become central analytical concerns. Such an approach is particularly relevant in the agrifood sector because it is characterized by distinctive features, including biological production risks, product perishability, seasonality, and imperfect market structures, all of which shape the efficiency and resilience of value chain operations. Accordingly, value chain analysis provides an important framework for understanding how value is created, distributed, and sustained across agribusiness systems.

In parallel, agroindustrialization may be understood as a process of structural upgrading in which agricultural activities progressively move beyond the production of raw commodities toward higher value-added processing, branding, and service-intensive functions(Li et al., 2025). Added value is the difference between the value of production output and the costs incurred in the production process. Added value can be analyzed through the processing and marketing activities. Understanding the added value of brownies processing can reveal the potential profits and the number of workers that can be absorbed, thus inspiring others to undertake similar businesses. According to Aponno et al. (2023), added value will increase the selling price of agricultural and plantation products. Therefore, it is necessary to pay attention to each stage of the business to increase added value, whether in terms of processing, packaging, or marketing. Additionally, the added value of agricultural and plantation products can also be generated by connecting farmers with business actors, providing information and technology resources, and encouraging farmers in processing or post-harvest activities and marketing agricultural products. One of the MSMEs in Pekanbaru is engaged in the processing and sale of brownies (Mahardana et al., 2015).

The perspective of agroprocessing economics, processing activities play a critical role in generating value addition, expanding income opportunities, promoting product diversification, and enhancing rural economic dynamism. Nevertheless, the economic contribution of agro-processing remains constrained in many contexts by efficiency gaps, limited technological capability, inadequate infrastructure, and insufficient scale economies. Micro, small, and medium enterprises (MSMEs) play an important role in community businesses and in improving the economy of those businesses. According to Alfarisi, Fasa & Suharto. (2022), MSMEs themselves play an important role in the Indonesian economy. MSMEs face challenges in terms of limited capital, product marketing, and technology development in the current era. MSMEs contribute significantly to national economic growth, particularly in the processed food sector. One type of business that has been widely developed is the brownie business.

Brownies are a food with wheat flour as the base ingredient, containing high levels of protein, fat, and carbohydrates (Melapa et al., 2016). Brownies are a type of dark brown cake with a soft and dense texture and a distinctive chocolate flavor (Miranda et al., 2023). In terms of added value analysis, brownies are an example of a product that undergoes a processing process from raw materials, namely wheat flour, to become brownies, thereby creating added value and high economic value. For food, quality improvement and innovative packaging are empirically shown to have significant positive effects on competitive advantage (Babayef & Balajayeva, 2023). One of the MSMEs that produces brownies is Syiaghi, located in Pekanbaru City. Syiaghi MSMEs face challenges in increasing the added value of their products in order to compete with other bakery entrepreneurs who continue to innovate their products, improve packaging, and utilize modern marketing strategies. On the other hand, the limited studies available show that research on the added value of brownies, especially using a quantitative approach such as the Hayami method, is still very limited. Meanwhile, most of the literature focuses more on marketing, innovation, and product quality aspects without directly measuring the contribution of added of brownie products in local MSMEs. In the research of Saputra et al (2014), the added value of brownies made from rambutan was Rp. 328,000 with a value added ratio of 26.97%.

Based on this description, the research analyzes the added value of brownies produced

by Syiaghi MSMEs in Pekanbaru. This analysis is expected to provide an overview of the amount of added value generated from the brownies production process as well as its contribution to business competitiveness. The results of this study are expected to serve as evaluation material and input for Syiaghi MSMEs in improving production efficiency and business development strategies, as well as a reference for the development of processed food MSMEs in the city of Pekanbaru. The purpose of this study is to analyze the added value of brownies products at Syiaghi MSME in Pekanbaru City.

2. Literature Review

2.1 Agroindustrial Value Chain

Agribusiness as a value chain based system linking farm inputs to consumers, with coordination, governance, and performance as central themes. Agroindustrial value chain theory applies value chain and global value chain (GVC) concepts specifically to agriculture-based industrial systems, from input supply through processing, distribution and retail

Agroindustrial value chain theory integrates governance, upgrading, sustainability and power relations in agriculture-based industries. It examines how chain structure and coordination by lead firms, states and other actors shape value creation, distribution, environmental and social outcomes, especially for smallholders and SMEs (Muflikh et al., 2021).

2.2 Production Cost Structure Analysis

Production cost structure analysis examines how different cost components (inputs, labor, energy, overhead, etc.) contribute to total and unit costs, and how this affects efficiency, pricing, and competitiveness in agroindustry (Suprianto et al (2021)**.**

Cost structures are generally divided into fixed costs and variable costs. Fixed costs are costs that remain relatively unchanged in the short term despite changes in production volume, such as building rent, equipment depreciation, or permanent labor wages. Conversely, variable costs change with production levels, such as the costs of raw materials, packaging, fuel, and daily labor wages. This distinction is important because it indicates the level of cost sensitivity to changes in output (Pena et al., 2022).

Cost structure analysis can also be conducted based on direct and indirect costs. Direct costs are costs that can be directly traced to a specific product or activity, such as primary raw materials and direct labor. Meanwhile, indirect costs include supporting costs that are not easily allocated directly to a single product unit, such as administrative costs, general electricity, maintenance, and supervision.

2.3 Value Added

Value added processing involves transforming raw commodities into processed product, ensuring increased economic return throught the use of raw materials, labor, time and technology (Sharangi, 2021). In agriculture and food, "value addition" often means transforming a raw commodity into a processed or differentiated product (e.g., turning wheat into flour, coconut water into packaged beverages), to obtain a higher economic return (cucugna & Goldsmith, 2018).

The amount of value added resulting from the processing is derived from the reduction in the cost of raw materials and other inputs relative to the value of the final product, excluding labor costs. Value added is influenced by several factors, namely technical factors and market factors. The influential technical factors include production capacity, the amount of raw materials used, and labor, while the influential market factors are the price of output, labor wages, raw material prices, and other input costs.

2.4 Brownies

Brownies are defined as chocolate-based, dark brown, sweet cakes, baked (or sometimes steamed) in a shallow pan, with a soft to dense texture and a characteristic chocolate aroma, then cut into square or rectangular pieces.

2.5 Hayami Method

The Hayami method is a structured value-added analysis tool for agroindustry: it tracks how processing turns raw farm products into higher-value goods, quantifies value added per kg, and shows how that value is split between labor, other inputs, and profit (Rizaldi et al., 2023).

Most value-added analysis applications in the agroindustry generally follow a systematic two-stage table structure. The first stage focuses on identifying outputs, inputs, and prices. Output (A) is defined as the quantity of

processed products produced, while input (B) is the quantity of raw materials used in the production process. Labor (C) is measured in person-days (PD) or working hours. From these three components, the conversion factor (D) is then calculated as the ratio of output to input (D = A / B), indicating the level of technical efficiency in the processing. Next, the labor coefficient (E = C / B) describes the intensity of labor use per unit of raw material. Price variables are also an important component, including the product price (F) as the selling value of output and the wage per unit of labor (G) as the basis for calculating labor costs. The second stage focuses on revenue and profit analysis. The price of raw materials (H) and other input costs per kilogram (I) are used to calculate the output value (J), which is the product of the conversion factor and the product price (J = D × F). Next, the value added per unit of input (K) is obtained by subtracting the output value from the cost of raw materials and other input costs (K = J – H – I). The value-added ratio is then calculated as the ratio of value added to output value (K / J × 100%), indicating the contribution of value added to the total product value. From this value-added Figure the distribution of labor income and the profit share received by business operators can be derived, so this analysis not only illustrates production efficiency but also the income distribution structure within agroindustrial activities (Ningsih, Santosa & Azrifirwan., 2024).

The level of value-added ratios can be grouped into several categories: a value-added ratio of <15% indicates low value-added, a value-added ratio of 15%–40% indicates moderate value-added, and a value-added ratio of >40% indicates high value-added (Santos *et al.*, 2024).

3. Research Methodology

The research was conducted at the Syiaghi SME located at Perumahan GMP 3, Tambang sub-district, Kampar regency, Rimbo Panjang. The method used to determine the sample in this study was the case study method. The selection of a single case study on Syiaghi MSMEs was chosen due to the limited studies that directly measure the added value of brownies at the local level, as well as specific factors that influence the culinary business in Pekanbaru. A single case study allows this research to focus on factors that influence production and quality on an SME scale, as well as market characteristics that are unique and cannot be generalized from larger studies. The scientific justification from Yuce (2022) for single case studies offers advantages in terms of efficiency in the use of resources and time, and allows for a more in-depth and theoretical understanding than double case studies.

The research focused on the production process and added value of brownies. Data collection was divided into two types: primary data and secondary data. Primary data was collected through direct observation at Syiaghi SMEs, and the researcher conducted interviews with the business owners. Secondary data was collected through library studies and other documents.

This study employs a quantitative descriptive design focused on Syiaghi MSMEs in Pekanbaru City, with the aim of measuring the value added of brownies using the Hayami Method. This design was chosen to provide an in-depth understanding of the contribution of the production process and added value, as well as to explore the phenomena occurring in the local context of local food MSMEs. The Hayami Method was chosen because it provides a systematic and measurable approach to calculating the contribution of production factors to the output produced, as well as its strong relevance in the context of agricultural and small industry economic studies. This research will involve 4 respondents consisting of the owner and 3 production workers to provide a complete picture of the production cycle, costs, and business strategies for the brownies produced. The Hayami Method is used to calculate the contribution of added value econometrically, which is expected to explore more deeply how the production process affects the competitiveness of the product.

Table 1. Added value calculation

Variable	Value
I. *Output, Input,* and Price	
1. *Output* (kg of brownies)	A
2. *Input* (kg)	B
3. Labor (HOK/production)	C
4. Conversion Factor	D=A/B
5. Labor Coefficient (HOK/kg *input*)	E=C/B
6. *Output* Price (IDR/kg *output*)	F
7. Labor Cost (IDR/HOK)	G
II. Revenue and Profit	
8. Raw Material Price (IDR/kg)	H
9. Other *Input* Contributions (IDR/kg *input*)	I
10. *Output* Value (IDR/kg)	J=D x F
11. a. Value Added (IDR/kg)	K = J - I - H
b. Value Added Ratio (%)	L%= (K/J) x 100%
12. a. Labor Income (IDR/kg input)	M= E x G
b. Labor Share (%)	N%= (M/K) x 100%
13. a. Profit (IDR/kg input)	O=K-M
b. Profit Margin (%)	P% = (O/K) x 100%
III. Return to Owners of Production Factors	
14. Margin (Rp/kg)	Q= J-H
a. Labor Income (%)	R=M/Q x 100%
b. Other *Input* Contribution (%)	S = I/Q x 100%
c. Company Profit (%)	T = O/Q x 100%

4. Results and Discussion

4.1 Syiaqhi brownie production process

The brownies processing process by MSME entrepreneurs requires various high-quality main ingredients to produce a delicious taste and soft texture. The selection of the right ingredients is one of the main keys in maintaining the distinctive taste of brownies produced by MSMEs, and requires the following ingredients.the following simple steps.

a. Put the sugar, flour, and eggs into the mixer bowl at the same time, then mix until fluffy, which is indicated by the dough turning a yellowish-white color.
b. Melt the previously measured butter in an oven preheated to 180°C until melted.
c. Pour the melted butter into the brownie batter that has turned yellowish-white until evenly distributed.
d. Add the cocoa powder and vanilla to the batter that has been mixed evenly with the butter until the brownie batter is thoroughly mixed.
e. The finished brownie batter is then poured into cup-shaped baking pans
f. The molded brownie batter is then baked in an oven preheated to 180°C for 25 minutes.
g. The baked brownies are then removed from the oven and left to cool for a few minutes before being transferred to a brownie box for packaging.
h. The brownies are packaged in 10x10cm plastic to prevent air exposure so that the top of the brownies remains *crunchy.* From the ingredients described in Table 1, 900 pieces of brownies can be produced for packaging. A picture of the brownies can be seen in **Figure** 1.

Table 2. Raw Materials for Brownie Processing

No.	Type of Ingredient	Amount per Unit
1	Egg	175 pieces
2	Wheat Flour	8 kg
3	Cocoa powder	3 kg
4	Butter	9 kg

5	Vanilla	200 g
6	Sugar	9 kg

Table 3. Calculation of equipment depreciation costs for the brownies business

No	Type of equipment	Total unit	Price (IDR)	Total (IDR)	Economic life (year)	Residual value (IDR)	Depreciation cost (IDR)	Depreciation cost/ production (IDR)
1	Gas stove	1	350,000.00	350,000.00	5	100,000.00	50,000.00	136.99
2	Gas cylinder	1	250,000.00	250,000.00	5	150,000.00	20,000.00	54.79
3	Mixer	1	500,000.00	500,000.00	5	200,000.00	60,000.00	164.38
4	Baking pan	2	40,000.00	80,000.00	3	-	26,666.67	73.06
5	Oven	1	8,000,000.00	8,000,000.00	17	1,000,000.00	411,764.71	1,128.12
6	Spatula	2	10,000.00	20,000.00	3	-	6,666.67	18.26
7	Digital scale	1	154,000.00	154,000.00	5	30,000.00	24,800.00	67.95
8	Measuring spoon	1	22,000.00	22,000.00	4	-	5,500.00	15.07
9	Measuring cup	1	10,000.00	10,000.00	5	-	2,000.00	5.48
							TOTAL	1,664.10

Based on the table above, the total depreciation cost of equipment incurred by the brownie business each time it carries out the production process is Rp. 1,664.10. The small depreciation costs are due to the calculation of annual depreciation costs being converted into daily depreciation costs. This Figure shows the amount of fixed costs that must be taken into account, even if the production volume changes. Therefore, equipment depreciation is an important part of calculating total production costs in order to more accurately reflect the value of asset usage.

a. Variable costs

Variable costs consist of the cost of purchasing primary raw materials, the cost of purchasing additional auxiliary materials or other input costs, and labor costs. The costs used in producing brownies are sugar, flour, eggs, butter, cocoa powder, and vanilla. These ingredients are purchased directly from a store called Kedai Upu. The average production costs for brownies are shown in Table 2 below.

Table 4. Variable costs of Syiaqhi brownies

No	Ingredients	Unit	Requirement/ production process	Price/unit (IDR)	Total cost
1	Granulated sugar	Kg	9	16,000.00	144,000.00
2	Wheat flour	Kg	8	8,000.00	64,000.00
3	Eggs	Butir	175	1,600.00	280,000.00
4	Margarine	Kg	9	35,000.00	315,000.00
5	Chocolate flour	Kg	3	136,000.00	408,000.00
6	Vanili	Gram	200	10.00	2,000.00
7	Packaging	Pack	9	10,000.00	90,000.00
8	Gas	Production	1	5,000.00	5,000.00
9	Electricity cost	Month	1	300,000.00	10,000.00
				TOTAL	1,318,000.00

Based on Table 3, it shows that the raw material cost is IDR 1,213,000 per production, the packaging cost for 9 packs, each containing 10 pieces, is IDR 90,000 per production, and other costs such as gas and electricity for one production are IDR 10,000 per production. *The* total *variable cost* is Rp. 1,318,000 for one production run, producing 900 pieces of ready-to-sell brownies. Below is the total production cost for brownies in one production run.

Table 5. Total brownies production costs

Cost Type	Total (Rp)
Variable Cost	1,318,000
Depreciation cost	1,664.10
Labor costs	150,000
Total	1,469,664.10

4.3 Syiaqhi Brownies Revenue

The Syiaqhi brownies business makes brownies using 1 batch of dough that can produce 900 pieces.

Each brownie is sold for Rp5,000. The following is the calculation of the total income of the Syiaghi MSME in Pekanbaru City.

Total Revenue = Selling price/unit x Number of units sold
= Rp. 5,000 x 900
= Rp. 4,500,000

Meanwhile, the net profit obtained is,

Net Profit = Total Revenue – Production Costs
= Rp. 4,500,000 – 1,469,664.10
= IDR 3,030,335.90

It can be concluded that producing one batch of brownies provides a considerable profit, as the income earned is quite high compared to the costs incurred. This shows that Syiaqhi's brownie business has the opportunity to expand further, as long as it is carried out continuously and consistently. According to Sutrisno (2026), if the profit obtained is greater than the costs incurred in the production process, then, the business is worth running.

4.4 Value-added calculation (Hayami method)

This calculation refers to primary data collected through interviews and observations. Value-added variables include labor, raw material prices, output prices, labor wages, and other inputs. The purpose of analyzing value added is to determine the increase in value obtained by Syiaghi MSMEs from processing wheat flour into finished products in the form of baked brownies. The Hayami method provides comprehensive information for users, investors, and workers.

Table 6. Value added calculation using the Hayami method

Variable	Value	Value
I. *Output, Input,* and Price		
1. *Output* (kg of brownies)	A	41
2. *Input* (kg)	B	8
3. Labor (HOK/production)	C	3
4. Conversion Factor	D=A/B	5.13
5. Labor Coefficient (HOK/kg *input*)	E=C/B	0.38
6. *Output* Price (IDR/kg *output*)	F	110,000
7. Labor Cost (IDR/HOK)	G	50,000
II. Revenue and Profit		
8. Raw Material Price (IDR/kg)	H	8,000
9. Other *Input* Contributions (IDR/kg *input*)	I	156,958
10. *Output* Value (IDR/kg)	J=D x F	563,750
11. a. Value Added (IDR/kg)	K = J - I - H	398,792
b. Value Added Ratio (%)	L%= (K/J) x 100%	71%
12. a. Labor Income (IDR/kg input)	M= E x G	18,750
b. Labor Share (%)	N%= (M/K) x 100%	5
13. a. Profit (IDR/kg input)	O=K-M	380,042
b. Profit Margin (%)	P% = (O/K) x 100%	95
III. Return to Owners of Production Factors		
14. Margin (Rp/kg)	Q= J-H	555,750
d. Labor Income (%)	R=M/Q x 100%	3
e. Other *Input* Contribution (%)	S = I/Q x 100%	28
f. Company Profit (%)	T = O/Q x 100%	68

Table 6 shows that the output produced is 41 kg of brownies in one production run from 8 kg of flour. The workforce, consisting of 3 employees in one production run, requires 8 hours from the preparation of ingredients to packaging. In one brownies production process, there are 3 workers with a direct wage value of IDR 50,000 per day. The price of one kg of brownies is Rp. 110,000. Other input contributions consist of supporting materials such as granulated sugar, eggs, margarine, chocolate flour, vanilla, packaging, gas, and electricity (The total costs are shown in Table 3 and Table 4), as well as

machine depreciation costs with a total of Rp. 1,255,664.10 divided by 8 (kg of input), resulting in Rp. 156,958/kg of input.

The brownies produced were 900 pieces and then weighed to produce a weight of 41 kg. The added value of brownies is Rp. 398,792/kg with an added value ratio of 71%, which is in the high ratio indicator because the ratio is in the range of > 40%. This is in line with the research by Ningsih, Santosa & Azrifirwan. (2024) that added value > 40% is classified as high, while below 15% is classified as low and added value of 15-40% is classified as moderate. Businesses with high added value will find it easier to adapt to market fluctuations and rising production costs. In the research of Saputra et al (2014), the added value of brownies made from rambutan was Rp. 328,000 with a value added ratio of 26.97%.

Based on the table presented, the analysis of high added value in brownies is related to cost structure, labor efficiency, and business sustainability in MSMEs. This added value describes the difference between the output value produced and the input costs used in the production process. High added value indicates that the products produced can generate greater profits than the costs incurred. The table shows that the profit earned is IDR 380,042 or 95%. High profits are an indicator of efficiency in the use of resources, including labor, as well as the ability of MSMEs to optimize each unit of input used in the production process. This is in line with the research by Sukaini and Mahyudin (2026), which states that high added value can be competitive with competitors. Meanwhile, the return on production factors for the owner can be seen from the margin derived from labor income, which reaches 3%. Additionally, the business owner's profit reaches 68%, which is quite high for a single production run.

Increased added value is often associated with increased labor efficiency. The table shows calculations related to labor wages, labor numbers, and their contribution to output. The labor coefficient is 0.38 HOK/kg of input, so that to produce 8 kg of input requires 3.04 HOK. High labor efficiency means that less labor is needed to produce more output, reducing production costs and increasing profitability. In the long term, this will support business sustainability.

Factors that affect the added value of brownies include low labor wages, a small workforce, fixed and variable cost structures, and fairly high selling prices. Higher selling prices, holding efficiency and input use constant, directly raise value added in industry and food processing (Robiani et al., 2024). In this case, increasing labor efficiency and optimizing production costs such as raw materials and overheads can generate higher added value. In Indonesia's food industry, raw materials (60–90% of costs) and fixed capital costs have a significant positive impact on value added (Nahar et al., 2022). In addition, in terms of processing flour into brownies, there has been a very significant change that will have an impact on the added value of a product. This is in line with research (Ramadhan, 2023) processing intensity and product form: more processing (e.g., fresh → fillet → canned tuna) shifts where value is created along the chain and can greatly increase total value added if markets exist.

The implication for the development of similar MSMEs is that to increase product competitiveness and business sustainability, MSMEs need to focus on improving production process efficiency through labor skills, optimizing the use of raw materials, and better cost management. In addition, the application of technology to increase productivity and reduce waste can be an important strategy in increasing added value and competitiveness. Therefore, MSMEs that are able to achieve high efficiency in the use of labor and other resources will have greater potential to survive in the long term and thrive in a competitive market.

5. Conclusion

Based on the results of research conducted on Syiaghi MSMEs with brownies as their product, it can be concluded that processing flour into brownies provides positive added value. The added value obtained is IDR 398,792 with an added value ratio of 71%, which is categorized as high added value, this contributes directly to the competitiveness of Syiaghi MSME brownies, with influencing factors such as labor, raw material costs, production efficiency, selling price, and product quality. The process of transforming raw materials into finished products generates significant added value, as reflected in the difference between the value of output and the costs of primary inputs and supporting costs. This value added indicates that the agro-processing of brownies not only enhances the economic value of raw materials but also opens opportunities for increased income for business operators. From a production efficiency perspective, cost structure and conversion factors provide crucial insights into optimizing the use of raw materials and labor, where higher efficiency leads to lower unit costs and larger profit margins.

Value-added analysis provides information for managerial decision-making by identifying the production activities that contribute most to increasing the value added to brownies. These findings point to strategies for improving efficiency, strengthening quality consistency, developing product differentiation, setting value-based prices, and formulating more targeted marketing communications. The implementation of value-added-based recommendations has the potential to increase the competitiveness of brownies products in a sustainable manner through cost, quality, and

perceived value advantages at the consumer level.

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