Journal of Supply Chain and Entrepeneurship
2025, VOL. 1, NO. 1, 13-19
https://doi.org/10.64268/josce.v1i1.5

Value Chain and Added Value in Goat Milk-Based Enterprise: A Case Study of Kefir Jember

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ABSTRACT
Aim: This study aims to analyze the value chain and measure the added value generated by a small-scale goat milk processing enterprise (Kefir Jember) in producing goat milk kefir drinks and kefir facial masks.
Method: A descriptive quantitative method was applied, using value chain analysis and the modified Hayami method to evaluate the economic contributions of primary and supporting activities. Data collection involved direct observation, structured interviews with open-ended questionnaires, and analysis of production and financial records.
Findings: The findings reveal that Kefir Jember successfully integrates key primary activities, such as sourcing, production, and marketing, along with supporting activities including infrastructure, human resource training, and simple technology use. The added value calculation demonstrated significant profitability, especially for kefir facial masks, which generated substantially higher added value compared to kefir drinks. These results highlight the economic benefits of diversifying goat milk products into innovative health and cosmetic items.
Significance: The study provides valuable insights for micro-scale agro-enterprises on how strategic value chain management and product diversification can significantly enhance profitability. Practically, these findings could guide similar small-scale businesses in improving operational efficiency, product competitiveness, and sustainable economic growth.

ARTICLE HISTORY
Submitted: February 27, 2025
Revised: March 21, 2025
Accepted: April 29, 2025

KEYWORD
Goat milk;
Kefir products;
Micro-enterprise;
Value chain analysis.

INTRODUCTION

Animal-based foods such as meat, eggs, and milk are essential sources of high-quality nutrition, particularly animal protein, which provides important health benefits to humans. Animal protein is valued for its complete profile of essential amino acids, which the human body requires. As the population grows and incomes rise, combined with increased awareness of healthy lifestyles, the demand for animal-derived products has consistently increased worldwide (Acosta, 2018). One particularly promising animal product is goat milk, known for its excellent nutritional profile and often preferred by people who have sensitivity or intolerance toward cow's milk (Gürel et al., 2021; Tarazona et al., 2025).

Goat milk contains valuable nutrients, including both macronutrients and micronutrients (Rai et al., 2022). A typical serving of goat milk (approximately 240 ml) provides around 170 calories, 10 grams of protein, 11 grams of carbohydrates, 6.3 grams of saturated fat, and 27 milligrams of cholesterol. Additionally, goat milk includes important micronutrients such as calcium, zinc, selenium, potassium, phosphorus, copper, riboflavin, and vitamins A, B2, C, and D, all crucial for immune system function and metabolism. Furthermore, goat milk contains short- and medium-chain fatty acids, making it easier to digest compared to cow's milk, thereby potentially offering improved digestive health benefits (ALKaisy et al., 2023; Verma et al., 2025). Due to its nutritional advantages, goat milk serves as a strategic raw material for developing various high-value food and health-related products.

Due to its nutritional benefits, goat milk requires proper processing methods to maintain its freshness and extend its shelf life. Without suitable processing, goat milk can easily spoil due to bacterial contamination or rapid quality degradation (Razali et al., 2021). Therefore, goat milk is increasingly

processed into various valuable products such as kefir drinks and facial masks, which have recently become popular for their health and cosmetic benefits. One local micro-enterprise involved in this industry is Kefir Jember, which consistently produces high-quality goat milk kefir drinks and facial masks. Currently, Kefir Jember produces approximately 10 liters of kefir drink and 7 liters of kefir facial masks every week, reflecting a promising business scale for a micro-sized enterprise.

However, Kefir Jember and other similar micro-enterprises face significant challenges due to unstable goat milk prices, directly affecting their income stability. These price fluctuations mainly result from seasonal changes and inconsistent raw milk supply from local goat farms. Despite these market challenges, Kefir Jember maintains a strong commitment to product quality as its main competitive advantage. To achieve balanced economic benefits among all stakeholders, including farmers and processors, a structured value chain analysis is essential. This type of analysis can clearly identify which activities generate the highest value, measure profitability accurately, and effectively calculate the added value of products. Ultimately, this strategy can enhance operational efficiency and strengthen the sustainability of small agro-based enterprises like Kefir Jember (Mazhari & Rasoulzadeh, 2021).

In developing agro-industry, it is essential to recognize that livestock products not only provide nutritional benefits but also significant economic value. This economic potential can be enhanced through effective processing methods and strategic management of the value chain. One effective way to identify the economic contribution of each stage in the production process is through value chain analysis. This analytical approach illustrates the entire production pathway—from the raw materials to the final product—and helps businesses pinpoint which specific activities generate the highest value. For small businesses like Kefir Jember, which processes goat milk into fermented drinks and cosmetic products, a thorough understanding of these value-generating activities is crucial. It enables the business to improve production efficiency, set appropriate prices, and promote sustainable business growth.

Several previous studies have explored the goat milk value chain in different global contexts. Lie et al. (2012) emphasized the importance of developing local value chains to enhance smallholder farmers' welfare through value-added products like yogurt in Tanzania. Gómez-Ruiz et al. (2012) and Maldonado et al. (2012) examined goat milk production and commercialization in arid regions of Mexico and Argentina, respectively. In Europe, studies by Grispoldi et al. (2022) and Le Féon et al. (2023) have focused on environmental impacts and microbial resistance related to goat cheese production. Research by Dubeuf et al. (2023) and Sacco et al. (2023) discussed how goats could play a key role in reshaping sustainable food supply chains, particularly in mountainous areas. Additionally, factors influencing the quality and productivity of goat milk have been examined by Khemiri et al. (2023) in Tunisia and Mbindyo et al. (2018) in Kenya. Moreover, Gërdoçi et al. (2017) analyzed long-term business relationships in dairy value chains in transition economies, while Msalya et al. (2016) studied public-private partnerships in marketing goat milk in Africa. Despite these valuable contributions, most research has concentrated primarily on basic production aspects, animal health, or sustainability of large-scale dairy operations. Few studies have specifically addressed value chain activities and value creation in micro-scale entrepreneurship, particularly in innovative goat milk products such as kefir and cosmetics in Indonesia.

Therefore, this research aims to identify both primary and supporting activities in the value chain of a small goat milk processing business "Kefir Jember" and calculate the added value generated by its main products, goat milk kefir and kefir facial masks, using the modified Hayami method. The findings are expected to provide practical insights to help other small livestock-based enterprises develop competitive strategies and enhance their economic benefits.

METHOD

Research Design

This study employed a descriptive quantitative research design aimed at analyzing the value chain and added value of goat milk-based products in a small-scale enterprise. The study focused on identifying key value-creating activities and calculating business income and value addition at the processing level.

A purposive sampling technique was applied to ensure that the selected informants were relevant to the objectives of the research.

Participants

The participants in this study included two key actors involved in the value chain of goat milk products: (1) goat milk farmers who serve as raw material suppliers, and (2) Kefir Jember, a small enterprise engaged in processing goat milk into kefir drinks and kefir masks. The research was conducted at Kefir Jember, located at Jalan Bandeng No. 84, Sempusari, Kaliwates, Jember Regency.

Instruments

The main instruments used in data collection were:

- Open-ended questionnaires that allowed respondents to freely express their answers without pre-set options, and
- Interview guides that were developed based on the research objectives to obtain in-depth information.

  Additionally, direct observation was conducted to record data related to the production process, raw material usage, equipment, and final products. Secondary data such as company documents and literature related to value chain analysis were also utilized.

Data Analysis Plan

The data were analyzed using three main approaches:

1. **Value Chain Analysis**

   Data were interpreted descriptively to identify the primary (inbound logistics, operations, outbound logistics, marketing, and service) and support activities (infrastructure, human resources, technology development, and procurement) involved in the production process. This analysis was conducted to map the entire value-adding process of goat milk products.

2. **Revenue, Cost, and Income Analysis**

   Business performance was evaluated using the formulas:

   - Total Revenue (TR) = Production Output × Price
   - Total Cost (TC) = Fixed Costs (FC) + Variable Costs (VC)
   - Profit (Pd) = TR – TC

3. **Added Value Analysis (Modified Hayami Method)**

   Added value at the processing level was calculated to determine the financial contribution from transforming raw goat milk into final products (kefir drink and kefir mask). This method enabled the measurement of profitability and value creation per unit of input.

RESULTS AND DISCUSSION

Results

1. General Overview of Kefir Jember

Kefir Jember is a small enterprise engaged in the processing of goat milk into health and cosmetic products in Jember Regency. Established in 2016, the business is known for its signature products—goat milk kefir and kefir facial masks—with production carried out regularly each month. The company operates under the brand "Kefir Jember" and has become one of the main centers for goat milk processing in the region.

2. Value Chain Analysis

The value chain in Kefir Jember involves a series of interconnected activities, both primary (e.g., procurement, processing, marketing, delivery) and supporting (e.g., infrastructure, human resource development, and technology usage).

a. Raw Material Procurement

The primary raw material—goat milk—is sourced from goat farms located in Lumajang, East Java. Kefir Jember processes around 61 liters of goat milk per month, resulting in approximately 40 liters of kefir drink and 9 kg of kefir mask. The purchase price for raw milk is Rp 20,000 per liter, and only high-quality milk is accepted to ensure consistent product standards.

b. Processing of Goat Milk into Kefir and Facial Masks

The processing stages involve three fermentation phases for kefir drinks: sterilization, grain mixing, double fermentation, and filtration. For the kefir mask, the curd portion (thicker part) of the fermented milk is separated and mixed with natural ingredients such as olive oil, virgin coconut oil, and extracts like bengkoang and essential oils, followed by packaging in 50g cups.

c. Transportation and Distribution

Transportation of raw materials and product distribution is carried out using 3- or 4-wheel vehicles. Consumers can purchase directly from the production site or through delivery channels.

d. Technology Usage

Kefir Jember relies on manual labor and basic tools such as digital scales, blenders, and freezers. While machinery is limited, this manual approach has preserved product quality. However, the business recognizes the need for further technology development to enhance productivity.

e. Human Resource Development and Marketing

Employees are recruited locally and trained directly by the owner. Marketing is done through social media and offline events like car-free day exhibitions. The products are sold at Rp 25,000 per 500ml bottle (kefir) and Rp 50,000 per 50g cup (mask).

3. Revenue, Cost, and Profit Analysis

The monthly financial performance of Kefir Jember is summarized as follows:

Table 1. Value Addition of Goat Milk Products

Description	Value (Rp)
Total Revenue (TR)	11,000,000
Total Cost (TC)	4,894,750
Total Profit (Pd)	6,105,250

4. Added Value Analysis (Hayami Method)

Using the Modified Hayami Method, the added value from both kefir drink and facial mask was calculated. The table below summarizes the findings:

Table 2 Added Value Analysis of Kefir Products

Variable	Unit	Kefir Drink	Unit	Kefir Mask
Purchase Price	Rp/liter	20,000	Rp/liter	20,000
Selling Price	Rp/liter	50,000	Rp/kg	1,000,000
Added Value per unit	Rp/liter	30,000	Rp/kg	980,000
Total Output per batch	liter	10	kg	3
Input Cost	Rp	200,000	Rp	140,000
Labor Wage	Rp	40,000	Rp	40,000
Other Inputs	Rp	82,714	Rp	848,199
Total Added Value	Rp	207,286	Rp	2,001,801
Added Value Ratio	%	41%	%	67%
Profit Margin	Rp	300,000	Rp	2,860,000
Farmer's Contribution (per unit)	Rp	2,815	Rp	886,962

Discussion

The results obtained from this study highlight how structured value chain management, even within micro-scale enterprises like Kefir Jember, can significantly improve the overall efficiency and value of goat milk-based products. By identifying and organizing both core operational activities—such as raw material procurement, production, and marketing—and supporting functions—including infrastructure, technology adoption, and human resource development—the business demonstrates a clear capacity to

create competitive products despite its modest scale. The processing of goat milk into kefir drinks and facial masks, which utilizes mostly manual labor and simple tools, reflects a strategy of local adaptation and resource optimization. This approach resonates with the findings of Sacco et al. (2023), who emphasized that local value chains rooted in community-based operations often exhibit sustainable performance and resilience, particularly in rural and mountainous food production contexts.

Moreover, the value addition analysis using the modified Hayami method revealed a distinct contrast between the two products. The kefir mask, positioned as a high-value cosmetic item, generated a substantially higher added value compared to the kefir beverage. This observation aligns with research conducted by Gómez-Ruiz et al. (2012), which suggested that niche goat milk products (especially those offering functional or wellness benefits) are more profitable than conventional dairy goods due to their market positioning and added processing stages.

The marketing practices adopted by Kefir Jember "primarily through digital platforms and face-to-face consumer engagement" also mirror the success factors described by Gërdoçi et al. (2017), who highlighted the importance of strong customer relationships and adaptive marketing in dairy-based value chains within developing and transitioning economies. Additionally, the structure of Kefir Jember's production and distribution channels supports earlier conclusions drawn by Lie et al. (2012), where empowering smallholders through integrated local value chains contributed to improved income stability and product differentiation in the goat milk sector. In this study, similar benefits were observed, particularly in the form of increased profitability and market reach.

Overall, these findings suggest that small-scale agro-industries, when equipped with localized knowledge, a well-managed value chain, and targeted product innovation, are capable of delivering high-impact economic outcomes despite limitations in technology or scale.

Implications

The results of this study imply that effective value chain management, even within micro-scale enterprises, can significantly enhance product value, profitability, and market competitiveness. By leveraging local resources, maintaining consistent product quality, and applying targeted marketing strategies, small agro-industrial businesses like Kefir Jember can successfully transform raw agricultural inputs into high-value consumer goods. This highlights the strategic importance of empowering rural enterprises through value-added processing and integrated supply chain practices to stimulate economic development in the livestock sector.

Limitations and Suggestions for Future Research

This research was conducted using a single case study approach, focusing solely on one microenterprise engaged in goat milk processing. As a result, the findings may not capture the full range of practices, production capacities, or value chain models that exist in other regions or among different types of dairy-based businesses. Additionally, the data analysis relied heavily on descriptive techniques and financial figures specific to local market conditions, which may limit the applicability of results to broader or more industrialized contexts. Factors such as consumer perception, ecological sustainability, and long-term enterprise growth were not included in the scope of this study.

To build upon the insights generated in this research, future studies are encouraged to involve multiple cases across different geographical or economic settings. Incorporating a mix of qualitative and quantitative methods (statistical modeling, life cycle assessment, or consumer market analysis) can enrich the understanding of value creation in small agro-based enterprises. It would also be beneficial to explore how digital innovation, such as online marketing and e-commerce platforms, can strengthen supply chain integration and business performance, especially in rural-based food processing industries.

CONCLUSION

This study concludes that the implementation of a structured value chain in a micro-scale enterprise such as Kefir Jember plays a vital role in enhancing product value, operational efficiency, and

overall business profitability. Through the identification of key primary and supporting activities—ranging from raw material procurement to marketing—the enterprise successfully transforms goat milk into value-added products like kefir drinks and facial masks. The analysis shows that the kefir mask provides a higher added value compared to the kefir drink, indicating the potential of product diversification in increasing profit margins. Moreover, the findings suggest that even with limited technology and manual production processes, small agro-industrial businesses can achieve significant economic outcomes when supported by effective resource management and targeted market strategies. Therefore, optimizing the value chain and focusing on high-value product innovation can serve as a strategic path for similar enterprises aiming to grow sustainably in the agro-food sector.

AUTHOR CONTRIBUTIONS STATEMENT

YDPN was primarily responsible for designing the research framework, conducting field observations, and collecting data. DEP focused on data analysis, literature review, and preparing the manuscript for publication. Both authors participated in interpreting the findings, revising the final manuscript, and approving it for submission.

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