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Value Addition in the Daily Industry of Monze District: An Assessment of Best Practices, Market Trends, and Constraints

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Abstract

Value addition in the Dairy industry is widely recognized as a pathway for improving dairy farmer incomes, reducing post-harvest losses, strengthening food security, and promoting agro-industrial development. However, despite Southern Province being the leading dairy-producing region in Zambia, value-added dairy products remain limited, with most output sold in raw or minimally processed form. This study examined value addition in the dairy industry in Southern Province of Zambia, focusing on Monze District, to analyse current practices, market trends, and best practices. A convergent parallel mixed-methods design was used, combining a quantitative survey of 380 respondents with qualitative interviews involving 20 key informants. Quantitative data were analysed using descriptive statistics, chi-square tests, and logistic regression, while qualitative data were analysed thematically and triangulated at interpretation stage. Findings revealed that 64.7% of respondents practiced value addition, with dairy products dominating (93.7%). Demand was perceived to be rising (94.2%), though 94.7% of sales remained local. Major constraints included lack of capital (66.6%), limited technology (63.4%), and insufficient skills (47.1%). Collaboration was the strongest predictor of value addition (OR = 13.76, $p < 0.001$), alongside experience. The study concludes that expanding value addition requires cooperative-based processing, targeted financing, technical training, improved infrastructure, and stronger market linkages.

1. Introduction

The livestock sector remains a critical component of Zambia's agricultural economy, contributing significantly to food security, employment creation, and rural income generation. Across the Southern African region, livestock continues to account for a substantial share of agricultural value added, driven by increasing global and regional demand for livestock products (Odubote et al., 2025). In Zambia, dairy production has historically fulfilled multiple socio-economic functions, including providing household nutrition, income, draught power, and financial security. In recent years, national development strategies have emphasized transforming the sector from subsistence-based production toward a more commercialized, value-driven industry capable of supporting agro-industrial growth and economic diversification (Songe et al., 2025).

Despite this potential, Zambia's dairy industry remains largely characterized by primary production with limited value addition, particularly in the dairy subsector. Most farmers continue to sell raw milk or live animals, with minimal processing into higher-value products such as cheese, butter, or yogurt. This limits income opportunities and reduces the sector's economic contribution. Although initiatives by government and private actors have sought to strengthen value chains and processing capacity, structural challenges persist, including weak cold-chain systems, limited technology adoption, and poor market coordination, which continue to constrain value addition and competitiveness (Ng'ombe et al., 2025; Matongo, 2025).

1.2 Statement of the Problem

Ideally, Zambia's dairy industry should operate as a productive and market-oriented sector where value addition through processing of dairy products such as processed milk, cheese, yoghurt and butter enhances farmer incomes, strengthens agro-industrial development, and improves food and nutritional security. A well-developed livestock value chain should promote commercialization, employment creation, and rural economic transformation while increasing the sector's contribution to national economic growth (Odubote et al., 2025). However, the current situation reflects a significant gap between this ideal and the reality of the sector. Although livestock production remains an important component of Zambia's agricultural economy, contributing approximately 3.2% to national GDP and about 42% to agricultural GDP (Kachinda et al., 2025), value addition in the dairy industry remains limited. According to the Ministry of Fisheries and Livestock (2023), Zambia had about 5,115,495 dairy and 535,371 households engaged in dairy rearing as of April 2023. Southern Province alone accounts for 31.5% of dairy-raising households, making it the country's largest dairy-producing region. Despite this large production base, most smallholder farmers sell milk in live form or as raw products with minimal processing.

The magnitude of the problem is also reflected in dairy production. Smallholder farmers produce over 80% of the country's milk, valued at approximately US$80 million annually, yet dairy processing and commercialization remain low (Cheng et al., 2025). In 2023, Zambia produced about 290,827,428 litres of milk, with Southern Province contributing the highest provincial output of 97,718,009 litres (Ministry of Fisheries and Livestock, 2023). Much of this milk, however, is marketed in raw form rather than processed dairy products that generate higher value. If these challenges persist, the sector may continue to experience low farmer incomes, post-harvest losses, and weak competitiveness of locally processed livestock products. Therefore, this study will fill this gap by examining existing value addition practices in the dairy industry in evidence to support strategies for strengthening the competitiveness and sustainability of the dairy value chain.Monze District, identifying best practices among producers and processors, and analysing market trends and constraints that influence the development of value-added livestock products, thereby providing empirical.

1.3 Research Objectives

- To analyse the current value addition practices in the dairy industry in Monze District.
- To investigate the market trends influencing the demand and development of value-added dairy products in Monze District.
- To identify and recommend best practices that can enhance value addition in the dairy industry in Monze District.

2. Literature Review

2.1 Introduction

Value addition in agriculture refers to processes that increase the economic worth of primary products through transformation, processing, packaging, and improved market access. In Zambia's dairy industry, particularly the dairy subsector, value addition is increasingly viewed as a key strategy for enhancing competitiveness, rural incomes, and food security. While raw milk production remains central, achieving higher value requires coordinated improvements in quality, processing, and distribution systems. This review examines global, regional, and local perspectives, alongside challenges, market trends, and theoretical insights, concluding with identified research gaps.

2.2 Global Perspectives on Dairy Value Addition

Globally, the dairy industry has evolved through technological innovation, quality assurance, and market diversification. Developed regions such as Europe and North America emphasize branding, certification, and compliance with international standards. Sustainable approaches, including circular economy practices, have enhanced efficiency and reduced waste (Gazal et al., 2025). Similarly, advancements in cold-chain infrastructure and niche product development have enabled access to high-value markets (Ait El Alia et al., 2025).

Quality assurance is central to competitiveness, with strict hygiene, traceability, and food safety standards determining market access (Goda et al., 2025). Value-added products such as UHT milk, yogurt, and cheese continue to experience rising demand driven by urbanization and lifestyle changes (Gereles & Szőllősi, 2025). However, disparities in access to technology and capital persist, limiting participation by smaller producers (Ma et al., 2025).

2.3 Regional Perspectives: Africa and SADC

In Africa, dairy value addition remains constrained by infrastructural and institutional limitations. Nonetheless, progress is evident within SADC and East Africa. Livestock health interventions improve productivity, which is essential for value addition (Mwacalimba et al., 2025). Climate-smart practices and improved feed systems also stabilize milk supply, enabling processing expansion (Srivastava et al., 2025).

Cooperative models have proven effective in strengthening market access and bargaining power. For example, dairy associations in Ethiopia enhance collective marketing and price negotiation (Wakaso et al., 2025). However, challenges such as limited training, weak extension services, and trade barriers continue to restrict growth.

2.4 Zambia's Livestock and Dairy Sector

Zambia's livestock sector contributes significantly to economic activity, accounting for approximately 3.2% of national GDP and 42% of agricultural GDP (Wezi et al., 2025). Despite this, the dairy subsector is characterized by low processing levels and weak market integration. Smallholder farmers produce over 80% of milk, much of which is sold informally with minimal value addition (Cheng et al., 2025).

The dairy herd represents a small proportion of the total dairy population, limiting production capacity (Odubote et al., 2025). Additional challenges include feed shortages, disease outbreaks, and limited access to veterinary and extension services (Kachinda et al., 2025). While commercial processors exist, inconsistent supply and structural inefficiencies hinder sector growth.

2.5 Dairy Value Addition Practices and Technologies

Value addition involves transforming raw milk into higher-value products through processing, preservation, and quality control. Cooperative participation enables resource pooling, access to equipment, and improved market access (Cheng et al., 2025). Technologies such as pasteurizers and cooling systems enhance product quality and shelf life, though high costs limit adoption.

Cold-chain infrastructure plays a critical role in reducing spoilage and maintaining quality, while compliance with safety standards improves access to formal and export markets. However, limited access to affordable technologies remains a key constraint for small-scale producers.

2.6 Challenges Constraining Value Addition in Zambia

Several interrelated constraints limit value addition:

- Infrastructure and Logistics: Poor roads, unreliable electricity, and inadequate cooling systems increase losses and reduce efficiency.
- Technology and Finance: High equipment costs and limited access to credit restrict investment.
- Quality Assurance: Weak hygiene practices and limited enforcement of standards affect product consistency.
- Market Linkages: Fragmented value chains and weak coordination limit access to formal markets.
- Policy Gaps: Ineffective implementation and limited institutional support undermine sector development.

2.7 Market Trends and Consumer Preferences

Demand for processed dairy products in Zambia is rising due to urbanization and changing diets. Consumers increasingly prefer packaged milk, yogurt, and cheese. However, affordability constraints, import competition, and supply inconsistencies limit market growth. Emerging products such as flavored and fortified dairy items offer diversification opportunities, but require improved processing capacity and market access.

2.8 Research Gap

Despite growing literature, there is limited empirical research focused on Zambia's dairy value chain at the smallholder level. Most studies emphasize macro-level trends, with insufficient analysis of farm-level practices and value chain interactions. There is also a lack of integration between production constraints and consumer behavior, making it difficult to identify high-potential products.

Additionally, existing research often treats constraints in isolation rather than as interconnected challenges. Limited evidence also exists on the effectiveness of current interventions such as cooperatives and extension services. Addressing these gaps is essential for designing context-specific, evidence-based strategies.

2.9 Key Lessons from Literature

The literature highlights several critical lessons: effective coordination across value chain actors improves efficiency; technology adoption enhances quality and market reach; and strong quality assurance systems build competitiveness. Infrastructure investment reduces losses, while institutional support and financial inclusion enable expansion.

Furthermore, market intelligence allows producers to align with consumer demand, and cooperative models facilitate scale and resource sharing. Innovation incentives accelerate adoption of new practices, while sustainability approaches ensure long-term resilience. Together, these insights provide a comprehensive framework for strengthening dairy value addition in Zambia.

2.10 Conceptual Framework

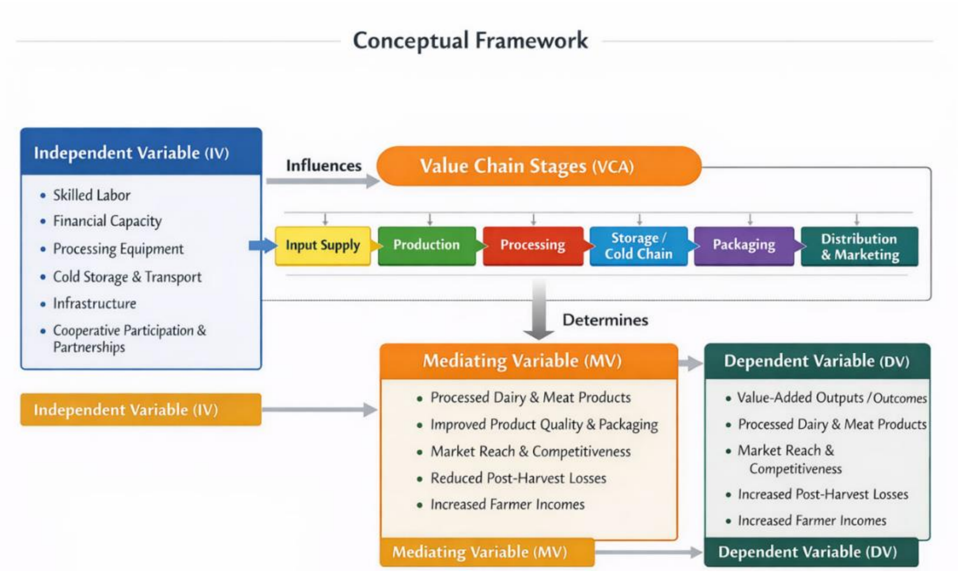

Figure 1: Conceptual Framework

3 Research Methodology

This study adopts a pragmatic research philosophy, which supports the integration of qualitative and quantitative approaches to provide both statistical measurement and contextual understanding of value addition in Zambia's dairy industry. Using a convergent mixed-methods design, qualitative and quantitative data were collected simultaneously, analyzed separately, and integrated during interpretation to enhance validity and reliability. The qualitative component employed exploratory and descriptive approaches through interviews, observations, and document analysis to understand value addition practices, while the quantitative component utilized a cross-sectional survey to measure factors such as productivity, technology adoption, and market participation. The study was conducted in Monze District of Southern Province, Zambia, a region characterized by active dairy production and dairy value chain activities, making it suitable for empirical investigation. The study population included key stakeholders such as smallholder farmers, processors, cooperatives, veterinary officers, and extension personnel. Participants were selected based on inclusion criteria requiring relevant experience and active involvement in dairy activities. A qualitative sample of 20 participants was determined based on data saturation, while a quantitative sample of 384 respondents was calculated using Cochran's formula for unknown populations at a 95% confidence level and 5% margin of error. This methodological approach ensures credible, reliable, and comprehensive findings aligned with the study objectives.

Researcher Reflexivity

The researcher recognizes their role in shaping data interpretation in this mixed-methods study on value addition in the dairy industry in Monze District. Care was taken to minimize bias, especially when analysing farmers' practices, market trends, and constraints such as technology and financing. Reflexive journaling and continuous engagement with both qualitative and quantitative data were used to ensure that findings reflect participants' actual experiences. Triangulation further supported objectivity by comparing insights from different data sources to strengthen the credibility of results.

4 Results and Discussion

4.1 Introduction

This chapter presents the empirical findings from the survey dataset comprising 380 valid responses on value addition in the dairy industry in Southern Province of Zambia. During data screening, the workbook was found to contain many empty spreadsheet columns created by formatting, but only 20 substantive survey variables contained usable data and were retained for analysis. Because the questionnaire was dominated by categorical variables, the analysis used frequencies, percentages, multiple-response analysis, chi-square tests of association, and binary logistic regression. The findings are organized around the study objectives: first, the current value addition practices; second, the market trends shaping value-added dairy products; and third, the constraints and best practices needed to strengthen value addition in the province. In line with your instruction, each table is introduced and explained before it is presented.

4.2 Quantitative Findings

Gender Distribution

The findings show that the dairy industry in Southern Province of Zambia is highly male dominated, with males accounting for 81.8% of the respondents. Female participation remains relatively low at 15.8%, while a very small proportion (2.4%) preferred not to disclose their gender. This suggests that value addition activities in the dairy sector are largely driven by men, which may reflect cultural norms, ownership patterns, and access to productive resources within the livestock industry.

Table 1: Distribution of Respondents by Gender (N = 380)

Gender	Frequency	Percent
Male	311	81.8
Female	60	15.8
Prefer not to say	9	2.4
Total	380	100.0

Age Distribution of Respondents

Many respondents fall within the 36–45 age group (45.3%), followed by those aged 26–35 (23.2%). This indicates that the dairy industry is dominated by economically active and mature individuals. Younger participants (18–25) are relatively few (7.6%), suggesting limited youth involvement, while older respondents (56 and above) also form a small proportion (7.1%). Overall, the results imply that value addition practices are largely undertaken by individuals in their prime working years.

Table 2: Distribution of Respondents by Age Group (N = 380)

Age Group	Frequency	Percent
36–45	172	45.3
26–35	88	23.2
46–55	64	16.8
18–25	29	7.6
56 and above	27	7.1
Total	380	100.0

Education Level of Respondents

Half of the respondents (50.0%) have attained secondary education, while 33.9% have only primary education. Very few respondents possess tertiary qualifications (11.5% combined for diploma and degree holders). This suggests that the dairy industry is largely operated by individuals with basic to moderate levels of education, which may influence the adoption of advanced value addition technologies, business practices, and market strategies.

Table3: Distribution of Respondents by Education Level (N = 380)

Education Level	Frequency	Percent
Secondary education	190	50.0
Primary education	129	33.9
Diploma/Certificate	26	6.8
Degree and above	18	4.7
No formal education	17	4.5
Total	380	100.0

Experience in Cattle-Related Activities

A significant proportion of respondents have considerable experience in dairy-related activities, with 31.1% having 11–15 years and 29.5% having 5–10 years of experience. Only 21.8% have less than five years of experience. This indicates that the study largely captured experienced participants who are likely to have established knowledge of dairy production and value addition practices, thereby strengthening the reliability of the findings.

Table 4: Distribution of Respondents by Experience (N = 380)

Experience	Frequency	Percent
11–15 years	118	31.1
5–10 years	112	29.5
Less than 5 years	83	21.8
More than 15 years	67	17.6
Total	380	100.0

Herd Size of Respondents

Most respondents own medium-sized herds, with 31.8% having between 11–30 dairy and 27.6% having 31–50 dairy. Smaller herd owners (1–10 dairy) account for 15.8%, while only 5.5% own large herds exceeding 100 dairy. This suggests that the dairy industry in the study area is dominated by small- to medium-scale farmers, which has implications for the scale and type of value addition activities undertaken.

Table 5: Distribution of Respondents by Herd Size (N = 380)

Herd Size	Frequency	Percent
11–30	121	31.8
31–50	105	27.6
51–100	73	19.2
1–10	60	15.8
Above 100	21	5.5
Total	380	100.0

4.3 Current Value Addition Practices in the Cattle Industry

Extent of Current Practice

To address the first objective, the study began by examining the extent to which respondents are currently engaged in value addition within the dairy industry. Understanding participation levels is essential because it provides a baseline for assessing how widespread value addition practices are in the sector. The findings reveal that while value addition has gained traction among dairy farmers and traders, it is not yet universally adopted. A notable proportion of respondents still operate within traditional systems that focus primarily on the sale of live dairy or unprocessed products.

As shown in Table 6, many respondents (64.7%) reported that they are engaged in some form of value addition, while 35.3% indicated that they do not undertake any value addition activities. This distribution suggests that value addition is becoming an important component of the dairy industry in Southern Province, but its adoption remains uneven. The relatively high proportion of non-participants points to the existence of barriers such as limited access to capital, inadequate processing infrastructure, lack of technical skills, and weak market linkages.

Table 6: Current Practice of Value Addition (N = 380)

Category	Frequency	Percent
Yes	246	64.7
No	134	35.3
Total	380	100.0

Types of Value-Added Products

Beyond simply identifying whether respondents engage in value addition, it is equally important to examine the specific types of products being produced or sold. This provides deeper insight into the nature and sophistication of value addition practices within the dairy industry. The analysis focused on respondents who reported at least one value-added product, allowing for a clearer understanding of product diversification within the sector.

As illustrated in Table 4.7, the results show a strong concentration of value addition activities in dairy-related products. An overwhelming majority of respondents (93.7% of valid responses) indicated involvement in dairy production, making it the most dominant form of value addition. This reflects the relative accessibility of dairy processing compared to other forms of value addition, as well as the consistent demand for milk and milk-based products in local markets.

In contrast, other forms of value addition are significantly less developed. Fresh beef cuts were reported by 22.4% of respondents, indicating some level of engagement in meat processing, although this remains largely basic. More advanced processing activities, such as packaged beef products (7.5%) and processed meats like sausages and biltong (4.7%), are still limited. Similarly, value addition through by-products such as manure (4.7%) and hides and skins (0.8%) is minimal, suggesting that opportunities for full resource utilization within the dairy value chain are not being fully exploited.

Qualitative Themes

Themes in Relation to Objective 1

Table 7: Themes in Relation to Objective 1

Theme	Code 1	Code 2	Code 3	Frequency (n=20)
Theme 1: Dominance of Dairy Processing	Milk pasteurization	Yoghurt production	Cheese making	18
Theme 2: Infrastructure and Technology Deficits	Lack of cold storage	Unreliable electricity	Inadequate processing equipment	17
Theme 3: Financial and Skills Constraints	Limited access to capital	High cost of equipment	Insufficient technical training	16
Theme 4: Fragmented Value Chain Coordination	Weak farmer-processor linkages	Absence of formal contracts	Limited cooperative participation	15

Table 8: How Quantitative and Qualitative are linked

Quantitative finding	Qualitative evidence	Integrated meaning
Collaboration strongly predicted value addition practice (OR = 13.76, $p < 0.001$)	"When we formed this cooperative, everything changed. Suddenly, we had bargaining power."	Cooperatives are not just social groups; they are operational mechanisms for market access, bargaining, and shared upgrading
Lack of capital was the top constraint (66.6%)	"The banks want collateral that I do not have…"	Financial exclusion directly blocks investment in equipment and processing
Demand increased (94.2%) but local markets dominated (94.7%)	"Going to Lusaka? That is a different story… I have no cold chain."	Demand exists, but infrastructure and logistics prevent market expansion
Training was the most needed support (37.9%)	"They have no training in these areas."	Skills gaps help explain low packaging, branding, and formal-market participation

4.4 Discussion of Findings

Introduction

This chapter discusses the qualitative findings in relation to existing literature, theoretical frameworks, and quantitative results. The discussion is structured around the study objectives: current value addition practices, market trends, and strategies for enhancing value addition. Key themes include dairy processing dominance, infrastructure and technology deficits, financial and skills constraints, fragmented coordination, localized demand growth, quality and price sensitivity, cooperative action, and institutional support. These findings are interpreted using Porter's Value Chain Analysis and the Resource-Based View, with integration of quantitative results to highlight convergence and divergence.

Current Value Addition Practices

The dominance of dairy processing aligns with Odubote et al. (2025), who highlight Zambia's small but concentrated dairy subsector. However, findings show value addition remains basic, mainly pasteurization and yoghurt production, which contrasts with advanced global practices (Gazal et al., 2025). Infrastructure and technology deficits strongly limit upgrading, consistent with Kachinda et al. (2025), who identify systemic livestock constraints in Zambia. The persistence of raw and minimally processed milk sales reflects weak value chain integration, as also noted by Ng'ombe et al. (2025). Fragmentation of the value chain further supports Songe et al. (2025), who argue that Zambia's livestock sector remains largely subsistence-oriented with limited transformation.

Market Trends

Findings show increasing demand for dairy products but highly localized markets. This aligns with Cheng et al. (2025), who note rising urban demand for processed dairy, but contrasts with limited market expansion due to infrastructure gaps. The dominance of informal markets reflects weak market systems identified by Girvetz et al. (2025). Consumer preference for freshness, price, and trust aligns with Goda et al. (2025), who emphasize food safety and quality assurance as key drivers of demand. However, reliance on informal vendors indicates persistent trust gaps in formal retail systems.

Best Practices and Strategies

Cooperatives emerged as the most effective strategy for enhancing value addition, consistent with Cheng et al. (2025), who highlight resource pooling and improved market access through collective action. The strong statistical significance of collaboration supports Ng'ombe et al. (2025), who link cooperatives to improved productivity and welfare outcomes. Institutional support and policy gaps identified in this study align with Girvetz et al. (2025), who emphasize the need for coordinated investment in livestock value chains. Suggested strategies—shared equipment, bulk marketing, and peer learning—are consistent with successful regional models such as Wakaso et al. (2025).

Theoretical Integration

The findings validate Porter's Value Chain Analysis by identifying bottlenecks across production, processing, and marketing stages. Weak infrastructure and limited processing capacity restrict value creation along the chain. The Resource-Based View explains variation in adoption, showing that access to capital, equipment, and skills determines value addition capacity. The strong effect of collaboration reflects RBV's emphasis on pooled resources and capability development. Together, both theories explain systemic and firm-level constraints shaping value addition outcomes.

Summary of Contribution

The study provides micro-level evidence that collaboration is the strongest driver of value addition in Monze District. It also reveals a key contradiction: while demand for value-added dairy products is rising, commercialization remains limited due to structural constraints in infrastructure, finance, and skills. This explains why value addition remains low despite market potential, reinforcing the need for integrated value chain and resource-based interventions.

5 Conclusions and Recommendations

5.1 Conclusion

This study assessed value addition in the dairy industry in Southern Province of Zambia, with a focus on Monze District. Findings for the first objective show that value addition is largely concentrated in dairy processing, with 93.7% of respondents engaged mainly in products such as pasteurized milk and yoghurt. Other areas like beef processing, hides, skins, and manure products remain underdeveloped. Most activities occur at farm and basic processing levels, with limited advancement into packaging and branding. Key drivers of value addition include collaboration, experience, and enterprise structure, while major constraints include poor infrastructure, limited access to finance, high equipment costs, and inadequate technical skills.

For the second objective, the study found strong and growing demand for value-added products, with 94.2% reporting increased demand. However, 94.7% of sales remain within local markets, with minimal access to supermarkets or export channels. Consumer preferences are mainly driven by freshness, price, and trust in informal vendors, while branding and packaging have little influence.

For the third objective, cooperatives and collective action emerged as the most effective strategy for improving value addition. Collaboration significantly increases participation in value addition, while shared resources, bulk marketing, and peer learning enhance efficiency. The study further recommends stronger institutional support, improved access to equipment and finance, better extension services, and private sector investment to strengthen value chain development.

5.2 Recommendations

Strengthen Cooperative Development and Collective Action: Government and development partners should prioritize strengthening farmer cooperatives through investment in governance, leadership, and organizational capacity, given that collaboration was the strongest predictor of value addition engagement with cooperative members being nearly 14 times more likely to practice value addition than non-members.

Invest in Processing Infrastructure and Cold Chain Systems: Government and private sector investors should make targeted investments in milk collection centers, cooling facilities, reliable electricity, and rural roads to address the infrastructure deficits that currently confine 94.7% of sales to local markets.

Establish Practical, Farmer-Centered Extension and Training Programs: The Ministry of Fisheries and Livestock should redesign extension services to deliver practical, hands-on training in processing techniques and business management through existing farmer organizations rather than sporadic theoretical workshops.

Facilitate Private Sector Investment and Market Linkages: Government should offer tax incentives and streamlined regulations to attract private sector investment in processing facilities while development partners facilitate public-private partnerships that connect farmer cooperatives with commercial buyers.

Establish a Value Addition Support Fund with Accessible Financing Mechanisms: Government, financial institutions, and development partners should establish a dedicated Value Addition Support Fund providing low-interest loans with flexible collateral requirements and matching grants for cooperatives seeking to acquire processing equipment.

Declaration of Competing Interests

The authors declare no conflicts of interest.

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Ethical considerations

The article followed all ethical standards appropriate for this kind of research.

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