

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 IJABR 2024; SP-8(1): 890-894
www.biochemjournal.com
 Received: 13-10-2023
 Accepted: 19-11-2023

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Navigating challenges in dairy value addition: A holistic examination of constraints and strategic roadmaps for sustainable growth

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DOI: <https://doi.org/10.33545/26174693.2024.v8.i1S1.469>

Abstract

The global dairy industry, pivotal to agriculture and livelihoods, has witnessed a surge in the integration of value addition practices, responding to market dynamics and consumer preferences. This paper delves into the challenges faced by dairy farmers in Haryana, India, as they navigate the adoption of Value Addition Practices (VAPs) for milk. Covering technical, economic, infrastructural, and miscellaneous aspects, the study offers nuanced insights and strategic roadmaps for sustainable growth. The research methodologically selects Hisar and Kurukshetra districts, involving 120 dairy farmers through a multistage random sampling approach. Utilizing the Mean Percent Score (MPS) formula, the study quantitatively evaluates constraints, revealing notable issues in scientific knowledge, economic expenses, infrastructural gaps, and miscellaneous hurdles. The findings underscore the urgency for targeted interventions, proposing enhanced training, financial support, infrastructure investments, and awareness campaigns to propel the dairy industry towards competitiveness, sustainability, and adaptability in the evolving agricultural landscape.

Keywords: Global dairy industry, Value addition practices, Mean Percent Score (MPS), Awareness campaigns, Competitiveness, Sustainability, Adaptability, Agricultural landscape

Introduction

The dairy industry stands as a pivotal force in global agriculture, providing an essential source of sustenance and livelihood for millions of farmers across the globe. In response to evolving market dynamics and shifting consumer preferences, there has been a growing emphasis on integrating value addition practices within the dairy sector (Neethirajan, 2023) [17]. When contemplating the future profitability of agriculture, animal husbandry, and dairy, the term "value added" consistently takes center stage. Its prominence surged in the 1990s, solidifying its place among the most frequently used terms in the industry. Broadly defined, value addition entails the process of elevating a product from its original state to a more valuable form, exemplified by the transformation of wheat into flour (Coltrain *et al.*, 2000) [4].

Within the dairy sector, value addition specifically involves the conversion of raw milk into a diverse array of processed products, offering farmers the potential for heightened income and enhanced market competitiveness (Chengappa, 2018) [3]. Despite the apparent advantages, dairy farmers often grapple with a myriad of challenges that hinder the smooth adoption and integration of value addition practices. As the global dairy industry undergoes transformative changes, recognizing the constraints perceived by dairy farmers concerning value addition practices becomes not only crucial but imperative.

The intricate complexities and nuances associated with these challenges directly impact farmers' capacity to diversify their product offerings and capture added value. A thorough analysis of these constraints is pivotal, as it can provide valuable insights informing targeted strategies and policies aimed at nurturing a more resilient and adaptive dairy sector. In essence, understanding and addressing these constraints are essential steps towards ensuring the sustained growth and competitiveness of the dairy industry in the face of evolving agricultural landscapes.

Methodology

The research was carried out in two districts of Haryana, namely Hisar and Kurukshetra, strategically chosen to represent the southwestern and northeastern agro-climatic zones, respectively. This deliberate selection aimed to ensure a comprehensive and varied portrayal of the state's dairy farming landscape. The sampling strategy employed for respondent selection was multistage random sampling, designed to capture a diverse range of perspectives.

- **District and Subdivision Selection:** Two districts were selected through a random process, and from each district, two subdivisions were chosen to provide a nuanced understanding of the regional variations.
- **Block and Village Selection:** Following the district and subdivision selection, one block was meticulously chosen from each selected subdivision. Further, to enhance the granularity of the study, three villages were randomly selected from each block.
- **Criteria for Respondents:** The criteria for participant inclusion involved identifying villagers with a minimum of four milch animals, ensuring that the respondents had a direct and substantial connection to dairy farming practices.

In totality, the sample size for the study consisted of 120 dairy farmers, with 10 participants selected from each of the 12 villages, thereby facilitating a comprehensive exploration of perspectives and practices within the chosen districts.

The constraints associated with Value Addition Practices were systematically explored through a detailed schedule, allowing for a thorough examination of challenges faced by dairy farmers in adopting such practices. The analysis of constraints was conducted using the Mean Percent Score (MPS) formula, providing a quantitative measure to evaluate

the perceived seriousness of the identified challenges. This meticulous approach to sampling and analysis contributes to the robustness and reliability of the study's findings, offering valuable insights into the complexities of value addition practices in the dairy sector.

$$\text{Mean Percent Score (MPS)} = \frac{\text{Observed score}}{\text{Total score}} \times 100$$

Results and Discussion

Constraints are regarded as formidable forces, as perceived by the respondents, acting as impediments to the adoption of Value Addition Practices (VAPs) and the overall growth of dairy farmers. The respondents participated in a constraints schedule aimed at assessing the factors affecting VAPs in the milk sector. These perceived constraints were categorized into four distinct areas: technical, economic, infrastructural, and miscellaneous.

Technical constraints

Table-1 illuminates the predominant and highly critical technical constraints perceived by respondents in the realm of Value Addition Practices (VAPs) for milk. At the forefront are the formidable challenges of 'lack of scientific knowledge about quality and hygiene maintenance' and the 'absence of training in the scientific methodology for producing value-added milk products,' commanding an imposing MPS of 65.83. Trailing closely behind, we find substantial hurdles encapsulated in the 'lack of machinery knowledge' (MPS = 62.5), 'insufficient availability of skilled labor' (MPS = 60.83), 'limited understanding of proper packaging techniques' (MPS = 56.25), and 'inadequate knowledge of milk processing methods' (MPS = 49.58).

Table 1: Ranking of technical constraints on the basis of MPS

S. No.	Technical Constraints	MPS	Rank
1	Lack of milk processing knowledge	49.58	V
2	Lack of packaging knowledge	56.25	IV
3	Lack of scientific knowledge about quality and hygiene maintenance	65.83	I
4	Lack of machinery knowledge	62.5	II
5	Lack of skilled labour	60.83	III
6	Lack of training for scientific way of making value added milk products.	65.83	I

These findings resoundingly corroborate the extensive body of research by Dolphine *et al.*, (2009) ^[6], Kumar *et al.*, (2012) ^[10], Bhattu *et al.*, (2013) ^[11], Dhindsa *et al.*, (2014) ^[5], Maruti *et al.*, (2016) ^[13], and Minhaj *et al.*, (2019) ^[14]. These studies consistently emphasize the pivotal constraints arising from a 'lack of knowledge on sources of information' and 'limited time to access critical information.' Furthermore, the work of Tailor *et al.*, (2012) ^[21] and Kumar *et al.*, (2016) ^[9]

reinforces these insights, underscoring the formidable challenges stemming from 'lack of awareness about clean milk production' and 'insufficient knowledge about creating value-added dairy products.' The resonance of these findings across multiple studies reinforces the urgency and significance of addressing these challenges for the sustainable advancement of dairy value addition practices.

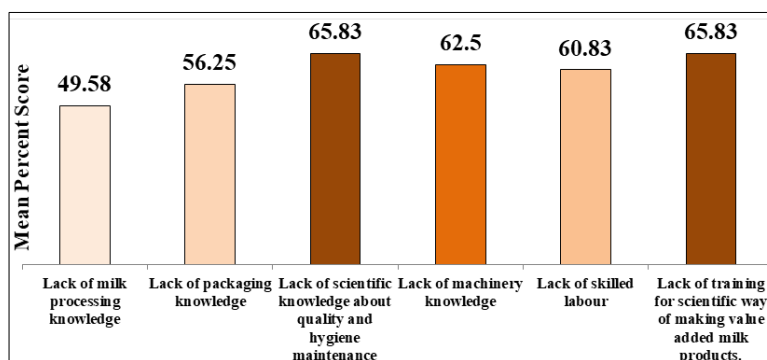


Fig 1: Diagrammatic presentation of MPS about technical constraints

Economic constraints

As highlighted in Table-2, among the economic constraints perceived by respondents regarding Value Addition Practices (VAPs) for milk, the top-ranked impediment was the 'high expenses on infrastructure/machinery,' standing assertively with an MPS of 67.5. This formidable constraint took precedence, followed closely by challenges such as the

'high cost of inputs' (MPS = 61.25), 'availability of credit facilities' (MPS = 60.42), 'elevated expenses on promotion/transportation' (MPS = 58.33), 'absence of incentives for supplying pure milk to the area' (MPS = 58.33), 'limited profit margins' (MPS = 57.5), and the 'non-remunerative price of milk offered by customers' (MPS = 54.58).

Table 2: Ranking of economic constraints on the basis of MPS

S. No.	Economic Constraints	MPS	Rank
1	Credit facilities	60.42	III
2	High expenses on promotion/ transportation	58.33	IV
3	High cost of input	61.25	II
4	No incentive for supplying pure milk to area	58.33	IV
5	Low profit of margin	57.5	V
6	Non remunerative price of milk offered by the customers	54.58	VI
7	High expenses on infrastructure/ machinery	67.5	I

These findings resoundingly align with the research landscape, echoing the sentiments expressed in studies by Patil *et al.*, (2009) [18], Nagrale *et al.*, (2015) [16], Murai and Singh (2016) [15], Mariammal *et al.*, (2017) [11], Bhawar *et al.*, (2020) [2], and Gamit *et al.*, (2021) [7]. The consistent recognition of economic challenges, such as high expenses

and cost of inputs, underscore the universality of these constraints within the broader context of dairy value addition. This convergence of insights emphasizes the critical nature of addressing economic barriers to facilitate the sustainable growth and success of milk value addition practices.

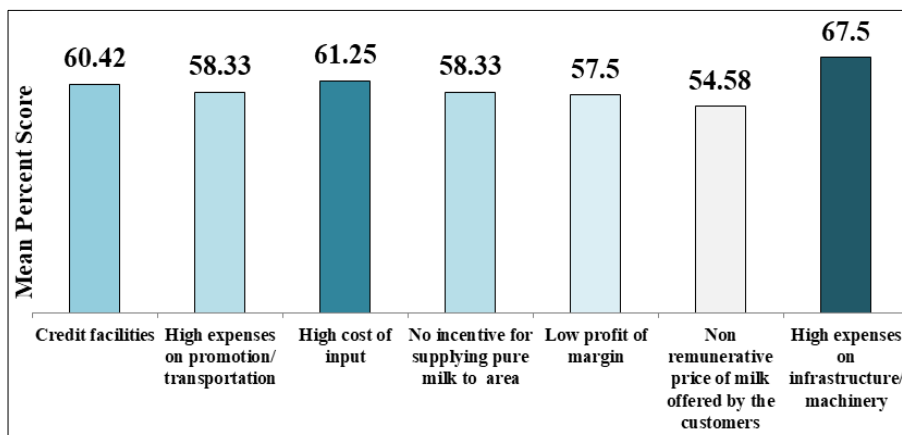


Fig 2: Diagrammatic presentation of MPS about marketing constraints

Infrastructural constraints

Illustrated in Table-3, the paramount and highly critical infrastructural constraints perceived by respondents regarding Value Addition Practices (VAPs) for milk were spearheaded by the formidable challenge of 'non-availability of sufficient gas round the year,' standing resolutely with an MPS of 64.58. This was closely followed by impediments

such as 'inadequate equipment for making value-added products of milk' (MPS = 63.33), 'distantly located retailer shop' (MPS = 58.33), 'absence of an automatic milk collection unit' (MPS = 58.33), 'inadequate sanitation and hygiene facilities' (MPS = 53.75), 'lack of storage facilities' (MPS = 51.25), and 'limited availability of bulk milk coolers and freezers' (MPS = 50.83).

Table 3: Ranking of infrastructural constraints on the basis of MPS

S. No.	Infrastructural Constraints	MPS	Rank
1	Non availability of automatic milk collection unit	58.33	III
2	Less availability of bulk milk cooler and freezer	50.83	VI
3	Lack of storage facilities	51.25	V
4	Improper sanitation and hygiene facilities	53.75	IV
5	Distantly located retailer shop	58.33	III
6	Non – availability of sufficient gas round the year	64.58	I
7	Inadequate equipment for making value added products of milk	63.33	II

These findings seamlessly align with the research landscape, echoing the sentiments expressed in the study by Martolia *et al.*, (2020) [12], which highlighted the scarcity of basic infrastructure at the local or commercial level for farm women, coupled with personal constraints. Additionally,

Singh and Kumari (2017) [19] underscored the critical constraint of lacking scientific housing and milking facilities. Gupta *et al.*, (2017) [8] emphasized the significant challenges faced by farmers, particularly the lack of milk collection centers, proper milk route channels (70.48%), and

inadequate infrastructure and facilities for marketing and value addition of milk (71.20%). Further, Surkar *et al.*, (2014) [20] noted the unavailability of chilling facilities at collection centers as a major constraint, while Vani (2013) [22] highlighted factors such as limited orientation towards processing and other value-adding activities (26.66%) and

insufficient preservation facilities, coupled with a lack of local demand (15.83%). The convergence of these findings underscores the critical need for addressing infrastructural gaps to foster a conducive environment for the successful implementation of value addition practices in the dairy sector.

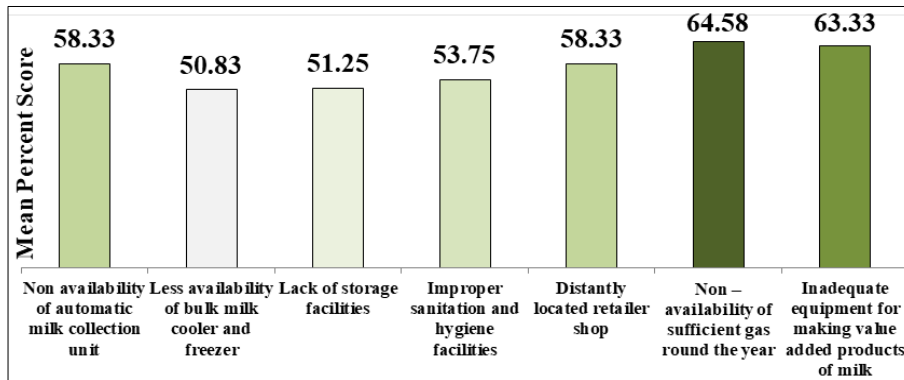


Fig 3: Diagrammatic presentation of MPS about infrastructural constraints

Miscellaneous constraints

Evident from Table-4, the preeminent and profoundly impactful miscellaneous constraints perceived by respondents concerning Value Addition Practices (VAPs) for milk were dominated by the formidable challenges of 'laborious work' and 'lack of resources management,'

commanding an authoritative MPS of 67.5 as the top constraint. Following closely in significance were hurdles such as 'social status consciousness' (MPS = 66.25) and the perception that these practices are 'more time-consuming' (MPS = 63.33).

Table 4: Ranking of miscellaneous constraints on the basis of MPS

S. No.	Miscellaneous Constraints	MPS	Rank
1	Social status consciousness	66.25	II
2	More of time consume	63.33	III
3	Laborious work	67.5	I
4	Lack of resources management	67.5	I

These findings align seamlessly with the observations made by Yadav *et al.*, (2021) [23], who extensively documented constraints such as the poor availability of high-producing germplasm, rapidly decreasing feed and fodder resources, suboptimal husbandry practices, and a myriad of reproductive and health-related issues. The convergence of insights underscores the multi-faceted challenges faced by

dairy farmers, with 'laborious work' and 'resource management limitations' emerging as central hurdles. Addressing these constraints becomes paramount in ensuring the effective implementation and sustainable success of value addition practices in the dynamic landscape of the dairy industry.

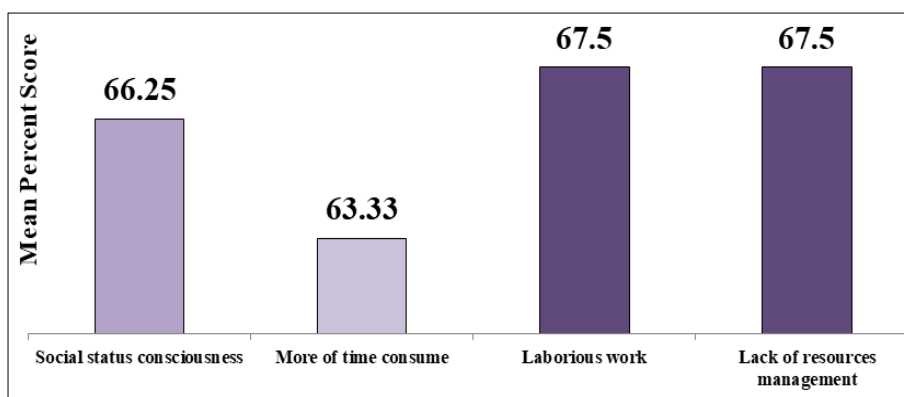


Fig 4: Diagrammatic presentation of MPS about miscellaneous constraints

Conclusion

In conclusion, this comprehensive study delves into the intricate challenges faced by dairy farmers in embracing Value Addition Practices (VAPs) for milk, presenting a thorough analysis across technical, economic,

infrastructural, and miscellaneous dimensions. The technical domain reveals critical gaps, with a prominent emphasis on the 'lack of scientific knowledge about quality and hygiene maintenance' and the 'absence of training in the scientific methodology for producing value-added milk products.' On

the economic front, the high expenses on infrastructure/machinery emerge as a formidable obstacle, underscoring the universal significance of economic constraints in dairy value addition. Infrastructural barriers, notably the 'non-availability of sufficient gas round the year,' highlight the necessity for targeted interventions to enhance basic facilities.

The miscellaneous constraints encompass the laborious nature of VAPs, challenges in resource management, and societal consciousness associated with these practices, emphasizing the multifaceted impediments faced by dairy farmers. These findings align with existing research, reinforcing the urgency of addressing these constraints for sustainable progress in the dairy industry.

Strategically addressing these challenges is imperative for fostering resilience and adaptability within the dairy sector. The diagrammatic presentations provide a visually compelling overview of the constraints, enhancing the accessibility and applicability of the study's insights. This research stands as a valuable resource for policymakers, practitioners, and stakeholders, offering a roadmap for targeted strategies aimed at bolstering the dairy industry's competitiveness and ensuring its sustained growth in the ever-evolving agricultural landscape.

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