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Review Article

DIMENSIONS OF CONSTRAINTS IN INDIAN DAIRY SECTOR: INSIGHTS FROM SYSTEMATIC LITERATURE REVIEW

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ABSTRACT: The present paper applies a systematic literature review of literatures on constraints faced by dairy farmers in India with main focus on the construct- Constraints in dairy sector. The concept has been studied by various authors however, needs further elaboration. Therefore, the present work follows the stages recommended for systematic literature review to examine the research gaps by previous authors. This study contains descriptive and thematic analysis. Descriptive analysis of 22 research articles was studied and classified on year- wise distribution, journal- wise distribution, and focus of the concept, research methods, and dimensions framework of constraints. This paper also describes sub dimensions of constraints and method of grouping them under major dimensions. Out of 14 major dimensions, the knowledge constraint, breeding constraint, economic/financial constraint, animal health management constraint and Feeding constraints contribute 75% share in overall constraints faced by dairy farmers.

Keywords: Constraints, Dairy sector, Systematic literature review, Milk producers.

INTRODUCTION

The dairy as a sub- sector in agriculture sector occupies significant place in the Indian economy. This sub-sector is the second largest agricultural commodity and its contribution to national GDP is next to rice [1]. However, there may be numerous constraints before the farmers [2] and consequently impacting the milk production and their income. The organized and unorganized dairy sectors of in India face constraints like technical, socio-psychological, economic and marketing [3]. Review work carried out to identify probable constraints to the knowledge of authors, is very limited [4]. Hence, a systematic literature review is crucial to study [5] the constraints faced in dairy sector by farmers.

Therefore, the major aim of this paper is to analyze the various dimensions and sub dimensions of constraints faced by dairy farmers in Indian dairy sector through synthesizing literatures thereby addressing the research gaps. In this connection, steps of systematic literature review were followed to examine the construct [5]. This paper attempted to develop a framework for

thematic analysis for a research question - What are the constraints faced by the Indian dairy sector and its dimensions and sub- dimensions?

The study is divided into two segments. The first segment of the study explains the descriptive analysis of research articles related to the constraints faced by Indian dairy sector with focus on farmers engaged in this sector. An analysis of construct starts with the study of particular articles from 2002- 2024. The descriptive analysis in this study is to offer acumen for room for forthcoming research. The thematic analysis is the part of second segment of this study and deliberates on various dimensions and sub dimensions of constraints faced in Indian dairy.

The review commenced with concept of theory of constraints, various constraints identified, explained, discussed and classified by researchers in the dairy. The review commenced with concept of theory of constraints, various constraints identified, explained, discussed and classified by researchers in the dairy sector. The dimensions associated with the construct –

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constraints faced by dairy producers were explored. It was tried to develop a framework for classification of constraints and grouped into specific classes for better understanding by applying thematic analysis.

RESEARCH MEHTODOLOGY

Theoretical basis

This paper referred Theory of Constraints (ToC) developed by Dr. Eliyahu Goldratt to explain theoretical orientation of constraints. Dr. Goldratt conceived the ToC and published it through his best-selling novel – "The Goal" in 1984. ToC provides a powerful set of tools about identifying the most limiting factor (*i.e.* constraints) and how improve the process (Theory of Constraints Institute, 1984). Many authors carried out study to classify and enumerate the several constraints faced by the farmers of the Indian dairy sector. However, fewer have tried to classify the constraints and its dimensions and sub-dimensions.

In this context, this study is an attempt on deeper insights on identification of sub dimensions of constraints & classifying into major category of dimensions of constraints faced in Indian dairy sector by farmers.

Limitations and the search of research articles

A procedure prescribed by(5,6) in their studies has been followed for this study to (a) define the keywords for selection of articles, (b) delimiting the articles on inclusion and exclusion criteria, descriptive analysis and (c) thematic analysis.

Articles connected to constraints in dairy sector were searched while keeping keyword of construct in view. It has been observed that words such as need, challenges, and issues were used interchangeably with word related to constraints in dairy farming, dairy sector, dairy industry, and constraints faced by dairy producers and dairy farmers. In the search process major publications such Emerald, Elsevier, Wiley, Sage, Springer and Taylor & Francis, UGC care grade I and peer reviewed open access journals were referred also publications were searched on Research Gate web portal. The title and abstract were verified for inclusion or exclusion criteria for 135 research papers. Search for backward reference was also carried out to identify works related to the study. Finally, 25 articles were identified and selected for the systematic literature review. However out 25 articles, 22 articles are related to the construct i.e. Constraints in dairy sector faced by dairy farmers and remaining 3 articles were refereed to develop the theoretical background for carrying out systematic literature review.

Content analysis

Content analysis technique has been used to categorize the articles considered for this study. Categorization of research articles assists to confirm clarity and identified pattern associated with the study (5,7) referred content analysis as research method for subjective process of classifying, coding and identifying the themes and patterns in the study.

A classification framework has been followed to categorize the articles in the descriptive analysis (Table1). The framework envisages frequency distribution based on time period and articles published in journals. The papers were categorized into four main theme- focus of the concept, sector, research methodology and major dimensions of constraints.

Descriptive analysis

A classification framework has been assigned for each article selected for the analysis indicated in Table 2. The descriptive analysis validates studies with appropriate examples and conduct audit trials [6].

THEMATIC ANALYSIS OF CONSTRAINSTS IN DAIRY SECTOR

Conceptualization

The articles under review have not mentioned any theoretical concept while describing or defining the constraints comes before dairy farmers in dairy sector in India. However, few authors attempted to describe the concept of constraints in dairy sector mainly faced by dairy producers.

"Theory of Constraints" (ToC) introduced by Dr. Eliyahu Goldratt in 1984 was the basis of conceptualizing this article. ToC is a process improvement methodology that emphasizes the importance of identifying "system constraint" or bottleneck (Theory of Constraints Institute). It suggests a scientific approach to hypothesizes and improve every complex process including manufacturing which consists of connected activities and any one of which may act as a constraint i.e weakest link upon whole process.

Some of the authors attempted to enlist and explain the potential constraints into categories or group. However, for better conceptualization of concept different types of constraint variables were identified and enlisted under major dimensions.

Dimensions of the concept

It was observed during review of literature that different authors understood concept differently. Therefore, it was attempted to develop major framework for each dimension to map the related sub dimensions of constraints variables under one dimension for better understanding of concept and analyze the importance of each major constraint dimension in dairy sector.

During literature review 215 sub dimension of constraints were identified and were tried to grouped under related 14 major dimensions of constraints faced by dairy producers in this sector for structured analysis. It was observed that researchers interchangeably used the various words to describe the construct constraints faced in dairy sector. In this paper authors identified all descriptions of constraints mentioned in literatures under review and into grouped to fit under major dimensions for precise understanding of concept and analysis. As for example, Sarker and Ghosh [19] mentioned unavailability of vaccines and lack of training facility under major dimension Infrastructural constraints whereas Narayan et al. [15] described lack of number of veterinary hospitals under same major dimension. Similarly different authors interpreted sub dimensions of constraints differently or used description of items interchangeably. Therefore, framework for description of major dimensions of constraints conceptualized for grouping of related sub dimensions into clear category of major dimensions. Descriptions of sub-dimension by authors were brought under related major dimensions for better understanding of concept and then analysis was carried out (Table 3).

Descriptive analysis of major dimensions of constraints

The result shows that knowledge constraint, breeding constraint, economic/financial constraint, animal health management constraint & feeding constraints are the five major dimension of constraints which is faced by

dairy farmers. These five major dimensions contribute 75% share in overall constraints faced by dairy farmers. Knowledge constraint is the most critical constraint faced by the dairy farmers as its weightage is highest (20.5%) among all other major dimension of constraints. Whereas Milk marketing, Socio-psychological, Policy, Infrastructural, Human resource Extension service, Environmental and Pandemic constraints are contributing 25% weightage in overall constraints faced by dairy farmers (Table 4).

DISCUSSION

As far as conceptualization of constraints faced by dairy sector is concern the authors attempted to describe the related sub dimensions of constraints and few authors tried to bring related sub dimensions under umbrella of major dimension of constraints. However, interpretation of constraints and descriptions are varying from authors to authors.

Earlier research regarding construct constraints have not been discovered much to construct through systematic literature review.

Hence, this study attempted to arrange the descriptions of constraints faced in dairy sector based on key words mentioned in selected literatures under review.

Theoretical implications

This study has showed that constraints in dairy sector through theoretical lens of ToC, which was not referred in any one of the previous studies. Therefore, further studies can be undertaken on using this theory.

Table 1. Structure for classification for statistical analysis.

Classification	Main theme	Sub themes
1	Focus of the concept	Completely on the constraints in Indian dairy by farmers. Constraints and another /various factors Constraints predominately not in study
2	Sector	Organized dairy sector- Dairy Cooperatives/ Private dairy Companies Unorganized dairy sector- Self consumption/Direct milk selling/middle milk men Sector- Not specified whether organized
3	Research Methods	Review Descriptive/exploratory Correlational Experimental Quasi- experimental Non experimental Ex-post facto research
4	Major dimensions of constraints	Animal health management (AHM) Animal feeding (AF) Animal breeding (AB) Infrastructural (I), Extension services (ES) Knowledge (K), Milk Marketing (MM), Technical (T), Socio- psychological (SP), Human resource (HR), Policy/Admin (P/A), Environmental (E), Pandemic (P).

Table 2. Classification of analysed studies.

SI. No.	Study	Focus	Sector	Research Methods	Major Dimensions of constraints in Indian dairy sector	Findings
1	Akila and Senthivel (2012)	Completely on the constraints faced in Indian dairy sector	No specified whether organized or unorganized	Descriptive/ Exploratory	AHM, F, B, MM, K, ES	Author indicated that lack of veterinary services, veterinary dispensary, organized milk marketing, knowledge in scientific practices, costly animal feed and treatment, were the constraints in dairy sector(8).
2	Bandhopadhyay et al. (2021)	Constraints and another/various factors	No specified whether organized or unorganized	Experimental	E/F,I, P	The researcher used Problem Relevancy Score (PRS) tool to calculate to identify the major challenges confronted by farmers. The majority of the farmers were facing serious challenges like high amount of feed, medicine cost, scarcity of funds to invest, high cost of construction of cattle shed, replacement of the milch animal due to low resell value, lack of veterinary services, training facilities(9).
3	Chand <i>et al</i> . (2015)	Constraints predominately not in study	No specified whether organized or unorganized	Correlation	F, AB , E	The study highlighted the sustainability status of smallholder dairy farms was not inspiring and hinted that the dairy farming may not be viable as enterprise for future. Average score of ecological dimension was dimensions of sustainability. Main traits like productivity feed, genetic potential of animals were weak facet of the dairy farming(10).
4	Kumar <i>et al.</i> (2014)	Completely on the constraints faced by dairy farmers	Unorganized	Descriptive/ Exploratory	AHM, AF, B, I, E/F, ES, MM, K, T, P/A	This study identified various constraints faced by dairy farmers and grouped under major headings of scientific management practices, scientific breeding practices, scientific feeding practices, institutional constraints, marketing constraints(11).
5	Kumar and Parappurathu (2014)	Constraints and another/various factors	No specified whether organized or unorganized	Descriptive/ Exploratory	AHM, I, F, B, K, MM	The paper identified and describe constraints related to biological, technical and socio-economic. The author also tried to describe sub dimensions of constraints(12).
6	Manhas and Sharma (2008)	Constraints and another/various factors	No specified whether organized or unorganized	Descriptive/ Exploratory	T, E/F,I, MM, SP	The study identified perceived constraints of dairy farmers in milk production. The researchers used Mean Percentage score used to determine the intensity of constraints. Technical, Economical, Infrastructural, Marketing, sociopsychological and other Miscellaneous constraints are the overall constraints faced in dairy sector(13).
7	Mohi and Bhatti (2006)	Completely on the constraints faced by dairy farmers	No specified whether organized or unorganized	Descriptive/ Exploratory	AF, I, B, AHM	The study identified various constraints in improved dairy practices and scale for perceived constraints to test the level of constraints faced by farmers in dairy sector(2).
8	Naik <i>et al.</i> (2013)	Completely on the constraints faced by dairy farmers	Organized	Descriptive/ Exploratory	AF	The study highlighted the constraints before dairy farmers in feeding practices of dairy animals(14).

Sl. No.	Study	Focus	Sector	Research Methods	Major Dimensions of constraints in Indian dairy sector	Findings
9	Meena <i>et al.</i> (2014)	Completely on the constraints faced by dairy farmers	Organized	Descriptive/ Exploratory	B, AF, AHM, I, K, MM	The paper used Garret ranking technique and ranked major constraints faced by milk producer are high cost of fodder repeat breeding of animals' health management, price of milk, poor animal housing, milk marketing, unavailability of animal hospitals and poor knowledge on feeding(15).
10	Prasad <i>et al.</i> (2018)	Constraints predominately not in study	Organized	Descriptive/ Exploratory	E/F, MM	The study highlighted that poor income and low milk price are the constraints faced by farmers(16).
11	Rathod <i>et al.</i> (2011)	Constraints and another/various factors	Organized	Descriptive/ Exploratory	P, MM, E/F	The study highlighted the constraints such as financial constraints, policy and administrative constraints, service delivery to dairy farmers were perceived by both farmers and dairy cooperative officials including Costly feed, medicine, treatment, low price for milk, complications in insurance as major constraints in dairy sector(16).
12	Rathod and Dixit (2020)	Constraints predominately not in study	No specified whether organized or unorganized	Review	I, E, T, SP, K	The author highlighted sub dimensions of constraints in terms of lack of IT infrastructure, difficulty in adopting technology, heavy investment, costly milk production, computer illiteracy & skill for adoption of technology(17).
13	Sah (2002)	Constraints and another/various factors	No specified whether organized or unorganized	Review	AHM, K, ES, T, I, AF,B	The study highlighted the many constraints faced in terms of perceived needs- Information need, Training need, Infrastructure need are important perceived constraints in dairy farming (18).
14	Sarker and Ghosh (2010)	Completely on the constraints faced by dairy farmers	Organized/Un organized	Experimental	I, E/F, MM, T, PS, P	Paper enlisted the major constraints faced by both organized (Dairy Cooperatives) and unorganised sector in expansion of milk production. The farmers have faced constraints of infrastructural, economic, marketing, technical, socio- psychological constraints(19).
15	Saravanan <i>et al</i> . (2021)	Completely on the constraints faced by dairy farmers	No specified whether organized or unorganized	Ex post facto	MM, I, E/F	The study revealed that during pandemic COVID-19, dairy farmers faced difficulty in milk selling transport of animal, purchase of animal, treatment of animal, shortage of concentrate feed(20).
16	Shende <i>et al.</i> (2020)	Completely on the constraints faced by dairy farmers	Organized	Descriptive/ Exploratory	MM	The researchers attempted to revealed that dairy farmers faced low milk rate during Pandemic COVID-19(21).
17	Singh <i>et al</i> . (2012)	Completely on the constraints faced by dairy farmers	Organized	Descriptive/ Exploratory	B, AF, AHM	Authors analysed the various sub dimensions of constraints and grouped into major dimensions as Breeding, feeding, management, health care, fodder production constraints and found that Healthcare was the most serious constraints among all constraints(22).

Sl. No.	Study	Focus	Sector	Research Methods	Major Dimensions of constraints in Indian dairy sector	Findings
18	Smitha <i>et al.</i> (2019)	Constraints and another/various factors	No specified whether organized or unorganized	Descriptive/ Exploratory	E/F, AF, P	The study highlighted that costly feed, vet services, labour, credit from financial institutions, and shortage of high yielding breed, insufficient fodder cultivation were the major constraints(23).
19	Tailor <i>et al</i> (2012)	Completely on the constraints faced by dairy farmers	No specified whether organized or unorganized	Descriptive/ Exploratory	AF,B,AHM, I	The researchers rank the constraints by milk producers and found that the major constraints were, breeding, production and health management of milch animals housing were the other serious constraints by using garret ranking technique(1).
20	Thirunavukkarasu (2014)	Constraints predominately not in study	No specified whether organized or unorganized	Ex post facto	HR	The study highlighted that ageing labour forces and low participation of youth in dairy is major constraints(24).
21	Yadav <i>et al</i> . (2021)	Constraints and another/various factors	No specified whether organized or unorganized	Review	AHM,K,E/F,I, ES,E,MM, P	Authors highlighted the major constraints in terms of training of farmers, improved breed of animals, method of rearing animals, market infrastructure and improper housing facility for animals including weak government policies(4).
22	Pavan <i>et al.</i> (2023)	Entirely on constraints	No specified whether organized or unorganized	Review	P	Findings highlighted animal production and product supply chain disruption during lock down(25).

Research implications

Authors used various alternative words in their papers to denote constraints faced by dairy farmers. There are few empirical studies which applied research instruments to measure and validate the concept of constraints in dairy sector but failed to identify its antecedents and implications. Hence, there is need to address the research gaps through concept-based research methodology.

Majority of studies mentioned focused on identification of sub dimensions of constraints faced by dairy farmer but failed to group into related main theme. Hence there is need to define the research framework for studies on constraints in dairy sector for right way of interpretation of sub dimensions of constraints faced by dairy sector.

Practical implications Suggestions for policy makers

Dairy sector is one of the important sector for the nation, where rural population dependent upon farming and allied activities. Government bodies need to realize the status and importance of constraints faced in both organized and unorganized dairy sector by dairy farmers and related stakeholders. There is requirement of interventions in dairy sector for addressing the major dimensions of constraints faced by dairy farmers. The Government authorities must focus on addressing the needs for education, awareness and training needs of dairy farmers for improvement of dairy sector. The policies may focus on organizing dairy sector so that constraints faced dairy farmers should be addressed in scientific manner.

Implication of stakeholder other than Government authorities

The organized dairy sector-dairy cooperatives, private dairy players should also focus on practical constraints of dairy farmers and accordingly plan for interventions. These institutions should take lead in extending government policies to the reach of dairy farmers.

The organized sector should incentivize the dairy farmers for following best dairy farming practices

Table 3. Structured framework for major dimensions and identified sub- dimensions of constraints.

Sl. No.	Framework for Major Dimension of constraints in dairy sector	Frequency of Sub dimensions of constraints found in literatures under review	Weightage
1	Economic /Financial Constraints	24	11.2%
2	Knowledge Constraints	44	20.5%
3	Infrastructural Constraints	7	3.3%
4	Extension Service Constraints	2	0.9%
5	Animal Health Management Constraints	26	12.1%
6	Breeding Constraints	35	16.3%
7	Feeding constraints	23	10.7%
8	Milk Marketing Constraints	19	8.8%
9	Technical constraints	6	2.8%
10	Socio- psychological constraints	16	7.4%
11	Human resource constraints'	3	1.4%
12	Policy constraints	7	3.3%
13	Environmental constraints	2	0.9%
14	Pandemic constraints	1	0.5%
	Total	215	100%

30 25 25 20 15 10 11 13 10 11 8 10 11

Fig. 1. Year wise distribution of prominent studies considered in analysis.

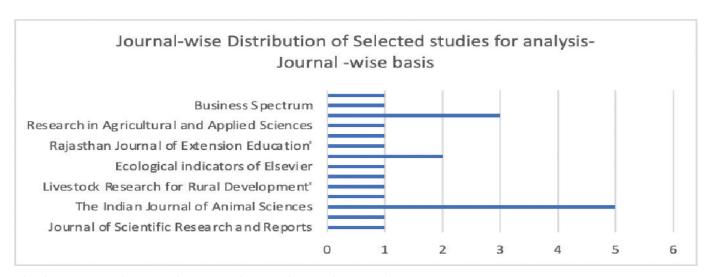


Fig. 2. Journal wise prominent studies considered in analysis.

to encourage to tackle constraints in systematic and scientific manner.

CONCLUSIONS

The present study followed a systematic literature review to conceptualize and construct Constraints in Dairy sector and identify their critical dimensions. Besides this, present review paper conducts a thematic analysis of the articles to understand the basis of concept and various angles of dimensions of constraints in dairy sector. The analysis signify the construct Constraints faced in dairy sector with fourteen major dimensions. This review provides implications to various stakeholders and also provide critical perspectives and important insights for researchers for future work.

This study is also subjected to certain limitations as selected literatures were restricted to specific resource. Nevertheless, the authors tried to follow rigorous process for selection of specific and focused studies for examination. However, there is chance of inadvertently overseeing some of articles.

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