A Managerial Perspective on Sustainable Supply Chain Management Practices and Performance in the Indian Dairy Industry of Maharashtra and NCR

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ABSTRACT

Need and Significance: The dairy business in India has made a substantial contribution to the rural economy of the country. It has been considered as a tool for achieving socioeconomic improvement. To meet the increasing demand of the consumers, companies are increasingly interested in supply chain management as a development area. A plethora of studies since the 1990s, both successful and unsuccessful, show how companies have invested heavily to optimize their supply chains to boost customer satisfaction and internal productivity. The winning network of individual enterprises is made up of supply chains that add the most value to customers at the lowest cost. In fact, companies can no longer compete if they operate in isolation from their suppliers, consumers, and other supply chain partners. As a result, the most pressing issue is optimizing the dairy industry's supply chain to meet future domestic demand while remaining competitive in global markets. The purpose of this study was to discover the true facts and, as a result, examine the methods for improving those processes to generate a win-win scenario for all players in the dairy supply chain.

Research Question & Objectives: Based on the literature review, the research question of the study is to understand-How can the Indian dairy industry's supply chain management (SCM) procedures be monitored and structured to improve performance and gain a competitive edge? The research objectives pertaining to the problem includes: 1) To get an understanding of the SCM methods used by supply chain participants in the Indian dairy business, such as producers, processors, distributors, and retailers. 2) To critically evaluate the impact of accepted SCM practices on the performance of the organization. 3) To have a better understanding of how youngsters are reacting to market dynamics leading to customer satisfaction. 4) What are the factors and challenges for the successful implementation of Sustainable Food Supply Chain Management? 5) To propose a clear direction for enhancing the performance of the Indian dairy industry by implementing SCM methods.

Methodology: The study involves exploratory research to understand the Indian dairy supply chain management. A descriptive research design has been adopted to answers the who (dairy companies operating in India), what (SCM practices are adopted), and what are the changing mindset of the consumers. The primary data has been collected from the Indian states- Maharashtra and NCR region. The five groups that have been identified as respondents include: two Dairy plants (registered milk processing unit), four Milk Cooperatives (collection centers), two Retailers (marketing and Distributors), one union employee and 545 customers (milk & milk products). Judgmental Sampling technique is used to select the various milk processing units, milk cooperatives, retailers, onion employee and data was collected through structured questionnaire. Simple Random sampling technique is used to reach out customers and data was collected through questionnaire on five points Likert-type scale. The data collected is analyzed using the 'Statistical Package for Social Sciences SPSS (Statistical Package for Social Sciences) version 25.0 subject to different analyzing techniques. Cronbach's Alpha value was used to conduct Reliability test. Other statistical tools used are mean and Factor analysis

Key Findings: The findings of the study show that all the dairy companies are aware of dairy supply chain management (DSCM) practices. The maximum of the companies has implemented or planned to implement whereas the small companies lacked implementation practices. All the respondents agree to DSCM practices will help the organization in improvement of performance, marketing orientation, and achieving competitive advantage. Use of ICT (Information and Communication Technology) and ERP (Enterprise Resource Planning) helps in supplier relationships. Factors that lead to customer satisfaction include customer services, customer

problem solving capability, value for money, product quality and Product & service reliability.

Implications of the study: This study would be beneficial for operating managers, Sales and marketing officers, procurement managers and other departments to understand the mindset of the consumers to fulfill their demand. It will also help the milk producers to sell decent quality products.

Keywords: **Supply Chain Management, Indian Dairy Industry, Customer Satisfaction, Sustainability**

I. Introduction

India is the world's greatest milk producer, accounting for 23% of worldwide milk production. As a result, the dairy business in India has made a considerable contribution to the economy of the country. Dairy activities in India are an important aspect of the rural Indian economy because they are the primary source of employment and revenue. Therefore, it's been seen as an instrument for accomplishing socioeconomic progress. India's population is enormous, and per capita milk consumption is approximately 394gms per day (in 2019). In India, the dairy industry's products are largely consumed domestically, with most of them being marketed as fluid. To meet rising consumer demand, India is rapidly investing in and emphasizing supply chain management as a development area.

Milk production in India is approximately 209.96 MMT, with an expected increase to approximately 255 MMT, indicating the potential growth of dairy management in India. Currently, the dairy business in India is largely unstructured; according to several studies, India has a 20% organized market and an 80% unorganized market. There is a lack of technology adoption or innovation in the unorganized milk market, resulting in higher wastage, variable quality, low customer satisfaction, and so on. Successful dairy companies are currently investing extensively in supply chain optimization to improve customer satisfaction and internal productivity.

Customers get the most value for the least amount of money. As a result, optimizing the supply chain to fulfill future domestic demand is critical for firms to preserve their competitiveness in the global market. Similarly, the Indian government has launched numerous development initiatives to enhance the dairy industry, and private engagement is growing in the Indian dairy sector.

Implementing an effective supply chain across the business (including inbound, manufacturing, and export) will be the most crucial area of development for the Indian dairy industry to meet both home and international demand. As a result, the most important challenge for the dairy business is streamlining its supply chain to meet future domestic demand while remaining competitive in global markets. The goal of this research is to uncover the truth and, as a result, look at solutions for enhancing those procedures to create a win-win situation for all parties involved in the dairy supply chain.

Ii. Related Literature Review

2.1 Indian Dairy Industry Scenario-

India is a developing country & day by day the consumption pattern, healthy lifestyle & eating habits of consumers changing due to numerous causes like growth in income level, Covid-19 epidemic, promotion of healthy & nutritional food culture etc. As a result, the food industry is attempting to enhance its supply chain. Interdependent supply chain linkages will ensure each stakeholder a market for their products, eliminate the risk of unpredictability, and keep them financially stable within such a supply chain. However, to maximize profit from the business while also ensuring a long-term supply chain, the company must optimize the chain by eliminating/merging unnecessary/less important linkages to increase the product's value at the lowest possible cost.

Studies by Goyal (1994), Srivastava & Patel (1994),

Roy (1997), Kulkarni (1997), Bhalla (2001), Rangasamy & Dhaka (2007), Burki and Jhan (2008), GyanPrakash (2011), Technopak (2010), and FAIDA & CII-McKinsey reports have highlighted the difficulties and the potential of the Indian agro-industry. Inefficiencies, deterioration of perishable food items, inferior food quality, malpractices in weights and measures, mismatch of demand and supply, feed/fodder shortages, costly raw materials, supply chain inefficiencies, increase in transportation and processing cost and so on are only a few of them.

Supply chain procedures are the most significant department in any company since they bring all the stakeholders together and connect them to provide the best services at the lowest possible cost while also ensuring customer satisfaction. According to many definitions, supply chain management encompasses various departments such as procurement, production, processing, and distribution, among others, and successful coordination between them will result in the organization's success. Previous literature (IBM, Chopra and Meindl 2007, Walters 2008, Yigrem et. Al. 2008, Burki and Jhan 2008, Subbhaiah et al.,2009, Karthikeyan and Teshome 2010, Wisner et al. 2012, Rebeca Sanchez-Flores 2020), has defined supply chain management (SCM) and its positive effect on productive efficiency of the small dairy farmers. These studies emphasize handling of the entire flow of goods and services, integration of trading partners, transport and storage of material, fulfilling customer requirement etc.

National and International studies have been reviewed to analyze the various predictor variables like Information and Communication Technology (ICT) (Hazen and Byrd 2010, Asabere et al 2012), Warehousing Management (Fatehpuria 2013, Aung at el 2012), Supplier relationship practices (Qrunfleh et al 2012, Boniface 2011), Supply chain manufacturing practices (Singh et al 2012, National Bureau of Agricultural Commodity and Food Standards 2005, Smith et al 1995), customer relationship management (Saarijarvi et al 2013, Wang and Feng 2012), Transportation management (Matapurkar and Sinha 2011,Garcia and Lunadei 2010), etc. These studies have been analyzed using a case-study, regression, multiple linear regression, factor analysis, Structural equation modeling etc.

2.2 Supply Chain of Indian Dairy Industry-
In India, for example, Amul cooperatives' supply chain eliminated the middlemen and engaged farmers/milk producers directly with processors, allowing them to enhance profit margins. Such a model aided in the creation of transparency among stakeholders, and the inclusion of all stakeholders' aids in the improvement of supply chain procedures by removing redundant supply chain links. This, in turn, leads to a long-term supply chain.

Nestle, on the other hand, uses a milk district model for distribution, which includes: (a) an agreement with farmers to divert milk twice a day, (b) the installation of chilling centers, mostly at collection points, (c) transportation from collection centers to the district's factory, and (d) the implementation of quality-improvement programmes. Sustainable supply chain implementation is essential to govern the environment, economics, and social aspects of such a complex distribution network. Then and only then will such a network be long-term viable. The Company's efforts in India have facilitated direct and indirect employment and offers livelihood to about one million individuals including farmers, suppliers of packaging materials, services, and other commodities. In such a circumstance, the social side of the supply chain must be prioritized to benefit the people who work for the company.

2.3 Sustainable dairy industry-The dairy supply chain must enhance its sustainability to meet increasing customer demands to reduce food waste, pollution, and natural resource usage. Although intermodal transportation has been identified as a significant instrument for reducing CO2 emissions, several barriers remain in the way of the dairy supply chain adopting this approach (Cannas 2020). This emphasizes that having access to technology is insufficient to boost the dairy supply chain's sustainability; action must be performed at all stages of the supply chain.

Supply chain sustainability is a new emerging business goal that could be the dairy industry's key

goal in being truly sustainable (Luther 2021). A company's attempts to address the environmental and human impact of their products' journey are referred to as supply chain sustainability. From raw material procurement to production, storage, and delivery, as well as all transportation links in between. Its purpose is to keep environmental damage to a minimum. The supply chain is where the organization sees the most improvement. The activity of coordinating sourcing, production, inventory management, and transportation to all supply chain partners is known as supply chain management. The supply chain sustainability statistic components include demand, environmental impact, societal risk, data system, and advancement. Consumer products firms account for more than 90% of the supply chain. Environmental indicators are used by corporate members to inform supplier management and hold business partners accountable to supply chain sustainability goals. The biggest hurdle to sustainable supply chains is cost, as smaller businesses cannot afford the costs of establishing a sustainable supply chain.

The advantages of implementing a sustainable supply chain include determining areas for improvement within the supply chain, as well as ensuring that the company's branding is such that customers are prepared to pay more for superior services. Employee hiring and retention are generally influenced by a company's corporate culture and principles, with sustainability playing a vital part.

Current Supply chain of Indian dairy is bit complex due to various difficulties & lack of advancement in sector. Typical supply chain of dairy industries is shown below in figure 1

Figure 1: Supply Chain of Dairy industry
(Refer Annexure)

. Milk flows from the farmer to the customer via many modes of transportation, and its perishable quality makes transit more challenging. Time to deliver, milk temperature, humidity, total cost, distance, demand, forecasting, and packaging are all important concerns in any efficient supply chain. To create a sustainable supply chain, technological progresses as well as better optimized processes to move items swiftly are required.

2.4 Challenges in supply chain

Various issues in supply chain management exist based on various characteristics such as material handling, transportation, and quality supply, among others. When it comes to material handling, it's clear that milk handling at the farm level is critical, as there's a risk of contamination when milk is extracted from a cow. If the container is not clean, sour milk can develop in minutes. When cooperatives or dairy plant vans collect milk from farmers, an unnecessary milk transfer from one container to the milk van occurs, and the van driver is inactive at the time, lengthening the wait.

Because of its weight, milk is usually delivered by truck, and it should not be kept in one place for an extended amount of time due to the risk of spoilage and expiration. When transporting milk by truck, the weight limit is critical; if the truck is carrying less milk than its capacity, the fuel consumption and truck numbers are increased. Another significant supply chain interruption is the byproduct of the milk after processing. Milk by products can be used as animal feed, but from the standpoint of the industry, it is a revenue-generating commodity. As a result, additional transportation is required to carry by products from processing plants to other factories to produce other goods such as whey and other dairy products. Now a days, dairy industry is producing various value-added products with different varieties within them.

As a result, there will be additional packaging as well as a quick increase in the number of stocks keeping units (SKUs) for those products. SKU handling and storage, as well as specific packaging, all impede the process's long-term viability. Another major concern in the current dairy market is the lack of government support for the construction of cold chain infrastructure, as well as the lack of private sector involvement in the cold chain.

It is critical for the industry to address these issues and develop a long-term supply chain. Sustainable supply chains must consider not just the efficiency of the process for delivering milk, but also the

environment for a better and healthier future. The goal of such a modern supply chain implementation is to eliminate redundant supply chain linkages while increasing the value of milk products at the lowest possible cost. While implementing a supply chain, three basic elements must be considered: economic, environmental, and social factors. The economic element can refer to the benefits, profit, or return that various players in the supply chain receive because of their efforts.

Animals are a crucial aspect of the dairy business and must be treated ethically while producing milk, as is the usage of water for constantly cleaning various equipment, machines, and so on. Human capital is influenced by social variables, and several policies are in place to ensure that the supply chain runs smoothly. Continuous refrigeration, which has a direct environmental impact on CO2 emissions around the world, is another part of the supply chain that impedes sustainability.

III. Research Methodology

In today's competitive business environment of Indian dairy industry, SCM play an important role to improve the operational performance of the organization. It will aid in the reduction of overall system costs while also providing maximum value to its customers. The study involves exploratory research to understand the Indian dairy supply chain management. A descriptive research design is adopted to answer who (dairy companies operated in India), what (SCM practices are adopted), and what are the changing mindset of the consumers.

3.1 Research Objectives-

Based on the literature review, the research question of the study is to understand-How can the Indian dairy industry's supply chain management (SCM) procedures be monitored and structured to improve performance and gain a competitive edge? The research objectives pertaining to the problem include:

1) To get an understanding of the SCM methods used by supply chain participants in the Indian dairy business, such as producers, processors, distributors, and retailers

2) To critically evaluate the impact of accepted SCM practices on the performance of the organization

3) To have a better understanding of how youngsters are reacting to market dynamics, leading to customer satisfaction.

4) To propose a clear direction for enhancing the performance of the Indian dairy industry by implementing SCM methods.

3.2 Research Hypothesis-

The research hypothesis constructed to achieve the objectives of the study is given below:

H1: There are significant differences in how SCM practices are implemented among dairy supply chain members.

H2: Adoption of supply chain practices helps in improving customer satisfaction.

3.3 Data Collection, population and sample-

Secondary resources like national and international journals, reports, books have been used to investigate and comprehend the techniques of supply chain management in the Indian dairy industry.

The primary data has been collected from the Indian states- Maharashtra and NCR region. The five groups that have been identified as respondents include: two Dairy plants (registered milk processing unit), four Milk Cooperative (collection centers), two Retailer (marketing and Distributors), one union employee and 545 customers (milk & milk products).

Judgmental Sampling technique is used to select the various milk processing units, milk cooperatives, retailers and data was collected through structured questionnaire. Simple Random sampling technique is used to reach out customers and data was collected through questionnaire on five points Likert-type scale.

3.4. Questionnaire design-

The questionnaire was designed based on nine variables mentioned in previous studies (Rajeev 2014, Karthikeyan and Teshome 2010, Hazen and Byrd 2012, Qrunfleh et.al., 2012, Wang and Feng 2012, Kohli & Jaworski, 1990). These include customer relationship management, Supplier relationship practices, Information &

Communication Technology, supply chain manufacturing practices, inventory management system, transport management, warehouse management system, marketing orientation.

3.5 Pilot study-

The questionnaire was pre-tested by the researcher by distributing it to academics and dairy companies. Academicians were prominent professors from management institutes (dairy and milk cooperatives), while industry experts were managers from dairies in Maharashtra and the National Capital Region. Finally, the questionnaire was updated in accordance with the comments received, based on the results of the pre-testing.

3.6 Scaling-

Two types of scales (on a five-point Likert-type scale) were adopted: Adoption continuum and Agreement continuum. The adoption continuum scale for measuring the adoption level (on a five-point Likert-type scale) was mainly applied to access the responses of the four groups of respondents: dairy plant, milk cooperative, milk retailer, and union employee. The scale consisted of 1-Will think about it, 2-Willing to adopt, 3-Planing to adopt, 4-Partly adopted, 5-Fully adopted. Agreement continuum for measuring the agreement level of consumers or customers. It consisted of 1= Strongly Disagree, 2= Disagree, 3= Indifferent, 4= Agree, 5= Strongly Agree.

Apart from it, there are a few questions that are on a dichotomous scale.

3.7 Statistical tools-

The data collected is analyzed using the 'Statistical Package for Social Sciences SPSS version 25.0 subject to different analyzing techniques. Cronbach's Alpha value was used to conduct Reliability test. Other statistical tools used are mean and Factor analysis.

IV Data Findings & Analysis

The information gathered from the questionnaire replies was entered onto a computer using Microsoft Excel software. The data was then analyzed using the Statistical Package for Social Sciences (SPSS) version 25.0 application software package. Table 1 shows how the data generated from the surveys was exposed to various data analysis procedures.

Table 1: Types of Questions Asked and Data Analysis Methodologies Employed (Appendix)

The demographic profile of the seven respondents who agreed to fill the adoption continuum scale includes one respondent from dairy plant, four milk cooperatives, one milk retailer, and one union employee. Out of the seven respondents two belong to the government sector and five belong to the private sector. Location wise one belongs to NCR and the other six were from Maharashtra. Based on the year of establishment of the respective organization –one organization is 76 years old while others have an age of 52 ,49,41, 20 and 7 years.

4.1 Reliability Testing- Reliability values for the two types of questionnaires is as below in Table 2

Table2: Reliability Testing (Refer Annexure)

The values for the dairy plant, milk cooperatives, and milk retailer were found to be more than 0.6, which shows the scale has high reliability. Cronbach's alpha value for the customer questionnaire was calculated to be 0.800 which is more than 0.6 indication that the scale has high reliability.

4.2 Assessment of agreement and adoption continuum which were common and appeared in Dairy Plant (DP), Milk Cooperative (MC) and Milk Retailer (MR)- To check the difference in opinion of the response of dairy plant managers, milk cooperative workers, milk retailers and union employee representative by using Mean for the statements that were common between the three.

Table 3: Mean for Dairy plant (DP), Milk Cooperative (MC) and Milk retailers (Refer Annexure)

The above table 3 shows that the respondents agree for all the supply chain management practices to be important for the improvement of organizational performance. When they were asked about their adoption level- for the statement SRP3 the mean value of the responses is 3 which indicates respondents are planning to adopt the supply chain management

practices. The mean value for ICT 1, ICT 2, ICT 3 and IMS 1 is 4 which indicates that the respondents have partly adopted. In the statements SRP1, SRP2, and SRP4 the mean value is 5 which indicates that these practices have been fully adopted. The findings clearly suggest that DP is more likely to engage in the practices listed above, whilst MC and MR are less likely to do so.

4.3 Assessment of agreement and adoption continuum which were common and appeared in Dairy Plant (DP), and Milk Cooperative (MC) To check the difference in opinion of the response of dairy plant managers and milk cooperative workers by using Mean for the statements that were common between the two.

Table 4: Mean for Dairy Palnt (DP) and Milk Cooperatives (MC) (Refer Annexure)

The above table 4 shows mean values for the three SCM practices i.e. supply chain manufacturing practices, transportation management (TM) and supplier relationship practices (SRP) which were common and appeared in different supply chain members i.e. DP and MC questionnaire. The mean value for TM1 is 3 which indicates that the milk cooperatives are planning to adopt transport management practices related to truckload. Statements SCMP2, SCMP3, SCMP4, TM2, TM3, and SRP 6 have a mean value of 4 which indicates these practices are partly adopted. Whereas practices related to the personal cleanliness of the employees to maintain hygiene in the dairy manufacturing plan have been fully adopted. The above mentioned findings clearly suggest that DP is more likely to engage in the practices listed above, whereas MC is less likely to do so.

4.4 Assessment of agreement and adoption continuum which were common and appeared in Dairy Plant (DP), and Milk Retailers (MR). To check the difference in opinion of the response of dairy plant managers and milk retailers by using Mean and Independent t-test for the statements that were common between the two. The four SCM practices, namely customer relationship management (CRM) practices, information and communication technology (ICT) tools and techniques, supplier relationship practices (SRP), and inventory management system (IMS), which were common and appeared in different supply chain members i.e. DP and MR questionnaire, were subjected to a mean.

Table 5: Mean for Dairy Plant (DP) and Milk Retailers (MR) (Refer Annexure)

The above table 5 shows the overall findings revealed that while there are considerable variances in agreement for some practices, there are big differences in acceptance for CRM1, CRM3, CRM9, ICT4, and SRP5.

4.5 Assessment of agreement and adoption continuum which were common and appeared in Milk Cooperatives (MC) and Milk Retailers (MR). To check the difference in opinion of the response of milk cooperatives and milk retailers by using Mean and Independent t-test for the statements that were common between the two. SCM practices such as information and communication technology (ICT), supplier relationship practices (SRP), and inventory management practices (IMS) that were common and present in diverse supply chain members i.e. MC and MR questionnaires were subjected to a mean

Table 6: Mean for Milk Cooperatives (MC) and Milk retailers (MR) (Refer Annexure)

The overall findings demonstrated that there are considerable variations between procedures ICT5 and SRP7 in terms of agreement and adoption. The aforementioned findings clearly suggest that both MC and MR have a lower proclivity for the practises listed above.

H1: There are significant differences in how SCM practices are implemented among dairy supply chain members.

Thus we reject the null hypothesis as there is a significant difference in the SCM practices adopted by dairy supply chain members.

4.6 To identify the aspects that influence customer satisfaction in the Indian dairy sector

The customer questionnaire consisted of 45 questions, the first nineteen questions were dichotomous questions, which were asked to the

customers to know number of family members, monthly income, current milk brand consumption, frequency of purchase, daily consumption, factors influencing purchase of preferred brand, whether they used packaged milk and milk products, impact of covid on the consumption of daily milk etc.

The next 26 questions were on a five-point likert scale, and they were asked of customers to learn about many elements that they considered when purchasing milk and milk products. The questionnaire had five different variables, each of which contained statements related to the following constructs: A. Product quality B. Product & Service Reliability C. Customer Problem Solving Capability D. Value for money offers and E Customer Service. The scale has been adopted from Kumar Rajeev (2014).

The questionnaire was pre-tested in a pilot study before being distributed to respondents to check for errors in the wording of questions, lack of clarity, and other issues. The questionnaire was pre-tested by the authors who gave it to academics (dairy industry specialists), senior professors of Research Methodology and managers from dairy companies.

In the customer satisfaction survey 545 respondents participated from Maharashtra (70.9%) and North Central Region (29.1%). The total sample consisted of 68.4% males and 31.3% females. Maximum respondents (57.2%) belonged to the age group of 18-25 years, 29.4% belonged to 26-35 years, 7.4% belonged to 36-45 years, 3.5% belonged to 46-55 years and 2.6% were in the age group of 56 & above.

Forty-five percent of the respondents had 4 members in their family, 26.9 percent with 5 and above members, followed by 24 percent with 3 members, and 4.2 percent with two members. With respect to the educational qualification 64.8 percent of the respondents were graduates, followed by post-graduate 26.3 percent, 12^{th} grade were seven percent, Diploma were one percent, and below 10th class were just 0.9 percent.

The monthly income (in Rs.) was highest (50.6 percent) in the range of Rs 45,000 and above, followed by Rs. 30,000-45,000 (16.4 percent), Rs 15,000-30,000(14.5 percent), Rs 5,000-15,000(5.2 percent) and Below Rs 5,000 were 4.5 %.

The different brands currently in use by the consumers varies from Amul, Adarsh Milk, Buffalo Milk, Chitale, Country Delight, Gau Prakash, Gowardhan, Mother Dairy, Mahananda, Milky Moo, Nandini to Direct from the farm/village/local dairy, online stores, supermarket, own cows. While observing the frequency of buying milk, eighty percent of the consumers buy milk daily, 12.3 percent purchase thrice a week, and 7.6 percent purchase twice a week. In our sample, 36.4 percent of the respondent's average daily consumption of milk is one liter, followed by 22.6 percent with 1.5 liters, 20.9 percent respondents consume upto 500 ml and only 2.9 percent consume 3 litres and above. The most preferred packaging direct supply, gallons, glass bottle, metal containers, plastic bag/ pouch, tetra packs.

Daily expenditure on milk in Rs. per liter shows 41.7 percent respondents spend Rs 40-50, followed by 30.5 percent spending Rs.51-60, 12.9 percent spent Rs 71& above, 11 percent spent Rs 61-70 and only 3.9 percent spent only above Rs 71. Milk consumption increases during the festival season for 77.9 percent respondent, it remains same for 21.3 percent of the respondents and for 0.7 percent respondents it decreases. This increase in milk consumption during the festival season is used to prepare sweets, cur, buttermilk, ghee, paneeer, lassi, and ice cream.

Among the various factors that influence buying a preferred brand of milk in the highest order of choice are quality (102), easy availability (34), regular supply (24), price (22), nutrition values (19), brand value (15), Attractive packaging, Dealer Relationship (15). If the preferred brand is not available, then 54.6% respondents prefer to change brand but 10.5% respondents do not want to change and stay loyal to the brand. Apart from this 34.9% respondents were indecisive to change or not to change.

During the covid –pandemic for most of the respondent's 60.8%, the consumption of milk did not affect i.e., they could continue with the same level of milk consumption. For 28.3% of respondents- the consumption of milk had increased but for 10.9% respondents it decreased during the pandemic.

The agreement continuum of the customer questionnaire was subjected to factor analysis using principal component analysis and the Varimax rotation method, and items with factor loadings greater than 0.50 were clubbed into a single factor. Further, the sample adequacy score was 0.800, and Bartlett's Test of Sphericity was significant [Chi square) = 2617.793, df = 325, p = .000<0.05], showing that factor analysis was adequate.

Table 7: KMO and Barlett's Test (Refer Annexure)

Six factors emerged prominently covering 71.74% variance. The identified factors were analyzed for a common thread and accordingly the naming of the factors was performed. Table 8 shows the crux of analysis.

Table 8 - Total Variance Explained (Refer Annexure)

6 components extracted.
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Six prominent factors were extracted through the factor analysis which is being clearly reflected by scree plot of the analysis shown in graph 1.

Graph 1: Factor Analysis on Agreement Continuum of Customer Scree Plot (Refer Annexure)

Various elements of five extracted factors with the percentage of variance and factor loading value of each component are given in table 9.

Customer service has emerged as the most important criterion of dairy customers, according to the factor analysis results. Customer problem-solving ability and value-for-money offers have also become important factors to consider when buying dairy goods. Product Quality and Product & Service Reliability are considered crucial factors in the fiercely competitive field, which is why buyers prioritised them at the bottom of their choices. The following are more details on the various factors:

Customer service is the first factor to consider. This factor consists of ten activities that target service usability in predicting future customer value contribution. It includes the level of services supplied to customers in addition to the delivery of the desired goods, such as presenting a variety of product options, establishing a commitment to each client as an industry entity, conducting market analysis and interpretation, and providing after-sales assistance. The services factor accounted for 21.944 percent of the data variation.

Factor 2 is Capability to solve customer problems. This component includes the six problem-solving practices, which include identifying, analyzing, and solving problems. The ultimate purpose of problem-solving is to overcome obstacles and find the best solution to the problem. It can be further defined by sub-parameters such as honesty in problem-solving, customer compliance management, and returns and exchanges. The data has a variance of 21.233% due to problem solution.

Factor 3 is Offers that are good value for money. Value for money is a criteria that relates to the perceived degree of quality in relation to the price paid for a product or service. With 7.941% variance in data, it involves four practices: pricing of milk and milk products, competitive prices, price consistency, and expectations regarding milk and milk products.

Product Quality is the fourth factor to consider. This element includes four behaviours that address the product's ability to meet the end user's expectations and demands, such as consistent quality of milk and milk products, quality of milk and milk products, packaging of milk and milk products, and variety. Product quality is responsible for 7.390 percent of the data variance.

Reliability of products and services is the fifth factor to consider. This element has to do with the ability to deliver the promised service consistently and accurately, and it may be broken down into sub-parameters like prompt delivery, supply of the right products, and error-free transactions. The data variance is 6.819 percent due to product and service reliability.

H2 : Adoption of supply chain practices helps in improving customer satisfaction.

Thus we reject the null hypothesis as there is a positive impact of adoption of supply chain practices on customer satisfaction.

I. CONCLUSION AND RECOMMENDATIONS

Since competition is no longer between firms, but among supply chains, effective supply chain management (SCM) has become a potentially significant technique of protecting competitive advantage and enhancing performance. Organizations came to recognise that improving efficiency within an organisation was insufficient; their entire supply chain needed to be competitive. Understanding and applying supply chain management (SCM) has become a must for being competitive in the global marketplace and increasing profitability.

SCM is a systemic, strategic coordination of traditional business activities and techniques across business functions inside a single organisation and between businesses within the supply chain in order to improve the long-term performance of the individual firms and the supply chain.

The Indian dairy industry has made a significant contribution to the country's rural economy. It has been regarded as a tool for bringing about socioeconomic change. India's dairy business has been changed by the 'white revolution.' It has enhanced milk supply while also providing a stable source of income and employment for millions of rural communities.

As a result, the research problem for this study was centred on the dairy industry's supply chain management procedures. In a nutshell, the research topic is to optimise the dairy sector supply chain in order to meet future domestic demands while remaining competitive in global markets. The current study attempted to discover the actual events and, as a result, examine the mechanisms for improving those processes in order to create a win-win situation for all stakeholders in the dairy supply chain.

Recommendations: Members of the dairy supply chain must concentrate on product quality, which refers to the product's capacity to meet the end user's expectations and needs. Product quality is primarily concerned with the physical characteristics of the product (taste, shelf life, etc.). It has three components: product freshness (meat, vegetables, milk and milk products, and fruits), product durability, and product variety. Members of the daily supply chain must concentrate on the level of service provided to customers in addition to the delivery of the product ordered. It entails having a diverse product range, committing to each customer as an industrial unit, and providing after-sales service. The dairy plant managers, milk cooperatives and milk retailers should also try to adopt all the supply chain practices related to ICT, supplier relationship practices, supply chain manufacturing practices, inventory management system, warehousing management system, transportation system, customer relationship management and overall organizational performance.

Thus, the study underlines the importance of management commitment, which ensures that SCM choices are widely accepted throughout the firm. The challenge may be solved by strategizing SCM decisions and implementing SCM practices to ensure cost minimization, efficient decision making, and flexible SCM methods to meet changing consumer expectations. It is believed that the study's findings will inspire decision-makers in the Indian dairy industry to employ supply chain strategies strategically when solving managerial difficulties.

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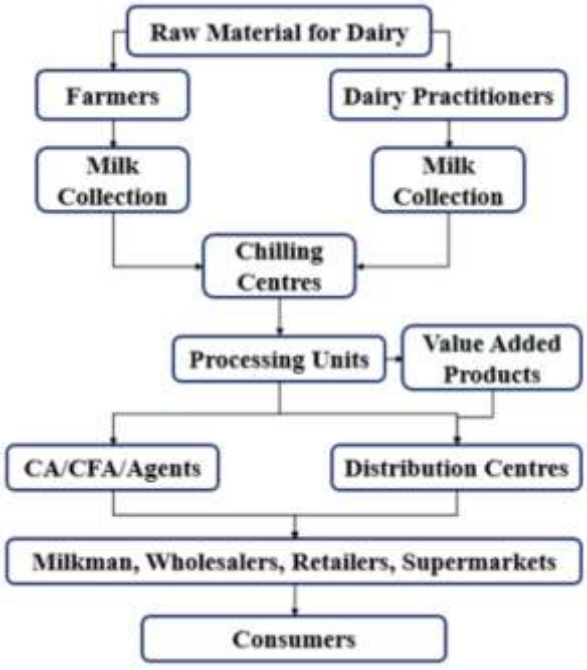
Annexure



Source: Industrializing Supply Chain, a new vroom for Dairy Industry

Table 1: Types of Questions Asked and Data Analysis Methodologies Employed

S. No.	Types of Questions	Data Analysis Technique	Remarks
1.	Dairy Plant (DP) and customer questionnaires have dichotomous questions.	Frequency of occurrence	To learn about the respondents' perspectives.
2.	Questions about adoption were widespread and occurred in the Dairy Plant (DP), Milk Cooperative (MC), Milk Retailers (MR) and union employee questionnaires.	Mean	To check the difference in opinion of the response of dairy plant managers, milk cooperative workers, milk retailers and union employees
3.	Customer questionnaires contained agreement continuum questions.	Factor analysis	To condense a large number of disparate activities into a smaller number of homogeneous factors.

Source - Tabulated by author

Table 2: Reliability Testing

Sr. No.	Questionnaire	Scale	Cronbach's Alpha value
1	Dairy Plant, milk cooperative, milk retailers Questionnaire	Adoption	0.926
2	Consumer Questionnaire	Agreement	.800

Table 3: Mean for Dairy Plant (DP), Milk Cooperative (MC) and Milk Retailers

Sr. No	Adoption Practices (Statement wise)	Mean
1	ICT1: Real-time information sharing facilitates the flow of material and money among supply chain partners	4
2	ICT2: Organization is having sufficient resources for implementation of ICT tools and techniques	4
3	ICT3: Supply chain partners (supplier and/or customers) are having adequate ICT infrastructure for ERP synchronization	4
4	SRP1: Organization considers quality as primary criterion in selecting suppliers	5
5	SRP2: Organization jointly solves problems with the suppliers on regular basis	5
6	SRP3: relies on a few dependable suppliers (key supplier)	3
7	SRP4: Organization has a supplier network that assures reliable delivery	5
8	IMS1: Organization reduces uncertainty by centralizing demand information	4

Table 4: Mean for Dairy Plant (DP), Milk Cooperative (MC)

Sr. No	Adoption Practices (Statement wise)	Mean
1	SCMP1: Organization focuses on the personal cleanliness of the employees in order to maintain hygiene in dairy manufacturing plant	5
2	SCMP2: Equipment, tools and devices used for raw milk testing are in compliance with the cleaning standards	4
3	SCMP3: Organization conducts workplace application of Hazard analysis and critical control points (HACCP)	4
4	SCMP4: Organization is having adequate system for milk testing and grading	4
5	TM1: Organization prefers less than truckload transportation over full truckload transportation (either for raw material or finished goods)	3
6	TM2: Tailored network	4
7	TM3: Organization uses the following techniques for tracing & tracking the vehicular movement i.e. smart card, radio frequency identification (RFID), Auto-id system, global positioning system (GPS)	4
8	SRP6: Organization includes its key suppliers in product planning and goal setting activities	4

Table 5: Mean for Dairy Plant (DP), Milk Retailers (MC)

Sr. No	Adoption Practices (Statement wise)	Mean
1	CRM1: Organization continuously determines future customer expectation	4
2	CRM2: The orientation of organization is on customer retention rather than on single transaction	5
3	CRM3: Organization delivers the milk and milk products on time	4
4	CRM4: Organization provides platform to receive complaints and feedback from customers	5
5	CRM5: Availability of product is an important criterion to satisfy customer	5
6	CRM6: Organization has convenient operating hour for supplying milk and milk products	5
7	CRM7: Organization emphasizes on quality and service levels preferably defined by customers	5
8	CRM8: Organization prefers convenience of customer in identification of milk retail locations	5
9	CRM9: Organization has amenable return policy	4
10	ICT4: Information technology (IT) system allows inventory management application to be linked to production planning	4
11	SRP5: Organization uses different strategies for different suppliers of product/service portfolio	4
12	IMS2: Collaborative management of inventories across SC ensures a high level of product availability	5

Table 6: Mean for Milk Cooperatives (MC) and Milk Retailers (MR)

Sr. No	Adoption Practices (Statement wise)	Mean
1	ICT5: Mode of Communication	4
2	SRP7: Proper input such as cattle feed, veterinary services, extension services etc. is provided to the milk producers	4
3	SRP8: Defective milk and milk products are taken back by milk dairy	5
4	IMS3: Proper supervision of supply storage and accessibility of milk and milk product items is taken care off in order to ensure an adequate & timely supply without excessive oversupply	5

Table 7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.800
Bartlett's Test of Sphericity	Approx. Chi-Square	2617.793
	df	325
	Sig.	0.000

Table 8 - Total Variance Explained

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.508	25.03	25.03	6.508	25.03	25.03	5.084	19.553	19.553
2	5.35	20.577	45.607	5.35	20.577	45.607	4.335	16.673	36.226
3	2.618	10.07	55.677	2.618	10.07	55.677	2.955	11.365	47.591
4	1.838	7.07	62.747	1.838	7.07	62.747	2.686	10.33	57.921
5	1.305	5.018	67.765	1.305	5.018	67.765	2.055	7.905	65.826
6	1.035	3.98	71.745	1.035	3.98	71.745	1.539	5.918	71.745

Graph 1: Factor Analysis on Agreement Continuum of Customer Scree Plot