

**“EXPLORING AND ANALYZING SCM CHALLENGES FACED BY DAIRY
INDUSTRIES BY USING DEMATEL APPROACH”**

A DISSERTATION

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE AWARD OF THE DEGREE OF
MASTER OF TECHNOLOGY

IN

PRODUCTION ENGINEERING

Submitted by:

GAURAV MISHRA

(Roll No. 2K16/PIE/05)

Under the supervision of

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AND

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(ASSISTANT PROFESSOR)



DEPARTMENT OF MECHANICAL ENGINEERING

DELHI TECHNOLOGICAL UNIVERSITY
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CANDIDATE'S DECLARATION

I, GAURAV MISHRA, hereby certify that the work which is being presented in this thesis entitled “EXPLORING AND ANALYZING SCM CHALLENGES FACED BY THE DAIRY INDUSTRIES BY USING DEMATEL APPROACH” being submitted by me is an authentic record of my own work carried out under the supervision of **Dr. Ranganath M. Singari, Professor, Department of Mechanical, Production and Industrial Engineering, Delhi Technological University, Delhi and Dr. Mohit Tyagi , Assistant Professor, Department of Industrial & Production Engineering, NIT Jalandhar**. The matter presented in this thesis has not been submitted in any other University/Institute for the award of M.Tech. degree.

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Date: 02/07/2018

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CERTIFICATE

I hereby certify that the project Dissertation titled “EXPLORING AND ANALYZING SCM CHALLENGES FACED BY THE DAIRY INDUSTRIES BY USING DEMATEL APPROACH” which is submitted by [GAURAV MISHRA], Roll No. 2K16/PIE/05 [Department of Mechanical Engineering], Delhi Technological University, Delhi in partial fulfillment of the requirement for the award of degree of Master of Technology, is a record of the project work carried out by the student under my supervision. To the best of my knowledge this work has not been submitted in part or full for any Degree or Diploma to this University or elsewhere

Place: Delhi
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I would like to thank, Sh. Shaktidhar Tripathi (Superintendent in supply chain department in Mother dairy) for all his assistance during execution of this project work, and without his support it would be almost impossible to complete my thesis work on time.

Last, but not the least, I would like to thank my family members for their help, encouragement and prayers through all these months. I dedicate my work to them.

Place: Delhi
Date: 02/07/2018

(GAURAV MISHRA)

ABSTRACT

This study is used to explore the challenges of the dairy industry in a supply chain, which affects the Supply Chain Management (SCM). It is the way toward arranging, executing and controlling the tasks of the production network such that the reason to fulfill client necessities as productively as could be allowed. Production network administration traverses all development and capacity of raw materials, work-in-process stock and culminated goods from point of origin/inception (POO) to point of consumption /utilization (POC). It involves the whole process from procurement of raw material till it converted into finished product. SCM is a conscious and deliberate control, integration, and management of the business functions. Supply chain management (SCM) is the supervision of materials, information, and funds as they incite in a procedure from provider to engenderer to distributor to retailer to the purchaser. It is the chain which is interconnected with each other same as the different department in the organization connected with each to perform a certain task. Supply chain management includes planning and coordinating these streams both inside and among organizations. The whole research design proceeds by finding out the challenges, than questioner development, after that statistical analysis which done by reliability analysis and factor analysis by using SPSS-23 software and in last prioritize the considered challenges by using Decision making trial evaluation laboratory (DEMATEL). This study provides more efficient, efficacious, robust and systematic way to surmount challenges. The conclusion that we concluded is that, the “Increasing Demand and Supply challenges in the dairy sector” has highest importance rating and therefore it is the main challenge of Supply chain management faced by dairy industry

KEYWORDS: - Supply chain management, Factor analysis, Dairy industry, challenges, DEMATEL.

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NOMENCLATURE

Parameter	Description
DEMATEL	Decision making trial and evaluation laboratory
SPSS	Statistical Package for the Social Sciences
“r”	Number of respondents
POI	Point of origin
POC	Point of consumption
SCM	Supply chain management
x_{ij}	Degree of respondents
‘T’	Total relation matrix
H and V	Sum of rows and Sum of columns
‘T’	Total cognation matrix

CHAPTER 1

INTRODUCTION

Supply Chain Management (SCM) is the way toward arranging, executing and controlling the tasks of the production network such that the reason to fulfill client necessities as productively as could be allowed. Production network administration increases all development and capacity of raw materials, work-in-process stock and culminated goods from point of origin/inception (POO) to point of consumption /utilization (POC). SCM is a conscious and deliberate control, integration, and management of the business functions. It contributes to and affects that supply flow through the business for the purpose of rising performance, costs, flexibility etc, which bring the ultimate benefits of the consumers. The supply chain function includes many sub-areas such as: forecasting and planning, purchasing and procurement, logistics, Operations, inventory management, transportation, loading, customer service etc.

However, it is very challenging to find a standard model of Supply Chain Management operating in the business community particularly in the dairy sector. It is the oversight of materials, information, and finances as they instigate in a procedure from provider to supplier to distributor to retailer to the purchaser. SCM involves regulating and assimilate these flows both within and among companies.

The role SCM in the dairy industry is very important it's like a spinal cord of any industry whether it is automobile sector, whether it is a pharmaceutical industry or any manufacturing industry, the role of the supply chain is vital. It concludes the growth of the company. It is both a horizontal business function (i.e. managing the supply chain in a business) and a vertical industry sector (i.e. businesses involved in managing supply chains on behalf of their customers). A company may operate as a supply chain services provider within the vertical supply chain industry sector. But each of the clients serviced by accompanying will employ supply chain staff within their commercial enterprises on a horizontal basis across their organizations.

Indian dairy industry spends one-third of their revenue on supply chain management activities due to inherently poor shipping base.

It is a vital function for many companies, as it is usually employed to lower expenses and increase sales for the company. SCM costs are higher in India than they are in different regions of the world, adding up to 13% of India's Gross domestic product. The purpose of this study is to explore different types of challenges faced by the dairy industry and use DEMATEL approach to solve the problem.

The DEMATEL approach deals with both the direct as well as indirect criteria and filters out of this the best criterion out of the both one. The key supply chain process stated by Lambert:-

1. Management of customer relationship
2. Management of customer service
3. Fulfillment of order
4. Management of manufacturing flow
5. Management of return

Predominantly dairy research interest has been dramatically incrementing towards supply chain management because of recent years certain consequential changes that are affecting the industry. Rapid development of globalization, shifting consumer demand, dismantling state support schemes and technological progress has so caused declaration of industrialization of dairy. Truth is told firms never again intensely can get by in separation of their providers, clients and different substances of the production network. The term supply chain management arises publically as utilized by Keith Oliver in its interview to financial times in 1982. It has picked up unmistakable quality significance and started to use by task administrators in their titles as it reliably expanded consistency in late 1990. Supply chain management (SCM) manages the aggregate stream of materials from providers to end clients. SCM is an integrative reasoning to deal with the aggregate stream of appropriation from provider to extreme end clients.

Supply chain management (SCM) as an integration of key business operations from end user through pristine suppliers that provides products, accommodations, and information that integrate value for clients and other stakeholders. Products, accommodations, and information that integrate value for clients and other stakeholders. Especially this kind of store network joining among accomplices has picked up benefits expanded income and stock turnover, cost decrease diminished request cycle and more noteworthy profitability accessibility. Additionally, SCM can improve market responsiveness, reduction in logistics cost, and optimum utilization of capital cost. Generously, SCM has been viewed as one of the basic regions in the improvement of the agriculture industry to take care of the worldwide market demand.

Hence the food supply chain encompasses organizations which are responsible for the production and distribution of vegetable and animal-based products. There are various common partners of the food supply chain such as producer, wholesaler, retailer, food industry and end-user market.

Agri-sustenance supply chains are much entangled as it included different multifaceted firms that normally working on the whole inside certain particular industry segments. Food supply chain network is complex and that comprises on different companies which strategically collaborate in one or more regions while continuing their own individuality and autonomy. Particularly it is trusted that agrarian items have been proclaimed essential in regard to utilization and money related esteem.

Thusly, partners of the farming item inventory network have been moving from family-based little scale autonomous firms to all the more firmly coordinated, needier players to the entire esteem chain of creation and appropriation. Therefore, SCM literature focuses on the need of collaboration among successive stakeholders of the supply chain from producer or grower to end consumers in order to the superior satisfaction of consumer demand at the lowest cost. This study only focused on dairy supply chain, especially in growing countries. Specifically, we defined dairy as it comprises the individual or firms that involved in milk production, transportation, processing (packaging & storage) and delivery of milk products to final consumer through the addition of maximum value at lowest possible cost.

In a regular inventory network, new materials are secured and things are delivered at least one processing plants, and afterward transported to distribution centers for the middle of the road stockpiling, and after that moved to retailers or clients. Subsequently, to decrease cost and enhance benefit levels, productive inventory network techniques must consider the communications at the different focuses in the store network. The supply chain, which is additionally referred as the logistics network, comprises of suppliers, manufacturing centers, warehouses, distribution centers, and retail outlets, as well as raw materials, work-in-process inventory, and culminated items that flow between the facilities (see Figure 1.1).

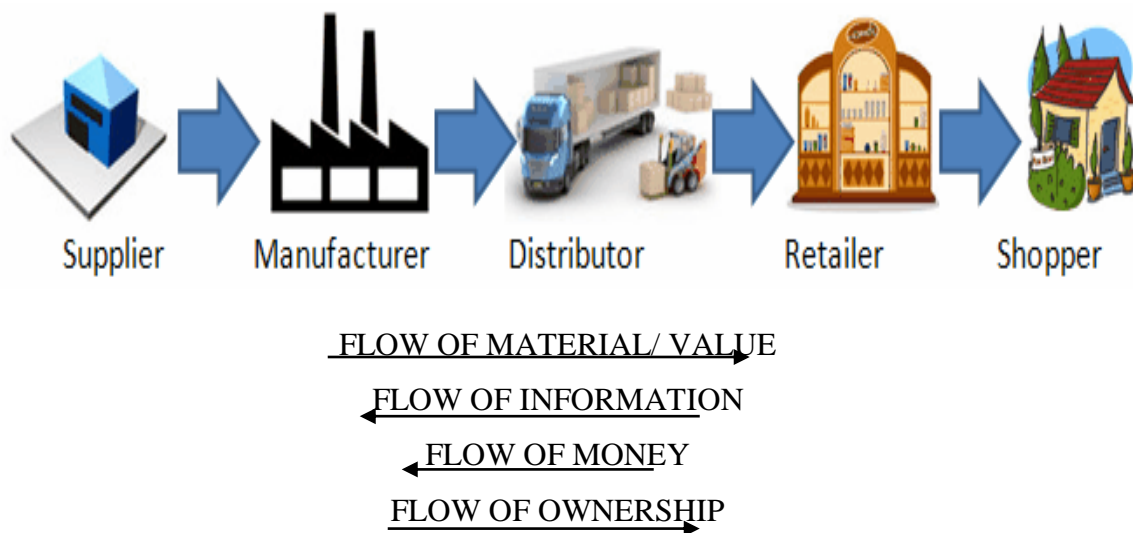


Fig 1.1 Components of a supply chain

The Supply Chain Management Program acclimatizes subjects from assembling activities, purchasing, transportation, and physical conveyance into a cumulated design. Prosperous supply chain management, at that point, arranges and incorporates these normal procedures into a consistent execution. In summation to the divisions inside the association, these accomplices incorporate merchants, outsider organizations, and data frameworks suppliers. Inside the association, the supply chain alludes to an extensive variety of useful zones

1.2 Importance of supply chain management

Managers these days acknowledge that getting products to clients faster than the competition will improve a company's competitive situation. To stay competitive, companies must look for fresh solutions to important Supply Chain Management topics such as modal analysis, supply chain management, freight planning, path planning, and distribution network design. Companies must face corporate challenges that impact Supply Chain Management such as re-engineering globalization and outsourcing. Why is it so paramount for companies to acquire merchandise to their clients expeditiously? Faster product availability is key to increasing gross revenue.

1.3 Evolution of supply chain management

In the 1980s, organizations found beginning assembling advances and methodologies that authorized them to decrease expenses and better contend in various emporia. Procedures, for example, in the nick of time fabricating, Kanban, lean assembling, add up to quality management, and others got extremely mainstream, and tremendous amounts of assets were put resources into taking out these systems. Over the most recent couple of years, in any case, it has turned out to be evident that numerous organizations have lessened assembling costs as much as it is conceivable.

A significant number of these organizations are finding that powerful supply chain management is the following stage they to come keeping in mind the end goal to increase profit and market share. Concurrently, many supply chain partners engage in information sharing so that engenderers are able to utilize retailers' au courant sales information to better forecast demand and abbreviate lead times (known as the bullwhip effect), and by doing that it minimize inventory and smooth out production.

In the end, in the late 90s, the Internet and the related e-plans of action prompted prospects that numerous supply chain issues would be settled essentially by applying these beginning innovations and business illustrations. E-business techniques should cut down costs, increase convenience level, and addition adaptability and, obviously, increase income,

though at some point in the great beyond. In authenticity, these prospects as often as possible were not satisfied, the same number of re-organizations fizzled. In numerous occasions, the defeat of a portion of the most astounding profile Internet organizations can be credited to their coordination systems. Of course, in many examples, the Internet introduced new channels and helped to enable the direct-to-consumer business model. These new channels required many companies to discover fresh skills and added complexity to existing supply chains. The landscape has shifted in recent years. Industry apperceived that trends, including outsourcing, off shoring, lean manufacturing, and just-in-time that fixate on reducing manufacturing and supply chain costs significantly increase the degree of peril in the supply chain.

As a consequence, over the past several years, progressive firms have begun to focus on strategies that determine the right balance between cost reduction and risk management. If supply chain management has become top managements incipient religious opinion, and so it involves a philosophical scheme. Andersen consulting has stepped forward to extend the needed guidance, espousing what it calls the “Seven Principles” of supply-chain management. When consistently and comprehensively followed, the consulting verbalizes, these seven bring a host of competitive advantages.

Andersen Consulting has ventured forward to offer the required direction, embracing what it calls the "Seven Principles" of supply-chain management. Whenever reliably and extensively took after, the counseling firm verbalizes, these seven standards bring a large group of upper hands. The seven principles as articulated by Andersen Consulting are as follows:

1. Segment clients in view of administration needs. Associations usually have accumulated customers by industry, thing, or trade channel and after that gave a comparable layer of organization to everyone inside a fragment. Successful supply-chain management, by separating, packs customers with indisputable organization needs- - paying little regard to industry- - and after that tailors organizations to those particular sections.

2. Customize the Supply Chain Management network. In outlining their Supply Chain Management arrange, organizations require focusing seriously on the assessment and repair necessities and productivity of the client portions recognized. The set up approach of making a "solid" Supply Chain Management organize runs counter to effective supply-chain management.
3. Listen to signals of market need and plan accordingly. Tune in to signs of market need and plan in like manner. Net income and activities arranging must traverse the whole string to descry early cautioning indication of transmuting request in inductively approving examples, client advancements, and subsequently forward. This definitive mandate escalated approach prompts more predictable conjectures and ideal asset assignment.
4. Differentiate item nearer to the customer. Organizations today never again can bear to reserve stock to pay for conceivable anticipating blunders. Or maybe, they have to delay item separation in the assembling procedure closer to genuine shopper request.
5. Strategically manage the sources of supply. By working intimately with their key providers to cut the general expenses of owning materials and administrations, supply-chain management pioneers extend edges both for themselves and providers.
6. Build up a supply far reaching innovation system. Additionally one of the establishments of productive supply-chain management, information advancement must help different layers of fundamental administration. It in like manner should give an obvious perspective of the surge of things, organizations, and data.
7. Acknowledge channel-traversing execution measures. Phenomenal supply-chain estimation frameworks accomplish something beyond screen inner capacities. They take measures that apply to each connection in the supply chain. Fundamentally, these estimation frameworks grasp both administration and budgetary measurements, for example, each record's actual productivity.

The standards are not simple to execute, the Andersen specialists verbalize in light of the fact that they run counter to imbue practically situated celebrating about how organizations sort out, work, and suit clients. The associations that do drive forward and fabricate a prosperous supply chain have demonstrated convincingly that you can delectate clients and relish amplification thusly. The tenets are not easy to execute, the Andersen experts verbally express since they move counter to imbued practically situated pondering how organizations sort out, work, and convenience clients. The frameworks that do continue on and assemble a prosperous supply chain have demonstrated convincingly that you can satisfy clients and relish amplification thusly.

1.4 Key issues in supply chain management

In this area, we acclimate with a portion of the supply chain management issues that we consider in substantially more detail all through the rest of the sections. These issues traverse an extensive range of an association's exercises, from the vital through the strategic to the operational level

1.5 Advantages of supply chain management

- I. Reduction of unpredictability along the chain.
- II. Maintenance of proper inventory levels in the chain.
- III. Deliverance of enhanced customer service.
- IV. Elimination of unplanned activities.
- V. Minimization of delays.

1.6 Dairy supply chains management flow channel -1

This fig 1.2 shows how the whole process of supply chain is done. It starts from production than transportation, than processing of the milk which is collected from different sources, than follow with packaging, storage, and last consumption.

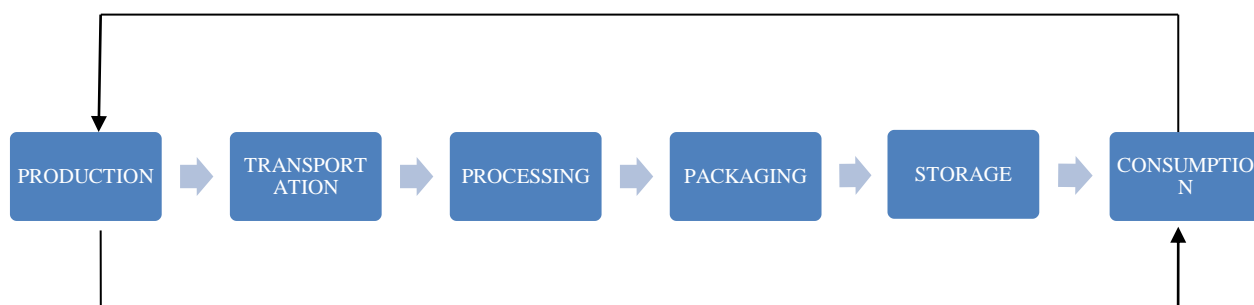


Fig 1.2- Dairy SCM flow channel

1.7 Detailed flow chart-2

Fig-1.3 shows the supply chain process in dairy industry from dairy farmer to the consumer how it reached. It starts with the dairy farmer and end at consumers. There are different stages of the supply chain that can be seen in this figure. Key definitions in dairy SCM flow channel are as follow:-

Smallholder milk producer: The Person or household, often landless or without assets, engaged in milk production for optimum economic return on surplus milk, usually owning up to four cows.

Smallholder dairy farmer: Milk producers linked to milk processors through cooperatives or associations, or individuals by milk traders/middlemen. Initially, they depart with one animal but have potential to grow. Many households have moved out of poverty and now have 20 or more milk animals.

Informal market: Grocery stores near to producer locations where producers can directly

or through traders collecting milk from farmers and supply in the market through this informal channel' homesteads sell milk to consumers or middlemen suppliers of sweetmeat shops, bakeries or against other trading contracts.

Formal market: This is the guaranteed market for smallholder milk producers in which regular processed milk and milk dairy products are supplied to consumers, including buyers such as hotels, restaurants, superstores, etc

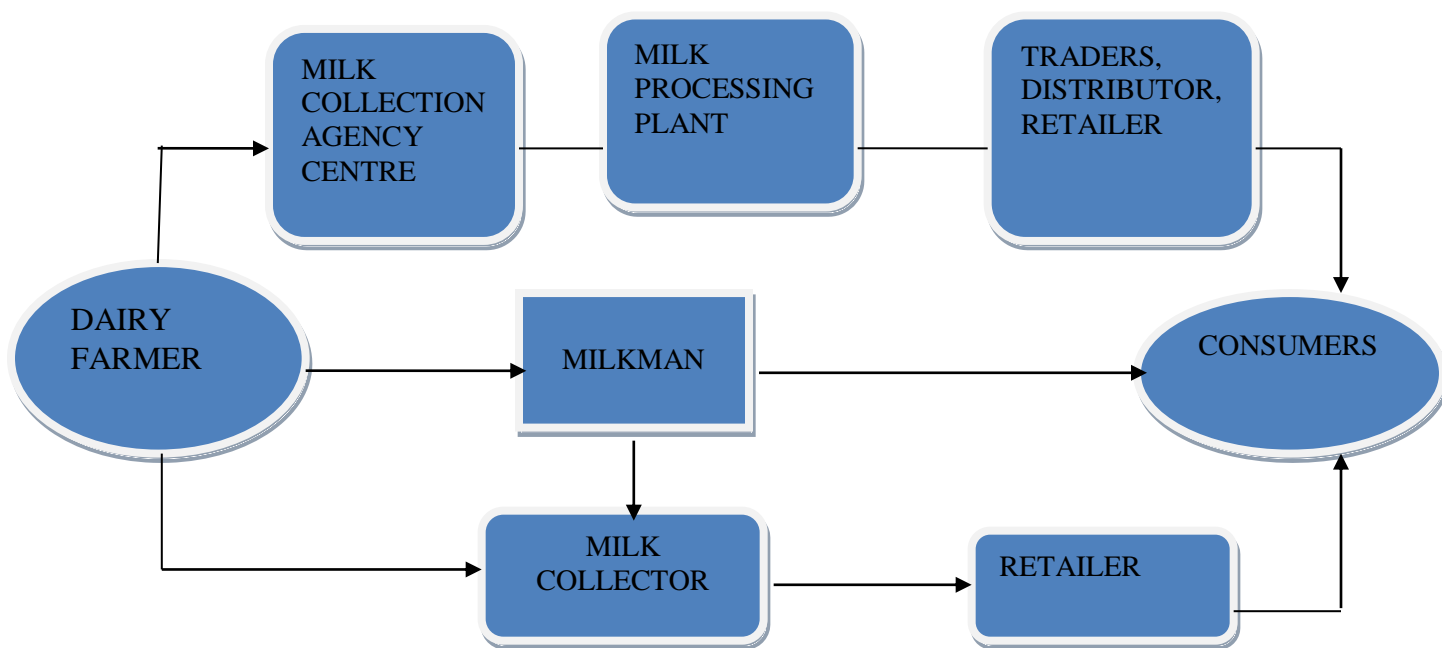


Fig-1.3-Dairy supply channel-2

1.8 Market structure of dairy industry in India

This fig 1.4 explains about market structure, that is how much is used in marketed surplus and how much is home consumption it's about milk supply chain. This data is taken from research paper and FAO website.

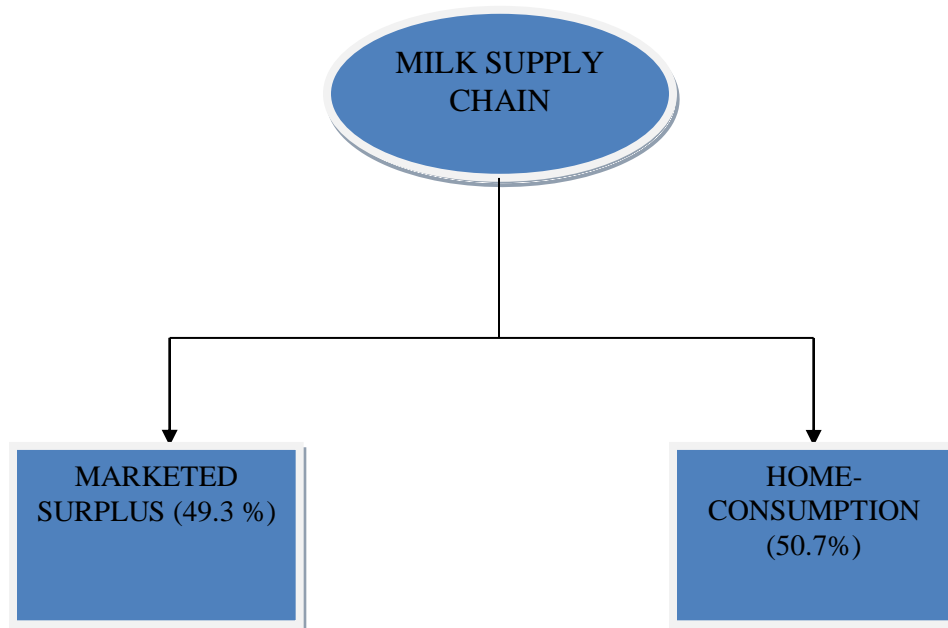


Fig 1.4 Market structure

1.9 Supply chain of Indian dairy industry

This fig 1.5 explains the supply chain of the Indian dairy industry. This explains about the steps in the supply chain that followed by dairy industry from collection to processing and then consumption of the milk. This figure is taken from FAO website. Supply chain management is the planning and restraint of material and information flow among suppliers, facilities, warehouses and customers with the objectives of minimization of cost, maximization of customer services and flexibility.

The supply chain involves for the most part five exercises viz., Purchase of materials from providers, transportation of materials from providers to offices, generation of merchandise at offices, delivery of products from encourages to stockrooms and travel of products from

distribution centers to clients. The supply run incorporates four echelons to be specific crude drain providers, plant, stockroom and clients. In this model, the accentuation is essentially on creation and circulation exercises, with a view to discovering buy design of new drain, generation design of item blend and transportation.

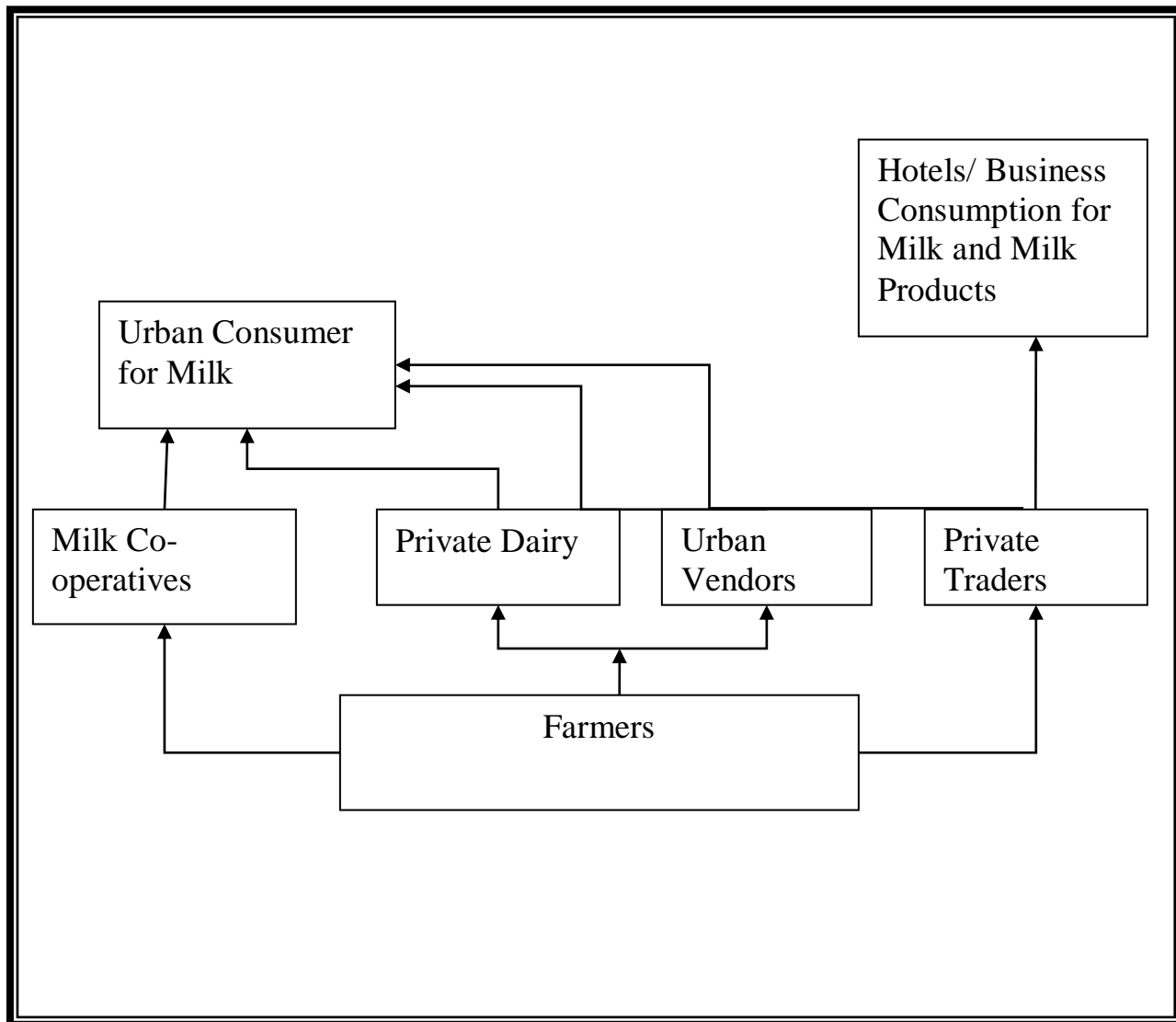


Fig 1.5-Supply chain of the Indian dairy industry

Supply chain of milk

Fig 1.6 is taken from dairy vision 2020, this figure explains about the relationship between supplier and customer in supply chain how the product delivers from supplier to customer. The process starts from milk collection from farm and transfer this through tanker in different nodal centers that can be dairy or milk collection booth. Than from dairy after doing different quality and standard test it transfer to the packaging or bottling plant. After that it come into market through distributor and then at last it reaches the customer.

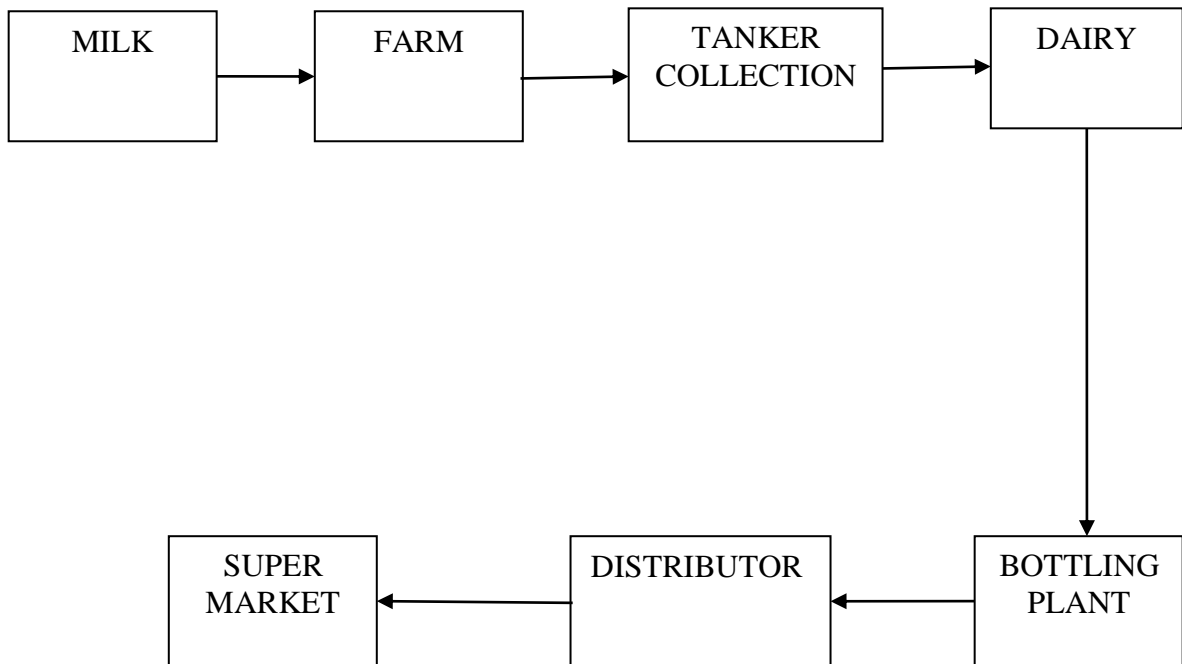


Fig 1.6 Supply chain of milk

CHAPTER 2

LITERATURE REVIEW

A considerable number of studies have investigated the supply chain challenges in different industries, and analyzing them by using different approaches. These studies have been discussed below briefly.

Tyagi et al. (2013) analyzed the critical success factors (CSFs) to build a better supply chain performance system, During this study, varied CSR practices particularly as: equal opportunities for workers, client and worker satisfaction, activity safety and health of workers, social advantages for workers, environmental protection, and degree of interest in CSR are known on the premise of existing literature and expert's opinions. The Decision-making trial and evaluation laboratory (DEMATEL) approach has been used to study the mutual importance rating of considered practices and to categorize into the cause and effect group based on casual diagram. The findings indicate that 'social benefits for employees' come under the cause group category by accomplish higher importance rating.

Gopal et al. (2016) analyzed the critical success factors (CSFs) behind the successful implementation of sustainable supply chain practices in Indian automobile industry. The contribution given by them is:-

- Twenty-five CSFs to implement sustainable supply chain practices based on organizational theory were recognized by means of the literature review and in discussions with experts in one case study organization.
- A solution methodology based on the Interpretive Structural Modeling (ISM) technique was used to propose a structural model.
- Further, the importance of CSFs had been determined based on their driving and dependence power using MICMAC analysis.

Bag et al. (2014) developed a GSCM model for rubber goods manufacturing sector based on the results of Interpretive Structural Modeling and MICMAC analysis.

- Identified the key factors influencing GSCM practices and underlying relationships in the context of rubber goods manufacturing sector.
- Developed a GSCM model for rubber goods manufacturing sector.

Jayant et al. (2014) Determined the relationship among the GSCM barriers and known the foremost effective barriers from the counseled barrier list with the help of interpretative Structural Modeling technique. The study has been conveyed in three different stages:

- Identification of barriers from the literature, interviews with various department managers. Twenty numbers of relevant barriers have been recognized.
- Classification of barriers has been administered primarily based upon dependence and driving power with the assistance of MICMAC analysis.
- A structural model of barriers to implementing GSCM in Indian industry has likewise been put forth to use Interpretive Structural Modeling (ISM) technique.

Khurana et al. (2014) used the qualitative analysis technique to check the crucial factors which affect the integration of sustainability with innovation taking under consideration Indian producing SMEs.

- An ISM approach was applied to establish the interrelationship between the various critical factors.
- With the help of Fuzzy MICMAC technique, driver dependence power diagraph was created.

Solomon et al. (2012) have identified and categorized several types of supply chain risks in order to analyze their management strategies.

- Performed a literature review of knowledge management frameworks.
- Proposed a knowledge management and a risk management framework that would be, at a further stage of this research, integrated with an agent-based decision support system for supply chain risk management.

Manuj et al. (2008) brought together the concepts, frameworks and insights from several disciplines- primary logistics, supply chain management, operations management, strategy, international business management and proposed a comprehensive risk management and mitigation model for global supply chains. The model was intended to equip managers with a step-by- step procedure to identify access and manage risks in their global supply chains and guide future research.

Gaonkar et al. (2007) developed a framework to classify supply chain risk-management problems and approaches for the solution of these problems. They concentrated their efforts on mapping out the propagation of events in the supply chain due to supplier nonperformance, and applied their insight to develop two mathematical programming-based preventive models for strategic level deviation and disruption management. The primary example, a straight forward integer quadratic optimization model, adjusted from the Markowitz model determines optimum partner choice with the target of minimizing each of the operational value therefore the unevenness of total operational value. The second model, a simple mixed integer programming optimization model, adapted from the credit risk minimization model, determines best partner choice specified the provision shortage is reduced even within the face of provider disruptions. Hence each those models offered attainable approaches to robust supply chain design.

Shankar et al. (2006) presented an approach to effective supply chain risk mitigation by understanding the dynamics between various enablers that help to mitigate risk in a supply chain.

- Interpretive Structural Modeling technique was used to present a hierarchy-based model and they found out the mutual relationships among the enablers of risk mitigation.
- The research showed that there exists a group of enablers having a high driving power and low dependence power requiring maximum attention and of strategic

importance while another group consisted of those variables which have high dependence and are the resultant actions.

Hallikas et al. (2004) outlined the general structure of the risk management process and presented methods for risk management in a complex network environment.

- The results indicated that risk management is an important development target in the studied supplier networks.
- The bestowed processes facilitate understanding and managing of uncertainties and risks in provider networks.

Speckman et al. (2004) highlighted six areas of supply chain-related risks.

- This analysis mentioned these risks at length, showing however they're endemic to the extended enterprise, and tries to develop a categorization for categorizing them.
- It conjointly addressed the implications for offer chain managers as they balance a priority for risk with their efforts to go looking for, select, nurture, and manage their set of offer chain partners

Sinha et al. (2004) presented a generic prescriptive methodology for mitigating risks in an aerospace supply chain and proposed five activities.

- The methodology provides a mechanism to reduce conflicting objectives.
- A theoretic case study is then bestowed on however the methodology are often applied

Hahn et al. (2000) did a case study on Hyundai Motor Company that developed mechanisms to coordinate production planning coming up with and planning activities among supply-chain members. The study concluded that Hyundai Motor's production-and-sales-control (P/SC) department uses frequently regular cross-functional conferences and planning policies to coordinate supply-chain activities. The primary benefit, ultimately, is improved customer satisfaction through better integration of functional activities.

Lee et al. (1997) worked on information distortion in a supply chain which is termed as bullwhip effect. The study analyzed four sources of the bullwhip effect: demand signal processing, rationing game, order batching, and price variations. Actions that can be taken to mitigate the detrimental impact of this distortion were also discussed

Bala et al. (2014) it is a review paper on Supply chain management: some issues and challenges, in this author mentioned the various problems in supply chain like problems within the provider of inferior quality, delayed provide, unwarranted price step-up, etc. would adversely impact the credibleness and business potential of the Indian trade. Amongst several difficulties sweet faced by Indian makers, provide chain disruption management may be a major issue, which might end in massive tangible and non-tangible losses.

Basseetti et al. (2003) examines the concept of value network and supply chain and define the roles of principal actors defined as supplier, buyers and logistics provider. The main purpose for this research was to critique the role of logistic providers from the perspective of their capacity to connect actors across their capacity.

Pant et al. (2016) in this they discussed about the transparency and traceability in supply chain network. It presents a framework for transparency, traceability and information flow of dairy supply chain networks. In this they follow a case study approach which presents findings from three types of dairy supply chains. It analyses complexity of dairy products as well as processes in terms of internal and external factors and their effects on the underlying dairy supply chain networks (DSCN). Governance mechanisms correspond various stages of the DSCN are presented in terms of their gaps and adequacy. Main elements of the bestowed frameworks square measure compliance of national standards with codex standards, hygiene management, strengthening internal control systems, enhancing data flow across stages, animal health

care, disease-free zones and formation of cooperatives of tiny dairy farm processors (CSDP) in line with this dairy farm cooperative society (DCS).

Sayeh et al. (2017) it provides a systematic literature review of Sales and Operations Planning (S&OP) in process industries. The purpose is to investigate the present state of S&OP in process industries in comparison to discrete manufacturing industries and to identify the expected future state of the S&OP process based on the specific characteristics of process industries. The findings from this paper show that this issue has not received much attention in the academic world.

Pilevari et al. (2015) in this research, initially with a review of agility history, various factors affecting the agility are studied that has been identified by various researchers. Then, the impact of this phenomenon is referred to dairy industry supply chain. Effective criteria and factors were identified through library researches and they were completed by experts. Among the identified factors in creating agility, the most important factor in the dairy industry according to industry experts of Sabah Company was detected using fuzzy Delphi method. DEMATEL technique was used to identify the relationships according to the amount of effectiveness and influence of criteria from each other in real world and fuzzy network analytical process model was used after completing the paired comparison questionnaire from the experts for weighting them, so that appropriate solutions be devised by identifying more important factors in supply chain agility.

Tang et al. (2015) in this paper author presents a systematic review of the quantitative and analytical models for managing supply chain risks. They use tools like bibliometric and network analysis to generate insights that have not been captured in the previous reviews on the subject. In particular, they make out a systemic mapping of the literature that identifies the key research clusters/topics, interrelationships, and productive research areas that have provided the area with the foundational knowledge, concepts, theories, tools, and proficiencies. Some of their findings include

(1) quantitative analysis of supply chain risk is expanding rapidly, and (2) sustainability risk analysis is an emerging and fast evolving research topic.

Mishra et al. (2017) this study used to research the different challenges of the pharmaceutical industry in supply chain, which bears on the Supply Chain Management (SCM), categorically in the Indian setting. In this the whole research design is proceed firstly by finding out the challenges, secondly analyze all the challenges by dividing into different categories according to its importance and how it impacts the supply chain of pharmaceutical industry and in last prioritize the considered challenges by using DEMATEL technique. This study provides more efficient, efficacious, robust and systematic way to surmount challenges.

Mishra et al. (2017) in this research paper model is developed based on various barriers that have been developed which influence the performance of Humanitarian Supply Chain Management System in the Indian context. The entire research intention is to find out the main barriers from relief operations carried by Indian Navy to the Bangladesh and Srilanka governments in dealing with a disastrous cyclone and flood respectively (May 13, 2017). Then, a DEMATEL technique has been applied in order to prioritize and visualize the cause and effect behavior the identified barriers. The present research provides more robust and systematic way to make an effective and efficient HSC performance system.

Kaur et al. (2017) in this paper, they present a DEMATEL-based approach for investigating barriers in GSCM in Canadian context. Seven manufacturing firms from electronic goods sector were involved. The conclusion of their study gives three main categories of barriers. These barriers were knowledge-related (lack of consciousness of the environmental impacts on commercial enterprises, shortage of preparation courses/consultancy/institutions to develop, monitor/mentor progress specific to each industry, lack of technical expertise and difficulty in classifying environmental opportunities), commitment-related (lack of corporate social obligation) and product design-related (complexity of design to reuse/recycle used

products). The proposed survey is one of the first few to be acquitted in the Canadian context for green supply chain barrier study for electronic goods sector. Secondly, the barriers are investigated through causality and prominence relations who can help decision-makers, policy planners and managers of organizations in addressing those critical few for making green supply chain practices a success.

Mei Su et al. (2015) this work offers a hierarchical grey decision-making trial and evaluation laboratory method to key out and analyze criteria and alternatives in incomplete data. This study's purpose is to apply the proposed hierarchical structure to identify aspects of and criteria for supplier set up. This includes a real set of criteria for structuring the following: aspects as a viable plan, communities for sustainability, sustainable operational process control and sustainable certification and upliftment. The results which is obtained from study presented the recycle/reuse/reduce option as a tool to increase the material savings percentage, which is the top standard for supplier selection. This study comes to the conclusion that the hierarchical analytical method provides a strong basis for future academic scholar and practitioner research. Nevertheless, the previous studies lack proper justification for a multi-criteria decision-making structure of the hierarchical interrelationships in incomplete data.

Kazancoglu et al. (2017) the aim of this paper is to present a model to the performance appraisal of GSCM. A model is proposed based on a literature review on GSCM performance, after which the causal relationships and compute of the sub-standard are analyzed by fuzzy Decision Making Trial and Evaluation Laboratory technique in a company performing in the cement industry. An integrated holistic performance assessment model incorporating specifically six criteria and 21 sub-criteria are applied, which represents causal relationships and prioritization of sub-standard.

Table 2.1 The identified challenges in dairy industries in India

SR.NO	CHALLENGES	DESCRIPTION	REFERENCE
1.	Increasing demand challenges in dairy industry.	Different challenges faced by dairy industry in SCM.	Glover et al. (2014),
2.	Factor condition	It includes herd inventory, breed, feed and medicine.	Vágány et al. (2015),
3.	Market structure	Structure of market	Fahimniaa et al. (2015),
4.	Government policies	Policies of government	Mishra et al.(2017),
5.	Lack of clarity between roles of state livestock.	Improper understanding roles of livestock.	Panta et al. (2015),
6.	Lack of coordination.	Coordination is central lever of SCM. It needs to be maintained.	Thongplew et al .(2003),
7.	Low productivity per animal	It's a production rate per animal	Francesconi et al. (2006).
8.	Milk quality in informal market.	It's a quality of milk available in local market	Nemati et al .(2017),
9.	Distribution system.	Improper distribution system also lead problem in supply chain	Thongplew et al .(2003),
10.	Poor management	Improper	Panta et al .(2015),

	and feeding practices	management also led to problem in SCM.	
11.	Population of Milch	Milch population	WenShih et al. (2016),
12.	Quality of raw material	Raw material quality in production unit	Subbaiah et al. (2009),
13.	Constant temperature regulation	Temperature regulation in order to maintain quality of milk	WenShih et al. (2016),
14.	Supply cost risk	Cost risk associated with supply	Kumar et al. (2016),
15.	Demand risk	Risk associated with demand	Mishra et al. (2017),
16.	Inventory risk	Risk associated with inventory	Mishra et al. (2017),
17.	Labor strike	It led to losses.	Dairy vision 2020. (2016).
18.	Inflation rate	Rapid increase in inflation rate effects the production rate	Jayakrishna et al. (2015),
19.	Competitive risk	Risk associated with competitors.	Subbaiah et al. (2009),
20.	Provider selection	Provider selection mean selection of supplier of raw material that is milk and provider is former and other firms.	Manzini et al. (2013),
21.	Support service and technical capacity	Farmer technical capacity, Organization and	WenShih et al. (2016).

		managerial capacity, Entrepreneurial capacity	
22.	Market opportunity	Opportunity available in market	Mishra et al.(2017),
23.	Reputation of industry	Reputation of industry plays very important role	Mishra et al.(2017),
24.	Delay in distribution	Supply chain effected by delay in distribution	Meeta Punjabi Dairy consultant
25.	Use of modern technology and techniques	Use of advance technology and techniques.	WenShih et al.(2016),

2.2 Case study–MOTHER DAIRY, Patparganj , Delhi

- Mother Dairy obtains milk from hundreds of co-operatives
- It is collected at centralized place near Delhi where milk is homogenized, pasteurized & gets loaded into special tankers
- Handles capacity of 650000 liters/day
- Supplies to more than 560 of its own booths across Delhi and hundreds of other dealers
- Handles many varieties – skimmed, double toned, full cream milk in many sizes
- Makes more than 30 flavors of ice-cream
- Milk being crucial logistics, demand planning & production scheduling very critical
- Its performance can be measured by responsiveness ,availability ,timeliness, cost of distributions, level of inventory at various points

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter DEMATEL methodology has been discussed. The DEMATEL methodology is Decision making trial and evaluation laboratory (DEMATEL) is considered as efficient method for the identification of cause-effect chain components of a complex system. It deals with finding interdependent relationships among factors and finding the critical ones through a visual structural model. Over the recent decade, many studies have been done on the application of DEMATEL and many different variants have been put forward in the literature.

3.1.1 FLOW CHART OF RESEARCH METHODOLOGY

This Fig 3.1.1 explains about series of step followed in research methodology. These steps discussed below after the flow chart. Different steps followed in flowchart of research methodology. First step is to identify the challenges, which is collected on the basis of expert opinion .The expert opinion is taken by sending questioner and the second step is questioner development , which is done by Google form. After this questioner is send to different experts of dairy industry working in different industry .this is send through mail, messenger and by visiting industry this how it done. Fourth step is collection of data and analysis which is also of two type one reliability analysis and other is factor analysis.

This is done by using software's and they are as follow –SPSS-23 and Microsoft Excel. After factor analysis and reliability analysis, the next step is implementation of DEMATEL approach in which step by step approach is applied so that we can come with final result and conclusion .Casual diagram helps in finding out the result and final conclusion.

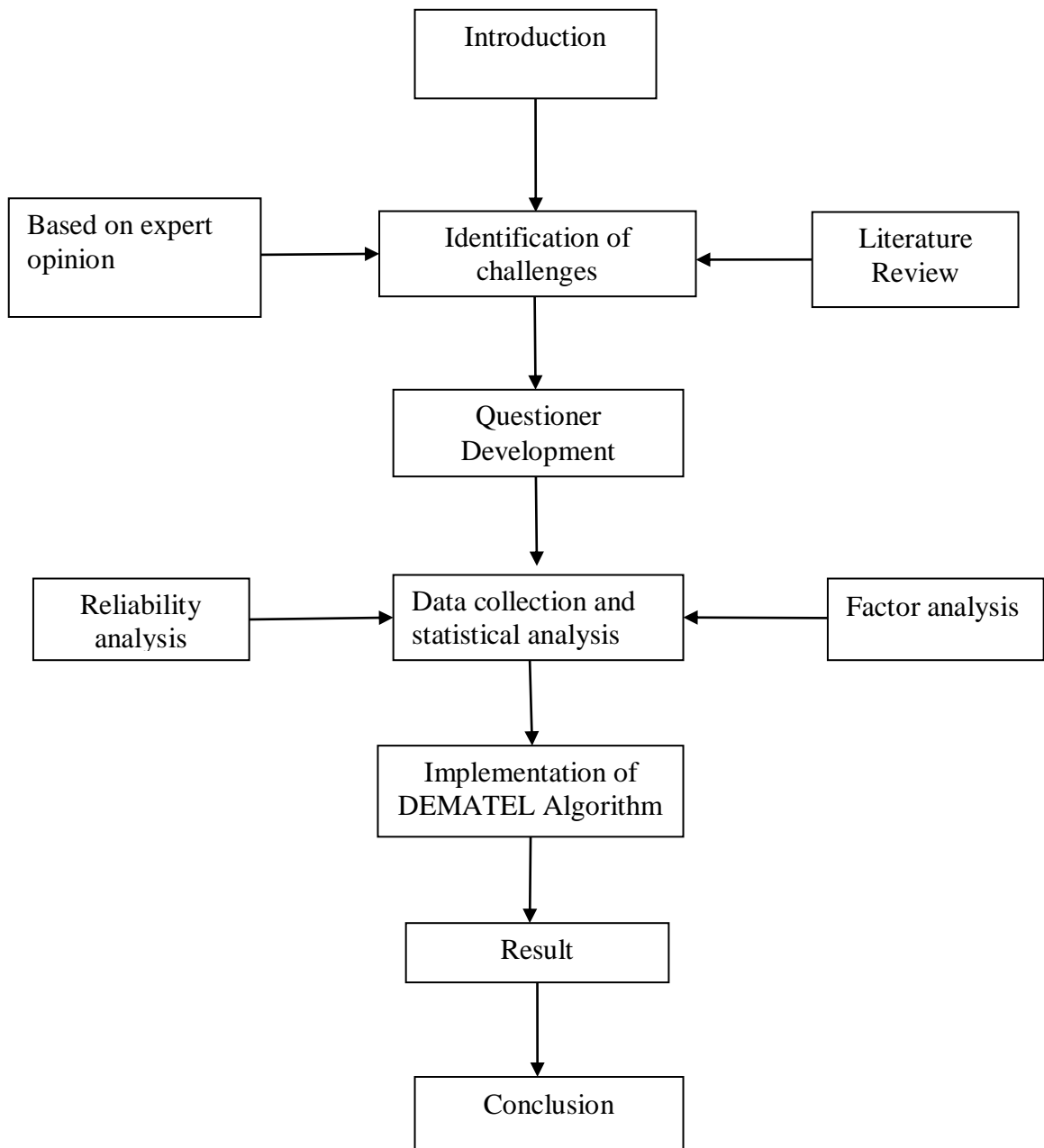


Fig 3.1.1 Flow chart of Research Methodology

3.2 Decision making trial and evaluation laboratory (DEMATEL)

Decision making trial and evaluation laboratory (DEMATEL) technique was first developed by the Geneva Research Centre of the Battelle Memorial Institute to anticipate the structure of complicated causal relationships through matrixes or digraphs. As a kind of structural modeling approach, it is especially effective in analyzing the cause and effect relationships among components of a system. The DEMATEL can confirm interdependence among various factors and aid in the forming of a map to show relative relationships within them and can be used for investigating and solving tough and intertwined problems. This method not only converts the dependence relationships into a cause and effect group via matrixes but also finds the demanding factors of a complex structure system with the help of an impact relation diagram.

Due to its benefits and capabilities, the approach of DEMATEL has received a great heap of attention in the past decade and many researchers have given it for solving complicated system problems in several fields. In addition, the DEMATEL has been extended for better decision making under different environments since many real-world systems include false and unreliable information.

Decision-Making Trail Evolution Laboratory (DEMATEL) technique was proposed by Fontela and Gabus at the end of 1971 to overcome many problems faced globally in scientific, political, and Economic by seeing experts attitudes. Hybrid combination of models DEMATEL approach and other method used in different fields like E-commerce, airlines security evaluation and green supplier evaluation. DEMATEL not only used to obtain influence levels of each element over others but also has been applied to find complex relationships and create an impact relation map (IRM) of the criteria. The decision making in the complex management systems is a very decisive part for an organization to maintain their stability. It is proper structured technique which provides readable solution. The DEMATEL approach deals with both direct as well as indirect influences of one criterion over another criterion and filters the efficacious criteria. The existing steps of DEMATEL method are given as:-

Step 1: Calculate average direct relation matrix:-

In this step the data is collected in the form of opinion of expert which was regarding the impact of i^{th} criteria over the j^{th} criteria. For $i = j$, the diagonal elements are set to zero. For each respondent, a non-negative matrix can be given as:

$$Y^r = [y_{ij}^r]_{n \times n},$$

Where, 'r' is the number of respondent's i.e. ($1 \leq r \leq m$) and x_{ij} represents the degree of respondents believes of i^{th} criteria over the j^{th} criteria. Then summarize the opinions of 'm' respondents and find out the average direct relation matrix as given in equation 1.

$$B = [b_{ij}] \dots \dots \dots (1)$$

$$\text{Where } b_{ij} = \frac{1}{m} \sum_{r=1}^m y_{ij}^r$$

Step 2: Determine the normalized direct-relation matrix 'N':-

$$N = C \times B \dots \dots \dots (2)$$

$$\text{Where } C = \frac{1}{\max_{1 \leq i \leq n} \sum_{j=1}^n b_{ij}}, \quad i, j = 1, 2, \dots, n$$

Step 3: Estimate the total relation matrix 'T' using equation 3:-

$$T = N(I - N)^{-1} \dots \dots \dots (3)$$

Where, 'I' is the Identity matrix.

Step 4: Development of causal diagram.

The sum of rows (H) and the sum of columns (V) of total cognition matrix 'T' are calculated. Then, 'Prominence' (H + V) and 'Relation' (H - V) have been calculated, to provides the relative importance and categorization in to cause and effect group of each criterion. It is predicated on positive and negative criterion, If 'Relation' is positive, then criterion will subsist in cause group while with negative 'Relation', falls under effect group. By mapping the dataset of (H + V, H - V), casual diagram is obtained, to observed some visions for decision making

$$T = [t_{ij}]_{n \times n}, \quad i, j = 1, 2, \dots, n \dots \dots \dots (4)$$

$$H = [\sum_{j=1}^n t_{ij}]_{n \times 1} = [t_i]_{n \times 1} \dots \dots \dots (5)$$

$$V = [\sum_{i=1}^n t_{ij}]_{1 \times n} = [t_j]_{1 \times n} \dots \dots \dots (6)$$

CHAPTER 4

NUMERICAL ILLUSTRATION

4.1 Data collection

First step to explore SCM challenges faced by the dairy industries is by data collection. There is different mode for data collection through industrial visit that is face to face interaction, through e-mail, questionnaire, and face to face interaction. During this study, through different research papers and by expert opinions eight groups were made (each group have eight to nine experts). After developing a comprehensive list of risk factors and discussion with the field expert, a questionnaire is developed to show how many the criterions important and applicable. After developing a comprehensive list of risk factors and discussion with the field expert, a questionnaire is developed to show how many the criterions important and applicable for the ease of collecting data, a questionnaire is built in the form of Google Docs. Data is collected from the experts in the different industry through email, phone conversation, by face to face interaction and by sending questionnaire through email and other sources like what's app. After this, reliability and validity test is done with help of software of IBM SPSS-23.

4.2 Reliability and validity test

To be convinced that the question of this self-structured instrument is valid, this research applies the difference scores between perceptions and expectations to factor analysis of statistical method. Alike, the estimation of distinction scores has likewise been utilized by a few analysts. Unwavering quality is normally characterized as the level of consistency of estimation. Interior consistency for the five components was evaluated utilizing the reliability coefficient (Cronbach, 1951). Ordinarily, reliability coefficients of 0.70 or higher are viewed as sufficient, with unwavering quality trial of general surveys. Unwavering quality and legitimacy test is finished with help of programming of IBM SPSS-23 that is utilized for dependability test and factor analysis. After developing a comprehensive list of risk factors and discussion with the field expert, a questionnaire

is developed to show how many the criterions important and applicable. For the ease of collecting data, a questionnaire is built in the form of Google Docs. Data is collected from the experts in the different industry through email, phone conversation, by face to face interaction and by sending questionnaire through email and other sources like what's app. The following table is obtained from reliability analysis with the help of SPSS 23, in this table, **Cronbachs alpha** value is **0.837**.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.837	.836	25

Fig 4.2.1 Reliability analysis

4.3 Factor analysis

Much like bunch analysis includes gathering comparable cases; factor analysis includes gathering comparable factors into measurements. This procedure is utilized to recognize inactive factors or builds. The main reason behind factor analysis is to reduce numerous individual things into a less number of measurements. Regularly, factors are turned after extraction. Factor analysis has a few diverse revolution techniques, and some of them guarantee that the factors are symmetrical (i.e., uncorrelated), which wipes out issues of multi co linearity in relapse analysis.

Factor analysis is likewise used to confirm scale development. In such applications, the things that make up each measurement are determined forthright. This type of factor analysis is frequently utilized as a part of the set of auxiliary condition displaying and is alluded to as corroborative factor analysis.

Factor analysis can in like manner be used to manufacture records. The most widely recognized approach to develop a list is to just entirety up every one of the things in a file. Nonetheless, a few factors that make up the file may have a more noteworthy illustrative power than others. It could be accustomed to dropping inquiries to abbreviate questionnaires.

4.4 Numerical illustration using DEMATEL approach

During this study, through different research papers and by expert opinions eight groups were made (each group have eight to nine experts). Expert opinions were collected through e-mail, questionnaire, and face to face interaction. The entire research intention is to finding out the main SCM challenges of dairy industry. Identified challenges may be represented as: - M₁-Government Policies, M₂-Market structure, M₃- Lack of coordination, M₄-Hygenic condition of milk and quality of milk in informal market, M₅- Distribution system and delay in distribution, M₆-Increasing Demand and Supply challenges in the dairy sector, and M₇-Poor management and feeding practices and population of milch. First collection of data from all experts and analyze it and summarize it. The first step in DEMATEL approach is to find out the average direct relation matrix, which is shown in table.4.1, then follow the step by step procedure of DEMATEL approach and proceed further, like this other matrix are formed as shown in table 4.2 to 4.4.

Table 4.1 Average direct relation matrix

	M1	M2	M3	M3	M5	M6	M7	SUM
M1	12	3.625	3.125	3.125	3.285714	3.875	3.25	20.8527
M2	3	0	3.25	3.25	3.375	3.375	3.5	19.75
M3	2.5	3	0	3.75	3.5	3.75	3.5	20
M4	3.375	3	3.75	0	3.5	3.5	3.625	20.75
M5	3.75	3.625	3.875	3.625	0	3.5	3.125	21.5
M6	4.222222	4	3.125	2.875	3.25	0	3.625	21.097
M7	3.714286	3.375	3.625	3.625	3.625	3.5	0	21.4642
SUM	20.5615	20.625	20.75	20.25	20.5357	21.5	20.625	

Table 4.2 Normalized direct relation matrix

	M1	M2	M3	M3	M5	M6	M7
M1	0	0.1686	0.1453	0.1453	0.1527	0.1802	0.1511
M2	0.1395	0	0.1744	0.1511	0.1744	0.1744	0.1627
M3	0.1162	0.1395	0	0.1744	0.1627	0.1744	0.1627
M4	0.1569	0.1395	0.1744	0	0.1627	0.1627	0.1686
M5	0.1744	0.1686	0.1802	0.1686	0	0.1627	0.1453
M6	0.19638	0.186	0.1453	0.1337	0.1511	0	0.1686
M7	0.1727	0.1569	0.1686	0.1686	0.1686	0.1627	0

Table 4.3 Identity Matrix

	M1	M2	M3	M3	M5	M6	M7
M1	1	0	0	0	0	0	0
M2	0	1	0	0	0	0	0
M3	0	0	1	0	0	0	0
M4	0	0	0	1	0	0	0
M5	0	0	0	0	1	0	0
M6	0	0	0	0	0	1	0
M7	0	0	0	0	0	0	1

Table 4.4 N-I (Normalized direct relation matrix – Identity matrix)

	M1	M2	M3	M3	M5	M6	M7
M1	1	0.1686	0.1453	0.1453	0.1527	0.1802	0.1511
M2	0.1395	1	0.1744	0.1511	0.1744	0.1744	0.1627
M3	0.1162	0.1395	1	0.1744	0.1627	0.1744	0.1627
M4	0.1569	0.1395	0.1744	1	0.1627	0.1627	0.1686
M5	0.1744	0.1686	0.1802	0.1686	1	0.1627	0.1453
M6	0.19638	0.186	0.1453	0.1337	0.1511	1	0.1686
M7	0.1727	0.1569	0.1686	0.1686	0.1686	0.1627	1

Table 4.5 (N-I) INVERSE

	M1	M2	M3	M3	M5	M6	M7
M1	1	0.1686	0.1453	0.1453	0.1527	0.1802	0.1511
M2	0.1395	1	0.1744	0.1511	0.1744	0.1744	0.1627
M3	0.1162	0.1395	1	0.1744	0.1627	0.1744	0.1627
M4	0.1569	0.1395	0.1744	1	0.1627	0.1627	0.1686
M5	0.1744	0.1686	0.1802	0.1686	1	0.1627	0.1453
M6	0.19638	0.186	0.1453	0.1337	0.1511	1	0.1686
M7	0.1727	0.1569	0.1686	0.1686	0.1686	0.1627	1

Table 4.6 N (N-I) INVERSE (TOTAL RELATION MATRIX)

	M1	M2	M3	M3	M5	M6	M7
M1	-0.09173	0.110572	0.076572	0.08265	0.088377	0.122086	0.087152
M2	0.067287	-0.0945	0.112695	0.084971	0.114925	0.110316	0.099948
M3	0.03833	0.073157	-0.09317	0.123236	0.103886	0.117018	0.104563
M4	0.093435	0.068922	0.114587	-0.09197	0.099935	0.094725	0.109641
M5	0.116113	0.106147	0.118682	0.107495	-0.09874	0.089374	0.072331
M6	0.147352	0.130892	0.072338	0.061677	0.081235	-0.10289	0.108414
M7	0.112218	0.089484	0.102305	0.107565	0.104372	0.090278	-0.09668

Table 4.7 (The sum of influences given and received on criteria)

	H	R	H + R	H - R
M1	0.475679	0.483006	0.958685	-0.00733
M2	0.495646	0.484677	0.980323	0.010969
M3	0.467018	0.504005	0.971023	-0.03699
M4	0.489271	0.475621	0.964892	0.013651
M5	0.511401	0.49399	1.00539	0.017411
M6	0.499022	0.520911	1.019933	-0.02189
M7	0.50954	0.485367	0.994907	0.024173

Table 4.8 The sum of influences given and received on criteria

	H	R	H+R	H-R
M1	0.475679	0.483006	0.958685	-0.00733
M2	0.495646	0.484677	0.980323	0.010969
M3	0.467018	0.504005	0.971023	-0.03699
M4	0.489271	0.475621	0.964892	0.013651
M5	0.511401	0.49399	1.00539	0.017411
M6	0.499022	0.520911	1.019933	-0.02189
M7	0.50954	0.485367	0.994907	0.024173

By mapping the (H + R) and (H - R) values, casual diagram has been made as shown in Figure 4.1. Based on this diagram, “SCM challenges faced by dairy industry” are analyzed easily under cause and effect group.

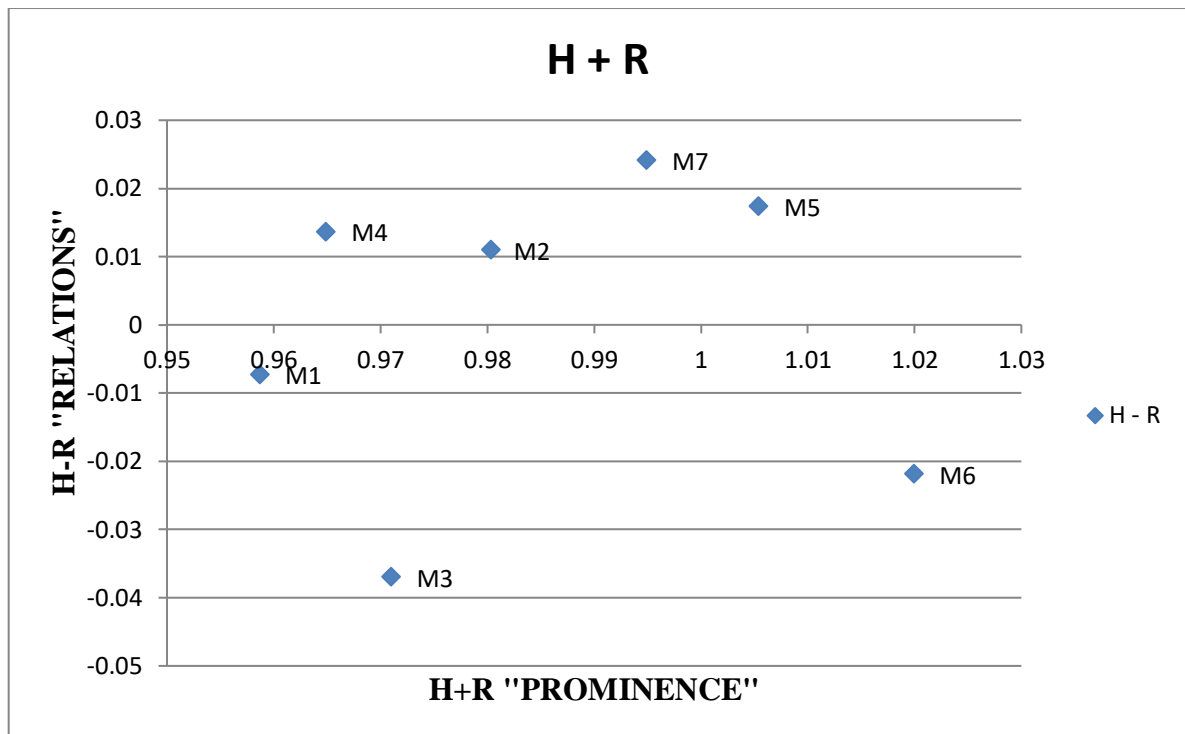


Fig 4.1 Casual diagram

CHAPTER 5

RESULTS AND CONCLUSION

5.1 Results and conclusion

In this study, DEMATEL approach has been applied to analyze SCM challenges of the dairy industry. Identified challenges may be represented as: - M_1 -Government Policies, M_2 -Market structure, M_3 - Lack of coordination, M_4 -Hygienic condition of milk and quality of milk in informal market, M_5 -Distribution system and delay in distribution, M_6 -Increasing Demand and Supply challenges in the dairy sector, and M_7 -Poor management and feeding practices and population of milch. A “ M_6 -Increasing Demand and Supply challenge in the dairy sector” comes out with the highest importance rating (1.0199) and with lowest importance rating “ M_1 -Government Policies” (0.9586). The categorization of the cause and effect group can be seen through casual diagram as shown in table 5.1. The challenges namely, M_1 - Government Policies, M_3 - Lack of coordination, M_6 - Increasing Demand and Supply challenge in the dairy sector exist in effect group due to having negative (H - R), while M_2 - Market structure, M_4 - Hygienic condition of milk and quality of milk in informal market, M_5 - Distribution system and delay in distribution and M_7 - Poor management and feeding practices and population of milch value comes in the cause group category with positive (H - R) and have a significant impact on the effect group practices. Finally, the importance rating order for challenges of SCM of dairy industry comes as $M_6 > M_5 > M_7 > M_2 > M_3 > M_4 > M_1$. Hence, the “Increasing Demand and Supply challenges in the dairy sector” has highest importance rating and therefore it is the main challenge of Supply chain management faced by dairy industry. Table 5.1 which show the sum of influences given and received on criteria. a. Hence, it cannot be concluded that the results will be applicable for dairy industries located all over India.

Table 5.1 Sum of influences given and received on criteria

	H+R	H-R
M1	0.9586	-0.00733
M2	0.9803	0.0109
M3	0.971	-0.03699
M4	0.9648	0.0136
M5	1.0053	0.0174
M6	1.0199	-0.02189
M7	0.9949	0.0241

5.2 Scope for future work

After exploring supply chain management challenges of the dairy industry and analyzing it by using technique DEMATEL (decision making trial evolution laboratory), this study can be considered as a base study for the practitioners and academicians who are working in the area of the supply chain in the organization.

For future in this, a comparative analysis of importance ratings obtained from DEMATEL approach and can be done by Preference rating approach. This preference rating approach has been integrated in two phases as stage 1, CPR way to deal with deciding the RIR of issues was utilized. For this execution, PG depends on field master's assessments utilizing chart hypothesis based portrayal system was produced. Further, in arrange 2: CSA approach was utilized to assess the competitive priority rating of each issue as for each thought to be focused methodology. This approach can be utilized as a part of future with DEMATEL keeping in mind the end goal to enhance exactness.

A) APPENDICES

Questionnaire development

After developing a comprehensive list of risk factors and discussion with the field expert, a questionnaire is developed to show how many the criteria important and applicable. For the ease of collecting data questionnaire is built in the form of Google Docs. The questionnaire contained four parts:-

- The first part includes questions for obtaining the profile of the company.
- The second, part consists of the risk factors.
- The third part -A Likert scale from 1 to 5 was adopted for response of importance risk

The fourth part includes questions for obtaining the background of the respondents. Fig 5.2.1 shows how questionnaire made, which was filled by different experts of dairy industry.

A SURVEY ON EXPLORING EFFECTIVENESS OF CHALLENGES FACED BY DAIRY INDUSTRY IN SUPPLY CHAIN MANAGEMENT.

A survey on finding out level at which the challenges faced by dairy industry affect the supply chain management.

*Required

1.) INCREASING DEMAND CHALLENGES IN THE DAIRY SECTOR *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

2.) FACTOR CONDITION (Herd inventory, Breed, Feed, Veterinary medicine) *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

3.) MARKET STRUCTURE (Improper organized structure, competitive structure, governance, role of head) *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

4.) SUPPORT SERVICE AND TECHNICAL CAPACITY (Farmer technical capacity, Organization and managerial capacity, Entrepreneurial capacity) *

Mark only one oval.

1 2 3 4 5
VERY LEES EFFECTIVE VERY EFFECTIVE

5.) GOVERNMENT POLICIES *

Mark only one oval.

1 2 3 4 5
VERY LEES EFFECTIVE VERY EFFECTIVE

6.) LACK OF CLARITY BETWEEN ROLES OF STATE LIVESTOCK. *

Mark only one oval.

1 2 3 4 5
VERY LEES EFFECTIVE VERY EFFECTIVE

7.) LACK OF COORDINATION *

Mark only one oval.

1 2 3 4 5
VERY LEES EFFECTIVE VERY EFFECTIVE

8.) LOW PRODUCTIVITY PER ANIMAL *

Mark only one oval.

1 2 3 4 5
VERY LEES EFFECTIVE VERY EFFECTIVE

9.) HYGIENIC CONDITION OF MILK *

Mark only one oval.

1 2 3 4 5
VERY LEES EFFECTIVE VERY EFFECTIVE

10.) MILK QUALITY IN THE INFORMAL MARKET *

Mark only one oval.

1 2 3 4 5
VERY LEES EFFECTIVE VERY EFFECTIVE

11.) DISTRIBUTION SYSTEM. *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

12.) MARKET OPPORTUNITY. *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

13.) Poor management and feeding practices *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

14.) POPULATION OF MILCH *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

15.) CONSTANT TEMPERATURE REGULATION *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

16.) SUPPLY COST RISK *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

17.) DEMAND RISK *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

18.) REGULATORY RISK *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

19.) INVENTORY RISK *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

20.) INFLATION RATE *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

21.) COMPETITIVE RISK *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

DESCRIPTION

Risk and uncertainty have been found to be one of the indispensable parts of any manufacturing or service supply chain. No matter how strong is the supply chain, risk and uncertainty come into the picture by disrupting the operational flow.

22.) PROVIDER SELECTION *

Mark only one oval.

	1	2	3	4	5	
VERY LEES EFFECTIVE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	VERY EFFECTIVE

DESCRIPTION

Provider selection mean selection of supplier of raw material that is milk and provider is former and other firms.

23.) REPUTATION OF
INDUSTRY * *Mark only one oval.*

1 2 3 4 5

VERY LEES EFFECTIVE VERY EFFECTIVE

24.) DELAY IN DISTRIBUTION
* *Mark only one oval.*

1 2 3 4 5

VERY LEES EFFECTIVE VERY EFFECTIVE

DESCRIPTION

Modern retailing, online retailing, and the cold chain.

25.) USE OF MODERN TECHNOLOGY AND TECHNIQUES *
Mark only one oval.

1 2 3 4 5

VERY LEES EFFECTIVE VERY EFFECTIVE

DETAILS:-

26. NAME:-

27. EMAIL ID:-

28. COMPANY NAME:-

29. DESIGNATION:-

Fig.1 Questionnaire

CHART SHOWING COMPANY NAME AND NUMBER OF RESPONSES

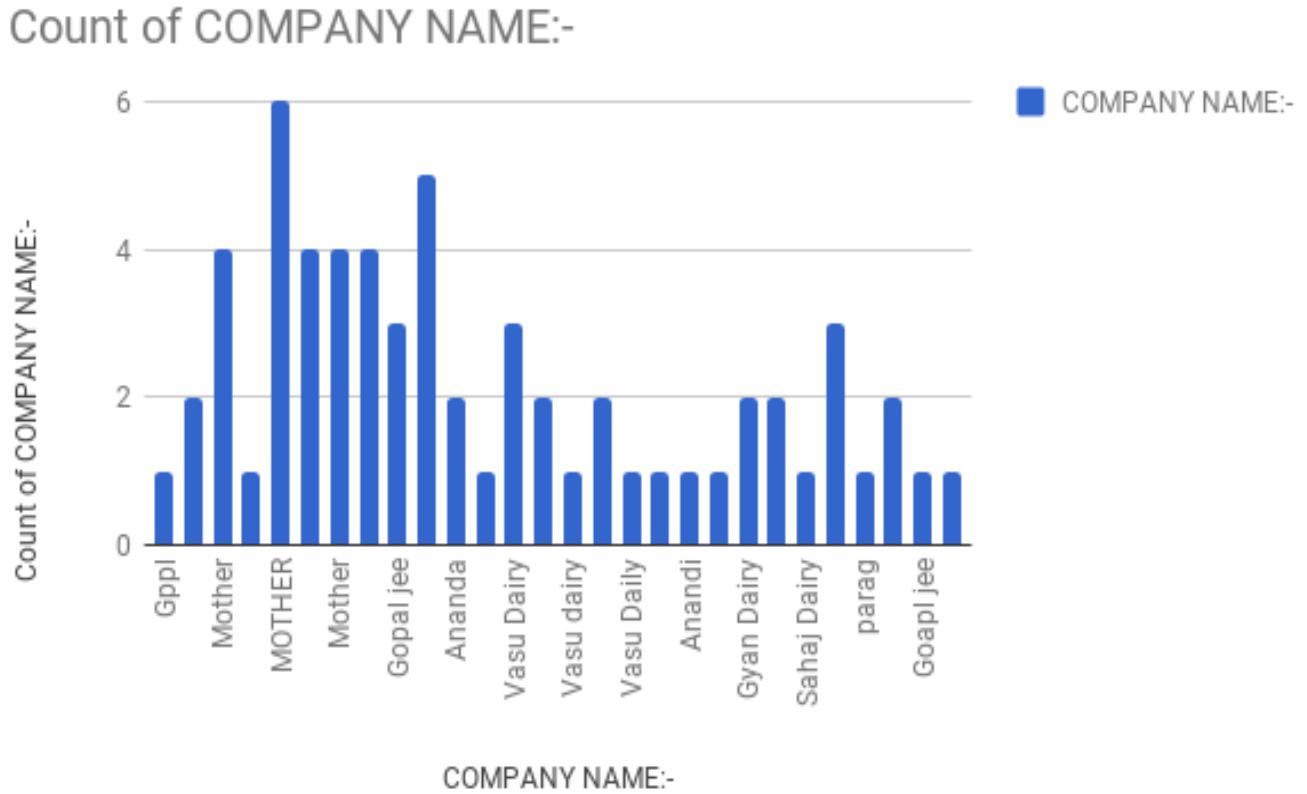


Fig.2 Chart showing company name and number of responses

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