

CHAPTER 1

INTRODUCTION

1.1 Overview

India is one of the leading consumers and producers of the milk in the world. The country is also the largest consumer of milk and milk products (FAOSTAT, 2012). Dairy activities have an essential function in the rural Indian economy, serving as an important source of employment and income. India has largest bovine population in the world. The Indian government implemented the “Operation Flood “programme in 1970, with the goal of increasing milk production and making the country one of the largest producers of milk in the world. Operation Flood was a rural development programme initiated by India's National Dairy Development Board (NDDB) (Cunningham, 2009).

The main objectives of the programme were to increase the production of milk, augment rural incomes, and offer fair prices for consumers. The whole programme envisaged making India the largest producer of milk and at the same time empowering milk producers. This programme resulted in advent of several state-owned co-operative dairies in different states of the country. Some of these dairies are marred by operational inefficiency and on the verge of closing operations in many factories.

Verma (2014) points out that Indian dairy suffers from low productivity. The dairy sector of India is dominated large co-operatives, which is struggling to improve their efficiency in the middle of established informal village-based dairy supply chain. In another, Confederation of Indian Industry (CII), Conference on Dairy Vision (2014) points out that Indian Dairy system facing problem regarding low output and low productivity. Verma (2014) also cites the MD of Amul, Mr. B.S. Sodi (CII, 2014) points out three major issues i) co-operative governance ii) professional management iii) autonomy in business decisions. In addition, he also points out to create cost effective quality assurance system and create cost effective competitive marketing and distribution system including modern retailing.

Patel and Jadawala (2017), points out a study conducted by Mr. N.G. Hedge the president of Bharatiya Agro Industries Foundation (BAIF), Development Research Foundation Indian Dairy has lost its low-cost production advantage. The high cost of milk production and high cost of milk handling and marketing, poor quality of milk due to unhygienic milk handling and lack of awareness amongst farmers quality parameters including microbiological climatic constraints as well as resident antibiotics. They suggested that opportunities like low-cost production, organic dairy farming, retaining high nutrients value in milk and adopting modern dairy farming techniques can reduce the threat of substitute products.

The business landscape in India is changing quickly and the dairy industry is no exception. While some dairies like Amul and Mother Dairy have

successfully expanded their portfolios, some dairies have failed to understand customer needs and financially surviving. Starting the study with customer assessment always gave an option to gather all the thought and analysis. Whereas, the purchase decision of customer can be affected by marketing tools such as promotions.

White Revolution in India

Operation Flood, launched in 1970, was a project of India's National Dairy Development Board (NDDB), which was the world's biggest dairy development programme. It transformed India from a milk-deficient nation into the world's largest milk producer, surpassing the USA in 1998 and, comprising about 17% of global output in 2010–2011. In 30 years, India doubled the milk available per person, and made dairy farming India's largest self-sustainable rural employment generator (FAOSTAT, 2012). Operation Flood was launched to help farmers direct their own development, placing control of the resources they create in their own hands. All this was achieved not merely by mass production, but by production by the masses. The process has been called *the White Revolution*.

Understanding Co-operative Dairy

To learn more about co-operative dairy, one must understand how the co-operative sector operates in India. The co-operative sector is an association of the government (public) and private sectors. In August 1844, when the Industrial Revolution started to transform the Western world, 28 workers established the first successful modern co-operative named “The Rochdale Pioneers Society”. The first principle of the co-operative sector was a concern for community and people (Bonner, 1961). Since a co-operative society significantly works for

deprived people and small industries, it is especially important for the co-operative society to connect with those people with whom it wishes to work.

Co-operative Societies in India

Co-operative societies can be defined as “autonomous associations of persons united voluntarily to meet common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise”. India has an agrarian economy and most of the population depends directly or indirectly on agriculture. According to the Indian Brand Equity Foundation (IBEF), agriculture is the primary source of livelihood for about 58 % of India’s population. Gross value added by agriculture, forestry, and fishing is estimated at Rs 18.53 trillion (US \$271.00 billion) in FY18. India has laid the foundation of biggest co-operative movement in the world. The co-operative movement has an objective to maximize the social welfare of the economically weaker section of the country.

India is a large country and most of the population lives in rural areas. Co-operative society can become a pioneering movement for Indian rural society because the private sector has failed to reach rural areas. At the same time, the government sector has its own limitations. The public sector has many hierarchies and less agility to respond to changing business scenarios. From the Indian perspective, co-operative society has its own challenges to establishing itself in changing business environment. Some of the challenges faced by co-operative dairy in India are as follows (Prakash, 2011).

1. *Intervention of government:* Co-operative societies face delayed decision making, as they require the approval from government, even for the smaller issues. Sometime the delay in approval from the government, hampers the decision making of the management.

2. *Mismanagement and manipulation:* Managers working for the co-operative societies have their own interests. Most of the time, managers are unable to bring up their suggestion to higher managers who are often administrators who lack marketing vision.
3. *Lack of awareness:* The management of the co-operative dairies are not updated about contemporary management practices and technology. They stick with traditional approaches.
4. *Incorrect use of power:* The management uses power to influence the operations of the co-operative dairies. They influence the vendor selection, employee selection and award contracts to favour their kith and kin.

Right from their inception government intervention is very high in Indian co-operative societies. Therefore, sometimes it become difficult follow the core principles and the purpose of co-operative societies. Co-operative societies aim to help rural, deprived people and communities but government intervention often obstructs them in achieving these objectives.

Co-operative societies aim to provide agricultural, technical, educational, and other resources to rural people and farmers. In the beginning, co-operative societies were small, and their objective was social welfare maximization. They had smaller operations and the number of intermediaries was low. Over the years, these societies have drifted away from their original objectives and profit maximization has become their main agenda. The higher managements of these co-operative societies now work for rich farmers, and deprived/poor people do not get resources (Prakash, 2011).

About the Co-operative Dairy Under Study

Uttar Pradesh is the major milk producing state of India contributing 17% of the total milk production of the country. In the year 2010-2011, the total milk production in the state was 21.033 million kg/day. The idea behind the creation of co-operative societies was raising the social status of deprived people and establishing direct connections between rural areas (producers) and urban areas (consumers). Keeping this in mind, the state government of Uttar Pradesh established co-operative dairies about 56 years ago. The aim was to develop organized dairying in the Uttar Pradesh, India.

The co-operative dairy produces milk and range of milk products including - butter, ghee, paneer, sweet yogurt, peda, khoa, laadu, raj bhog, kalakand, gulab-jamun, mattha and chhachh and so on. The main aim and objective for the formation of the co-operative dairy was to make certain that the milk producers would get fair compensation without any intermediary. The co-operative dairy aims to increase production of milk by providing technical assistance to milk producers and ensuring high quality milk to consumer at affordable prices.

The co-operative dairy works through a three-tier structure that links village milk producers and milk consumer in cities. The three-tier structure consists of the following:

1. Village level dairy co-operative Societies (DCSs): The DCSs in villages collect the surplus milk from the registered milk farmer members. Animal health support and services are also provided through DCSs.
2. District level milk unions: The unions collect milk, from the DCSs of its district, then process it and market it. The milk unions provide support and services to farmers through the village DCSs. Milk unions sells cattle feed, organize fodder development

programmes, high quality fodder seeds available, and provide artificial insemination facilities to improve the breeds of milk animals.

3. State level federation: The Apex Federation provides marketing services and other support to the district milk unions of the state. It also helps the milk unions to market milk outside the state, maintains a liaison with the government, plans and coordinates programmes and ensures the mobilization of resources.

The organization structure of the co-operative dairy is depicted by Figure 1.1. A board of directors, elected from milk union boards, controls and directs the overall management. The managing director is the chief head of the federation. The management has other responsibilities regarding marketing, procurement, operations, quality control, finance and so on for smooth functioning of the overall process. As depicted in the Figure 1.1 the organizational structure of the co-operative dairy is not horizontal. This results in delays in decision-making.

Figure 1.2 represents the market portions covered by all dairies situated in Varanasi. Amul is the leader in the area, followed by other dairies including, Sudha, Shuddh and the co-operative dairy under study. The co-operative dairy in this study is the oldest dairy, but it is lagging behind the newly formed co-operative dairies. The probable reason behind this is operational inefficiency and the perceived quality of the dairy. The annual sale of the co-operative dairy is gradually falling (data collected from the co-operative dairy).



Figure 1.1: Organization Structure of Co-Operative Dairy (Source: From the Website of Co-Operative Dairy)

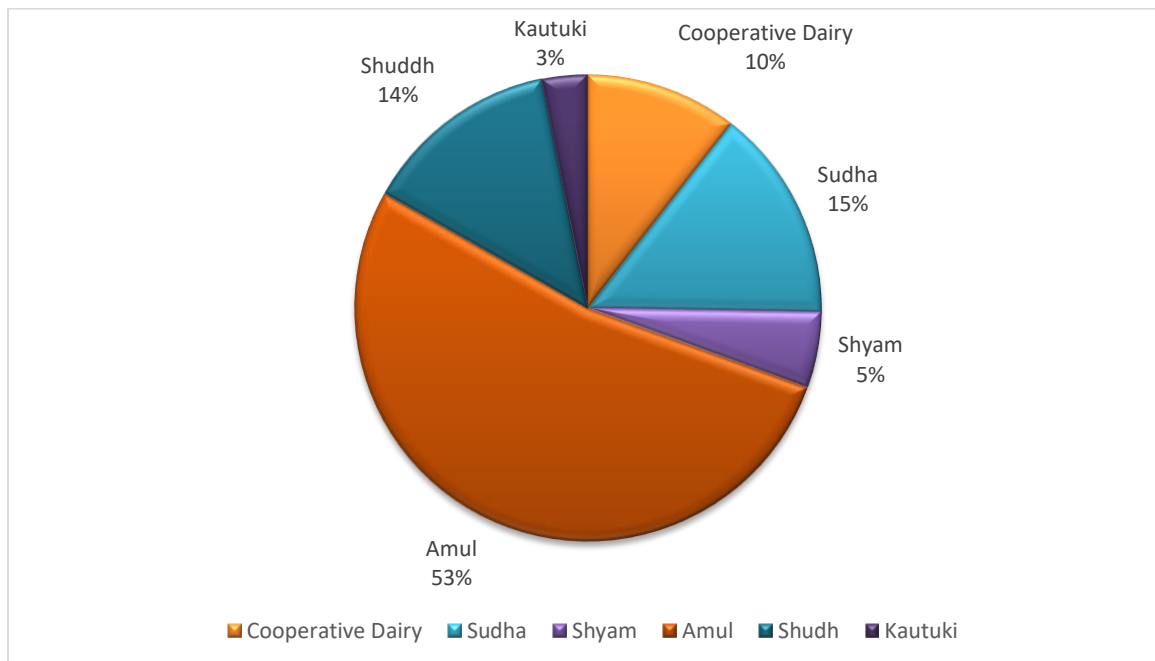


Figure 1.2: Market Percentage Covered by the Dairies in Varanasi Region (Source: Provided by the Co-Operative Dairy)

Being the first co-operative dairy in the Varanasi region, a loss in sales at the present time seems very irrational. It is also evident from the unstructured interview of milk consumers that the co-operative dairy under study is not the preferred one.

This study carries out an assessment of customer requirements and finds out where the co-operative dairy is lacking in the present market scenario. The primary point of the study is to find out the decline in sales of Co-operative dairy. Therefore, the assessment gave some points, where the co-operative dairy needs some focus. As young generation do not have much idea about the cooperative dairy. The good marketing strategies can help the co-operative dairy. The co-operative dairy has budget limitations, the study tried to lower the cost in transportation.

1.2 Objectives:

The objectives are as stated below:

1. Assessing the target market, customers' buying behaviour and the needs of consumer for the co-operative dairy.
2. Preparing a marketing plan for the co-operative dairy with focus on promotion and selling side of the business.
3. Formulating a distribution model to minimize transportation cost through Vehicle Routing Problem (VRP), and search for better solutions.

1.3 Approach:

The purpose of the study is to assess customers' requirements, preferences and perceptions and to minimize the distribution costs of the co-operative dairy as proposed in the thesis titled- "Demand Management and Distribution Planning: A Case of Indian State Government-Owned Dairy." For any industry, it is critical to know what customers want and what their requirements are. The study revealed from a survey that there are three areas where the focus of the co-operative dairy was either missing or not given enough managerial thoughts. These three areas are stated below.

- i. Market Planning (promotion/ advertisement)
- ii. Distribution Cost and Time
- iii. Product Expansion

The research started with an assessment of customer requirements part, where a survey (with the help of a questionnaire) was conducted in Varanasi including the locality of Banaras Hindu University (BHU), Varanasi (India) and titled "Preferences for Milk and Milk Products". Banaras Hindu University, formerly Central Hindu College, is a public central university located in Varanasi, Uttar Pradesh. It was established in 1916 by Madan Mohan Malaviya and Annie Besant. With over 30,000 students residing in campus, it claims the title of largest residential university in Asia.

The reason behind using BHU as a location was, the diversity of sample population. The population of BHU includes both local people and students who come for studies from all over India. The collected data was analysed with parametric (F test) and non-

parametric tests (chi square test). After the parametric and non-parametric tests, the significance differences were observed between the sample groups. After the analysis these differences helped to find out WHATs (customer requirements) of the House of Quality (HOQ) (Chan and Wu, 2002). HoQ is a Quality Function Deployment (QFD) tool, to know WHATs (customer requirements) and HOWs (technical requirements). Technical requirements (HOWs) were found out with the help of experts via the Delphi method. After careful analysis, several problems were identified and solutions to those problems were suggested.

The co-operative dairy works under the state government of Uttar Pradesh. The co-operative dairy has its own budget allocated by the government annually, and the dairy must operate under that allocated budget. The budget seems meagre (0.2%) in terms of the revenue. Marketing experts suggest the marketing budget for small and medium business should be 5-10% of the revenue. Therefore, the next objective of the market planning deals with to identify low-cost advertisement channels that have minimum costs and maximum exposure to customers. For that, a focus group was formed of experts with previous experience in the field of marketing. Their opinions on ways to improve the co-operative dairy's market share were gathered using Delphi method. The results from this survey were analysed using the Analytic Hierarchy Process (AHP), which is a technique for ranking various options and making complex choices. A consistency index was used to check the consistency of experts' opinions.

Once the marketing methods were chosen, the next step was to analyse their effects on the co-operative's production system. This was done using a methodology known as System Dynamics (SD), wherein the dairy's productions system's components, including its milk stock levels, productions rate and backlog, were represented as inter-related functionalities.

This enabled to estimate the effect of chosen marketing methods on the co-operative dairy's growth rate as a function of time.

The third objective deals with to how minimize distribution costs to cut out the loss carried by the co-operative dairy. For this purpose, a distribution model has been formulated using the Vehicle Routing Problem. For this, all seven distribution routes used by the co-operative dairy were mapped, and the approach of the dairy was analysed. After the analysis, centre of gravity method was applied to find out the centre of gravity (CG) of each route. With the help of these CG's further changes were made to this Vehicle Routing Problem (VRP).

Later, to check if the distribution cost could be reduced further, new routes were identified, using k-means clustering and the Cheapest Link Algorithm (CLA). In this part, capacitated k-means clustering was used to split delivery locations into similar size groups (i.e. clusters) based on proximity without exceeding a specified total cluster capacity. Each cluster was to be served by a local stockist. The CLA was then used to find delivery routes from dairy (i.e. depot) to stockist in each cluster and from the stockist to all other delivery locations within the cluster.

1.4 Structure of the Thesis

Knowing the customer requirements is crucial for the success of any product in the current competitive market. The first part of the study compared the preferences of different categories of customers, for example, men, women, adult male and adult female, with respect to milk and milk products provided by the co-operative dairy, in relation to several parameters (milk characteristics, packaging, delivery, brand, storage and awareness). Six hundred respondents (150 adult male, 150 adult female, 150 men, and 150 women), participated in the survey.

The preferences of consumers with respect to milk and milk products were evaluated using the questionnaire 'Preferences for Milk and Milk Products'. The questionnaire was designed to meet the needs of the present study and 25 questions were listed. The questionnaire was tried on 15 students to test its feasibility (a pilot study). It took about 10-12 minutes for each respondent to answer the questionnaire. In its final form, the questionnaire had 24 questions covering various areas relating to milk and milk products: Characteristics; Delivery; Packing; Brand; Storage; and Awareness. Significant differences were observed between the four groups' respondents on several variables. To analyse the data parametric (F test) and non-parametric tests (chi square analysis) were used. Parametric tests were used particularly when the information regarding the population was completely known and the population size was small. The test was only applicable for variables and based on the distribution of the population. Non-parametric tests were required to test the hypothesis of the population. This survey helped to attain customer preferences in the current market situation.

These preferences were further subjected to House of Quality (HoQ), the Quality Function Deployment tool, to find out the 'HOWs' (Technical Requirements) given these findings of 'WHATs' (Customer Requirements). This suggests that such a survey of customer requirements can be very impactful to House of Quality (HoQ). These findings have important implications for market strategies related to the product development, distribution, and promotion of the co-operative dairy. Moreover, it was also concluded with the help of this survey that the current marketing strategies of the co-operative dairy are not effective to the extent desired. Thus, this work can provide a useful approach to modify and improve the market strategies of the co-operative dairy.

The work aims to promote the co-operative dairy the among masses that form its potential

customers. The second part of the thesis deals with potential customer exposure and the sole purpose was to create awareness about the co-operative dairy and uplift its brand image in the restricted amount (budget provided by government to co-operative dairy). The five P's listed below are crucial aspect of the market (Kotler and Keller, 2006):

1. Product
2. Price
3. Place
4. Promotion
5. People

The pilot study suggested lack of awareness about co-operative dairy, therefore, low-cost promotion is selected. To plan the low cost advertisement , three parameters were taken into account cost, reach, and effectiveness. Here, the cost means the cost of advertisement on a per day basis, which has remained low. The reach is the number of people who are exposed to with an identified channel. The effectiveness is the degree to which this is converted into sales.

From the experts a total seven advertisement channels were listed Social Media, Advertisement on the back side of auto rickshaw (Auto Back), e-mail, FM Radio, Billboard, Newspaper Inserts and TV. Analytical Hierarchical Process (AHP) shows the low-cost advertisement channeles, which are best for the co-operative dairy. These marketing channeles are:

- i. Social Media,
- ii. e-mail, and
- iii. Newspaper Insert

System dynamics is a methodology for understanding complex systems and how objects in these systems interact with each other and change over time. The emphasis of systems dynamics is on a system as a whole instead of trying to break it down into smaller parts, as other disciplines do. The focus of system dynamics is either to study the behaviour of a system or to design a new policy with which a desired behaviour can be achieved. Therefore, a conceptual production-inventory model was developed that captures the time behaviour of sales with increases in market budget allocation. The conceptual framework supports the idea that increases in budget support growth in sales, and hence increases the profit of the co-operative dairy.

The purpose of third objective was to minimize transportation costs with the implementation of effective and efficient routes. In Supply Chain Management (SCM), effective and efficient routes selection is a major problem and called Vehicle Routing Problem (VRP). Vehicle routing problem (VRP) is combination of integer programming and combinatorial optimization that emphasis the planning of routes for vehicles in order to meet customers' demands at a minimum cost. The dairy distributes milk packets of one litre and one-half litre through hired small homogeneous vehicles to its retailers. The cost of distribution is paid based on per litre milk distribution, making the distribution cost quite high. The co-operative dairy has seven existing routes, with each route having small retailers. The routes are condensed to seven supply nodes with the help of the centre of gravity method. Using these seven nodes, one on each route, vehicle routing problem was formulated to reduce the number of vehicles with the appropriate constraint like type of vehicle, one delivery man, time window (arrival and departure), the demand matching constraint and the vehicle capacity constraint. Ultimately, the overall cost was reduced by approximately 17.09%, which will be a huge cost saving for the

co-operative dairy.

The clustering model (k-means clustering) and Cheapest Link Algorithm (CLA) were implemented with constraints of distance, vehicle capacity, and demand. Initially, clustering was completed with the k-means clustering method because it generated evenly sized clusters, and then the Capacitated Vehicle Routing Problem (CVRP) was solved for the clusters and for the depot to the cluster centres. This approach led to a reduction of 22.35% in distribution costs per day, resulting in significant savings.

1.5 Scope of the Thesis

The white revolution in India gave birth to state-run co-operative dairies in different states of India. While some of the dairies have been profitable and expanded to other states, others are finding it hard to survive. These dairies require very efficient operations and have very lean operations. The dairy under study is facing tough competition from new entrants and its sales have stagnated. Moreover, this dairy does not have much of a marketing budget at its disposal. This research analyses the various marketing options and identifies the preferred channels for spending the marketing budget.

The research concludes that distribution and collection time are some of the most-important requirements for the efficient operation of the co-operative dairy. The dairy needs to deliver the milk in less than four hours after its production. The result also concluded that 'product line expansion' should also be considered by the co-operative dairy to compete in the market with their full potential. The marketing budget of the co-operative dairy is significantly less (0.2 % of revenue) than the recommended budget, which should be 5-10% of revenue for small business according to marketing experts. The dairy has left with no option other than to use

low-cost marketing channels to maximise the exposure to customers. Afterwards, the to lower the distribution cost and time the optimisation methods are used. In the last but not the least the research optimises the delivery route using Vehicle Routing Problem and shows that there was significant reduction in the cost.

The future of this study can be the design of a pre-launch survey for new product offered by the co-operative dairy. The tools like conjoint analysis can be used to find out the utility of the customer for different attributes of the product like packaging, availability, quality so on but due to budget restriction this study has used low –cost marketing channels for outreach. The future direction of the study may include the inclusion of more marketing channel and allocation of advertising budget to these channels such that exposure can be maximised at given cost.

