TECHOLOGICAL ADVANCEMENT IN MILK PROCUREMENT SYSTEM AND DAIRY MARKET DEVELOPMENT – A STUDY WITH SPECIAL REFERENCE TO GUJARAT, INDIA.

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Abstract:

India is currently the largest producer of milk in the world and is self-sufficient. India is going through winds of change on account of meliorated milk availability, globalization, and the entry of the private sector in the dairy industry. According to the recent report by RNCOS, traditional products claim a significant share in the dairy industry revenues; although these products have limited shelf-life. Now with the advent of novel milk processing technologies, the sector is poised to gear up.

In recent years, Indian dairy industry has witnessed various R&D initiatives. Government federations as well as companies are working upon increasing the productivity in the sector. Recently, Amul has planned to sell fluid milk through "Any Time Milk" vending machines. The pilot project of this 24x7 ATM began recently with the installation of a vending machine at the gate of Amul Dairy at Anand in Gujarat. Other innovations like the new technology of whey based lassi are a conventional method of concentration, drying and membrane processing. With regular new product developments and technological advancements in the processing, Indian dairy sector is set to follow a stupendous growth in the coming years.

I. INTRODUCTION

THE milk collection system at DCS under the Anand Pattern is quite simple in design as it is meant for rural folks. Even today when any new dairy organization decides to start milk procurement, it has to think about this user friendly system in a simple form as explained above. However, during the last 25 years several new technologies have been developed/adopted which have simplified various operations/steps in involved in milk collection, testing and cooling apart from bringingefficiency and reliability. These have been tested over time and can be regarded as dependable. But, these technologies require larger capital investment, recurring costs, and good service back-up and can become affordable for a dairy organization with a product mix that gives value addition.

Problems in the Conventional System

1. Quality control was a major problem that confronted the cooperatives. The National Dairy Development Board (NDDB) worked to reduce quality variations among sellers by upgrading the technology of milk production by improving cattle feed and the milk processing and delivery infrastructure.

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2. Fair and efficient markets do not occur by accident, but are created. Thus, the cooperatives had difficulties to ensure accuracy in measuring quantity and fat content of milk and in making fair payments to the farmers.
3. Before automation, the farmer was paid only every 10 days. Therefore, even though at times he or she delivered milk each day the farmer was not sure of the reliability of the manual calculations of quality and quantity by cooperative society staff.
4. Milk for testing was stored in plastic bottles and tested only after the milk collection process was over. This led to unhygienic conditions and fear of contamination at the center.
5. The conventional Gerber method for testing the fat content of milk is a cumbersome multi-step method. It has various disadvantages including chances of human error, handling of corrosive chemicals, and use of different types of glassware. All these processes added to the cost and the time taken to test the milk.

For this project we collected primary data from the DCS of Sabarkantha Region. It covers 100 Dairy Co-operative Societies working in Sabarkantha Region. 27 among 100 DCS having Bulk Milk Cooler at their DCS. Survey includes talukas like Himatnagar, Khedbramha, Prantij, Idar,Vadali, Bhiloda, Vijaynagar, Shamlaji, Malpur, Modasa, Meghraj, Bayad and Dhansura. For milk collection, weighing, testing, payment, storage, and transportation activities done DCS in milk procurement and distribution. After using PC based automatic milk collection system at DCS improve the process of collection by reduce time of collection. It dame speedy working system. Also, it provide accurate weighing of milk at DCS. So, it credit confidence milk procurement at DCS toward. By adopting technological advancement testing of milk for Fat and SNF becomeaccurate. Payment system also becomes efficient by using technological advancement in milk procurement.

The establishment BMCU at DCS for storage of milk is the biggest discovery, which changes whole face of milk procurement and distribution system at DCS. It improve milk quality, reduce cost of milk procurement at long term, flexibility in milk transportation for collecting milk from DCS. By establishing BMCU at DCS, reduce the rate of sour milk and curd milk. BMCU are most profitable for the DCS and dairy union both, Sabar Dairy pays 20 paisa/litter to DCS for BMCU operation expenditure as chilling charge. Sabar Dairy provides financial and technical help to the DCS for Technological advancement in milk procurement and distribution process. The technological advancement in the milk procurement distribution at DCS welcomed by the DCS members. Technological advancement in milk procurement and distribution system is profitable, less time consuming. It make procurement and distribution system efficient and effective. Sabar Dairy is behind establishment of BMCU at DCS compare with other dairy union in North Gujarat. DCS needs financial and technical helps from the district milk co-operative union. Milk price should be fixe on the bases of Fat + SNF + Microbial Quality of milk. Technological advancement in milk procurement and distribution improve quality of milk. Also, upliftment in DCS operation due to technological advancement is welcomed by the DCS members. They also need to adopt new technology at DCS. BMCU establishment at DCS affect social condition of milk producers because it give time flexibility for milk selling time at DCS.

NEED FOR PROCESSING AND MARKETING TO SUSTAIN DAIRY DEVELOPMENT

Milk is a perishable product. Absence of chilling facilities, high ambient temperatures and lack of hygiene aggravate the problem of marketing milk. Wherever milk production is based on crop residues and agricultural by-products, the availability of milk for the purpose of marketing depends on the availability of crop residues. In India availability of milk in the post-monsoon season is 2–3 times the availability during the pre-monsoon summer periods. This led to a peculiar situation of “surpluses” in winter, even when there were overall shortages of milk in India, and the country was importing as much as 60,000 tonnes of milk powder per

annum to meet the local demand. Unfortunately, the fact that there were surpluses during the winter months was completely ignored by the planners of the Indian dairy industry until the beginning of Operation Flood.

The most significant technological development in India's dairy development programme took place as early as 1954 when the Kaira Co-operative put up its first milk powder plant to conserve the seasonal surpluses and market them during the summer months. The powder plant enabled the co-operative to pay its members some 80% of the high "summer price" of milk during the winter months. In the rest of the country the rural milk producers continued to get 50% of the summer price in winter. The bulk of milk in India is produced during the winter months when the crop residues are available for conversion into milk. Since the availability of crop residues is dependent on monsoon rains, the production of milk is also dependent on the previous year's monsoon. The breeding cycle has over the years been tuned into the availability of crop residues and most of the calving take place immediately after the monsoon rains. The processing of milk is, therefore, an extremely important operation in the dairy development programmes. One of the criticisms against Operation Flood was that it placed too much emphasis on milk processing. We now do not have adequate processing capacities to process all the rurally produced milk since milk production and procurement efforts have exceeded the processing and marketingcapacities. Initially, the processing and marketing facilities may not be fully utilised, however, these facilities should be made available before milk procurement and production are promoted to sustain a large dairy development programme.

Theoretical Framework

Social Capital in Service Network and Technological Advancement

Social capital is about creation of a set of resources through value exchange (Bourdieu, 1986). The Theory of Social Capital has been widely used in marketing discipline to describe the outcomes such as value creation, value delivery (Lindgreen and Wynstra, 2005; Baxter and Matear, 2004), organizational effectiveness (Batjargal, 2003), and stakeholder relationship potency (Nahapiet and Ghoshal, 1998). It also helps in understanding network growth (Batt, 2008). According to Ostrom (2000), social capital is "the platform of the sharing understandings, rules, norms, knowledge, and expectations about patterns of interactions that groups or individuals bring to a recurrent activity" (p. 176). Social capital has also been defined as the connections among individuals through social networks which follow norms of reciprocity and trustworthiness (Putnam, 2000). Networks and its relationships are considered a significant instrument in value exchange in social capital. Most commonly used definition of social capital is "the aggregate of resources embedded within, available through, and derived from the network of relationships possessed by an individual or organization" (Inkpen and Tsang 2005, p. 151). The dimensions of social capital are structural (social interaction), cognitive (shared values), and relational (identification-based trust) (Tsai and Ghoshal, 1998). To reduce asymmetry among the network members, it is necessary to have social interaction between all parties. Moreover, social interaction also reduces chances of opportunism (Wang et al., 2013) among network members. As per the second dimension of social capital, perceived fair intention and desire of each network member determines the level of trust among network members (Zaheer et al., 1998). In addition, goal congruency and shared value among network members also increase the chances of success in network relationship (Wuyts and Geyskens 2005; Jap and Anderson 2003). The present study tries to understand the role played by trust, commitment, co-operation and density in exchange outcome.

II. TECHNOLOGICAL ADVANCES

THE milk collection system at DCS under the Anand Pattern is quite simple in design as it is meant for rural folks. Even today when any new dairy organization decides to start milk procurement, it has to think about this user friendly system in a simple form as explained above. However, during the last 25 years several new technologies have been developed/adopted which have simplified various operations/steps in involved in milk collection, testing and cooling apart from bringing efficiency and reliability. These have been tested over time and can be regarded as dependable. But, these technologies require larger capital investment, recurring costs, and good service back-up and can become affordable for a dairy organization with a product mix that gives value addition. Some technologies, which can be directly applied, are mentioned bellow:

- Electronic Milk Tester
- The Micro-Processor-Based Milk Collection System
- Electronic SNF Tester
- Ultrasonic ANF Tester
- Portable Milk Analyzer
- Electronic Weighing Scales
- Automatic Milk Collection Unit
- Row Milk Reception Dock (RMRD) Automation System
- Bulk Milk Cooling Tanks / Bulk Milk Chiller Unit (BMCU)
- Instrumentation for Quality Control Analysis
- Animal Database Management System (ADMS)
- Data Processor Milk Collection Unit (DP-MCU)
- Automatic Milk Collection Unit (AMCU)
- Automated Raw Milk Reception Dock
- Enterprise Resource Planning
- Geographical Information System (GIS)
- Village Self-Leadership Improvement Programmed(VSLIP)

III. Study Set-Up

Anand Milk Union Limited (AMUL), the first dairy cooperative, was established in 1946 in India to address the problems of milk distribution and pricing of milk for milk producers. Today, it has become one of the most trusted brands. At present it is managed by Gujarat Co-operative Milk Marketing Federation (GCMMF). Popularized as *White Revolution*, the co-operative model of AMUL has been replicated all over India. Amul has made significant changes in milk collection and distribution in country (Bellur et al., 1990).

The Amul model, set-up to delegate the various functions and services to milk producers, is a four-tier cooperative structure. 1. The village dairy cooperative society (VDCS) operates at village level and is affiliated to the 2. District level milk producers' union. Milk Producers' Union in turn is further connected to 3. milk federation at the state level. 4. Customer. The village dairy cooperative society procures raw milk from milk producers and supplies it to the district level milk union. Collected milk is processed and some milk is converted into milk products at the district level. Federation markets milk and milk products and generates revenue for milk producers' union. The customer gets good quality milk and milk products through federation. The village dairy cooperative society

gives economic and social benefits to milk producers such as higher price for milk and provides cattle feed. It also runs rural health scheme. Moreover, it also tries to explore the role played by all network members in social transformation.

IV. RESEARCH PROBLEM:

Dairy sector occupy the important place in the national economy in terms of providing sustainance to the rural people as well as satisfying an important , essential need of cosumers both in Rural and Urban areas. Improvement in the efficiency of this sector will be important for both producers of milk products in rural area and consumer in general. The present study focuses on analysing technological advancementin procurement,production , storage and distribution of milk and milk products and examining their impact on various groups of participants involved in this chain.

Objectives:

1. To measure the impact of technological advancement in cooperative dairy sector on various groups of participants involved in this chain.
2. To study the gains to production operations due to technological advancement in dairy cooperative sector.
3. To study the impact of technological advancement in cooperative dairy sector on quality of milk & milk products marketing.
4. To study the nature of technological advancement in cooperative dairy sector for market development.
5. To study the need of technological advancement in cooperative dairy sector for market development.

- **Data Sources**

Research Plan

- **Primary Data**

1) Questionnaire.

2) Expert opinion

- **Secondary Data**

1) Websites.

2) Magazines &News papers.

3) NDDB.

4) Agricultural & Processed Food Products Exports Developments Authority (APEDA)

5) Financial institutions , Semi government organizations , Foreign organizations and other authority related to Indian dairy industry.

6) Agricultural & food processing based journals, books.etc...

7) Agriculture department of Government of Gujarat.

I. Research Instrument:-

Questionnaire.

IV . Sampling Plan:-

1) **Sample type:**

According to the target population the sample type is a SIMPLE CONVINIENCE SAMPLING.

2) Sample population:

It is the total collection of the element about which I wise to make the inferences, i.e. COOPERATIVE DAIRIES OF GUJARAT.

3) **Sample frame:**

The sample frame will be consisting of tree components (1) The secretaries of the dairy cooperative society,(2) Dairy farmers, (3) The managers of the dairy cooperative sector.

4) Sample size:

500 respondents.

(1) The secretaries of the dairy cooperative society – 150 respondents.

(2) Dairy farmers - 250 respondents.

(3) The managers of the dairy cooperative sector – 100 respondents.

(a) Contact Methods :-

E-Mail questionnaire, Telephone interview, Personal Interview etc.

Hypothesis:

1.) <u>Analysis Using Z test</u>

<u>Hypothesis Testing:</u>

Z test:

Data given:

n = 100, x= 14.47, s = 25.5, H0 = 0, a = 0 .05;

*** Source: ESB Stats Software**

Step 1 - State the Hypotheses:

PH0: u = 0 respondent say that technological advancement in milk procurement & distribution at various DCS is not important.

PH1: u <0.90 respondent say that technological advancement in milk procurement & distribution at various DCS is important.

Step 2 - State the Test Statistic:

t = (x-H0)/(s/root (n))

Step 3 - State the Critical or Rejection Region:

The critical region depends upon Ha.

For t < 0.90, we reject Ho if

Z < - tn-1, a

Z < - t (99, 0.05)

Z < 0

Step 4 - Conduct Experiment and Calculate Test Statistic:

Z = (x-H0)/(s/root (n))

Z= (14.47-0)/ (25.5/root (100))

Z= 5.675

Step 5 - Reach Conclusions and State in English:

Since it is not true that Z < 0, we don't have sufficient evidence to reject Ho. We therefore accept that the true mean is not less than 0.

*** Source: ESB Statistic problem solver Software , www.runiter.com**

Expected Outcome

Technological advancement in milk procurement and distribution system is profitable, less time consuming. It make procurement and distribution system efficient and effective. DCS needs financial and technical helps from the district milk co-operative union. Milk price should be fix on the bases of Fat+SNF+Microbial Quality of milk. Technological advancement in milk procurement and distribution improve quality of milk. Also, upliftment in DCS operation due to technological advancement is welcomed by the DCS members. They also need to adopt new technology at DCS. BMCU establishment at DCS affect social condition of milk producers because it give time flexibility for milk selling time at DCS. There are major problems of lack of Sabar Dan availability in time at DCS from Sabar Dairy. Most of DCS agree for animal hostel concept.

Limitations and Future Research

This investigation is based on the interviews from limited number of network members from a single co-operative network. Multiple case studies would give better insight about social capital related to co-operative network. It's difficult to draw prediction regarding social transformation based on mere interviews from limited number of respondents. Future research can be conducted with ethnographic approach which can give concrete understanding about transformation. Even generalization has been made based on exploratory study, however empirical study will help to establish, validate and generalize the results of the study.

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