

VALUE CHAIN ANALYSIS IN DAIRY ENTERPRISE IN
BELGAUM DISTRICT

RAJANI M. MURAGOD

DEPARTMENT OF AGRICULTURAL EXTENSION
EDUCATION
COLLEGE OF AGRICULTURE, DHARWAD
UNIVERSITY OF AGRICULTURAL SCIENCES,
DHARWAD – 580 005

MAY, 2015

VALUE CHAIN ANALYSIS IN DAIRY ENTERPRISE IN BELGAUM DISTRICT

Thesis submitted to the
University of Agricultural Sciences, Dharwad
in partial fulfillment of the requirements for the
Degree of

Master of Science (Agriculture)
in
Agricultural Extension Education

By
RAJANI M. MURAGOD

DEPARTMENT OF AGRICULTURAL EXTENSION
EDUCATION
COLLEGE OF AGRICULTURE, DHARWAD
UNIVERSITY OF AGRICULTURAL SCIENCES,
DHARWAD – 580 005

MAY, 2015

DEPARTMENT OF AGRICULTURAL
EXTENSION EDUCATION
COLLEGE OF AGRICULTURE, DHARWAD
UNIVERSITY OF AGRICULTURAL SCIENCES,
DHARWAD

CERTIFICATE

This is to certify that the thesis entitled "VALUE CHAIN ANALYSIS IN DAIRY ENTERPRISE IN BELGAUM DISTRICT" submitted by Miss. RAJANI M. MURAGOD for the degree of MASTER OF SCIENCE (Agriculture) in AGRICULTURAL EXTENSION EDUCATION to the University of Agricultural Sciences, Dharwad is a record of research work done by her during the period of her study in this University under my guidance and supervision and the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar titles.

DHARWAD
MAY, 2015

(NAGARATNA BIRADAR)
CHAIRMAN

Approved by:
Chairman:

(NAGARATNA BIRADAR)

Members: 1.

(J. G. ANGADI)

2.

(S. L. PATIL)

3.

(S. M. MUNDINAMANI)

4.

(HEMALATHA S.)

ACKNOWLEDGEMENT

A journey is easier when you travel together. Interdependence is certainly more valuable than independence. This thesis will remain incomplete if I fail to acknowledge all those people who have been there to support me in some way or the other during my two years of research. It's a pleasant aspect that I have the opportunity to express my gratitude to...

I recall the words of Henry Adams who laid "A teacher effects eternity, he can never tell when his influence stops" I am overwhelmed with heartfelt feelings of gratitude and profound indebtedness to my beloved teacher Dr. NAGARATNA BIRADAR, Chairman of my Advisory Committee and Principal Scientist, Indian Grassland and Fodder Research Institute, Regional Research Station, Dharwad, for her inspiring guidance, stable and expert help, sustained interest in planning and execution during my research period. I sincerely confess that it would have been a day dream on my part to accomplish this present investigation without the involvement of this ever helpful personality. It was a great pleasure and privilege for me to have her as a guide.

I express my sense of respect and sincere thanks to Dr. J. G. ANGADI, former Head and Professor and Dr. S. L. PATIL Professor, Department of Agricultural Extension Education and are member of my advisory committee for their valuable suggestions and encouragement in pursuit of the study.

I am also grateful to other members of my advisory committee, Dr. S. M. MUNDINAMANI, Professor, Department of Agricultural Economics, UAS Dharwad and Dr. HEMALATA S., Professor and Head, Bakery Training Centre, College of Rural Home Science, UAS Dharwad.

I gratefully acknowledge the support given by Dr. EDNA ANTONY, Sr. Scientist, IGFRRI, RRS, Dharwad.

I avail this opportunity to express my sincere gratitude to the teachers of the Agricultural Extension Education department and other staff members, for their instantaneous help and valuable suggestions during my tenure of studies.

I greatly owe my deep sense of honor and gratitude to my beloved parents, sister and all my relatives for their affection, encouragement and blessings shown to me during the course of my study.

It is time to surface out my love and affectionate gratitude towards my beloved friends, juniors, seniors, PG friends who sparkled the spirit of prayers, enthusiasm, and encouragement and molded me into the present position.

I convey my whole hearted thanks to M/s Arjun Computers, Dharwad for meticulous typing of the manuscript neatly, timely and more vitally co-operation extended to me.

I acknowledge my respondents who have spend their time to share the information required for the study.

Finally, I express my commitment to the University of Agricultural Sciences, Dharwad for letting my dreams come true.

DHARWAD

MAY, 2015

(RAJANI M. MURGOD)

CONTENT

Chapter No.	Chapter Particulars
	CERTIFICATE
	ACKNOWLEDGEMENT
	LIST OF TABLES
	LIST OF FIGURES
	LIST OF PLATES
	LIST OF APPENDICES
1.	INTRODUCTION
2.	REVIEW OF LITERATURE
	2.1 Value chain definitions
	2.2 Socio-economic characters of respondents
	2.3 Value chain mapping of farmers to end consumers
	2.4 Documentation of value chain experiences of milk producers in cooperative dairy sector
	2.5 Role analysis of different stakeholders in backward and forward linkages of dairy value chain
	2.6 SWOT analysis of dairy value chain
3.	METHODOLOGY
	3.1 Research design used in the study
	3.2 Locale of the study
	3.3 Devices of data collection
	3.4 Operationalization of terms dairy enterprise and value chain analysis
	3.5 Variables and their measurement
	3.6 Method of collection of data
	3.7 Statistical tools and techniques used for the analysis of data
4.	RESULTS
	4.1 Socio-economic profile of milk producers
	4.2 Value chain mapping of farmers to end consumers
	4.3 Documentation of value chain experiences of milk producers in cooperative dairy sector

Contd.....

Chapter No.	Chapter Particulars
	4.4 Role analysis of different stakeholders in backward and forward linkages of dairy value chain
	4.5 Final mapping of milk value chain
	4.6 SWOT analysis of dairy value chain.
5.	DISCUSSION
	5.1 Socio-economic profile of milk producers
	5.2 Value chain mapping of farmers to end consumers
	5.3 Documentation of value chain experiences of milk producers in cooperative dairy sector
	5.4 Role analysis of different stakeholders in backward and forward linkages of dairy value chain
	5.5 Final mapping of milk value chain
	5.6 SWOT analysis of dairy value chain
6.	SUMMARY AND POLICY IMPLICATIONS
	REFERENCES
	APPENDICES

LIST OF TABLES

Table No.	Title
1.	Average milk collection of co-operative milk societies in taluks of Belagaum from 2009-2014
2.	Villages selected for the study along with the average milk procurement of the respective societies for the year 2013-14
3.	Socio-economic profile of milk producers
4.	Average crop residue produced by the producers from their cropping system
5.	Extent of participation of producers in mass media
6.	Participation of producers in extension activities
7.	Extent of extension contact of producers with the extension agencies
8.	Milking animals owned, milk production and utilization pattern of producers
9.	Benefit cost ratio of milk production of producers
10.	Volume of milk yield obtained by the producers
11.	Far percentage of milk obtained by the producers
12.	Percentage of respondents processing milk for household consumption only
13.	Value chains of different types of milk of Belgaum co-operative dairy plant (per l or kg)
14.	Value chains of curd for co-operative dairy plant
15.	Value chains of butter milk for co-operative dairy plant (per l or kg)
16.	Dealers margin for value added products of milk and milk products
17.	Willingness of producers to continue as a member of milk co-operative society
18.	Producers experiences of service rendered by co-operative society
19.	Backward services obtained by the producers from the co-operative society in a year
20.	Role of producers in proper functioning of co-operative milk society as perceived by them
21.	Difficulty in operating the milk society
22.	Role performed by societies for effective functioning of milk co-operative societies
23.	Forward business support extended by dealers to milk unions
24.	Backward support received by dealers from milk unions

Contd.....

Table No.	Title
25.	Consumer response for Nandini milk and milk products as perceived by dealers
26.	Basic characteristics of milk consumers
27.	Consumers' buying behavior for milk products
28.	Value addition to milk by consumer at home
29.	Brand loyalty of consumers to Nandini products
30.	Step-wise regression analysis of amount of milk sent to co-operative societies versus with the selected variables: predominating variables retained at the last step
31.	SWOT analysis of dairy value chain

LIST OF FIGURES

Figure No.	Title
1.	Map showing study district and taluks
2.	Milk utilization pattern of producers
3.	Producers' experiences of services rendered by co-operative society
4.	Consumer response for Nandini milk and milk products as perceived by dealers
5.	Final mapping of milk value chain

LIST OF PLATES

Plate No.	Title
1.	Milk collection by the society
2.	Mechanized milk testing
3.	Computing payment amount for the day
4.	Feed to the producers
5.	AI service to the livestock of producers

LIST OF APPENDIX

Appendix No.	Title
	Interview schedule
Ia.	Milk producers
Ib.	Co-operative society
Ic.	Processing unit
Id.	Dealers
Ie.	Consumers

1. INTRODUCTION

Dairy development has assumed significant importance in the rural economy of India due to its immense potential for supplementing income and employment generation for the rural people. According to the 19th Livestock Census, 2012, India possessed the largest livestock population in the world, after Brazil. However it shows an overall decline of 3.33 per cent in the total livestock population as compared to the previous census of 2007. Cattle accounts 37.28 per cent (190.90 million) and buffalo accounts for 21.23 per cent (108.7 million) of the total livestock population of the country (GoI, 2012).

Today, India ranks first in the world in milk production, which has risen from 17 million tons (Mt) in 1950-51 to about 127.9 Mt by 2012-13 (GoI, 2012). Whereas world's milk production is increasing at the rate of 1-1.5 per cent per annum, in India, it is increasing at the rate of 4.00 per cent (Gupta, 2012). Consequently, the per capita availability of milk has also increased from 124 gms/day in 1950-51 to 290 gms/day in 2012-13 (GoI, 2012-13).

In India, about 46 per cent of the produced milk is retained for home consumption, while 54 per cent is disposed to various agencies (Gupta, 2012). About 80 per cent of milk produced in the country is handled by the unorganized sector and the remaining 20 per cent is shared equally by co-operative and private sectors for processing with varying degree of product mix (GoI, 2009). About 35 per cent of milk produced in India is processed. The organized sector (large-scale dairy plants) processes about 13 Mt milk annually, while the unorganized sector (halwais and vendors) processes about 22 Mt per annum.

Unlike in advanced western countries where milk handled by the organized sector or Milk delivered to the dairies account for over 90 per cent of production in India, milk collection in organized sector is around 18 per cent of total production.

Across the country, there are 24 state-level federations of dairy cooperatives, which have 15.11 million dairy farmers. Private players are entering the Indian dairy market in a big way. Dairy cooperatives, which ushered in the White Revolution, need to expand and strengthen their network to protect the interests of small dairy farmers. But the cooperatives are hampered by political interference, unsustainable subsidies

and poor marketing strategies. Cooperatives have helped transform India from being a country dependent on imports of milk and dairy products, from baby food to butter, to a growing exporter of dairy products.

In 2012-13, the country produced 132.4 Mt of milk (15% of the global production), worth Rs. 270,000 crore, making it one of the world's largest milk producers, and exported 87,824.21 tons of dairy products, worth over Rs. 1,412 crore. Most of the exports are to Bangladesh, Egypt, UAE, Saudi Arabia, Algeria and Yemen. In 2011-12, co-operative dairies procured about 28 million liters per day of milk, whereas the organized private industry procured more than 35 million liters a day. This works out to a 45:55 ratio in favor of private dairies.

At present, there are 678 dairy processing units registered in India which process around 12-15 per cent the milk produced totaling to 26.63 Mt/year. Out of the total number of dairy processing units registered, 403 are private dairies, processing around 11.83 Mt/year, whereas cooperative dairies numbering 212 process 10.36 Mt/year. The remaining 63 government plants have the balance- processing capacity of 4.44 Mt/year. These dairy plants are registered in different states of India.

At a national level, processing including manufacturing, of different dairy products such as butter, ghee, milk powder, ice-cream, kulfi, khoa and cheese engages only 1.20 per cent of dairy workers in both the formal and traditional informal sectors. A little over 6 per cent of workers in the dairy sub-sector are engaged in selling of milk and milk products, including both wholesaling as well as retailing. As expected, a higher proportion of workers in the dairy sector in rural areas are engaged in production-related activities (95%) and less than 1 per cent in processing. In urban areas about 31 per cent of the dairy workers are engaged in selling of milk and milk products.

Karnataka ranks 11th in overall milk production in the country (Anonymous, 2014) and per capita availability of milk is 254 gms/day as on 2013-14. Karnataka Milk Federation (KMF) procures an average 4.80 Mt milk/day and per capita availability is 216 gms/day. It has milk processing capacity of 2.10 lakh litres per day. There are 20.38 lakh farmers registered with 10,087 dairy co-operatives.

Karnataka Cooperative Milk Producers' Federation Limited (KMF) is the apex body in Karnataka representing dairy farmers' co-operatives. It is the second largest dairy co-operative amongst the dairy cooperatives in the country. In South India it stands first in terms of procurement as well as sales. One of the core functions of the federation is marketing of milk and milk products. The brand "Nandini" is the household name for pure and fresh milk and milk products.

KMF has 13 Milk Unions throughout the State which procure milk from Primary Dairy Cooperative Societies (DCS) and distribute milk to the consumers in various towns/cities/rural markets in Karnataka.

The first ever World Bank funded Dairy Development Programme in the country started in Karnataka with the organization of Village Level Dairy Co-operatives in 1974. The AMUL (Anand Milk Union Limited) pattern of dairy co-operatives started functioning in Karnataka from 1974-75 with the financial assistance from World Bank, Operation Flood II & III. The dairy co-operatives were established under the ANAND pattern in a three tier structure with the village level dairy co-operatives forming the base level, the district level milk unions at the middle level to take care of the procurement, processing and marketing of milk and the Karnataka Milk Federation as the apex body to co-ordinate the growth of the sector at the State level. All the milk and milk products are sold under a common brand name NANDINI.

Karnataka Milk Federation which is most popular as KMF, evolved itself as a premier and most profitable dairy farmers' organization in the State of Karnataka. As an agency in 1975 to implement the World Bank Aided Dairy Development Projects, Karnataka Dairy Development Corporation (KDDC) was formed, the company grew itself fast and as it spreads the wings of new found rural economic activity - dairying all over the state The genesis of apex cooperative body took the shape of KMF in 1983 encompassing entire State with 13 district co-operative milk unions executing the various parameters of dairy activity - organization of dairy co-operatives, milk routes, veterinary services, procurement of milk in two shifts of the day, chilling, processing of milk, distribution of milk and also establishment of cattle feed plants, Nandini sperm station, liquid nitrogen supply, training centers - as its main stay.

Eight southern districts of Karnataka were considered initially with a target of organizing 1800 dairy co-operative societies, four milk unions and processing facilities were set up to the tune of 6.50 lakhs per day by 1984. The DCS have undergone tremendous transformation by adopting new technologies and the process to handle milk without being touched by human hands has been initiated.

Under operation flood - II & III, project which started in 1984 & 1987 covered the remaining parts of Karnataka. Thirteen milk unions are organized in 175 talukas of all 20 districts then and the field work was extended by organizing more dairy cooperative societies. The processing facilities *i.e.* chilling centers, milk dairies and powder plants were transferred in phases to the administrative control of respective cooperative milk unions and the activities continued to be implemented by these district organizations. Additional processing facilities were created & existing facilities augmented every decade with the help of government and NDDDB (National Dairy Development Board) to handle ever increasing milk procurement without declaring milk holidays.

Value chain as a term was created by Porter (1985). Porter's value chain consists of a set of activities that are performed to design, produce and market, deliver and support its product. Value chains are the linked groups of people and processes by which a specific commodity is supplied to the final consumer. These chains have inputs that are used to produce and transport a commodity towards a consumer; this is the supply chain. The value chain encompasses more than the production process; value chain as a term implies a flow of information and incentives between the people involved. Money is sent from the consumer to the different people in the chains to complete the value chain. Understanding value chain is important to understand the flow and distribution of incentives. It is important to note that value chains may involve several products, including waste and by-products. Value chains are the input, production and marketing chains that supply livestock products to the consumer. The chains are operated by people as an economic activity. Therefore, value chains are groups of people linked by an activity to supply a specific commodity. Value chains of milk and milk products describe the processes through which inputs, animals and products pass during the production process.

Value chain analysis can be a useful tool in planning as it directs and identifies people and organizations to be involved for an intervention to succeed. Value chain mapping acts as a focus for communicating knowledge, and can play a very important role in risk communication, thus leading to more transparent decision-making. Value chain analysis includes not only description of the production and marketing processes but also analyses the economic and social drivers of the chain.

Though India stands first in milk production in the world, the per capita livestock productivity is less. Besides as mentioned earlier, 80 per cent of the milk collection is handled through unorganized sector. But it is essential to shift the farmers towards organized sector by improving the backward linkages through extension advisory services. This can be addressed effectively by conducting a study to map the present backward and forward services rendered to producers and processors. This will help to understand how to make the services more attractive and effective to loop in more number of livestock farmers to the organized sector as well as to improve the livestock productivity by better management practices. In view of this, present study was conducted using value chain analysis as a method with the following objectives-

1. To map the milk value chain from farmer to end consumer
2. To document value chain experiences of milk producers in co-operative dairy sector
3. To analyze the role of different stakeholders in backward and forward linkages of dairy value chain.
4. SWOT analysis of dairy value chain

Limitations of the study

Basically study was handicapped to an extent that it was a single student venture. Hence, the associated constraints like time, funding, physical facilities constrained the researcher to confine the study to a limited sample size. In spite of this, researcher has made systematic efforts to select ideal location for the study, so that the results would be extrapolated to other areas with similar situation.

2. REVIEW OF LITERATURE

Studies conducted in the past were reviewed keeping objectives of the present study in consideration. Only those studies conducted after 2000 were included for common variables. Studies for the specific variables considered under value chain concepts were limited. Studies in such cases were grouped and presented according to the objectives of the present study. Studies related to SWOT analysis were not restricted only to livestock but also included of other commodities and crops owing to few numbers. The collected reviews have been chronologically arranged and presented under different heads as given below.

- 2.1 Value chain definitions
- 2.2 Socio-economic characters of respondents
- 2.3 Value chain mapping of farmers to end consumers
- 2.4 Documentation of value chain experiences of milk producers in cooperative dairy sector
- 2.5 Role analysis of different stakeholders in backward and forward linkages of dairy value chain
- 2.6 SWOT analysis of dairy value chain
- 2.1 Value chain definition

Value chain as a term was first suggested by Porter in 1985. Porter defined it as a “set of activities that are performed to design, produce and market, deliver and support its product”.

Hobbs *et al.* (2000) defines the value chain as a vertical alliance or strategic network between a number of independent business organizations within a supply chain.

A value chain is the full range of activities which are required to bring a product or service from conception, through the different phases of production, transformations, and delivery to final consumers and final disposal after use (Bammann, 2000)

Kaplinsky and Morris (2002) termed value chain as the full range of activities which are required to bring a product or service from conception, through the different phases of production, transformation and delivery to final consumers, and eventual disposal after use.

2.2 Socio-economic characters of respondents

2.2.1 Age

Rajanna *et al.* (2003) conducted a study in Warangal district to know the training need and consultancy pattern of dairy farmers. They found that 43.30 per cent of dairy farmers were under the age group of less than 25 years, followed by 26-40 years of age (33.40%) and above 41 years of age (23.30%).

Chauhan *et al.* (2004) conducted a study on impact of farmers' status on milk production in tribal area of Kinwat taluk. Study revealed that the 28.00 per cent of dairy farmers belonged to the age group of 36-45 years, 27.00 per cent in 46-55 years, 25.00 per cent in above 55 years' age group, 16.00 per cent in 26-35 years group, whilst only 4.00 per cent were below 25 years of age.

Suresh (2004) conducted a study on entrepreneurial behaviour of milk producers in Chittoor district of Andhra Pradesh and revealed that 64.58 per cent of the entrepreneurs were of middle aged, whereas 17.92 per cent of them belonged to young age and 17.50 per cent were of old age.

Khin Mar Oo (2005) conducted a study on knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district. She revealed that majority of women dairy farmers (59.17%) belonged to middle age group, whereas 22.50 per cent of them were younger, followed by old age (18.33%) category.

Senthilkumar *et al.* (2005) conducted a study in Tamil Nadu to know the profile of urban dairy farmers utilizing mobile artificial insemination service. They found that nearly half of the respondents (48.00%) belonged to old age group, one third (31.00%) belonged to middle age group and rest one-fifth (21.00%) were young.

Arora *et al.* (2006) conducted a study on socio-economic and communication variables associated with level of knowledge and degree of adoption about improved dairy husbandry practices in Uttaranchal. They reported that 17.10 per cent of the dairy farmers were lower age group (less than 36 years), followed by middle age group 36 to 64 years (54.00%) and upper age group more than 64 years, (28.90%).

Pushpa (2006) conducted a study on livestock production systems of rural and periurban livestock owners in Belgaum district. She reported that 50.00 per cent of the respondents were middle aged, followed by old (36.25%) and young (13.75%) age groups.

Mande and Thombre (2009) conducted a study on adoption of cattle rearing practices by owners in Latur. They observed that 53.33 per cent of the dairy cattle owners were between 36 and 50 years, followed by 15.00 per cent of them belonged to 35 years and 31.67 per cent of them belonged to above 50 years of age groups.

Nataraju (2013) conducted a study on participation of women in dairy farming in Chikkamagalore. He observed that nearly half of the respondents (48.30%) were middle aged followed by 38.33 and 13.33 per cent belonged to young and old age groups, respectively.

So in most of the studies reviewed majority of the respondents belonged to middle age group.

2.2.2 Education

Wadear *et al.* (2003) conducted an economic analysis of human labour adoption in dairy farming in Karnataka. They revealed that 25.83 per cent of dairy farmers had primary education followed by 25.00 per cent illiterates, 13.33 per cent had SSLC/matriculation, 12.50 per cent secondary, 10.83 per cent PUC, 9.16 per cent higher secondary and only 3.35 per cent of dairy farmers were educated up to graduation level.

Chauhan *et al.* (2004) conducted a study on impact of farmers' status on milk production in tribal area of Kinwat taluk. They observed that 30.00 per cent of the dairy farmers were educated upto high school level, followed by primary school level

(27.5%), middle school level (19.00%) and college level (13.5%), whereas 10.00 per cent of them were illiterates.

Savitha (2004) conducted a study on role of rural women in animal husbandry in Dharwad district of Karnataka and found that major portion of the respondents (75.50%) were illiterates, followed by 10.00 per cent of them could only read and write. The respondents who attended primary school constituted 8.80 per cent and the rest of 5.60 per cent made up to middle school.

Bordoloi *et al.* (2005) conducted a study on socio-economic characteristics of dairy households of Guwahati, Assam and found that only 13.11 per cent of dairy farmers were educated above 10th standard and 42.33 per cent of them were educated upto 7th standard, whereas 44.57 per cent of dairy farmers were illiterates.

Khin Mar Oo (2005) conducted a study on knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district. Study revealed that majority of the respondents (60.83%) were illiterates, primary education was received by 22.50 per cent of the respondents and 10.83 per cent of them studied upto middle school, while 4.17 per cent of them studied upto high school and only 1.67 per cent of the respondents' studied upto college level.

Chaudhari (2006) conducted a study in Dharwad on entrepreneurial behaviour of dairy farmers and reported that 39.00 per cent of trained and only 13.00 per cent of untrained dairy farmers were educated upto high school. Thirty six per cent of trained and 33.00 per cent of untrained dairy farmers had middle school education, 14.00 per cent of trained and only 4.00 per cent of untrained dairy farmers had education upto college level, while 11.00 per cent of trained and 29.00 per cent of untrained dairy farmers had primary level education. Thus nearly about one fourth of untrained dairy farmers (21.00%) were illiterate.

Pushpa (2006) conducted a study on livestock production systems of rural and periurban livestock owners in Belgaum district. Study revealed that one third of the respondents (31.25%) had received high school education, followed by primary (27.50%), illiterates (25.00%) and very few (16.25%) had received graduation and above level of education.

Mande and Thombre (2009) conducted a study on adoption of cattle rearing practices by owners in Latur. They reported that 13.33 per cent of dairy cattle owners were illiterate, followed by 36.67 per cent had primary school education, 21.67 per cent had secondary school, 16.67 per cent had high school and 11.66 per cent were college educated.

Nataraju (2013) conducted study on participation of women in dairy farming in Chikkamagalore. He found that 35.00 per cent of the dairy farmers were educated up to high school level, followed by middle school level (30.00%), primary school level (15.00%) and college level (14.17%). Whereas, 5.83 per cent of them were illiterates.

From the above studies it could be concluded that majority of the respondents were literates with education from primary to high school levels.

2.2.3 Land holding

Wadear *et al.* (2003) conducted a study on economic analysis on human labour adoption in dairy farming in Karnataka and reported that small dairy farmers had average farm land of 1.74 ha, medium dairy farmers had 5.17 ha and large dairy farmers had 9.04 ha of land.

Chauhan *et al.* (2004) studied the impact of farmers' status on milk production in tribal area of Kinwat taluk and revealed that 27.00 per cent of dairy farmers had 2.1 to 4.0 ha of farm land, followed by 23.00 per cent, 22.50 per cent, 15.00 per cent and 12.50 per cent had 4.1 to 6.0 ha, below 2.0 ha, above 8 ha and 6.1 to 8.0 ha farm land, respectively.

Savitha (2004) conducted a study on role of rural women in animal husbandry in Dharwad district of Karnataka and observed that, most of the respondents (62.00%) were landless. While, 21.00 per cent of the respondents were having land between 1 to 2.5 acres, 12.00 per cent of them owned land between 2.6 to 5.0 acres and 4.50 per cent owned land between 5.1 to 10.0 acres.

Khin Mar Oo (2005) conducted a study on knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district and found that 33.00 per cent each of the respondents belonged to small and marginal land

holding group, 29.17 per cent respondents fell under medium land holding group and remaining 4.16 per cent of the respondents had large land holdings.

Chaudhari (2006) conducted a study in Dharwad on entrepreneurial behaviour of dairy farmers and found that more than half of trained dairy farmers (54.00%) possessed semi medium land holding, followed by medium land holding (21.00%), small land holding (19.00%) and only 6.00 per cent of trained dairy farmers had marginal land holding. In case of untrained dairy farmers, more than one third of the respondents (37.00%) had semi medium land holding, followed by small (35.50%), marginal (19.00%) and medium (19.00%) land holdings.

Pushpa (2006) conducted a study on livestock production systems of rural and periurban livestock owners in Belgaum district and reported that 41.25 per cent had more than 2 ha land, 23.17 per cent of the respondents had 1 ha land, 21.25 per cent of the respondents had 2 ha land and only 9.37 per cent of the respondents were landless.

Mande and Thombre (2009) conducted a study on adoption of cattle rearing practices by owners in Latur. They revealed that 8.33 per cent of the dairy cattle owners were marginal farmers, followed by small farmers (18.33%), semi-medium farmers (28.33%), medium farmers (25.00%) and big farmers (20.00%).

Satyanarayan and Jagadeeswary (2010) conducted a study on knowledge and adoption behaviour of livestock farmers in Uttar kannada. They reported that 16.00 per cent of the livestock farmers had small land holdings, followed by 2.00 per cent of the livestock farmers had medium land holdings and 82.00 per cent of the livestock farmers were having large land holdings.

Nataraju (2013) conducted a study in Chikkmagalore district of Karnataka on participation of women in dairy farming and found that most of the respondents were having 2.6 to 5.0 acres of land (46.67%) followed by less than 2.5 acres (38.33%), medium 5.1 to 10.0 acres (10.00%) and above 10 acres of land (5.00%).

In most of the studies reviewed, nearly one third respondents belonged to marginal and small land holding categories.

2.2.4 Herd size

Veeranna and Singh (2004) studied gender analysis of dairy and crop production systems in Bidar district of Karnataka. Study reported that herd size had positive and significant correlation with the extent of adoption of improved dairy production practices.

Khin Mar Oo (2005) conducted a study on knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district and found that 7.50 per cent of dairy women possessed 1 cross bred cow, followed by 2 cross bred cow (4.16%), 3 and more cross bred cows (0.83%), 1 local cow (19.16%), 2 and more local cow (9.16%), 1 buffalo (32.50%), 2 buffaloes (39.16%) and 3 and more buffaloes (5.83%).

Savitha (2005) conducted a study on the role of rural women in animal husbandary in Dharwad and found that herd size was positively and significantly associated with the time spending pattern of the respondents. As the herd size increased, the amount of time spent on washing the animals, milking and various activities of dairy enterprise also increased.

Senthilkumar *et al.* (2005) conducted a study in Tamil Nadu to know the profile of urban dairy farmers utilizing mobile artificial insemination service. They found that nearly two fifth (38.00%) of the respondents maintained medium herd size (4-7 animals), followed by one-third with small herd size (1-3 animals) and the remaining respondents maintained large herd size (8 and above animals).

Bharadwaj *et al.* (2006) conducted a study on economics of Buffalo milk production in Hisar District of Haryana. Study revealed that 67.00 per cent of the dairy farmers possessed small herd size (up to 1 to 2 animals), followed by medium herd size (24.50%) *i.e.*, 3 to 4 animals and large herd size (8.50%) *i.e.*, 5 and above.

Pushpa (2006) studied in Belgaum district of Karnataka on livestock production system of rural and peri urban livestock owners and found that 43.75 per cent respondents owned medium herd size, 32.50 per cent owned small herd size and 23.75 per cent owned large herd size.

Sikka and Dixit (2006) conducted a study on perception of rural women on buffalo husbandry in Jind of Haryana and revealed that 42.00 per cent of the respondents owned 3 to 5 buffaloes and 25.00 per cent of respondents possessed more than 5 buffaloes and one third of the respondents had less than 2 buffaloes per family.

Singh *et al.* (2006) conducted a study on migratory sheep and goat production system-the mainstay of tribal hill economy in Himachal Pradesh and found that the average number of animals were 318 on small and 528 on large flocks, with an overall average of 437 animals per flock.

Mande and Thombre (2009) conducted a study on adoption of cattle rearing practices by owners in Latur. They revealed that 50.00 per cent of cattle owners possessed small herd size (up to 4 animals), followed by medium herd size (31.67%) *i.e.*, 5 to 10 animals and big herd size (18.00%) *i.e.*, above 10 animals.

Satyanarayan and Jagadeeswary (2010) conducted a study on knowledge and adoption behavior of livestock farmers in Uttara Kannada. Study revealed that 23.00 per cent of the livestock farmers possessed non-descript cattle, followed by 35.00 per cent possessed indigenous breeds of cattle, 45.00 per cent possessed cross breed cattle, 10.00 per cent possessed buffaloes, 27.00 per cent possessed sheep and 13.00 per cent possessed goats.

Thus small and medium herd size were maintained by most of the respondents in the studies reviewed.

2.2.5 Annual income

Savitha (2004) conducted a study on role of rural women in animal husbandry in Dharwad district of Karnataka and found that 45.50 per cent of the respondents belonged to low income group, followed by medium income group (28.80%) and high income group (25.70%).

Suresh (2004) conducted a study on entrepreneurial behaviour of milk producer in Chittoor district of Andhra Pradesh and reported that majority of milk producers were

in medium income group (80.30%), followed by high (15.00%) and low (4.17%) income groups.

Khin Mar Oo (2005) conducted a study on knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district and found that 45.00 per cent of dairy women had medium annual income *i.e.*, Rs. 30,001 to Rs. 50,000, followed by low *i.e.*, upto Rs. 30,000 (29.16%) and high *i.e.*, above Rs. 50,000 (23.33%) annual income groups.

Senthilkumar *et al.* (2005) conducted a study on profile of urban dairy farmers utilizing mobile artificial insemination service in Tamil Nadu. They found that the average annual income from dairying ranged from Rs. 3,000 to Rs. 90,000. Whereas, the annual income from other sources ranged from Rs. 25,000 to Rs. 2,00,000.

Chaudhari (2006) conducted a study in the operational area of Rural Development and Self Employment Training Institute (RUDSETI), Dharwad (Karnataka) to know the entrepreneurial behaviour of dairy farmers and reported that nearly half of the trained dairy farmers (47.00%) had medium level of annual income (Rs. 64,000 to Rs. 1,32,000), followed by high (39.00%) level of annual income (>Rs. 1,32,000), whereas, only 14.00 per cent of trained dairy farmers had low annual income (<Rs. 69,600). In case of untrained dairy farmers, more than half of the respondents (51.00%) had medium level of annual income (Rs. 47,316 to Rs. 90,684), followed by low (36.00%) annual income (<Rs. 47,375) and high (13.00%) annual income (>Rs. 90,684).

Pushpa (2006) conducted a study on livestock production systems of rural and peri urban livestock owners in Belgaum district and revealed that 99.37 per cent of the respondents belonged to high level income group (>Rs. 11500) and remaining 0.62 per cent of the respondents belonged to low level income group (<Rs. 11500).

Mande and Thombre (2009) conducted a study on adoption of cattle rearing practices by owners in Latur. They found that 25.00 per cent of the respondents had low income, 45.00 per cent of the respondents had medium income and 30.00 per cent of the respondents had high income.

Satyanarayan and Jagadeeswary (2010) conducted a study on knowledge and adoption behaviour of livestock farmers in Uttar kannada. They reported that 79.00 per

cent of the livestock farmers had low income *i.e.*, less than Rs. 68000, 14.00 per cent had medium income *i.e.*, Rs. 68,000 to Rs. 1,36,000 and 7.00 per cent had high income *i.e.*, above Rs. 1,36,000.

Nataraju (2013) conducted a study in Chikmagalur district of Karnataka on participation of women in dairy farming and found that 40.00 per cent of dairy farm women had high annual income *i.e.* above Rs. 1,00,000 followed by medium annual income *i.e.* Rs. 50,000 to 1,00,000 (33.33%) and low *i.e.* up to Rs. 50,000 (26.67%).

Most of the studies reviewed indicated that almost half of the respondents had medium annual income.

2.2.6 Crop residue availability

Fernandez *et al.* (1995) conducted a study on fecal excretion by ruminants and manure availability for crop production in semi arid West Africa. The reliance on crop residues for livestock feeding increases as a farm size decreases in the case of Eastern Kenya, farmers with the only two ha of land barely covered two – thirds of the feed needs of their livestock and are forced to exploit their crop residue to the full, to herd their cattle along road side and on waste land, to rent grazing land from other farmers or as a last resort, to purchase feed.

Kayouli (1996) conducted a study on role of feeding system based on cereal residues in integrated farming systems in Sub-Saharan Africa. He found that, as pasture production declined, ruminant animals in the Sahel have become more dependent on crop residues which assumed progressively greater portion of the total diet being mainly during the dry season.

De Leeuw (1997) conducted a study on crop residue in tropical Africa: trends in supply, demand and use. Study revealed that, 13.7 million tons of crop residues annually produced as dry matter in Ethiopia, wheat, barley and tef, the typical highland crops, accounted for 6, 10 and 17 per cent of the total, respectively. The potential availability of crop residues for livestock feed increases with an increase in the area of land put under food crop production. In areas where the proportion of cropped land is relatively low, the contribution of crop residues to the total feed will be minimal. Crop selection, cropping practice and level of inputs influence crop residue yields. Inter

annual fluctuations in rain fall also affect crop residue yields which in turn may affect the ratio between edible and non-edible fractions within residues. Crop residue to grain ratios usually decrease with increase in grain yields.

McIntyre *et al.* (1998) conducted a study on evaluating sorghum cultivars for grain and straw yield. The average cereal crop residue yields in the medium altitude areas of highlands of Ethiopia were about 2 tons DM/ha, 70.00 per cent of which was edible. The major cereals were tef and wheat, covering up to 85.00 per cent of the cultivated areas and also that, the actual stover yield increased from 5.7 to 7.0 tons DM/ha, regardless of a decline of crop residue to grain ratios from 2.3 to 1.2.M.

Jiang *et al.* (2012) conducted a study on bio-energy potential from crop residues in China: availability and distribution. In China, where about 700 Mt crop residues are generated annually, 31.00 per cent of crop residues are left in the field, 31.00 per cent are used for animal feed, 19.00 per cent are used for bio-energy generation and 15.00 per cent are used as fertilizer.

Ministry of Agriculture (2012) has estimated that, a vast majority of land is used for farming and a wide range of crops are cultivated in its different agro-ecological regions. With the production of 93.9 Mt of wheat, 104.6 Mt of rice, 21.6 Mt of maize, 21.7 Mt of millets, 357.7 Mt of sugarcane, 8.1 Mt of fiber crops (Jute, Mesta, Cotton), 17.2 Mt of pulses, 30.0 Mt of oil seeds crops, in the year 2011 – 12 it is but natural that huge volume of crop residues are produced both on-farm and off-farm. It is estimated that approximately 500-550 Mt of crop residues are produced per year in the country. These crop residues are used for animal feeding, soil mulching, bio-manure making, thatching for rural homes and fuel for domestic and industrial use. Thus crop residues are of tremendous value to the farmers.

Lule *et al.* (2012) conducted a study on optimizing livelihood and environmental benefits from crop residues in small holder crops- livestock system in Western Oromia. They reported that, the use of crop residue depends on the type of the crops. On an average, 50.00 per cent teff straw is allocated for stall feeding, 22.00 per cent for sale and 12.00 per cent for construction. However, 41.00 per cent of maize stover is used for stubble grazing by other farmers' animals, 34.00 per cent by own animals and 24.00 per cent for household fuel. For other crops such as barley, wheat, sorghum and

finger millet, about 51.00 per cent was used for stubble grazing by other farmers' animals, 19.00 per cent for stubble grazing by own animals, 9.00 per cent for stall feeding and 8.00 per cent was burnt. None of the respondents across any of the village reported deliberately used crop residues for mulching.

In most of the studies reviewed, crop residue formed an important feed source especially during dry season and had immense value to the livestock farmers

2.2.7 Mass media participation

Suresh (2004) conducted a study on entrepreneurial behavior of milk producers in Chittoor district of Andhra Pradesh and reported that 64.17 per cent of respondents were exposed to mass media to a moderate extent followed by 21.25 per cent to low extent and 14.58 per cent to high extent.

Khin Mar oo (2005) conducted a study on knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district. Study revealed that majority of the respondents listened to radio sets regularly (71.67%) and 9.17 per cent of them occasionally and 19.15 per cent of them did not listen. Majority of the respondents were never in the habit of reading newspaper regularly and occasionally (80.00%). Only 11.00 per cent of them were regular readers of newspaper. While, 18.33 and 33.33 per cent of the respondents were in the habit of viewing television regularly and occasionally. Only five per cent each of them go through dairy magazines.

Prakashkumar (2012) conducted a study on farmers' perception towards livestock extension service: A case study in western Maharashtra. Study indicated that 48.00 per cent of the dairy farmers had medium level of mass media exposure while 12.00 and 40.00 per cent of respondents had low and high level of mass media exposure, respectively.

Soujanya (2013) conducted a study on management efficiency of dairy farm women in Belgaum district. Study revealed that, 59.16 per cent of the dairy farm women belonged to medium category, while 34.16 and 6.66 per cent of dairy farm women belonged to low and high categories of mass media utilization, respectively.

Fatima (2014) conducted a study on women dairy farmers in Madurai district. Study revealed that above half (53.33%) of the respondents had medium level of mass media exposure, followed by 40.00 per cent of the respondents with high level of mass media exposure and remaining 6.67 per cent had low level of mass media exposure.

Majority of the respondents in the studies reviewed had medium level of mass media exposure.

2.2.8 Extension contact

Bhatt (2012) conducted a study on extent of knowledge of dairy farmers regarding improved animal husbandry practices under VRCs (Village Research Centers) Program in Anand district of Gujarat. Study found that majority of the respondents (65.62%) had contact with Agricultural Assistant whenever there was a problem, while 62.50 per cent of the respondents had no contact with Assistant Agricultural Officer. Only 13.12 per cent had contact with scientists whenever there was a problem.

Prakashkumar (2012) conducted a study on farmers perception towards livestock extension service : A case study in Western Maharashtra. Study reported that 40.83 per cent of the farmers belonged to medium extension contact category, followed by 30.00 and 29.16 per cent who belonged to high and low categories of extension contact, respectively.

Kashappa (2013) conducted a comparative study on dairy and non-dairy farmers in Belgaum district. The results indicated that more than half of the dairy farmers (65.28%) had medium extension contacts followed by high (20.83%) and low (13.89%). Whereas, 51.39 per cent of dairy farmers had low extension contacts followed by high (43.06%) and medium (5.56%) levels of extension contact.

Oladele (2013) conducted a study on factors influencing demand for animal health services and knowledge of bio-security among livestock farmers along border villages of South Africa and Namibia. Study indicated that majority of the farmers

(52.50%) had low level of extension agency contact, followed by 47.50 per cent of the farmers had medium level of extension agency contact.

Fatima (2014) in her study on women dairy farmers in Madurai district indicated that 51.67 per cent dairy women never contacted Assistant Agricultural Officer. Whereas, 42.50 per cent of the respondents had regular contact with village Administrative Officers and 50.83 per cent contacted Agricultural Officers occasionally.

Most of the studies reviewed indicated medium level of extension contact of the respondents.

2.2.9 Extension participation

Abdul *et al.* (2003) conducted a study on livestock farmers' preference of communication media and their use by extension workers in tribal area of Bihar. They revealed that majority of extension workers who preferred to use the extension methods for communication were group discussion (80.00%), followed by Kisan Mela (66.67%), farm visit (63.33%), cattle show (56.67%), training (46.67%), news paper (33.33%), demonstration (30.00%), film show (30.00%), radio (26.66%), television (16.66%), exhibition (13.33%), chart-poster-wall painting (13.33%), slide shows (13.33%) and folder-magazine-bulletin (10.00%).

Anita (2004) conducted a study on entrepreneurial behavior and market participation of dairy farm women in Bangalore rural district of Karnataka. She reported that 17.50 per cent of the entrepreneurs had high extension participation whereas 44.20 per cent of them had medium, followed by low extension participation (38.30%).

Khin Mar oo (2005) conducted a study on knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district. Study revealed that considerable percentage of respondents participated in extension activities such as, training program (97.50%), discussion meetings (91.66%) and animal health camps (61.66%). While, 25.00 and 21.00 per cent of them participated in exposure visits and field days, respectively. Krishi Mela and demonstrations meeting were attended by 12.50 and 16.66 per cent of the respondents, respectively.

Soujanya (2013) conducted a study on management efficiency of dairy farm women in Belgaum district. Study revealed that regarding krishimela, 77.50 per cent of the respondents never participated, while 18.33 and 4.16 per cent had occasionally and regularly participated, respectively. Regarding demonstration, 87.50 per cent of the respondents never participated, while 12.50 per cent had occasionally participated. In case of workshop, 61.66 per cent of the respondents never participated, while 30.00 and 8.33 per cent had occasionally and regularly participated, respectively. Regarding conference, 77.50 per cent of the respondents never participated, while 12.50 and 10.00 per cent had occasionally and regularly participated, respectively. Study also reported that, 85.00 per cent of respondents participated occasionally in-group discussion meetings, while 8.33 and 6.66 per cent participated regularly and never, respectively. One fourth (26.66%) of respondents participated occasionally in exhibitions, while 73.33 per cent never participated. Regarding tours, it was observed that 80.83 per cent of the respondents never participated, while 19.16 per cent had occasionally participated.

Fatima (2014) in her study on women dairy farmers in Madurai district reported that 23.33 per cent of dairy farmers subscribed for news paper and farm magazines and read them regularly, while 42.50 and 42.86 per cent of the respondents regularly listened and viewed the agricultural programs, respectively.

Participation of respondents in extension activities varied across studies from low to medium levels.

2.2.10 Milk utilization per house hold

Fayad (2009) conducted a study on value chain analysis of the dairy sector in Syria. Study reported that over 50 per cent of the milk produced in Syria is purchased fresh from the local hallabs and mostly processed at home, mainly as laban and labneh.

Surendra *et al.* (2009) conducted a study on value chain analysis of dairy in Merak and Sakten. Study revealed that, of the total quantity of milk, 17.00 per cent was sold in the market and rest 65.00 per cent is used for consumption and remaining 18.00 per cent is used to process butter and cheese.

Michael (2010) conducted a study on developing market linkages for small holders' farmers in Tanzania. Study revealed that 72.50 per cent of total production is consumed. Of the remaining 27.50 per cent, over 90.00 per cent is sold through informal marketing channels. Only 9.50 per cent of marketed milk is processed and 0.50 per cent is traded in the formal market.

Milan and Liesbeth (2012) conducted a study on value chain analysis in the Montenegrin dairy sector. Study revealed that of the total milk production, farms retains 85.00 per cent of the milk produced. A significant share of the retained milk (20.00%) is used for feeding calves. The remainder (80.00%) is consumed in the household as fluid milk or turned into homemade dairy.

Girima and Marco (2014) conducted a study on analysis of milk value chain: the case of Ada's dairy cooperative in Ada's district, East Shawa zone of Oromia regional state, Ethiopia. Study indicated that the mean milk yield produced per day by smallholder farmers during the rainy season was 24 liters of which 10.41 per cent, 89.59 per cent were home consumed and sold, respectively while during the dry season the mean milk yield in the study area was 21 liters of which 7.60 per cent and 92.40 per cent was home consumed and sold, respectively.

Girima and Marco (2014) conducted a study on assessment of factors and factors affecting milk value chain in small dairy farmers: a case study of Ada's district, East shawa zone of Oromia regional state, Ethiopia. Study indicated that some dairy farmers directly sell their milk to the neighboring consumers without processing the milk whereas other farmers locally process their milk into different products such as butter and cheese to sell to local market.

From the studies it could be inferred that major part of the milk produced was sold while retaining only small part for household use.

2.3 Value chain mapping of farmers to end consumers- milk and milk products value chain

Bhanja and Dubey (1987) examined the critical factors in organizing dairy co-operatives in three milk production zones in Mehasana district of Gujarat and observed that the societies were successful in a case of members who joined a society besides

economic reasons, and realization of social benefits. Milk producers who were selling through milk vendors had come to know some malpractices of vendors.

Singh *et al.* (1987) studied production and marketing channels of milk in different regions of Punjab state and reported that the milk federation had played a commendable role in the collection and distribution of milk particularly in rural areas, where in the role of milk vendor was still dominant. Study reported that the selling milk through milk federation was more profitable compared to other channels of marketing.

Ntengua (1999) concluded from a study on dairy products demand and marketing in Kilimanjaro region of Tanzania that African dairy industries have to build marketing systems which provide incentives for local farmers and supply consumers of competing multiple channels involving a pedestal, cooperatives and private traders. There was ample evidence that the system was efficient, with producers obtaining as much as 78.00 per cent of the final milk price.

Bhanja *et al.* (2000) conducted a study on linking farmers to market; different approaches to human capital development. Study reported that livestock products have a short life and perishable quality in the absence of proper cold storage facilities and have a shelf life of 4-5 hours at normal room temperature. It is always necessary for some intermediary processing and sterilized packaging of livestock products before it's long distance transport for marketing.

Nancy (2008) conducted a study on analysis of the value chain of fresh milk in the north of Vietnam, the case study in Sonla. Study indicated that 99.50 per cent of total milk produced is sent to dairy plant through collection centers for processing and packaging, whereas only 0.50 per cent of milk was sold to retailers and milk shops. From dairy plant majority of milk sent to wholesalers, showroom, super market and followed by retailers and consumers.

Eyassu (2009) conducted a study on value chain analysis of milk and milk products in Borana pastoralist area of Addis Ababa, Ethiopia. Study revealed that Borana pastoralists supply milk to the market using local materials like quabbe and sorora, jerry cans and retail at the market with a cup which has a volume of 300 ml while butter is supplied by quabbe and different tins and cups. Generally the milk consumer prefer to buy milk from the local container.

Fayad (2009) conducted a study on value chain analysis of the dairy sector in Syria. Study indicated that Syrian dairy market involves two channels- formal commercial market and informal market. Formal commercial market includes milk collectors with licensed processing units and processing dairies. Both processors sell their products through different distribution channels like directly to retailers or caterers, through wholesalers and from them to retailers and caterers, and through agents' distributors, from them to retailers and caterers. Formal channel includes farmers – consumers or to the vendors or small groceries.

Surendra *et al.* (2009) conducted a study on value chain analysis of dairy in Merak and Sakten district of Bhootan. Results revealed that milk products of Merak and Sakteng Gewogs follow one of the following four routes.

Dairy farmers – local consumers (individual households)

Dairy farmers – local traders/retailers – consumers

Dairy farmers - local traders/retailers- restaurants/hotels- consumers

Dairy farmers - middlemen – institutional buyers- consumers

According to survey, 75 per cent of the dairy farmers sell their products to local traders. The remaining 25 per cent respondents sell their dairy products to various places depending upon their convenience from the place of temporary huts established while migrating their livestock for fodder.

Debebe (2010) conducted a study on value chain financing : The case of Selale area dairy value chain in Selalea of Ethiopia. Study revealed that farmers produce milk and sell it to their cooperative (Selale Milk Union) or to traders. The cooperative or the trader transport or store the milk and sell to a processors, the processor pasteurize some of the milk and convert some to other dairy products and sell to retailers (like Supermarkets and kiosks) and finally retailers sell to end consumers.

Michael (2010) conducted a study on developing a market linkage for small holder dairy farmers in Tanzania. Study reported that the informal market in Tanzania

is far greater than formal market as 72.50 per cent of total milk production is consumed. Of the remaining 27.50 per cent, over 90 per cent is sold through informal marketing channels which include actors like farmers – hawkers – retailers/consumers. Only 9.50 per cent of the marketed milk is traded in the formal market which represents the actors like farmers – milk collection centers – processing units – retailers – consumers.

Muriukiet (2010) conducted a study on small scale milk marketing and processing in Ethiopia. Study reported that, out of the total interviewed smallholder dairy farmers, 35.00 per cent of the respondents sold their raw milk through informal milk marketing channels. Whereas, 25.00 per cent of the respondents sold their milk through both informal and formal channels.

Valk (2010) conducted a study on formal dairy chain of Addis Ababa, an analysis of the integration of small scale dairy farmers in Addis ababa, Ethiopia. Study reported that 98.00 per cent of milk produced in rural area were sold through informal chain, whereas only 2.00 per cent of the milk produced is reached the final consumers through formal chain.

Arcadia (2012) conducted a study on a profile of the South African dairy market value chain in Durban. Study revealed that, milk production in Durban is mainly by 2 sectors- commercial producers and small and medium producers. Commercial producers sell milk to dairy processors. Small and medium size producers sell most of their milk directly to consumers and some to processors. Dairy processors buy milk from farmers and import milk concentrates and produces dairy products for primary distribution to retailers, exports and for further processing

Milan and Liesbeth (2012) conducted a study on value chain analysis in Montengrin dairy sector in Montengrin. It was found that farms retain 85.00 per cent of milk produced. Significant share of the retained milk is used for feeding calves. Reminder is consumed in the household as fluid milk or turned into homemade dairy products. Some of these products are sold directly from the farm, mainly cheese and kajmak. Direct sales of fluid milk to consumers are negligible.

Murthy *et al.* (2012) conducted a study on evaluating value chain and retailing of milk in Chittoor district, Andhra Pradesh. The study revealed that the value chain of

the milk and milk products in Komirredy gari palli village, Chittoor district, Andhra Pradesh involves six distinct value adding activities from the production of the milk through reaching to the final consumer in the market. These activities include input supply; production; gathering; processing; transportation; and retail trading.

Pieters (2012) conducted a study on dairy farming, value chain analysis and potential for expansion of processed milk industry in Land O' Lakes of Ethiopia. Study revealed that Land O' Lakes co-operatives have facilities like pasteurization of milk and capability of producing butter, cheese and yogurt. Co-operatives market the milk and dairy products to super markets, dairy processors, retailers, schools, households and other commercial establishments.

Nguyen (2013) conducted a study on wicked problems: a value chain approach from Vietnam's dairy product. Study indicated that value chain of Vietnam's dairy sector consists of five activities as input ingredients, production, processing, marketing and consumption.

Reddy (2013) conducted a study on value chain analysis of dry land agricultural commodities in Patancheru of Andhra Pradesh. Study revealed that the most important marketing channels for pearl millet were

- Producer-Commission agents-Wholesalers-Retailers-Consumers
- Producer-Village merchants-Commission agents-Wholesalers-Retailers-Consumers
- Producer-Wholesalers-Retailers-Consumers
- Producer-Commission agents-Wholesalers-Exporters
- Producers-Retailers-Consumers
- Producers-Consumers.

Study identified that channel-I as the most prevalent value chain *i.e.* producer-commission agent-wholesaler-retailer-consumer.

Reddy (2013) conducted a study on value chain analysis of dry land agricultural commodities in Ranga reddy district of Andhra Pradesh. Study indicated that most of

the fodder produced is traded within boundaries of adjoining villages among farmers and the left over about 10-20 per cent is traded in informal markets within 30 km distance from the villages. The widely used marketing channel for fodder is farmer-trader-commission agent-cattle shed owner.

Jeroïn (2013) conducted a study on dairy value chain mapping and analysis in Ethiopia. Study indicated that milk was in most cases transported by the processors from the Milk bulking groups to their plants. Processors also distribute milk and milk products to major outlets including super markets, retail shops and their milk depots.

Girma and Marco (2014) conducted a study on factors affecting the milk value chain in small holders dairy farmers; A case study of Ada'a district, East Shawa Zone of Oromia regional state, Ethiopia. The study revealed that 59.00 per cent of the respondents sold their raw milk through informal marketing channels which comprises producers themselves (23.60%) and private milk collectors (76.40%). Formal channels include 30.60 per cent producer, 44.40 per cent processors and 25.00 per cent retailers. Marketing channels includes small scale producer > dairy co operatives >processors> wholesalers > retailers.

Girima and Marco (2014) conducted a study on analysis of milk value chain: the case of Ada's dairy co-operative in Ada'a district, East shawa zone of Orima regional state Ethiopia. Study revealed that in urban area out of the total interviewed farmers 22.50 per cent, 15.00 per cent, 7.50 per cent and 5.00 per cent of the interviewed farmers sold their raw milk to a dairy cooperative, private milk collectors, both Ada'a dairy cooperative and private milk collectors and direct to local consumers, respectively. Where as in rural area, out of the total interviewed farmers 17.50 per cent, 17.50 per cent and 15.00 per cent of the respondents sold their milk to private milk collectors, Ada'a dairy cooperative and private milk collectors and direct to local consumers, respectively.

Frank (2007) conducted a study on value chain program design : promoting market - based solutions for industry competitiveness. Study revealed that the small growers of green beans either sell their produce to brokers or directly to small exporters. The brokers also sell to the small and medium exporters, though to a lesser extent.

Kohls (2011) conducted a study on value chain analysis of the dairy industry in Botswana. Study revealed that 30.00 per cent of raw milk produced is consumed at home and about 67.00 per cent is marketed through informal or traditional marketing channel and only 3.00 per cent goes through formal marketing channel there.

Most of the studies reported multiple value chains involving producers, collectors, processors, and consumers etc of both dairy cooperatives and private players.

2.4 Documentation of value chain experiences of milk producers in cooperative dairy sector

Ranjit (1999) conducted a study on impact of dairy co-operatives on the rural economy in Nalanda district. The study revealed higher productivity of milch animals (local cows and buffaloes) for households within the cooperative program (5.75 and 4.75 litres/day for buffaloes and local cows, respectively, compared with 3.70 and 2.79 litres in the households not covered by the programme). Dairy enterprise contribution to total family income was 28.00 per cent and 20.00 per cent for beneficiary and non-beneficiary households, respectively. The dairy enterprise provided an employment of about 217 and 210 days per year for family members of beneficiary and non-beneficiary households, respectively. It is concluded that the rural dairy cooperative society has been successful in improving the socio-economic conditions of milk producer households, especially the weaker households.

Surendra *et al.* (2009) conducted a study on value chain analysis of dairy in Merak and Sakten district of Bhootan. Study reported that there were number of farmers specializing in milk production and processing of specialty cheese from yak milks. These farmers have technical knowledge about milk production, gained by training and self study / experience. They consider milk processing as a business that generates good income opportunities. According to the information of these dairy farmers, dairy production has good perspectives due to a growing market.

Babu and Verma (2010) conducted a study on value chain of milk and milk products in organized sector (co-operative and private dairy plants) comparative analysis in the Salem district of Tamil Nadu. It was found that the overall procurement cost per liter of milk has been found higher for the co operative dairy plant than the private plant. The co operative plant was more efficient in the manufacturing of toned

milk, standardized milk, full cream milk and ghee where as the private plant has an edge over co operative dairy plant in the manufacture of butter and skimmed milk powder. The marketing cost of toned milk, standardized milk, full cream milk and skimmed milk powder has been found lower for private dairy plant and only of butter and ghee for the co-operative dairy plant.

Ochja (2010) conducted a study on economics of veterinary services delivery among commercial poultry farmers in a market-driven economy: evidence from Delta state, Nigeria. The results of the study showed that though the veterinary services delivery was structured into public and private sectors, majority (60.90%) of the commercial poultry farmers demanded and obtained veterinary services from the public sector. It was recommended among others that private individuals should be encouraged by policy to participate in veterinary services delivery.

Pieters (2010) conducted a study on dairy farming value chain analysis and potential for expansion of processed milk industry in Ethiopia. Study revealed that co-operative societies are providing technical and marketing support to the members. Members got experience in feed management and artificial insemination.

Surendra *et al.* (2009) in his study on value chain analysis of dairy in Merak and Sakteng districts of Bhootan. Study revealed that farmers were getting services in improvement of productivity, hygiene, sanitation and planting of fodder trees by the co-operative society.

Gasana (2011) conducted a study on exploring the determinants of joining dairy farmers' cooperatives in Rwanda: a perspective of Matimba and Isangano cooperatives. Services like market access, access to input service and credits are the major services given by the society as perceived by the members.

Pallavi (2011) conducted a study on preference of service providers for the veterinary service-a case study of Sangli District of Maharastra state. Study revealed that majority of large farmers' preferred state veterinary services and cooperative veterinary services where it had strong presence. Cooperative veterinary service can be a good alternative to the state veterinary services and the private veterinary service providers are still not preferred in the rural area.

Murthy *et al.* (2012) conducted a study on evaluating value chain and retailing of milk in Chittoor, Andhra Pradesh. In the co-operative dairy plant all the dairy products had added more than 30.00 per cent of value after passing through the value chain. In terms of money, it varied from Rs. 5.26 in toned milk to Rs. 85.50 in khoa. Full cream milk's contribution to the value addition was least among the co-operative dairy products. In the case of private dairy plant the value addition ranged from Rs. 5.54 in toned milk to Rs. 81.63 in ghee.

Prakashkumar (2012) conducted a study on farmers perception towards livestock extension service: a case study in Western Maharashtra region with regards to timely availability, amount paid and satisfaction level of the farmers towards the services. The study revealed that 56.00 per cent of the farmers perceived that extension services were available in time. With regards to amount paid for the services, 58.66 per cent of the respondents perceived that extension services were delivered free of cost. In the study area, 37.33 per cent respondents were satisfied with the extension service delivery.

Ganeshagowda *et al.* (2013) conducted a study on impact of KSAMBS' free SMS to farmers on agricultural marketing prices- a case study in Karnataka. Results revealed that 95.50 per cent of the farmers were educated, who had expressed satisfaction about the SMS information received in local and English languages. Most of the medium and large farmers (52.00%) had benefited from selling their produce based on the free SMS on price information. It is interesting to note that about 88.18 per cent of the beneficiary farmers had shared the price information to other farmers. A majority of the farmers (80.00%) opined that disseminated information was simple, timely, understandable and accurate, which helped them in fetching better price.

Gbolagade (2013) conducted a study on comparative analysis of public and private veterinary services delivery among commercial poultry farmers in delta state, Nigeria. Results revealed that there was a significant relationship between flock size and affordability with constraints in access to veterinary services and there was a significant difference between private veterinary service delivery and public veterinary service delivery. The study further concluded that private veterinary services provider provided better poultry health services delivery compared to public veterinary services delivery in Delta State.

Jeroir (2013) conducted a study on dairy value chain mapping and analysis in Ethiopia. Study reported that training of farmers in dairy husbandry has helped to improve the performance of the dairy sub sector.

Subhash (2013) conducted a study on farmers' satisfaction with delivery of veterinary services in Karnool district of Andhra Pradesh. Study revealed that farmers were found 'very satisfied' with reliability of treatment, information about disease outbreak and vaccination of animal whereas 'dissatisfied' with in-time availability of services at village level, awareness campaign and post-mortem of dead animal. There was significant difference in satisfaction level of farmers regarding various services provided by department of animal husbandry.

Fatima (2014) conducted a study on women dairy farmers in Madurai district of Uttar Pradesh. Study revealed that there is a significant change in the economic condition of the women after taking up dairy farming. Profitability, job security, promotional measures of the government, easy marketing, self esteem, financial independence *etc.* had influenced the opinion of the women dairy farmers about the benefit of dairy farming.

Most of the studies reviewed have reported that dairy enterprise has contributed to the family income besides generating employment to the family members. Milk producers felt that dairy enterprise has good perspective

2.5 Backward and forward linkages of dairy value chain

Hirevenkanagoudar (1998) studied the impact of dairy development on the weaker sections in Bangalore North and Doddaballapur Taluks of Karnataka and found that more than 64 per cent of Karnataka Dairy Development Corporation (KDDC) farmers had repaid 75 to 100 per cent of dairy loan, whereas only 10 to 25 per cent of non-KDDC farmers had repaid 75 to 100 per cent of their dairy loan. Increase milk prices paid to producers by up to 50 per cent, but also led to a steepening of the price gradient with distance from urban consumption centers. Market liberalization therefore expanded the role of the raw milk market and the participation of the dairy farmers cooperative societies in milk marketing and the provision of input services.

Desai (2003) conducted a study on performance of farmers' service societies (FSS) in Zhang district of Punjab. Study indicated that FSS is providing backward services like extension services, input services on both cash and credit mode and forward services like commodity marketing, commodity processing and sale of members produce.

Roger and Daniel (2003) conducted a study on the economic importance of the Iowa dairy industry in Iowa State University, Ames, Iowa. The study revealed that it is convenient to incorporate dairy processing activities as part of the direct or primary component of the Iowa dairy industry. The backward linkages include purchased inputs, supplies and services used by dairy products. The forward linkages include further value added activities occurring after the farm gate such as dairy processing, cheese and ice cream production.

Bowender (2005) conducted a study on ICT application in a dairy industry: the e-experience of Amul in Anand, Gujarat. Study indicated that Gujarat milk marketing co-operative federation giving services to farmers such as access to multimedia database, communication facilities such as e-mail, fax, net phone, banking centers for payment for the farmers by using the milk cards which are already in place, the e-governance and e-procurement.

Chengappa and Nagaraj (2005) conducted a study on strengthening backward and forward linkages in horticulture, SAFAL Market in Bangalore district of Karnataka. Study indicated that SAFAL market is linked to 40 collection centres that are equipped to meet the specific or special requirements of buyers, in terms of quality control, packaging and weighing. Individual growers are being trained on quality management and are provided extension services. Logistics support in terms of packaging and transportation of produce is also arranged on behalf of the growers on pre-fixed charges. The farmers are made aware about the demand of the produce in advance by the procurement department of SAFAL. On the forward linkages side, wholesalers participate in auctions at the auction market complex or can even bid using remote electronic system. Forward linkage is carried out through 10 to 12 cash and carry stores, cold storage facility is also available for the wholesalers and other market users on payment basis. Wholesaler / retailer - friendly packs for easy handling and transport. The state-of-the-art fruit ripening facility, assured quick and efficient dispatch

of produce per auction and online wholesale price information of all items in major markets are also made available at the SAFAL.

Frank and Henry (2007) conducted a study on value chain program design; promoting market based solution for MSME (Micro Small Medium Enterprises) and industry competitiveness in Washington, D.C. The study revealed that opportunity for linkages that is potential forward and backward linkages between large and small enterprise and large buyers are overlooking MSMEs as source of supply or unable to organize them to meet their demands.

Grygiel (2007) conducted a study on Kosovo dairy value chain- a case study in Kosovo of United States of America. Study indicated that processor collects raw milk from individual producers and milk collection centers. Due to quality concerns they prefer to buy from individual farmers under a contract. Some processors like Kabi processor offer direct assistance to producers to improve the quality and quantity of raw milk and trains the farmers with whom it contracts on herd health, hygiene and proper milk handling practices. Another processor like Bylmeti supplies lacto – freezers to its larger farmers. Based on their agreement, Bylmeti does not charge the farmers to use the freezers but they must sell their milk to Bylmeti and maintain the freezers.

Mittal (2007) conducted a study on strengthening backward and forward linkages in horticulture: some successful initiatives in Mysore district of Karnataka. Study indicated that seeds, fertilizers, pesticides and other necessary inputs are also provided by Namdhari at wholesale rates. In the case of crop failure, the farmers are given financial assistance at very low rate of interest. To ensure freshness of the horticultural produce till it reaches the consumer, the company has a strong cold chain network right from the farm gate. The transportation of produce in refrigerated trucks helps in the removal of field heat before transferring it to the pre-cooling room. The grading and packing of produce are done under cool conditions.

Uhls (2008) conducted a study on dairy value chain in Rwanda and reported that producers are getting the services from Kegali input suppliers like bran for feed, salt blocks, treatment for ticks and worms, provides free and mandatory training for AI providers and sells semen at cost on credit. The milk collection centers have a chilling

plant and bulk milk coolers and also they have own milk shops to market the milk. If a milk collection center does not own a milk shop it is likely to sell its milk to a processor.

Fayad (2009) conducted a sector study and value chain analysis of the dairy sector in Syria. Study reported that the two main milk types used in processing were cow and sheep; goat milk was also manufactured in lesser amount. UHT milk, laban and labneh were the dairy products mainly prepared from cow milk and large portion of cheeses were made from sheep milk. Further dairy farmers were availing the services like free veterinary care, race improvements, feed provision with some free subsidy from department of animal husbandry.

Reddy (2009) in the study on analysis of dairy value chain in Coimbatore district of Tamilnadu indicated that government encourages creation of farmer co-operatives to manage the milk gathered at a society. Society not only serves as a marketing point for milk, but also provides additional services like wholesale agricultural inputs, farmers' education and financial credit.

Bhatt (2011) conducted a study on extent of knowledge of dairy farmers regarding improved animal husbandry practices under Village resource center's programme in Aanand, Gujarat. Study indicated that VRCs in association with ISRO is giving services to farming community such as tele-education, tele-medicine, interactive advisories on agriculture, livestock management, fisheries and water management.

Moyo (2011) conducted a study on multi-stakeholder platform contribution to value chain development in Sarah drost of Ethiopia. Study revealed that Ethiopian milk and milk products producers and processors association provides backward services to farmers such as access to knowledge and technology about availability of new animal breeds, quality animal breeds, training and quality management, farmers awareness on quality, artificial insemination and diversification of milk products.

Rajinder (2011) conducted a study on services provided and availed by the dairy farmers from selected milk processing agencies in Jargon block of Punjab. The findings revealed that dairy services such as AI facilities, veterinary medicines, veterinary doctors, milking machine, provision of fodder, seeds and dairy literature were provided by cooperative and multinational milk processing agencies whereas

private milk processing agencies provided a calendar containing 32 points of clean milk production.

Pandey (2012) conducted a study on analysis of dairy sub sector industry and value chain in Zambia. Study revealed that dairy support organizations such as livestock development trust have initiated feed formulation and mixing at the milk collection centers using locally produced feed ingredients in order to make more affordable dairy feed available to small holder farmers.

Pieter (2012) conducted a study on dairy farming, value chain analysis and potential for expansion of processed milk industry in Land O' Lakes of Ethiopia. Study revealed that co-operatives provide services like milk collection and sales, artificial insemination services, animal health care and veterinary services, feed supply, male calves fattening program, training on farm management, training on savings and credit systems.

Sivapalan and Rajendran (2012) conducted a study on value chain analysis in dairy sector in Karachchi division, Kilinochchi district of Sri Lanka. Study indicated that each of the players in the value chain carry out various value adding services, the input suppliers for instance provide various veterinary drugs, milking equipment, AI services, feed among other services. The primary producer in the dairy value chain – the farmer carries various animal husbandry measures such as disease control measures, provision of feed to in-calf and lactating cows.

Nguyen (2013) conducted a study on production and marketing constraints of dairy farmers in Son la milk value chain, Vietnam. Study indicated that there is only one major suppliers of heifers, grasses, feed, proteins, *etc.* Besides there are some private input and equipment suppliers for dairy farmers. Milk collecting centers and milk collectors in the region are under the control and management of the dairy plants. These dairy plants link dairy farmers with input suppliers, milk collectors. Their influences are also on both wholesalers and retailers. In the distribution stage, there are many participants namely small milk shops, milk cake shops, showrooms, super markets and many agents and retailers.

Nguyen (2013) conducted a study on wicked problems: a value chain approach from Vietnam's dairy product in Vietnam. Study indicated that local authorities are

providing service regarding breeding selection, breeding crossing, feed supply, preserving the feeds and also under takes centralized cow farming and brings many benefits such as fully utilizing the economy of scale and reducing the cost per unit. They are providing forward services in the areas like providing milk collection centers, establishing milk collection centers, establishing the standards, financial support to processing industries, policies to support milk processing subsectors such as package production and processing additive.

Peter (2013) conducted a study on dairy value chain mapping and analysis in Malawi. Study indicated that a local NGO providing the service to farmers in the areas of skills and knowledge development, livestock extension services, community animal health programmes, AI services through Small scale livestock and livelihood program.

Girima and Marco (2014) conducted a study on analysis of milk value chain: the case of Ada's dairy co-operative in Ada'a district, East Shawa zone of Oromia regional state Ethiopia. Study revealed that some of governmental and non -governmental organization who are involved in provision of AI service, veterinary service, improved forage varieties and value addition technologies were identified. Also dairy cooperative is involved in collecting, processing and marketing of processed products like pasteurized milk, butter, soft cheese and yogurt and distributing of processed products to its retailers in Debrezeit town and Addis Ababa city.

Girima and Marco (2014) in their study on assessment of factor and factors affecting milk value chain in small holder dairy farmers: a case study of Ada's district, East Shawa zone of Oromia regional state, Ethiopia indicated that Ada's district co-operative development office is provided different services to Ada's dairy co-operative in the district. Some of the supports provided by this organization are organizing farmers into different types of co-operative, giving of licence to the co-operative, arranging of credit service to the members by linking the co-operative with the local micro financial institution and provision of training for the members on the role and regulation of the co-operative.

Many studies indicated forward services mainly milk collection and sales and range of backward services like supply of bran, salt blocks, treatment for ticks and worms, AI services, extension and advisory services.

2.6 SWOT analysis of dairy value chain

Anand (1995) in his study on analysis of farmer's constraints in cotton production in Haveri, Karnataka indicated that higher yield and good market value were the major strengths. Expensiveness of plant protection measures was the major weakness while high export potential due to its good qualities is the major opportunities. Adulteration of seeds is major threats as perceived by the cotton growers.

Karim (2005) in his study on A "SWOT" Analysis of Medicinal Plant Production in Iran, indicated that major strengths were the supply of an effective material of medicines, the supply of an un-side effect medicine, the supply of a raw material of medical industries. Weaknesses include all of medicinal and industrial plant species have not been identified, knowledge of genetics and plant physiology of medicinal plants is unfortunately not as developed as that of food crops. Opportunities such as: diverse climate appropriate for growth of various medicinal species, no dependence on foreign medicine, helping the development of medical industries by providing added value, helping the development of processing industries. Threats include having no integrated and systemic approach in planning for medicinal plants, drought and climate change.

Ramesh (2005) conducted a study on SWOT analysis of Indo-Dutch network operational research project on drainage and water management for salinity control by beneficiaries in Bapatla, Andhra Pradesh. Study revealed that the 3 important strengths of operational research project as perceived by beneficiaries were improvement in crop yield (92.59%), negligible wastage of land (82.65%), less maintenance and long life of the system (78.29%). Higher initial cost involvement (77.65%), too short project period to credible end results (75.46%) were the weaknesses. Opportunities were higher returns than the existing (88.24%) and; further improvement of socio economic condition of farmers (74.23%). Major threats were disposal of drain water may be a problem if the other farmers raise objections (74.90%) and improper maintenance of system (74.51%)

Shantanu (2006) conducted a study on SWOT analysis of potato cultivation in east khasi hills district of Meghalaya: farmers' perception. Export of potato to other neighboring north-eastern states, existing potato based cropping system, local /

traditional method of potato cultivation practiced by the farmers as well as connectivity of the villages to the city markets and better market price of potatoes were the strengths as perceived by the potato farmers. Prevailing rainfed conditions, lack of knowledge of scientific methods of potato cultivation and heavy incidence of diseases were felt as the inherent weaknesses of potato cultivation. Processing of potato, better linkage with the market and large scale adoption of Kufri Giriraj were the major opportunities for potato cultivation in the state. At the same time, fluctuating market price, non-availability of quality seed and competition from plains were the potential threats to sustain potato cultivation in this area.

Venkatakonda (2006) conducted a study on SWOT analysis of cotton cultivation in Andhra Pradesh. Study revealed that major strengths in cotton cultivation were thinning and gap filling which increases the yield and maintenance of optimum plant population (89.81%), removal of top leaves by topping in cotton plants (78.72%) and yield is 28 q / ha (71.00%). Weaknesses are expensiveness of plant protection measures (94.09%) and low price to cotton at proper time (91.00%). Opportunities were bracts (perfect flower) during cooler times of the day (89.09%) and; conservation of natural enemies (81.72%). Threats were adulteration of seeds (91.45%), cotton can tolerate excess moisture or water logging conditions (85.63%).

Arunkumar (2007) conducted a study on profile of self help groups and their contribution for livestock development in Karnataka. The study revealed that team strength and lack of family support from banks or other organization were the major strength and weakness by the SHGs, respectively. More scope to strengthen poor and weaker sections; and no proper policies to fund SHGs were the major opportunity and threat expressed by the SHGs respectively.

Javanmard (2008) conducted a study on a SWOT analysis of organic dried fig. production in Iran. Study revealed that major strengths of organic fig. production were sufficient supply of effective organic figs (87.20%) and; product with low moisture content (83.25%). Weaknesses were lack of research and development of high-yielding varieties (75.25%) and lack of cooled and controlled atmosphere storages facilities in region (72.30%) whereas major opportunities were lower cost of production (86.85%) and the fastest growing market of organic consumption in the world

(85.30%). The major threats were drought and climate change (96.45%) and fluctuation of fig. price (85.40%).

Kim (2008) conducted a study on e-business & the dairy and grains industry value chains in Australia. Study reported that major strength of producers were low cost and low input livestock management system, positive attitude of farmers towards dairy farming as a priority number one in their economic activities of their livelihoods. Weaknesses were low input system does not take full advantages of cross-bred cows and pure breeds and lack of reliable AI services. Opportunity like turning their small low input, low output businesses into larger high input with the increased profits businesses. The high cost and scarcity of feed was a big threat to milk producers.

Fayad (2009) on sector study and value chain analysis of the dairy sector in Syria indicated that major strength was the diversity of milk sources; cow, sheep and goat (95.30%), weaknesses were scarcity of water resources in certain areas (92.50%) and- consumer habits favoring in house processing (89.25%). Opportunities were upgrade of the quality and yield level of milk (90.25%), development of new diversity of products with a higher value addition (87.50%) and less prone to un-fair competition (85.05%). Persistence of the un-structured milk market as a result of informal sales channels and its negative impact on the sector development (89.00%) was the major threat.

Cummins (2010) conducted a study on SWOT analysis on rice supply chain in Lao PDR. Study revealed that abundant natural resources suitable for rice growing (92.25%) and seed diversity (89.25%) were the major strengths of rice production, whereas major weaknesses were low productivity of rice (92.50%) and limited skills of farmers to improve productivity (90.50%). Increased public private partnership on value adding of agricultural production for export (92.50%) and regional linkages (90.50%) were the major opportunities. Weaknesses were natural disasters (91.25%) and increased out break of pest and diseases (90.25%).

Garnevaska (2010) in his study on SWOT analysis of the horticultural farms in the Plovdiv region of Bulgaria reported that major strengths of farms were possession of considerable experience in agriculture/horticulture (63.00%) and availability of own machinery (48.00%). Weaknesses were lack of machinery or having obsolete

machinery (72.00%) and use of old technologies in farming (65.00%) whereas opportunities were planting new crops (41.00%) and expanding farm land (36.00%). Major threats were unpredictable weather conditions (77.00%) and lack of, or uncertain, market (66.00%).

Ravi (2010) conducted a study on SWOT analysis in private extension service. Major strengths identified were efficiency of delivery channels and economic efficiency in services (92.00%). Weaknesses were information becomes excludable in short term due to differences in speed of information dissemination or medium use (87.25%). Employment opportunities opened up due to more requirement of man power (91.00%) was the major opportunity and the social development of the people takes a back stage due to profit motto of the actors (85.70%) was the major threat.

Eyassu *et al.* (2011) conducted a study on analysis of dairy value chain: a case study of Dire Dawa city, Eastern Ethiopia. Major strengths identified by the study were strong link between milk producers, traders and all stakeholders (95.05%) and well organized dairy value chain (91.25%). Weaknesses related to milk marketing were lack of quality control of milk (89.21%), lack of cooling and storage facilities at milk vending cites (82.00%). Major opportunities include high demand for milk (92.25%) and presence of enabling policies that encourages in the dairy sector (90.25%). Major threats were organizational and technical problems (95.20%) and difficulty to get the grazing land (89.30%).

Prakashkumar (2011) conducted a study on SWOT analysis of dairy cooperatives: a case study of western Maharashtra. Study indicated that major strengths of co-operative members were cooperative membership encouraged members to market their milk and helped them to get sustainable market (89.25%) and milk processing through the cooperative was more efficient, less milk wastage and high quality dairy products becoming better marketable (87.70%). Major weaknesses were shortage of professional manpower in the provision of service by the cooperative (85.20%) and low price for milk as compared to other private competitors (83.50%). Genuine quality measures for the supplied milk, timely and convenient mode of payment system and competitive price for the supplied milk (95.50%) were the major opportunities for producers. Poor dairy feed and AI technology service delivery institutes (83.25%) were the major threats as perceived by the members.

Abdallah (2012) conducted a study on SWOT analysis of Mango production in Ghana. Study indicated that seasonal advantages for mango cultivation especially in the northern regions of Ghana and cold stores and pack houses have been built over the years to support the pineapple export industry, benefiting the mango value chain were the major strengths. Actors have partial knowledge of production potential, available varieties, post-harvest practices and actors have partial knowledge of market access requirements, demand trends and international competition and these formed the major weaknesses. Major opportunities include mango and fruit processors in Ghana are always on the lookout of mangoes for processing purposes and urban consumers in West Africa are becoming richer and more conscious of healthy living : Accra represent an immediate opportunity compared to foreign markets and threats include farmer organizations seem to be struggling in supplying quality and quantity to market intermediaries which is penalizing the country's capacity to cater foreign markets.

Milan and Liesbeth (2012) conducted a study on value chain analysis in Montengrin dairy sector in Montengrin. Major strengths identified by the study were sufficient resources available for fodder production for ruminants and extensive knowledge about dairy farming. Weaknesses were unfavorable wage structure of farm population and small scale production. Support available for upgrading dairy farm business from a national source like Ministry of Agriculture and Rural Development was the major opportunity. Threats were strong pressure from imported dairy products and problem in accessing bank loan.

Ravinder and Shridhar (2012) conducted the study on SWOT analysis of dairy farming as perceived by the dairy owners in Najafgarh, South west Dehli. The study analyzed that traditional nature of the milk production (76.00%) and availability of market for milk (84.00%) were the strengths as perceived by the dairy farmers, whereas non availability of the grazing lands (92.00%) and costly nature of the fodder (92.00%) were the perceived weaknesses of the dairy farming. The study also revealed that providing training programmes (72.00%) and providing subsidized ration (94.00%) were the opportunities for the improvement of the dairy farming, whereas the non-availability of the fodder (78.00%) and continuous electric power problem (74.00%) were the potential perceived threats regarding dairy farming.

Tsang (2013) conducted a study on dairy value chain mapping and analysis in Syria. Study indicated that existence of government machinery on livestock development (83.45%), technical expertise in both veterinary and livestock production areas (82.50%) were the strengths of stakeholders. Weaknesses were limited capacity in terms of human resources (85.25%) and limited expertise among extension workers (86.25%). Opportunities were high demand for dairy products by communities (89.25%) and to improve the productivity of the dairy cows through intensification of farmers training (85.75%). Threats were lack of team spirit (89.25%) and limited collaboration among the dairy value chain actors (85.25%).

Arularasan (2013) conducted a study on SWOT analysis of integrated tribal development program in western ghats of south India. The main strengths identified were, the holistic approach of the program encompassing all activities as opined by 93.33 per cent of the respondents, enabling the poor free from debt trap (90.00%), remunerative market price for their produce (84.67%) and improvement in education and literacy (80.00%). Ninety-two per cent of respondents opined that lack of coordination among the implementing agencies was the prime weakness. Equally important weak spots of the program was in-adequate loans (88.00%). Human resource development of tribal youth through appropriate interventions (96.00%) and opportunity to learn new skills (92.67%) were the opportunities available for empowering themselves and to attain the self reliance. Non willingness of government personnel to work in remote areas and fluctuations in market price for their produce were the major threats faced by 94.67 per cent and 92.00 per cent of respondents, respectively.

Daniel (2013) conducted a study on SWOT analysis system of vegetable and fruit industry and Texas AgriLife Program. Major strengths of Texas AgriLife were cited to be faculty and staff capabilities (89.25%) and reputation and credibility (88.30%). The top weaknesses were lack of incentives (85.70%) and disconnect between research and extension (84.50%). Locally produced fruits and vegetables (92.70%) and new alliances with stakeholder associations (89.70%) were considered as major opportunities. Major threats were reduction in budgets (95.20%) and decreasing funding opportunities and more competition for funding (89.45%).

Jeroïn (2013) conducted a study on dairy value chain mapping and analysis in Ethiopia- SWOT analysis for stakeholders. Major strengths found by the study were existence of government machinery on livestock development, availability of guiding documents like livestock policy document, livestock development master plan and strategic plan. Weaknesses was limited capacity in terms of human resources in most organizations including government; major opportunities like high demand for dairy projects and community collaboration among dairy sectors; lack of team spirit, lack of consultation and limited collaboration among dairy value chain actors threatens the growth of the industries.

Seema (2013) in her study on SWOT analysis of an entrepreneurial venture set up by entrepreneur in Agra nagar nigam indicated major strengths as easily available skills (97.00%), high rate of return (97.00%) and low investment (63.00%). Weakness was seasonality of raw material (64.00%). Opportunities were large market (80.00%) and less mobility required (80.00%). Threat was high demand (97.00%).

Girima and Marco (2014) conducted a study on analysis of milk value chain: the case of Ada's dairy co-operative in Ada'a district, East Shawa zone of Orima regional state Ethiopia. Co-operative provides mobile AI and animal health services for its members by reasonable price were the strengths; weaknesses were low linkages of co-operative with external support to get financial support from different business environment such as different NGO and actors and lack of cooling tanks and laboratory equipment at milk collection centers for better milk quality control; high capacity of the processing plant to process 15,000 liters of milk per day, presence of good government policy which help dairy co-operative to improve its position in the milk value chain were the major opportunities and threats were high competition for milk from informal or local markets, pasteurized milk consumption is not familiarized by local markets and people prefer to drink boiled whole milk.

Himabindu (2014) conducted a study on SWOT analysis of dairy industry in India. Flexibility of product mix and technical human resource pool built over last 30 years were the major strengths. Major weaknesses were bad roads and inadequate transportation facility makes milk procurement problematic and competition is becoming tougher day by day. Major opportunities were retailing of dairy products is a great investment opportunities for standardization and upgrading dairy products in the

main metropolitan cities and there is a great scope for investment in the manufacturing of finished dairy products such as cheese sauce and cheese powders. Major threats reported were large informal markets that extend credit are constraining farmer and low productivity and scattered production which is leading to high cost of transportation.

The studies reviewed in this chapter on dairy industry have been conducted either in different countries like Sri Lanka, Ethiopia, Syria, Montenegro or in places like western Maharashtra, southwest Delhi. These studies focused on dairy value chain analysis at large. None of the studies focused on organize dairy industry. The present study having identified this gap specifically focused on second largest organize dairy sector of our country. Belgaum Milk Union of Karnataka Milk Federation was considered for indepth analysis of milk value chain.

3. METHODOLOGY

The research study was conducted during the year 2013-14 in Belgaum (presently renamed as Belagavi) district of Karnataka state. The general description of the research methods and procedures employed in the study are outlined under the following major headings

3.1 Research design used in the study

3.2 Locale of the study

3.2.1 Selection of villages

3.2.2 Selection of respondents

3.3 Devices of data collection

3.4 Operationalization of terms dairy enterprise and value chain analysis

3.5 Variables and their measurement

3.6 Method of collection of data

3.7 Statistical tools and techniques used for the analysis of data

3.1 Research design used in the study

In the present investigation, *Ex-post facto* research design was used. This design was considered as appropriate because the phenomenon had already occurred. *Ex-post-facto* research is the most systematic empirical enquiry in which the researcher does not have control over independent variables as their manifestation has already occurred or as they are inherent and cannot be manipulated. Thus, inferences about relation among variables could be made without direct intervention from concomitant variation of independent and dependent variables (Kerlinger, 1973).

3.2 Locale of the study

The study was conducted in Belgaum district of Karnataka. The district was selected for the study as it is the highest milk procuring district and ranks 1st in livestock

population in the state. Further, Gokak and Bailhongal taluks of Belgaum district were selected as the locale of the study, since they have highest functional milk co-operative societies and highest average milk collection over a 5 year period from 2009 to 2014 (Table 1) among all taluks of the districts. The map indicating study area is given in Figure1.

3.2.1 Selection of villages

List of villages having cooperative milk societies falling under each selected taluk was obtained from Belgaum milk union. From each taluk, four villages having societies with highest milk procurement in 2013-14 were selected. Thus study in all covered 8 villages of 2 taluks of Belgaum district (Table 2).

3.2.2 Selection of respondents

Study made use of the value chain analysis method. So producers, cooperative societies, processor, dealers and consumers together formed the sample of the study.

One of the criteria for selection of producer was they should be a member of co-operative society and should be a milk producer at the time of the study. Fifteen such producers from each village were randomly selected, thus forming a sample of 120 producers from 8 villages.

In Nagnur and Hallur villages more than one cooperative society was functional and in such villages among them only one cooperative society was selected randomly. In remaining villages only one milk cooperative society was operated which were included for the study. In all 8 milk cooperative societies formed the part of the study. The Secretaries of all the milk cooperative societies of these villages were interviewed to collect the required data.

Only one milk processor is operating in study area under Belgaum milk union and was so included to collect related information.

Gokak has 51 dealers and Bailhongal has 17 dealers, together making 68 of which 50.00 per cent of them (34) were selected randomly for the study. Besides from each taluka, 20 consumer were selected randomly thus forming a sample of 40 consumers.

Table 1: Average milk collection of cooperative milk societies in talukas of Belgaum from 2009 to 2014

Talukas	Functional Societies	2009 to 2010	2010 to 2011	2011 to 2012	2012 to 2013	2013 to 2014	Total milk collection (kg)	Average milk collection (kg)
Bailhongal	76	10522	11803	12785	13286	12200	60596	12119.20
Gokak	64	14463	16368	19324	22391	22324	94870	18974.00
Ramdurg	51	9329	10135	10757	9824	9611	49656	9931.20
Khanapur	50	8190	8437	8627	9439	8724	43417	8683.40
Rayabhag	43	9556	10491	12892	16785	16512	66236	13247.20
Savadatti	39	5856	6476	6441	6297	7001	32071	6414.20
Athani	33	4325	5826	5435	7603	7047	30236	6047.20
Belagavi	26	4423	4509	4531	4038	3715	21216	4243.20
Hukkeri	25	3683	4206	5009	5590	5632	24120	4824.00
Chikkodi	15	1480	2762	3237	3317	2660	13456	2691.20
Total	422	71826	81013	89040	98570	95426	435874	87174.80

Source: Belgaum Milk Union, Belagaum

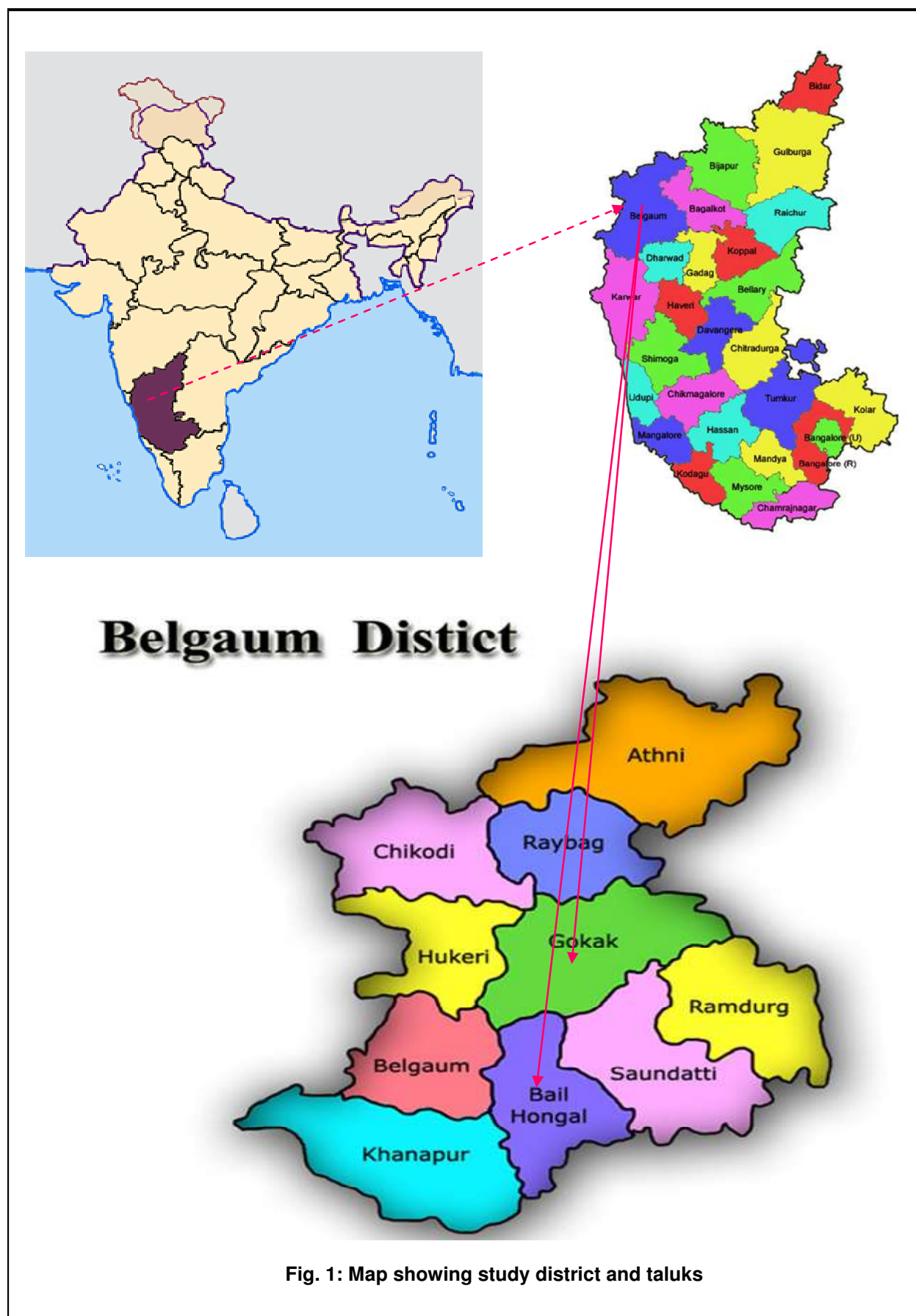


Table 2: Villages selected for the study along with the average milk procurement of the respective societies for the year 2013-14

Taluk	Village	Average daily milk procurement in litres (2013-2014)	Number of respondents
Gokak	Shindikurabet	1698	15
	Hallur	1597	15
	Khanatti	1409	15
	Munyal	1357	15
Bailhongal	Ambadagatti	587	15
	Bailur	446	15
	Holinagalapur	366	15
	Nagnur	310	15
Total	8		120

Source: Belgaum Milk Union, Belgaum

One hundred and twenty milk producers, 8 milk cooperative societies, one processor, 34 dealers and 40 consumers together formed the sample of the study.

3.2.4 Brief description of study area

Belgaum lies in the zone of cultural transition between Karnataka, Maharashtra and Goa. It has an average elevation of 751 metres (2463 feet) above sea level. Among the 27 districts of Karnataka, Belgaum is the biggest district situated in the Northwest part of the state. The district is bordered by Maharashtra state to the North, Bagalkot district in the east, Dharwad & Uttar Kannada districts in the south, Goa and Maharashtra states in the west. The area of the district is 13,415 km², which has been divided into ten blocks, and the population was 4,214,505 at the last census in 2011. As per the provisional 2011 India census, Belgaum has an average literacy rate of 78 per cent, of those literate 54 per cent are male and 46 per cent are female. The languages spoken in this district include Kannada, Marathi and English.

The topography of the district can be divided into four key zones:

1. On the western side, the district is covered with thick forests along the Western ghat ranges
2. The northern belt of the district between the Ghataprabha and Krishna rivers makes a second zone
3. The central zone of the district is defined by hills to the west and a succession of bare sandstone ranges to the east
4. The lands are more open in the southern zone of the district; here arable crops occupy the majority of the land

The major commercial crops are maize, rice, wheat, sugarcane, tobacco and cotton. There has been a 45 per cent increase in sugarcane cultivation since 1993 and currently sugarcane, tobacco and cotton account for 22 per cent of the gross cropped areas of the district. Medium and large-scale farmers own nearly 70.00 per cent of the cultivable land in the district. Agriculture is the main source of livelihood for 71.00 per cent of the district population. The city is also known as the “Sugar Bowl of Karnataka”, and the district as the “Sugar District” because of the enormous scope of its sugar cane cultivation and production facilities.

Belgaum is known for buffalo milk production, and out of Karnataka state's annual production of 13.58 lakh tonnes of milk, Belgaum contributes 3.83 lakh tonnes, or 28.00 per cent. Approximately three-quarters of the milk produced comes from buffaloes. However, pastoralists remain external to the dairy sector of the district economy; Belgaum the city has carved itself a new name as "Kunda nagari" because of its famous sweet dish, Kunda, made with milk, sugar and spices. The current livestock population comprises of 701,196 buffalo, 507,583 cattle, 902,255 sheeps and 508,776 goats (2003 livestock census).

3.3 Devices of data collection

Keeping the objectives of the study and review of literature, set of interview schedules were prepared for range of actors sampled for the study viz., producers, milk societies, processor, dealers and consumers. These interview schedules were discussed with the extension officers of Dharwad milk union before pre-testing to ensure that they addressed all the important aspects of value chain and were subsequently pre-tested with respective groups - producers and a society in Marewad village, processor, dealer and consumer in Dharwad city, all belonging to Dharwad district, a non sample area for their practicability and relevancy. In the process it was observed that some of the questions needed different forms like open end to close end or other wise and such questions were changed accordingly. Pretested and standardised interview schedules (Appendix Ia to le) were administered to respective category of respondents for final data collection.

3.4 Operationalization of the terms dairy enterprise and value chain analysis

Dairy enterprise

In the present study, it is operationally defined as an enterprise of dairy products operated by cooperative sector in Belgaum district.

Value chain analysis

Value Chain analysis was first suggested by Porter (1985) as a way of presenting the construction of value as related to end customer

Porter's value chain consists of a "set of activities that are performed to design, produce and market, deliver and support its product".

Hobbs *et al.* (2000) defines the value chain as a vertical alliance or strategic network between a number of independent business organizations within a supply chain. Thus, rather than value creation and sharing, emphasis is placed on the permanence of linkages among chain actors.

Bammann (2000) defined a value chain as the full range of activities which are required to bring a product or service from conception, through the different phases of production, transformations, and delivery to final consumers and final disposal after use. It is made up of a series of actors from inputs suppliers to producers and processors to exporters and buyers.

Value chain analysis can be viewed in a narrow or broad sense. In the narrow meaning, a value chain focuses on a single firm and includes the conception and design stage; the acquisition of inputs; production, marketing and distribution activities; and the performance of after sale services (Van den Berg *et al.*, 2009). The broad approach also comprises all backward and forward linkages, up to the level in which the raw material produced is linked to the final consumers

The livestock value chain can be defined as the full range of activities required to bring a product (e.g. live animals, meat, milk, eggs, leather, fibre, manure) to final consumers passing through the different phases of production, processing and delivery. It can also be defined as a market-focused collaboration among different stakeholders who produce and market value-added products (Kaplinsky and Morris, 2002).

Value chains are tool to describe the interrelationship between a range of actors, functional activities, service providers, customers, supporting institutions and supply chains, where governance is assessed by exploring power relations between the different sides of transactions (Herr and Muzira, 2009).

Operational definition of milk value chain analysis

Some common points emerge from the various definitions given above. Using these some common points the operational definition of value chain analysis is framed as below

Milk value chain analysis is a tool or study method to cover range of actors involved in production of products, their roles and performances and linkages between

them in the form of backward and forward supports. Range of actors includes milk producers, milk societies (milk collection units), processor (milk union), dealers and consumers.

3.5 Variables and their measurement

3.5.1 Age

It refers to the chronological age of the respondents in completed years at the time of investigation. The procedure followed by Hinge (2009) was used to categorize the respondents.

Category	Age
Young age	18-30 years
Middle age	31-50 years
Old age	Above 50 years

3.5.2 Education

Number of years of formal schooling completed by the respondents at the time of data collection was collected and used for the study. For the purpose of quantification to calculate the mean and standard error, each year of schooling was given one score. The similar procedure of grouping and scoring was followed by Pushpa (2006).

The respondents were grouped as given below

Categories	Education level
Illiterate	Do not read and write
Primary school	1 st Std. to 4 th Std
Middle school	5 th Std. to 7 th Std
High school	8 th Std. to 10 th Std
Pre-university	11 th Std. and 12 th Std
Graduate	above 12 th Std

3.5.3 Land holding

It refers to the number of acres of land possessed by the farmer. The criteria prescribed by the Karnataka Land Reforms Act 38 to 1966 (Part-B) 99 and 195-96 under sections 2 (a) 32 was used where in one acre of irrigated or garden land is equated to 2.5 acres of dry land. This conversion was used for calculating the total land holding of the producers, based on which respondents were grouped as below. The similar procedure was followed by Pushpa (2006).

Farmers categories	Landholding (ha)
Landless	0
Marginal	0.1 to 1.00 ha
Small	1.00 to 2.00 ha
Medium	2.10 to 4.00 ha
Big	>4.00 ha

3.5.4 Herd size

Data regarding type and age of livestock owned by the respondents was collected. This data was converted into adult cattle units (ACUs) using the conversion factors as suggested by Ramachandra and Sampath (2007).

Species	Age	Conversion factor
Buffalo	>2.5 years	1.14
	1.0 – 2.5 years	0.50
	< 1.0 years	0.17
Cattle	>2.5 years	1.00
	1.0 – 2.5 years	0.34
	< 1.0 years	0.11
	>1 year	0.10

Sheep/Goat	<1 year	10.03
------------	---------	-------

Producers were then categorized as those having big, medium and small herd sizes based on the mean and standard deviation of Adult Cattle units.

3.5.5 Total annual family income

Income from crops

Producers were asked to mention the income they obtained from crops for the year 2013-14. Using this information, producers were categorized according to the classification suggested by Ministry of Rural Development, Government of India notification of June, 2011. Similar procedure was followed by Taskeen (2012). The mean annual income and standard deviation were also calculated.

Categories	Annual income (Rs.)
Low income group	Upto 60,000/-
Medium income group	60,001- 1, 20,000.
High income group	Above 1, 20,000.

Income from livestock

Data regarding the income earned by the producers from the sale of milk in one year was collected. Respondents were then grouped into three categories as low, medium and high livestock income by applying mean and standard deviation. This procedure was followed by Taskeen (2012)

3.5.6 Crop residue produced

This was derived by multiplying quantity of crop residue produced by the farmers with the likely selling price reported by them as followed by Akshata (2014). The respondents were classified based on crops grown by using frequency and percentage and also average availability of crop residue for each household and cost incurred were calculated and presented in tabular form.

3.5.7 Mass media participation

This variable is operationalized as the exposure of an individual to different mass media such as news paper, farm magazine, radio, television and his degree of participation in them. The respondents were asked to indicate their level of participation as regular, occasional and never for reading, listening and viewing habits. Scores of 2, 1 and 0 were given for regular, occasional and never levels of participation for quantification. The responses so obtained for these levels were expressed in frequency and percentage as followed by Gajendra (2011).

3.5.8 Extension participation

It refers to the extent of participation of the farmers in different activities like krishimela, training program, extension meeting, group discussion *etc.* Responses were sought from the producers to 7 most relevant extension activities as regular, occasional and never. Responses were tabulated as frequency and percentage for each of the responses and presented in tabular form.

Sl. No.	Extension activities	Extent of participation		
		Regular	Occasional	Never
1.	Krishimela	2	1	0
2	Training programme	2	1	0
3.	Extension meetings	2	1	0
4.	Group discussions	2	1	0
5.	Field visits	2	1	0
6.	Agricultural exhibitions	2	1	0
7.	Study tour	2	1	0
8.	Any other, specify	2	1	0

For quantification scores of 2, 1 and 0 were given for regular, occasional and never, respectively as followed by Gajendra (2011).

3.5.9 Extension contact

Extension contact has been operationally defined as the frequency of contact of respondents with their extension personnel and extension agencies for seeking information about livestock farming. Frequency of their contact to the enlisted 6 extension workers was obtained from the respondents and was expressed as frequency and percentage. Similar procedure was followed by Gajendra (2011).

3.5.10 In milk animals

Data was elicited from the producers about kind and numbers of animals in lactating stage (milk yielding) at the time of data collection. Based on number of animals in lactating stage, producers were grouped into three categories as given below-

Particulars	Categories
Cow (Nos)	1 - 3
	3 - 5
	5 - 7
Buffalo (Nos)	1 - 2
	2 - 4
	4 - 6

Frequency and percentage of producers belonging to each of these categories were computed and presented in tabular form. Similar procedure was followed by Murthy *et al.* (2012)

3.5.11 Milk utilization pattern

Milk utilization pattern refers to the extent of milk produced at household, retained for house hold consumption, milk sold to co-operative society and milk processed for household consumption in the form of curd or ghee etc by the producers. Data for these were collected and were converted into percentages e.g what per cent of total milk

produced was retained for household consumption. Based on these percentages producers were grouped into three categories as given below -

Less than 25%

26-75% (as very few respondents fell in the group 26 to 50%)

More than 75%

For these categories percentages and frequencies were calculated. The similar procedure was followed by Murthy *et al.* (2012)

3.5.12 Benefit cost ratio of milk production

Data on cost incurred in one year by the producer (household) on crop residue, concentrated feed, labor and veterinary services to rear livestock were collected and accounted for working out the total cost of milk production per household per year. The returns were calculated by multiplying the average quantity of milk produced with the average selling price for the household. Net returns per household were derived by subtracting total returns from cost of milk production. Benefit to cost ratio was then computed by dividing the total returns with total cost. The similar procedure was followed by Murthy *et al.* (2012).

3.5.13 Volume of milk yield

Data on the maximum and minimum milk yield obtained at initial, peak and last stages of lactation of buffalo and cow was collected from the respondents. The average values as well as minimum and maximum values to indicate milk production range at each stages were computed and presented in the table.

A=Maximum quantity of milk obtained in each stage

B=Minimum quantity of milk obtained in each stage

Average milk yield obtained in each stage = $A+B/2$

The similar procedure was followed by Pushpa (2006).

3.5.14 Fat percentage in milk

It was operationally defined as per cent of fat content in the milk of a dairy animal. Data on the fat percentage of cow and buffalo milk at different stages of lactation were collected from the producers. Average fat percentages in different stages were computed and presented in tabular form along with the minimum and maximum values to present the range. Similar procedure was followed by Babu and Verma (2010).

3.5.15 Processing milk for household consumption

Data was collected from the producers about extent of milk processed as curd, butter milk and ghee for household consumption only was obtained, and expressed as frequency and percentage and presented in tabular form.

3.5.16 Value chains of different types of milk, curd and butter milk

Milk in different forms, curd and butter milk were the three products which were sold in relatively good quantity by the Belgaum cooperative dairy plant as was found from the data collected from the dealers. So value chain for these products was considered for the study. To analyse value chains for these products secondary data collected from the Belgaum milk union was used. Costs towards raw material, procurement, processing and administrative were included in production cost. Along with the production cost, costs of distribution and depreciation were accounted for total cost for each unit of production. Then it was compared with selling price and marketing margin to work out the marketing efficiency.

Details are as below

Production cost : Costs towards raw material, procurement, processing and administrative

Total cost : Production cost + Distribution cost + Depreciation cost

Selling price is as fixed by the Belgaum milk union

Marketing margin = Selling price - Total cost

Total marketing cost : Procurement cost of raw material + processing cost distribution cost

$$\text{Marketing efficiency} = (\text{Marketing cost} + \text{margin}) / \text{total marketing cost} - 1$$

The procedure followed by Babu and Verma (2010) was followed for the same.

Dealers margin: This was presented in tabular form based on the secondary data collected from the Belgaum milk union as well as from the dealers. This data was readily available.

3.5.17 Willingness of producers

Data was collected from the milk producers about their willingness to continue as a member of co-operative society and reasons for the same. For this, frequency and percentage were computed and presented in tabular form.

3.5.18 Producers' experience

A list of 10 most relevant services given by co-operative society to the producers was prepared after discussing with the cooperative society. Responses for these services from the producers was collected as very good, good, moderate and poor and these responses were expressed in frequency and percentage.

For the purpose of quantification scores of 3, 2, 1 and 0 were given for very good, good, medium and poor, respectively and total scores were used for analysis.

3.5.19 Backward services

Backward services to the producers

Backward service is operationally defined as the support/services rendered to the producers by the milk unions through the societies or any other agencies to facilitate not only higher milk production but also the production of quality milk. These services may be in the form of hardwares like feed at discounted price or in soft forms like improving skills through training programs.

Different services being rendered to the producers were listed after discussing with the officials of milk union in the interview schedule. Producers were asked to mention the number of times they had availed these services in the previous one year. Producers having availed the services were expressed in frequency and percentages.

Number of times services availed by each producer in one year were totaled, the total value of which is used for further statistical analysis.

Backward services to the dealer from the milk union in the form of training and advisory services were considered for the study. Information on these services received by the dealer was collected and expressed in frequency and percentages.

3.5.20 Role perception of producers in proper functioning of co-operative society

Most common 5 roles of producers as perceived by them for proper functioning of cooperative society were listed viz., giving right quality of milk, asking for more price for milk when production cost increases, getting quality feed for their livestock, obtaining required fodder seeds of adequate quantity and getting better education and advisory services. Responses for these as they perceive them as important role or not were obtained from the producers and expressed as frequency and percentage in tabular form.

3.5.21 Difficulties in operating milk co-operative society

Difficulties experienced by the milk cooperative society were categorised and listed in the interview schedule as difficulties related to members, facilities, financing and working environment. Difficulties were listed for the first three categories and only for the last *i.e.*, working environment question was kept open end. The responses for these were sought from secretaries of cooperative milk societies and their responses were expressed in frequency and percentages.

3.5.22 Role performed by the society

The roles of the societies were listed as distribution of fodder seeds in a year, distribution of feed bags per month, providing AI services per month in numbers, disbursement of payment in a week, number of trainings conducted in a year and other roles performed. The responses of each society for the listed roles were totaled and presented in tabular form.

3.5.23 Forward support from dealer to milk union

It is operationally defined as the working relationship of dealers with the agency *i.e.* Belgaum milk union in supporting post production activities in dairy, that is reflected through the sales of different value added products. Month wise sales of milk and milk

product were collected from each dealer. The average quantities of product sold and product value per month were computed and expressed in tabular form. The similar procedure was followed by Roger and Daniel (2004).

3.5.24 Family milk consumption by consumer

Quantity of milk purchased every day for family consumption was noted down from each consumer. They were then categorised in to 4 groups based on the extent of milk purchased as given below. Frequency and percentages for each group were presented in tabular form.

Categories	Milk purchased (l/day)
I	0.5
II	1
III	1.5
IV	2

3.5.25 Total amount spent on milk by the consumers

Data was collected from consumers about total amount spent by them on milk per month. Consumers were then grouped into 4 categories based on the minimum and maximum values in the data as given below-

Categories	Amount spent (Rs/month)
I	300-600
II	600-900
III	900-1200

IV	>1200
----	-------

For these categories frequency and percentage were computed and presented in tabular form.

3.5.26 Purchase point of packaged milk by the consumers

Information was collected from the consumers regarding their purchase point of packaged milk from dealer's point, shop, dairy booth and home delivery. For these responses, frequency and percentage were calculated and presented in tabular form.

3.5.27 Type of milk purchased by the consumers

Data was obtained from the consumer about type of milk -toned milk, double toned milk and whole milk -they purchase regularly. For the given responses, frequency and percentages were computed and presented in tabular form.

3.5.28 Mode of influence of purchase decision of the consumers

Information was elicited from the consumers about the mode by which their milk purchase decision was influenced. Media, word of mouth and agent/sales man were the responses given. For the responses, frequency and percentage were computed and presented in table.

3.5.29 Buying behaviour of the consumers for milk products

Milk products are not purchased daily. So information on frequency of purchase of milk products viz., curd, ghee, butter, pedha, kunda, panneer, khoa, icecream and cheese was elicited from the consumers. Based on the consumers responses frequency and percentage were calculated and presented.

3.5.30 Value addition to milk by the consumer at home

Information was collected from consumers about value addition to milk at home through preparations like curd, butter milk and ghee *etc.* and the responses were expressed in frequency and percentage.

3.5.31 Brand loyalty

Brand loyalty is operationally defined as consumers' commitment to a particular brand and making repeat purchases over time. It is the result of consumer behaviour and is affected by their preferences.

Data on number of years consumers are since buying milk of Nandini brand of Belgaum milk union was collected. They were also asked to give reasons for it. Consumers were then grouped into three categories as 1-5 years, 5-10 years, and 10-15 years. For these categories and for the reasons mentioned, frequency and percentages were calculated.

3.5.32 SWOT analysis

A SWOT analysis (alternatively SWOT matrix) is a structured planning method used to evaluate the strengths, weaknesses, opportunities and threats involved in a project or in a business venture.

In the present study this analysis was done for range of actors-milk producers, cooperative societies, dealers and consumers. Data on SWOT was collected by using close ended question for milk producers and for remaining actors open end questions were made use of. Each chain actors were individually interviewed and personal observations were also made. Few simple questions were also asked to obtain as many SWOT items as possible to facilitate the logical discussion. The responses which were almost similar were grouped for each actors. SWOT items for each actors were listed and respective percentages were calculated for meaningful presentation of findings.

3.5 Method of data collection, nature and source of data

Set of interview schedules pretested and standardized comprising both close ended and open ended questions for the study were used to collect the data from producers, milk societies, processor, dealers and consumers. Personal interview technique was the method employed for the study to collect primary data. Data was collected in an informal environment.

Belgaum milk union having responsible for processing milk was considered as the processor. Though interview schedule was prepared for collecting the data, much of the information as was available sourced from its secondary data sources from its three departments- administrative, marketing and processing. Arriving value chains in the study for milk types and selected products was done by using this secondary data.

3.6 Statistical tools and techniques used for the analysis of data

The appropriate statistical procedures such as frequency, percentages, mean, standard deviation, standard error and step-wise regression were employed to analyze the data. Statistical package like excel and SPSS were used for analysis.

4. RESULTS

The attempt was made through this study to understand value chain analysis in dairy enterprise. In consistence with the objectives of the study the necessary data collected were analyzed and presented under following headings-

- 4.1 Socio-economic profile of milk producers
- 4.2 Value chain mapping of farmers to end consumers
- 4.3 Documentation of value chain experiences of milk producers in cooperative dairy sector
- 4.4 Role analysis of different stakeholders in backward and forward linkages of dairy value chain
- 4.5 Final mapping of milk value chain
- 4.6 SWOT analysis of dairy value chain.

4.1 Socio-economic profile of milk producers

4.1.1 Age

More than half of the producers (57.50%) belonged to middle age group followed by 30.00 per cent belonged to old age group and only 12.50 per cent to young age group. The mean age of producers was 44.58 ± 0.025 years (Table 3).

4.1.2 Education

Almost equal per cent of producers were educated up to primary school (45.00%) and high school (45.83%). Only 9.16 per cent producers had education above high school. The mean year of schooling was 6.73 ± 0.025 years (Table 3).

4.1.3 Land holding

More than half of the producers (56.67%) had marginal size of landholdings. One fourth of the producers (25.83%) belonged to medium land holding group and 12.50 per cent of producers had small size land holding. Only one farmer (0.84%) had big landholdings. The mean land holding size was 1.31 ± 0.008 hectares (Table 3).

Table 3: Socio-economic profile of milk producers**n=120**

Particulars	Categories	Respondents	
		Frequency	Per cent
Age (years)			
Young	18-30	15	12.50
Middle	30-50	69	57.50
Old	>50	36	30.00
Mean	44.58		
SE	0.025		
Education			
Illiterate	0	0	0
Primary school	7	54	45.00
High school	10	55	45.83
PUC and above	>15	11	9.16
Mean	6.73		
SE	0.025		
Land holding (ha)			
Landless	0	6	5.00
Marginal	1	68	56.67
Small	2	15	12.50
Medium	2-4	31	25.83
Big	>4	1	0.84
Mean	1.31		
SE	0.008		
Herd size (Adult cattle units)			
Small	Mean - 0.425 x SD	62	51.66
Medium	Mean $\pm$ 0.425 x SD	38	31.67
Large	Mean + 0.425 x SD	20	16.67
Mean	3.35		
SE	0.169		
Annual income (Rs.)			
Crops			
Low	Up to 60000	25	20.83
Medium	60,000-1,20,000	42	35.00
High	Above 1,20,000	53	44.17
Mean	124429.70		
SE	581.49		
Livestock income			
Low	Mean - 0.425 x SD	50	41.67
Medium	Mean $\pm$ 0.425 x SD	38	31.67
High	Mean + 0.425 x SD	32	26.66
Mean	11831.09		
SE	73.63		

4.1.4 Herd size

Small herd size was possessed by 51.66 per cent producers, medium herd size was possessed by 31.67 per cent producers and large herd size was possessed by 16.67 per cent of producers. The mean herd size was 3.35 ± 0.0169 adult cattle units (Table 3).

4.1.5.1 Annual income from crops

The average annual income from crops of the producers was Rs. 124429 $\pm$ 581.49. One fifth of the producer (20.83%) had low annual income (upto Rs. 60000), 35.00 per cent of them had medium annual income (Rs. 60,000-1,20,000) and 44.17 per cent producers had high annual income from crops (above Rs. 1,20,000) (Table 3).

4.1.5.2 Livestock income

The average annual income from livestock was Rs. 11831.09 $\pm$ 73.63. Low livestock income was obtained by 41.67 per cent of producers followed by medium (31.67%) and high livestock income (26.66%) (Table 3).

4.1.6 Average crop residue produced by the respondents (producers) from their cropping system

Maize stover was produced by 65 per cent producers with average availability of 3.06 tons per year per farmer by incurring an average cost of Rs. 6,699.00. *Kharif* paddy straw was produced by 16.67 per cent of a producers with average availability of 4.90 tons per year per farmer by incurring average cost of Rs. 1,680.00. Wheat straw and bajra stover were produced by 4.16 per cent and 1.67 per cent producers, respectively. The average availability was 0.13 tons and 0.067 tons per year per farmer with cost incurred of Rs. 2,700.00 and Rs. 4,500.00 for wheat straw and bajra stover, respectively. Sugarcane was though produced by half of the respondents (52.50%) it tops were fed to livestock only for 45-60 days (Table 4).

4.1.7 Extent of participation of producers in mass media

Newspapers were never read by half of the respondents, occasionally read by 37.50 per cent of producers and regularly read by 13.34 per cent producers for general news items. Almost all the producers never (95.00%) used newspaper for reading

Table 4: Average crop residue produced by the producers from their cropping system**n=120**

Type of crop residue	Respondents		Avg. availability (tons/year/farmer)	Cost incurred (Rs./year/farmer)
	Frequency	Percentage		
Maize stover	78	65	3.06	6699
<i>Kharif</i> paddy straw	20	16.67	4.90	1680
Wheat straw	5	4.16	0.13	2700
Bajra stover	2	1.67	0.067	4500
Sugar cane	63	52.5	Sugarcane tops fed for 45 – 60 days	

agricultural related news items. Only four and two producers reported that they regularly and occasionally, respectively read newspaper for agricultural items.

Radio was never used for general (60.84%) and agricultural programs (85.00%). It was used occasionally to listen general (26.66%) and agricultural (8.33%) programs.

Television was regularly viewed for general (35.84%) and agricultural (35.84%) programs. It was viewed occasionally for general (64.16%) and agricultural (38.34%) programs by producers. Little above one fourth (28.83%) producers never used television to view agricultural programs (Table 5).

4.1.8 Participation of producers in extension activities

Producers participated in krishimela regularly (40.00%), occasionally (46.67%) and never (13.33%). Participation of producers in other extension activities was extremely poor as 99.16 per cent each never participated in training programs and group discussions, 96.66 per cent in agricultural exhibitions and 95.48 per cent in field visits (Table 6).

4.1.9 Extent of extension contact of producers with extension agencies

More than half of the producers (59.16%) contacted Raith Sampark Kendra (RSK) or agricultural department official whenever there was a need. Only 8.34 per cent producers visited it once in a month and 32.50 per cent never visited. Krishi Vigyan Kendra (KVK) was contacted by 17.50 per cent producers whenever there was need, 5.83 per cent once in a month and 76.67 per cent of producers never contacted. All most all the producers never contacted University of Agricultural Sciences' scientists (95.84%) and private company extension officers (95.50%). Only 4.16 per cent and 5.00 per cent of producers contacted UAS scientists and private company extension officers, respectively when there was need, meager 6.66 per cent once in a month and 11.67 per cent never contacted them. Majority of producers (81.67%) contacted veterinary officials whenever need arises, only 6.66 per cent of producers contacted once in a month where as 11.67 per cent of producers never contacted veterinary officials (Table 7).

4.2 Value chain mapping of farmers to end consumers

4.2.1 In milk animals owned by producers

Table 5: Extent of participation of producers in mass media**n=120**

SI. No.	Mass media	Frequency of use (Read / listen / View)					
		General news programs			Agricultural news programs		
		Regular	Occasional	Never	Regular	Occasional	Never
1	News paper	16 (13.34)	45 (37.50)	59 (49.16)	4 (3.34)	2 (1.66)	114 (95.00)
2	Radio	15 (12.50)	32 (26.66)	73 (60.84)	8 (6.67)	10 (8.33)	102 (85.00)
3	Television	43 (35.84)	77 (64.16)	0 -	43 (35.84)	46 (38.34)	31 (28.83)

Figures in the parenthesis indicate Percentage

Table 6: Participation of producers in extension activities**n=120**

SI No	Extension activities	Extent of participation		
		Regular	Occasional	Never
1	Krishimela	48 (40.00)	56 (46.67)	16 (13.33)
2	Training programmes	0	1 (0.84)	119 (99.16)
4	Group discussions	0	1 (0.84)	119 (99.16)
5	Field visits	0	5 (4.16)	115 (95.84)
6	Agricultural exhibitions	0	4 (3.34)	116 (96.66)

Figures in the parenthesis indicate Percentage

Nearly three fourth of producers (72.50%) owned 3-5 lactating cows. One fourth possessed 1-3 and 2.50 per cent producers owned 5-7 lactating cows. Sixty per cent producers owned 2-4, 33.34 per cent owned 1-2 and 6.66 per cent owned 4-6 lactating buffaloes. The average milk produced by the household was 9.93 ± 0.071 liter per day (Table 8).

4.2.2 Milk utilization pattern of producers

Out of the total amount milk produced, 85.84 per cent producers retained less than 25.00 per cent of milk produced and 13.32 per cent retained 26.00 to 75.00 per cent of milk produced. The average milk retained by the household was 0.87 ± 0.0035 liters per day per household. On the contrary the reverse figure were observed for quantity of milk sold as 85.84 per cent, 13.34 per cent, 0.82 per cent sold more than 75.00 per cent, 26.00 to 75.00 per cent, less than 25.00 per cent respectively, the average was 9.065 ± 0.07 liters per day per household (Table 8 and Fig. 2).

All most all the producers (98.33%) processed 25.00 per cent of milk retained either in the form of curd or butter milk. Only one producer each processed 26.00 to 75.00 per cent and more than 75.00 per cent of the milk retained. Average milk processed was 0.38 ± 0.0045 liters per day per household (Table 8 and Fig. 2).

4.2.3 Benefit cost ratio of milk production by the producers' household

The benefit cost ratio of 2.60:1.00 was obtained for milk production cost. Total cost (Rs. 38,728.40) incurred by the producers was computed by incorporating residue value (Rs. 6,575.00), feed value (Rs. 19,298.00), labor cost (Rs. 12,700.00) and veterinary cost (Rs. 155.40). The return obtained due to sale value of milk produced was Rs. 1,00,795.95 with annual net returns of Rs. 62,067.55 (Table 9).

4.2.4 Volume of milk yield obtained by the producers

The average, maximum, minimum milk yield obtained by the producers in a day were 7 liters, 12 liters, 2 liters in peak season; 5 liters, 8 liters, 2 liters in initial stage; 4.25 liters, 7.5 liters, 1 liter in last stage by cows, respectively. The daily average, maximum and minimum milk yield were 4.5 liters, 6 liters, 3 liters in peak season; 3.5 liters, 5 liters, 2 liters in initial stage; 3 liters, 5 liters, 1 liter in last stage by buffaloes, respectively (Table 10).

Table 7: Extent of extension contact of producers with extension agencies**n=120**

SI No	Extension workers	Frequency of contact		
		Once in a month	Whenever Need	Never
1	RSK/Agril dept officials	10 (8.34)	71 (59.16)	39 (32.50)
2	KVK officers	7 (5.83)	21 (17.50)	92 (76.67)
3	UAS scientists	-	5 (4.16)	115 (95.84)
4	Private companies' extension officers	-	6 (5.00)	114 (95.00)
5	Veterinary officials	8 (6.66)	98 (81.67)	14 (11.67)

* No response for once in a week and fortnight contact categories

Table 8: Milking animals owned, milk production and utilization pattern of producers**n=120**

Particulars	Categories	Respondents	
		Frequency	Percentage
In milk animals			
Cow (Nos)	1-3	30	25.00
	3-5	87	72.50
	5-7	3	2.50
Buffalo (Nos)	1-2	40	33.34
	2-4	72	60.00
	4-6	8	6.66
Average milk produced (l/day/household) ±SE	9.93±0.017		
Milk utilization pattern			
Milk retained (Per cent of production)	<25%	103	85.84
	26-75%	16	13.32
	>75%	1	0.84
Average milk retained (l/day/household) ±SE	0.87±0.0035		
Milk sold (Percentage sold)	<25%	1	0.82
	26-75%	16	13.34
	>75%	103	85.84
Average milk sold (l/day/household) ±SE	9.065±0.07		
Milk processed (Percentage retained)	<25%	118	98.34
	26-75%	1	0.83
	>75%	1	0.83
Average milk processed (l/day/household) ±SE	0.38±0.0045		

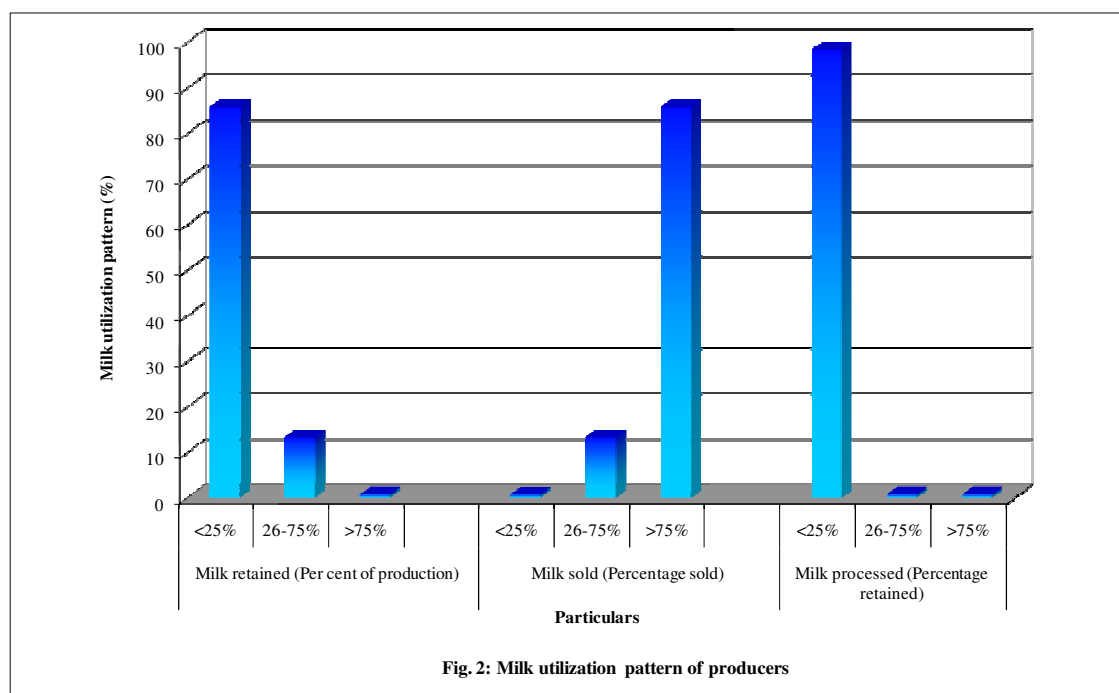


Table 9: Benefit cost ratio of milk production of producers (Rs./year)**n=120**

Particulars	Average
Cost incurred	
a. Residue value	Rs. 6575.00
b. Feed value	Rs. 19298.00
c . Labor cost	Rs. 12700
d. Veterinary services	Rs. 155.40
e. Cost of production (a+b+c+d) (Rs./year)	Rs. 38728.4
Returns	
f. Milk produced (l/day/household)	9.93
g. Average selling price (Rs./litre)	27.81
h. Returns (Rs./year)	Rs. 100795.95
Net returns (h-e) (Rs./year)	Rs. 62067.55
B:C Ratio	2.60 : 1.00

4.2.5 Fat percentages in the milk obtained by the producers

Average fat per cent in cow milk varied from 4.57 ± 0.0043 per cent, 4.78 ± 0.005 per cent, 5.24 ± 0.0047 per cent respectively, for initial, peak season, last stages. In buffalo milk average fat per cent in initial stage was 6.74 ± 0.0061 per cent, during peak season it was 7.10 ± 0.0064 per cent and last stage it was 7.44 ± 0.0068 per cent (Table 11).

4.2.6 Percentage of producers processing milk for house hold consumption only

Curd was prepared regularly by 98.83 per cent producers for family use. More than half (50.83%) producers reported that they prepared butter milk for family use was prepared. Only 2.50 per cent respondents prepared ghee for family use (Table 12).

4.2.7 Value chains of different types of milk of Belgaum co-operative dairy plant (Processor)

In all the products viz, toned milk, homogenized toned milk (HTM), homogenized cow milk (HCM) and shubham raw material cost accounted for 73.00 per cent, procurement cost to the extent of 3.00 per cent, processing cost 7.00 per cent together forming 83.00 per cent production cost. Distribution cost slightly varied from 7.75 per cent of the total cost for toned milk, 7.85 per cent for HTM, 8.28 per cent for shubham and 8.31 per cent for HCM. Though the total cost remains all most same for toned (Rs. 29.52), HTM (Rs. 29.55), HCM (Rs. 29.64) and shubham (Rs. 29.69). The selling price for three types of milk fixed were Rs. 30.00, Rs. 31.00, Rs. 34.00 and Rs. 36.00 respectively, because of this the marketing margin was Rs. 6.31 for shubham, Rs. 4.36 for HCM, Rs. 1.45 for HTM and Rs. 0.48 for toned milk. Total marketing cost and margin was Rs. 11.77, Rs. 9.77, Rs. 6.77, Rs. 5.77 for shubham, HCM, HTM, toned. milk respectively. The marketing efficiency thus obtained was highest for shubham 1.15 followed by HCM (Rs. 0.81), HTM (Rs. 0.27) and toned milk (0.09) (Table 13).

4.2.8 Value chain of curd for co-operative dairy plant

Curd of 200 g and 500 g were taken for value chains analysis. Raw material cost for 200 g and 500g packs was same (Rs. 22.53) with the percentage share to total cost was 79.62 per cent and 81.34 per cent, respectively. Processing cost was Rs. 5.77 and Rs. 5.17 for 200 g and 500 g packs with 20.38 per cent and 18.66 per cent share to total cost. Total cost was Rs. 28.30 for 200 g curd pack and Rs. 27.70 for 500 g curd pack. Selling

Table 10: Volume of milk yield obtained by the producers

n=120

Particulars	Milk production (l/day)		Avg milk yield (l/day)
	Maximum	Minimum	
Cow			
Initial stage	8	2	5
Peak season	12	2	7
Last stage	7.5	1	4.25
Buffalo			
Initial stage	5	2	3.5
Peak season	6	3	4.5
Last stage	5	1	3

Table 11: Fat percentages of milk obtained by the producers

n=120

Particulars	Fat Percentage	
	Average	SE
Cow		
Initial stage	4.57	0.0043
Peak season	4.78	0.005
Last stage	5.24	0.0047
Buffalo		
Initial stage	6.74	0.0061
Peak season	7.10	0.0064
Last stage	7.44	0.0068

Table 12: Percentage of producers processing milk for household consumption only

n=120

Particulars	Frequency	Percentage
Curd	109	90.83
Butter milk	67	55.83
Ghee	3	2.50

price was Rs. 45.00 and Rs. 36.20 respectively for 200 g and 500 g curd packs. Retailers' margin for this product was Rs. 3.75 for 200 g and Rs. 2.00 for 500 g packs. Contributions, that is the final amount remained with the milk union, of Rs. 12.95 (200 g) and Rs. 6.30 (500 g) were allocated that lead to Rs. 2.59 (200g) and Rs. 3.15 (500g) on per packet basis (Table 14).

4.2.9 Value chain of butter milk for co-operative dairy plant

Cost of raw material was Rs. 23.21/l for both sweet and masala butter milk with a percentage share to total cost was 44.80 per cent and 90.21 per cent respectively. Processing cost was Rs. 28.40/l (sweet) and Rs. 2.52/l (masala) accounting for 50.20 per cent and 9.79 per cent, respectively. Total cost was Rs. 51.61/l and Rs. 25.73/l for sweet and masala butter milk, respectively. Yield obtained was 3 liter and 4 liter for sweet and masala butter milk, respectively. Cost of butter milk per liter was Rs. 17.20/l (sweet) and Rs. 6.43/l (masala). Packaging cost was Rs. 1.50 for sweet and Rs. 1.20 for masala butter milk. Selling price was Rs. 40.00/l and Rs. 25.00/l for sweet and masala butter milk. Contribution of Rs. 21.30/l (sweet) and Rs. 17.07/l (masala) were allocated that lead to Rs. 4.26 (sweet) and Rs. 3.41 (masala) on per 200 ml packets basis (Table 15).

4.2.10 Dealers margin for value added products of milk and milk products

Results presented in Table 16 indicate that dealers margin was highest for Shubham (Rs. 1.52) followed by HTM (Rs. 1.44), HCM (Rs. 1.28) and toned milk. Rs. 1.20) among milk types. Dealers margin was Rs. 4.00 for 500 g curd pack and Rs. 1.50 for 200 g curd pack. Lassi attracted dealers margin of Rs. 2.00 and Rs. 3.00 for plain and mango flavor. Masala butter milk and masala butter milk tetra attracted Rs. 0.75 and Rs. 1.50 dealers margin, respectively. The dealers price and maximum retail price for the products are toned milk (Rs. 28.80, Rs. 30.00), HTM (Rs. 34.56, Rs. 36.00), HCM (Rs. 30.72, Rs. 32.00), Shubham (Rs. 36.48, Rs. 38.00) all for 1 litre packs, curd-200 g (Rs. 8.50, Rs. 10.00), curd-500 g (Rs. 36.00, Rs. 40.00), lassi plain-200 ml (Rs. 8.00, Rs. 10.00), lassi mango-200 ml (Rs. 12.00, Rs. 3.00), masala butter milk-200 ml (Rs. 4.25, Rs. 5.00) and masala butter milk tetra-200 ml (Rs. 8.50, Rs. 10.00).

4.3 Documentation of value chain experiences of milk producers in cooperative dairy sector

Table 13: Value chains of different types of milk of Belgaum co-operative dairy plant (Per l or Kg)

Sl. No.	Particulars	Toned milk (3.0/8.5)	HTM* (3.1/8.5)	HCM** (3.5/8.5)	Shubham (4.6/8.5)
1	Raw material cost (Rs.)	21.78 (73.78)	21.78 (73.70)	21.78 (73.48)	21.78 (73.35)
2	Procurement cost of raw material / unit (Rs.)	0.89 (3.01)	0.89 (3.01)	0.89 (3.00)	0.89 (2.99)
3	Processing cost / unit (Rs.)	2.11 (7.14)	2.11 (7.14)	2.11 (7.11)	2.11 (7.10)
4	Administrative cost / unit (Rs.)	2.28 (7.72)	2.28 (7.71)	2.28 (7.69)	2.28 (7.67)
5	Production cost / unit (1+2+3+4) (Rs.)	24.78 (83.94)	24.78 (83.85)	24.78 (83.60)	24.78 (83.46)
6	Distribution cost / unit (Rs.)	2.29 (7.75)	2.32 (7.85)	2.41 (8.31)	2.46 (8.28)
7	Depreciation cost (10% p.a) (Rs.)	0.17	0.17	0.17	0.7
8	Total cost / unit (Rs.) (5+6+7)	29.52	29.55	29.64	29.69
9	Selling price / unit (Rs.)	30.00	31.00	34.00	36.00
10	Marketing margin (Rs.) (9-8)	0.48	1.45	4.36	6.31
11	Total marketing cost (Rs.) (2+3+6)	5.29	5.32	5.41	5.46
12	Marketing cost and margin (Rs.) (10+11)	5.77	6.77	9.77	11.77
13	Marketing efficiency [(12/11) -1]	0.09	0.27	0.81	1.15

***Homogenized toned milk **Homogenized cow milk**

Figures in the parenthesis indicate percentage

Table 14: Value chains of curd for co-operative dairy plant

SI No	Particulars	Curd	
		200 g	500 g
1	Raw materilas cost / kg (Rs.)	22.53 (79.62)	22.53 (81.34)
2	Processing cost/ kg (Rs.)	5.77 (20.38)	5.17 (18.66)
3	Total cost of production (Rs./kg) (1+2)	28.30 (100%)	27.70 (100%)
4	Selling price / kg (Rs.)	45.00	36.20
5	Retailers margin (Rs.)	3.75	2.00
6	Contribution* / kg (Rs.)	12.95	6.30
7	Contribution / packet (Rs.)	2.59	3.15

Figures in the parenthesis indicate Percentage

*Contribution=Selling price-total cost of production-retailers margin. Contribution refers to final amount remained with milk union

Table 15: Value chains of butter milk for co-operative dairy plant (per l or kg)

Sl. No.	Particulars	Butter milk (l)	
		Sweet	Masala
1	Raw materials cost/l (Rs.)	23.21 (44.80)	23.21 (90.21)
2	Processing cost /l (Rs.)	28.40 (55.20)	2.52 (9.79)
3	Total cost of production/l (Rs.) (1+2)	51.61	25.73
4	Yield (l)	3	4
5	Cost of butter milk per liter	17.20	6.43
6	Packaging cost	1.50	1.20
7	Total cost (Rs.) (4+5) per liter	18.70	7.93
8	Selling price (Rs./l)	40.00	25.00
9	Contribution / l (8-7) (Rs.)	21.30	17.07
10	Contribution / Packet (200 ml) (Rs.)	4.26	3.41

Figures in the parenthesis indicate Percentage

*Contribution=Selling price-total cost of production-retailers margin. Contribution refers to final amount remained with milk union

Table 16: Dealers margin for value added products of milk and milk products

Milk and Milk products	Quantity	Dealers price (Rs.)	Dealers margin (Rs.)	M.R.P
Toned milk	1 (l)	28.80	1.20	30
Homogenized toned milk	1 (l)	34.56	1.44	36
Homogenized cow milk	1 (l)	30.72	1.28	32
Shubham (STD)	1 (l)	36.48	1.52	38
Curd	200gm/PKT	8.50	1.50	10
Curd	500gm/kg	36	4	40
Lassi	200ml/PKT	8	2	10
Mango lassi	200ml/PKT	12	3	15
Masala butter milk	200ml/PKT	4.25	0.75	5
Masala butter milk Tetra	200ml/PKT	8.50	1.50	10

4.3.1 Willingness of producers to continue as a member of milk co-operative society

Cent per cent of producers expressed their willingness to continue as a member of milk cooperative societies of their villages. Large majority (93.34%) expressed correct payment as the reason. Half of the producers expressed that assured market (50.84%) was the reason. Availability of quality feed (7.50%), advisory services (5.83%) and other like opportunity for learning and loan availability etc (1.75%) were the reasons given by small number of producers (Table 17).

4.3.2 Producer's experiences of services rendered by co-operative society

All the producers expressed payment at regular interval as very good experience. Fairness of quality of milk testing was mentioned as very good by 99.17 per cent and good by 0.83 per cent producers. AI services at right time was experienced as very good (86.67%), good (11.67%), moderate and poor (0.83% each). Fifteen per cent of producers rated distribution of feed at discounted price as poor while 65.83 per cent experienced it as very good and 19.17 per cent as good service. Quality of the feed received was mentioned as very good and good (41.66% each), moderate (6.68%) and poor (10.00%) by the producer. Half of the producers (52.50%) mentioned that experience of immediate veterinary service as moderate while 18.30 per cent, 15.83 per cent and 13.34 per cent as very good, good and poor, respectively. Opportunities to participate in trainings and demonstrations were rated as very good (2.50%), good (1.66%), moderate (66.67%) and poor (29.17%) by the producers. Half of the producers (50.84%) expressed supply of fodder seed of desired type as moderate and 45.84 per cent as poor. Only 2 producers each (1.66% each) expressed it as very good and good. Facilitation for bank linkage to obtain credit was expressed as moderate and poor by 47.50 per cent each producers, very good by only 1.66 per cent and good by 3.34 per cent producers. Continuous and regular advisory services were expressed as very good (0.83%), good (4.17%), moderate (76.66%) and poor (18.34%) experience by the producer (Table 18, Fig. 3).

4.4 Role analysis of different stakeholders in backward and forward linkages of dairy value chain

Table 17: Willingness of producers to continue as a member of milk co-operative society**n=120**

Particulars	Frequency	Per cent
Has willingness to continue	120	100
Reasons		
Correct payment	112	93.34
Assured market	61	50.84
Quality feed available	9	7.50
Advisory services	7	5.83
Others*	3	1.75

*includes opportunity for learning and loan availability



Plate 1. Milk collection by the society



Plate 2. Mechanized milk testing



Plate 3. Computing payment amount for the day

4.4.1 Backward services obtained by the producers from the co-operative society in a year

All the producers in previous year availed artificial insemination service to their livestock from the milk cooperative society. Feeds at discounted price were obtained from the milk cooperative society by 88.33 per cent producers. Three fourth (75.84%) of producers availed veterinary services, 54.17 per cent availed cooperative society help to get linkage with the bank, 51.67 per cent got fodder seeds and 34.10 per cent availed advisory services for selection of suitable breed. Only 17.50 per cent producers had opportunity to participate in exposure visits and 9.16 per cent in training on dairying (Table 19).

4.4.2 Role perception of producers in proper functioning of cooperative milk society

Producers identified their five roles in proper functioning of cooperative milk society. All the producers felt that it is their responsibility to give right quality of milk to the society. Almost all of them (98.34%) felt that for more price for the milk in accordance with rise in livestock rearing cost is also one of their important role. Nearly three fourth (71.67% and 67.5%) expressed that obtaining quality feed and fodder seeds of adequate quantity, respectively as their roles. One third of them (33.34%) expressed getting better education and advisory services on livestock rearing as another role to ensure proper functioning of cooperative milk society (Table 20).

4.4.3 Difficulties in operating milk cooperative societies as perceived by their secretaries

Difficulties of milk cooperative societies were analyzed under four heads as difficulties with respect to members, facilities, financing and working environment. However, only two difficulties were expressed by them. Irregularity in carrying milk to the society by members was the main difficulty expressed by 62.50 per cent milk cooperative societies. However 12.50 per cent of them viewed lack of computerization as the difficulty with regard to the facilities extended to the cooperative society by the milk union (Table 21).

4.4.4 Roles performed by societies for effective functioning of milk co-operative societies

Ten thousand kilos of seeds of fodder maize were distributed by Ambadagatti society followed by 200 kg by Bailur and 30 kg by Holinagalapura societies of Bailhongal

Table 18: Producer's experiences of services rendered by co-operative society**n=120**

Sl. No.	Services	Experiences			
		Very good	Good	Moderate	Poor
1	Payment at regular interval	120 (100)	0 -	0 -	0 -
2	Fairness in quality of milk testing	119 (99.17)	1 (0.83)	0 -	0 -
3	AI services at right time	104 (86.67)	14 (11.67)	1 (0.83)	1 (0.83)
4	Distribution of feed at discounted price	79 (65.83)	23 (19.17)	0 -	18 (15.00)
5	Quality of the feed received	50 (41.66)	50 (41.66)	8 (6.68)	12 (10.00)
6	Immediate veterinary assistance	22 (18.33)	19 (15.83)	63 (52.50)	16 (13.34)
7	Participation in training and demonstrations conducted	3 (2.50)	2 (1.66)	80 (66.67)	35 (29.17)
8	Supply of fodder seed of desired type	2 (1.66)	2 (1.66)	61 (50.84)	55 (45.84)
9	Facilitates for bank linkage to obtain credit	2 (1.66)	4 (3.34)	57 (47.50)	57 (47.50)
10	Continuous and regular advisory services	1 (0.83)	5 (4.17)	92 (76.66)	22 (18.34)

Figures in parenthesis indicate percentages

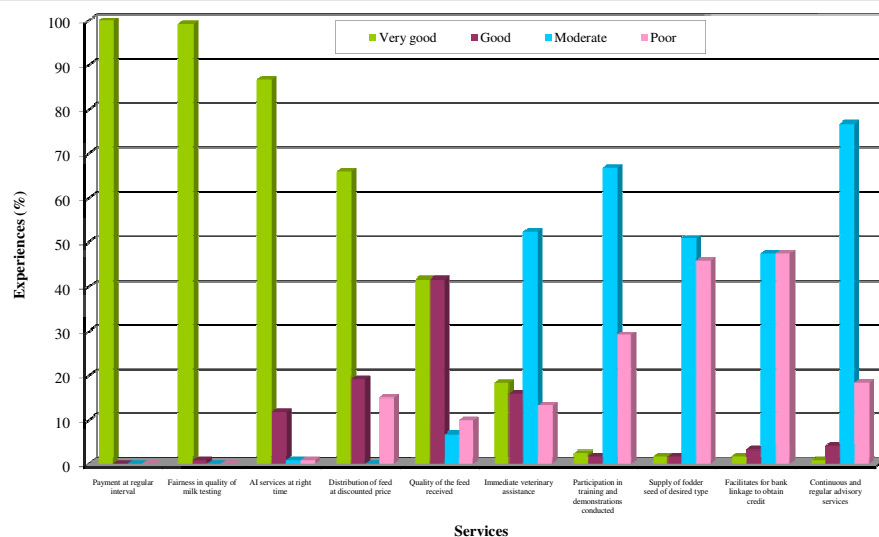


Fig. 3: Producer's experiences of services rendered by co-operative society

Table 19: Backward services obtained by the producers from the co-operative society in a year**n=120**

Services	Respondents	
	Frequency	Percentage
Availing artificial insemination services	120	100
Obtaining feed at discounted price	106	88.33
Availing veterinary services	91	75.84
Helped to get linked with the bank	65	54.17
Getting fodder seeds	62	51.67
Availing advisory services on selection of breeds	41	34.10
Opportunity to participate in exposure visits	21	17.50
Opportunity to participate in training (Dairying)	11	9.16



Plate 4. Feed to the producers



Plate 5. A-I service to the livestock of producers

taluk in the previous one year. Distribution of fodder maize seeds was comparatively very low for previous year as only 25 kg and 20 kg were distributed by Shindikurbet and Munyal societies of Gokak taluk, respectively. An average of 1200 bags of feeds were distributed monthly by Bailur, 100 bags by Ambadagatti, 65 bags by Nagnur and 30 bags by Holinaglapura societies of Bailhongal taluk. On the contrary large quantities of feed bags were distributed monthly by societies of Gokak highest by Hallur society (3000 bags/month) followed by 2900 bags by Kanatti society, 2800 bags by Shindikurbet and 2500 bags by Munyal societies. Monthly on an average 180 AI services were extended by Ambadagatti society followed by 150 Nagnur, 80 Bailur and 50 Holinaglapura societies of Bailhongal. Similarly, Munyal (180), Hallur (160), Shindikurbet (150) and Kanatti (109) societies of Gokak extended AI services monthly. Average weekly disbursement of payment in Bailhongal taluk was highest for Ambadagatti (Rs. 226000.00) followed by Bailur (Rs. 175000.00), Nagnur (Rs. 100000.00) and Holinaglapur (Rs. 70517.00). The same in Gokak taluk was highest for Munyal (Rs. 206895.00) followed by Kanatti (Rs. 189562.25), Hallur (Rs. 152768.00) and Shindikurbet (Rs. 60525.50). Trainings on dairying were conducted by Bailur, Ambadagatti, Nagnur societies of Bailhongal and Kanatti society of Gokak. Training in last year on fodder crops was conducted by Bailur society, on livestock keeping by Holinaglapura of Bailhongal, hygienic and clean milk production and storing by Shindikurbet, account keeping using software by Hallur, computer training by Munyal societies of Gokak. Besides societies also performed other roles like collecting donations for social work (Bailur), participating in Amrut Yojane of Karnataka state government (Holinaglapur), conducting animal exhibitions (Ambadagatti), organizing cattle and veterinary camps and giving bonus to members (Hallur), creation of bulk milk cooler facility (Kanatti) and organizing veterinary camp by Munyal society (Table 22).

4.4.5 Forward business support extended by dealers to milk unions

As given in the Table 21 average monthly quantity of 3164.59 litres of full cream milk was procured by the dealer the procurement value of which was Rs. 115444.41 and sale value was Rs. 120870.87 with the average difference of Rs. 5426.46. Standard milk was sold an average of 3141 litres every month with the difference of Rs. 4327.52 between the procurement (108750.6) and sale (Rs. 113078.12) values. This was followed by toned milk, the average quantity procured was 1691.7 litres with procurement value of Rs. 47383.78 and sale value of Rs. 48640.86 the difference of which was Rs. 1257.08. Other products in line which were sold on monthly basis with their average quantity,

Table 20: Role perception of producers in proper functioning of cooperative milk society as perceived by them

n=120

Roles	Respondents	
	Frequency	Percentage
a. Giving right quality of milk	120	100
b. Demand for more price for milk	118	98.34
c. Demanding quality feed for their livestock	86	71.67
d. Demanding required fodder seeds of adequate quantity	81	67.5
e. Demanding better education and advisory services on livestock rearing	40	33.34

Table 21: Difficulty in operating milk society**n=8**

Difficulties	Societies	
	Frequency	Percentage
A. Difficulty with respect to members		
1. Irregular carrying of milk to the society	5	62.5
2. Any operation problems	-	-
B. Difficulty with respect to facilities		
1. Lack of computerization	1	12.5
2. Lack of mechanization	-	-
3. Lack of laboratory equipments	-	-
C. Difficulty with respect to financing		
1. Irregular payment to the members	-	-
2. Any other specify	-	-
D. Difficulty with respect to working environment	-	-

procurement value, sale value and difference were masala butter milk (78.38 l, Rs. 333.11, Rs. 391.89, Rs. 58.78), sweet lassi (64.86 l, Rs. 518.92, Rs. 648.65, Rs. 129.73), curd (33.91 l, Rs. 7477.7, Rs. 8797.3, Rs. 699.73) and others like pedha, badam milk etc (12.35 kg, Rs. 994.19, Rs. 1107.36, Rs. 113.16).

4.4.6 Backward support received by dealers from milk unions

Totally six dealers attended trainings organized by milk union to dealers in previous year. Of these, 13.89 per cent each dealers attended trainings on management and marketing topics, 11.12 per cent on cold storage and 8.34 on hygiene in handling milk. Twenty one dealers received advisory services in last one year. Of these 16.67 per cent each availed advisory service on storage of products and sweet preparation, 13.89 per cent each on marketing and management of shop; and 5.56 per cent each on hygiene and pricing aspects (Table 24).

4.4.7 Consumer response for Nandini milk and milk products as perceived by dealers

Almost 64.00 per cent of dealers felt that their consumers rate nandini milk and milk products as excellent. Only 9.00 per cent, 2.78 per cent and 8.34 per cent dealers felt that consumers rate products as very good, good and average, respectively (Table 25 and Fig. 4).

4.4.8 Basic characteristics of milk consumers

Majority of the consumers (70.00%) belonged to old age group followed by 25.00 per cent to middle and 5.00 per cent to young age groups. The mean age of the consumers was 41.85 ± 0.24 years. Only 2.50 per cent consumers studied up to primary school, followed by 32.50 per cent studied up to high school and 55.00 per cent studies beyond high school. The mean years of formal schooling of consumers were 12.58 ± 0.073 . Half of the consumers' (55.00%) family takes 1 liter milk daily. Only 12.50 per cent consumers reported that their family consumes 2 liters of milk daily. Half litre milk consumption by the family every day was reported by 15.00 per cent consumers and 1.5 liters milk consumption by the family was reported by 17.50 per cent consumers. Correspondingly 7.50 per cent consumers reported that monthly they spend an amount between Rs. 300-600 and 20 per cent between Rs. 600-900. More than half of the consumers (57.50%) spent between Rs. 900-1200 and only 15.00 per cent consumers

Table 22: Role performed by societies for effective functioning of milk co-operative societies

Particulars	Bailhongal societies (n=4)				Gokak societies (n=4)			
	Bailur	Holinaglapura	Ambadagatti	Nagnur	Shindikurbet	Hallur	Kanatti	Munyal
Distribution of fodder seeds kg/yr Fodder maize	200	30	10000	-	25	-	-	20
Distribution of feeds (bag/month)	1200	30	100	65	2800	3000	2900	2500
Providing AI services (Nos/month)	80	50	180	150	150	160	109	180
Disbursing payments weekly (Rs.)	175000	70517	226000	100000	60525.50	152768	189562.25	206895
Conducting training in a year	Fodder Dairying	Livestock keeping	Dairying	Dairying	Hygienic and clean milk production and storing	Account keeping using software	Dairying	Computer training
Any other	Donation for social work	Amruta yojane,	Animal exhibitions	-	-	Cattle camp, Veterinary camp, Bonus to members	Bulk milk cooler-3000ltr capacity	Veterinary camp

Table 23: Forward business support extended by dealers to milk unions**n=36**

Product type	Avg. qty procured l/month	Avg. procured value Rs. /month	Avg. sale value Rs. /month	Difference Rs. /month
Full Cream Milk	3164.59	115444.41	120870.87	5426.46
Standard Milk	3141	108750.6	113078.12	4327.52
Tonned Milk	1691.7	47383.78	48640.86	1257.08
Masala butter milk	78.38	333.11	391.89	58.78
Sweet lassi	64.86	518.92	648.65	129.73
Curd	33.91	7477.7	8797.3	699.73
Others* (kg)	12.35	994.19	1107.36	113.16

(*includes peda, Badam milk, Butter, Ice cream, Ghee, Kunda etc.)

Table 24: Backward support received by dealers from milk unions**n=36**

Particular	Respondents	
	Frequency	Percentage
Training given by KMF	6	16.67
Training issues		
a. Management	5	13.89
b. Marketing	5	13.89
c. Cold storage	4	11.12
d. Hygiene	3	8.34
Advisory services	21	58.34
Advisory aspects		
a. Storage of products	6	16.67
b. Sweet preparation	6	16.67
c. Marketing aspects	5	13.89
d. Management of shop	5	13.89
e. Hygiene	2	5.56
f. Rating aspects	2	5.56

spent above Rs. 1200 every month on milk. Half of the consumers (52.50%) purchased milk from dealer's point, followed by 27.50 per cent from dairy booth and 5.00 per cent from other shops. However 15.00 per cent consumers resorted to home delivery of milk packets. Toned milk was purchased by 57.50 per cent consumers and double toned milk by 42.50 per cent consumers. Purchase decisions were influenced by media for 82.50 per cent consumers, word of mouth for 40.00 per cent consumers and 5.00 per cent through sales agents (Table 26).

4.4.9 Consumer's buying behavior for milk products

Curd was purchased daily by 80.00 per cent consumers, ghee was purchased monthly by 90.00 per cent and fortnightly by 2.50 per cent consumers and butter was purchased monthly by 12.50 per cent consumers. Monthly purchase of pedha was made by 10.00 per cent and fortnightly by 2.50 per cent consumers. Kunda was purchased monthly by 7.50 per cent consumers; paneer was purchased monthly by 10 per cent and weekly by 5.00 per cent consumers. Khoa, an ingredient used to prepare other sweets was purchased monthly by 12.50 per cent and fortnightly by 2.50 per cent consumers. Ice-cream was purchased weekly by 7.50 per cent, fortnightly and monthly by 5.00 per cent each consumers. Five per cent each consumer purchased cheese monthly and fortnightly (Table 27).

4.4.10 Value addition to milk by consumer at home

More than half of consumers (65.00%) added value to milk by preparing curd, less than half (40.00%) through butter milk preparation, 12.50 per cent in the form of ghee, 10.00 per cent by preparing other products (kheer and khoa) and butter by 5.00 per cent consumers. However only 12.50 per cent expressed that milk products were not being prepared by them (Table 28).

4.4.11 Brand loyalty of consumers to nandini products

One fifth (20.00%) consumers expressed brand loyalty to Nandini from 1 to 5 years and 65.00 per cent had brand loyalty between 5 to 10 years. Only 15.00 per cent consumers' brand loyalty was for 10 to 15 years. Reasons for exhibiting brand loyalty as per the consumers' response were low price of the milk (75.00%), assured quantity

Table 25: Consumer response for Nandini milk and milk products as perceived by dealers**n=36**

Responses	Respondents	
	Frequency	Percentage
Excellent	23	63.88
Very good	9	9.00
Good	1	2.78
Average	3	8.34

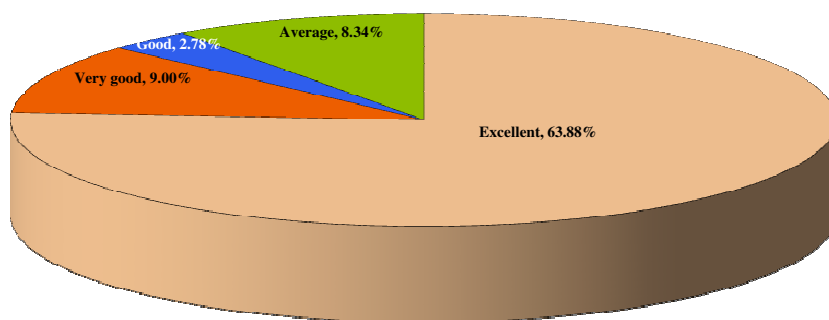


Fig. 4: Consumer response for Nandini milk and milk products as perceived by dealers

Table 26: Basic characteristics of milk consumers

n=40

Particulars	Categories	Respondents	
		Frequency	Percentage
Age			
Young	18-30	2	5.00
Middle	30-50	10	25.00
Old	>50	28	70.00
Mean	41.85		
SE	0.24		
Education			
Illiterate	0	0	0
Primary school	7	1	2.50
High school	10	13	32.50
PUC and above	>15	22	55.00
Mean	12.58		
SE	0.073		
Family milk consumption/day (l)			
	0.5	6	15.00
	1	22	55.00
	1.5	7	17.50
	2	5	12.50
Average	1.14		
SE	0.011		
Total amount spent on milk/month (Rs.)			
	300-600	3	7.50
	600-900	8	20.00
	900-1200	23	57.50
	>1200	6	15.00
Purchase point for packaged milk			
	Dealer's point	21	52.50
	Other shop	2	5.00
	Dairy booth	11	27.50
	Home delivery	6	15.00
Type of milk			
	Toned milk	23	57.50
	Double toned milk (Shubham)	17	42.50
Purchase decision influenced* (*more than one answer was given)	Media	33	82.50
	Word of mouth	16	40.00
	Agent / sales man	2	5.00

(45.00%), good quality milk (42.50%), popular brand (12.50%) and hygiene maintained by 7.50 per cent consumers (Table 29).

4.5 Final mapping of milk value chain

Based on the information generated by the study, an attempt has been made to diagrammatically map the milk value chain focusing on backward and forward services. This map is represented in Fig. 5, bolder the lines stronger the link and vice versa. In the figure, center line represents different steps followed by milk union to reach milk producers and consumers. Right side of the figure represents forward support which is mainly in the form of payments. It was found that at every stage payment is regular as indicated with bold lines. Left side of the figure has representation of backward services. AI services, veterinary services to producers from society, animal health care like immunization from milk union to producers, provision of balanced cattle feed to producers, employment generation in each society, credit and cold storage to dealers were the strong backward services. Extension services to dealers, feedback from consumers to dealers and balanced cattle feed to producers from society indicated moderate level of backward services. Extension services to producers from milk union, provision of fodder seeds to milk producers and training to dealers were the weak backward services noticed in the map.

4.6 Step wise regression analysis of amount of milk sent to cooperative societies versus with selected variables; predominating variables retained at the last step

Table 30 presents the stepwise regression analysis of amount of milk sent to cooperative societies with selected variables. It has been found that the predominating predictors viz., total milk production, milk retained for family, annual income from livestock, backward services availed, herd size and price of the milk have been retained at the last step of screening. The R^2 being 0.998, it is to infer that all the above 6 predominating predictors have explained 99.8 per cent variance embedded with the predicted variable amount of milk sent to cooperative societies.

4.7 SWOT analysis of dairy value chain

Strengths, weaknesses, opportunities and threats of producers, cooperative societies, dealers and consumers were presented in Table 31. Six strengths, 5

Table 27: Consumer's buying behavior for milk products**n=40**

Milk products	Daily	Weekly	Fortnight	Monthly
Curd	32 (80.00)	0 -	0 -	0 -
Ghee	0 -	0 -	1 (2.50)	36 (90.00)
Butter	0 -	0 -	0 -	5 (12.50)
Pedha	0 -	0 -	1 (2.50)	4 (10.00)
Kunda	0 -	0 -	0 -	3 (7.50)
Paneer	0 -	2 (5.00)	0 -	4 (10.00)
Khoa	0 -	0 -	1 (2.50)	5 (12.50)
Ice cream	0 -	3 (7.50)	2 (5.00)	2 (5.00)
Cheese	0 -	0 -	2 (5.00)	2 (5.00)

(Figure in parenthesis indicates the percentage)

Table 28: Value addition to milk by consumer at home**n=40**

Particulars	Respondents	
	Frequency	Percentage
Products prepared (n=35)		
Curd	26	74.28
Butter milk	16	45.71
Ghee	5	14.28
Other products (Kheer, khoa)	4	11.42
Butter	2	5.71
None	5	12.50

Table 29: Brand loyalty of consumers to nandini products**n=40**

Particulars	Categories	Respondents	
		Frequency	Percentage
Brand loyalty (years)	1-5	8	20.00
	5-10	26	65.00
	10-15	6	15.00
Reasons	Low price for milk	30	75.00
	Quantity assured	18	45.00
	Good quality milk	17	42.50
	Popular brand	5	12.50
	Hygiene maintained	3	7.50

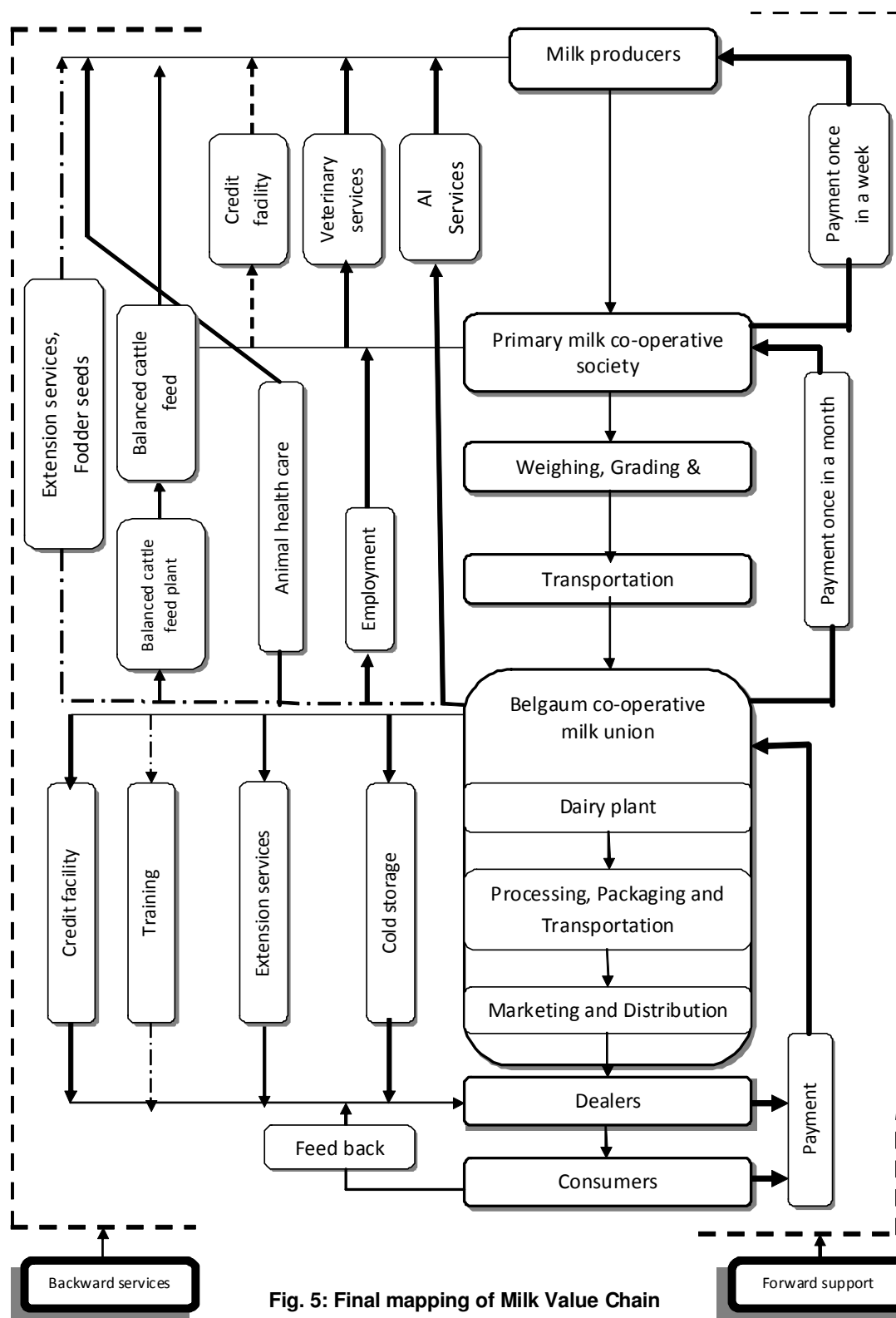


Fig. 5: Final mapping of Milk Value Chain

weaknesses, 3 opportunities and 2 threats emerged for producers. For cooperative societies, 12 strengths, 4 weaknesses, 5 opportunities and 3 threats were identified. In case of dealers, 10 strengths, 6 weaknesses, 6 opportunities and 5 threats were identified. Consumers could specify only 6 strengths, 3 weaknesses and no opportunity and threats were mentioned by them.

For producers, assured market (99.16%), correct payment (98.34%), availability of cattle feed at discounted price (89.16%), timely availability of veterinary services (56.67%), good access to advisory services (26.67%) and opportunities for training and visit (21.67%) were the strengths. Non availability of Artificial Insemination (AI) throughout the day and week (92.5%), non availability of adequate quantity of feeds at times (22.50%), specific time period for milk collection becomes disadvantageous at times (9.16%), more distance to milk collection point (6.67%) and variation in fat and SNF percentages lead to confusion at times (6.67%) were the weaknesses. Helps to become member in the society (81.67%), more learning opportunities (58.33%), more credit linkage possibility (27.50%) were the opportunities. No control over the price (99.16%) and prevailing politics in the society and federation (56.67%) were the perceived threats. Some of the respondents were engaged in activities other than milk production, so they feel inconvenience with milk collection time of society. Only few of the respondents indicated that distance to milk collection center is more may be due to long distance between their home to milk collection center. Only 6.67 per cent of milk producer thought that variation in fat and SNF percentage leads to confusion at times as one of the weakness may be because of low level of knowledge and less concentration during milk testing.

Strong marketing channel (100%), good animal health services to the members (100%), AI services at reasonable price (100%), people support to the society (100%), providing feeds at discounted price (87.50%), good support of the government to the society (75.00%), mutuality with the farmers (75.00%), rural accessibility to the society (62.50%), democratic control in the society (62.50%), providing more number of milk collection centers (50.00%), opportunity for social participation (50.00%) and as model cooperative society (12.50%) were the strengths identified for cooperative societies. Dependence on state aid (75.00%), political interference (37.50%), absence of professionalism (25.00%) and high establishment costs (25.00%) were the weaknesses of cooperative societies. Diversification of activities (87.50%), presence of good government

Table 30: Step wise regression analysis of amount of milk sent to cooperative societies versus with selected variables; predominating variables retained at the last step

Predictors	Coefficient	R	R ²	R square adjusted	SE estimated
Total milk production (X ₁)	1.00	0.999	0.998	0.998	0.400
Milk retained for family (X ₂)	-1.00				
Annual income from livestock (X ₃)	1.282				
Backward services availed (X ₄)	3.489				
Herd size (X ₅)	-2.930				
Price of the milk (X ₆)	1.730				

Table 31: IV. SWOT analysis of dairy value chain

Particulars	Producers	Co-op societies	Dealers	Consumers
Strength	1. Assured Market (99.16%) 2. Correct Payment (98.34%) 3. Cattle feed at discounted price (89.16%) 4. Timely veterinary Services (56.67%) 5. Good access to advisory services (26.67%) 6. Opportunities for training and visits (21.67%)	1. Strong marketing channel for members (100%) 2. Good animal health services to the farmers (100%) 3. AI services at reasonable prices (100%) 4. Members support to the society (100%) 5. Feeds are provided at discounted rates (87.50%) 6. Good support of government to the society (75.00%) 7. Mutuality with the farmers (75.00%)	1. Home delivery to customers (47.23%) 2. Provides employment to family (38.89%) 3. Almost monopoly in the market place (33.34%) 4. Assured customers (13.89%) 5. Easy access to consumer (8.34%) 6. Good quality products (5.55%) 7. Door delivery by KMF (5.55%)	1. Low price for milk (75.00%) 2. Good quality (62.50%) 3. Assured quantity (45.00%) 4. Popular brand (12.50%) 5. Hygiene maintained (7.50%) 6. Available in retail outlets (7.50%)

Contd.....

Particulars	Producers	Co-op societies	Dealers	Consumers
Strength		8. Rural accessibility to the society (62.50%) 9. Democratic Control in the society (62.50%) 10. Provides more number of milk Collecting centers (50.00%) 11. Opportunity for social Participation by the society (50.00%) 12. Co-operative societies (12.50%) provide a model with all facilities	8. Strong marketing knowledge (5.55%) 9. Responds to consumer needs (5.55%) 10. Well established dealer shop (5.55%)	
Weakness	1. 24 X 7 A.I services not available (92.50%) 2. Non availability of adequate quantity of cattle feed at times (22.50%) 3. Specific time period for milk collection at times disadvantageous (9.16%)	1. Dependency on state Aid (75.00%) 2. Political interference (37.50%) 3. Absence of Professionalism to some extent (25.00%)	1. Non-availability of labors (16.67%) 2. Away from consumer points (13.89%) 3. Lack of knowledge about Nandini products (11.11%)	1. Sometime scarcity of milk and milk products (17.50%) 2. Poor packaging (7.50%) 3. High price for value added products (2.50%)

Contd.....

Particulars	Producers	Co-op societies	Dealers	Consumers
Weakness	4. Distance to milk collection point is more (6.67%) 5. Variation in fat and S.N.F Percentages leads to confusion at times (6.67%)	4. High establishment cost (25.00%)	4. Highly perishable products (5.55%) 5. Inadequate supply of value added products of milk (2.78%) 6. Less paying capacity of consumers (2.78%)	
Opportunities	1. Helps to become office bearer in the society or obtain recognition (81.67%) by being society member 2. More learning opportunities (58.33%) 3. Credit linkage possibility is more (27.50%)	1. Diversification of activities (87.50%) 2. Presence of good government policies help dairy co-op to improve its position in milk value chain (75.00%) 3. Improving the economic level of farmers by providing livestock and other incentives from governments (75.00%) 4. Professional management (37.50%)	1. Scope for establishment of ice cream parlor (33.33%) 2. Growing demand (25.00%) 4. Can add diversity in marketing (11.11%)	

Contd.....

Particulars	Producers	Co-op societies	Dealers	Consumers
Opportunities		5. Expansion of business (37.50%)	5. Increase in the income (5.55%) 6. More demand to Nandini than private products (2.78%) 7. Rent borne by KMF (2.78%)	
Threats	1. No control over the price (99.16%) 2. Politics in the society and federation (56.67%)	1. High level of competition from private sectors (37.50%) 2. Disloyalty of members (12.50%) 3. Corruptive practices (12.50%)	1. Poor cold storage facility (38.39%) 2. Delivery problem (30.55%) 3. Poor packaging (27.78%) 4. High competition from private players (22.22%) 5. Electricity problem (5.55%)	

policy (75.00%), improving the economic level of farmers by providing livestock and incentives from government (75.00%), professional management (37.50%) and possibility to expand business volume (37.50%) were the opportunities identified. High level of competition from private sectors (37.50%), disloyalty of members (12.50%) and corruptive practices (12.50%) were the threats mentioned for cooperative societies.

Strengths of dealers identified were- home delivery to customers (47.23%), provides employment to family (38.89%), almost monopoly in the market (33.34%), assured customers (13.89%), easy access to consumers (8.34%), good quality products (5.55%), door delivery by KMF (5.55%), strong marketing knowledge (5.55%), responds to consumer needs (5.55%) and well established dealership (5.55%). Weaknesses were-non availability of labours (16.67%), located away from consumer points (13.89%), lack of complete knowledge about nandini products (11.11%), highly perishable products (5.55%), inadequate supply of value added products (2.78%) and less paying capacity of consumers (2.78%). Opportunities were scope for establishment of ice cream parlour (33.33%), growing demand for products (27.78%), can add diversity to the market (11.11%), possibility to increase income (5.55%) and in some cases rent borne by the federation (2.78%). Threats were poor cold storage facility (38.39%), improper delivery of products at particular time (30.55%), poor packaging (27.78%), high competition from private players (22.22%) and electricity problems (5.55%).

Consumer strength for Nandini milk and milk products were low price for milk (75.00%), good quality without adulteration (62.50%), quantity assured (45.00%), popular brand (12.50%), hygiene maintained (7.50%), available in retail outlets (7.50%). Only weakness was scarcity of milk and milk products some time (17.50%), No opportunities and threats were mentioned by the consumers.

5. DISCUSSION

The results presented in the previous chapter in relation to the present study on value chain analysis in dairy enterprises by the chain actors are elaborately discussed in this chapter with possible reasons and explanations. The discussion of the results of the study is made under following headings-

- 5.1 Socio-economic profile of milk producers
- 5.2 Value chain mapping of farmers to end consumers
- 5.3 Documentation of value chain experiences of milk producers in cooperative dairy sector
- 5.4 Role analysis of different stakeholders in backward and forward linkages of dairy value chain
- 5.5 Final mapping of milk value chain
- 5.6 SWOT analysis of dairy value chain
- 5.1 Socio-economic profile of milk producers
 - 5.1.1 Age

The data projected in Table 3 indicated that 57.50 per cent of the producers belonged to middle age category (30-50 years). About 30.00 per cent of the producers belonged to old age category (more than 50 years) and 12.50 per cent of producers belonged to young age category (18 – 30 years). The mean age of producers was 44.58 ± 0.025 years.

Migration of rural youth from dairy farming to urban areas and many youths though they stay in rural areas might not be taking up full time dairy farming. This could be the reason for less number of producers in young age category. Owing to their experience as the survey was related to dairy farming middle aged member of the family could have come forward to share the information for the study. The fact that dairying is a recurrent income generating enterprise, it adds significantly to the family income. The income from dairy is more stable unlike agriculture, as is less

prone to weather vagaries. Therefore, more of middle age dairy farmers might be taking up dairying as subsidiary occupation. Since the dairy farming requires more laborious work, old age people might find it difficult to handle. These could be the reasons for present result. The similar results were reported by Monika (2009), Kashappa (2013) and Akshata (2014).

5.1.2 Education

Almost equal per cent of producers were educated up to primary school (45.00%) and high school (45.83%). Only 9.16 per cent of producers had education above high school. The mean year of schooling was 6.73 ± 0.025 years (Table 3).

Result showed that, almost all the respondents were literates. The formal schooling helps the dairy farmers to gather new information required for dairy enterprise. This in turn might create positive outlook to manage the dairy enterprise. None of the respondents were illiterates. This could be attributed to better awareness about the importance of education as well as better access to education facilities even in rural areas. The similar findings were reported by Chaudhari (2006), Pushpa (2006) and Monika (2009).

5.1.3 Land holding

More than half of the producers (56.67%) had marginal size of landholdings. One fourth (25.83%) belonged to medium land holding groups and 12.50 per cent of producers had small size land holding. Only one farmer (0.84%) had big landholdings. The mean land holding size was 1.31 ± 0.008 hectares (Table 3).

The reasons for possession of marginal and small size land holdings could be fragmentation of land holdings among family members due to emergence of more nuclear families even in rural areas. Meeting livelihood needs of a family from small land holdings is difficult and to supplement the income, livestock rearing that matches with their traditional skills might have been taken up by many respondents. Few

respondents were landless might be due to their low economic status. Similar findings were reported by Akshata (2014) and Khin Mar Oo (2005)

5.1.4 Herd size

Small herd size was possessed by 51.66 per cent producers, medium herd size was possessed by 31.67 per cent and large herd size was possessed by 16.67 per cent of producers. The mean herd size was 3.35 ± 0.0169 adult cattle units (Table 3).

The reason for small and medium large herd size, together being possessed by 80 per cent producers, could be attributed to various reasons like lack of adequate space to house more number of animals, high cost of animal maintenance, restricting herd size in accordance with the availability of labors, feed and fodder. The results were in line with the results of Kashappa (2013) and Akshata (2014).

5.1.5.1 Annual income through crops

The average annual income from crops of the producers was Rs. 124429 ± 581.49 . One fifth of the producer (20.83%) had low annual income (up to Rs. 60000.00), 35.00 per cent of them had medium annual income (Rs. 60,000.00-1,20,000.00) and 44.17 per cent producers had high annual income from crops (above Rs. 1,20,000.00) (Table 3).

Reason for majority belonging to high annual income group could be that the study area has irrigation facility predominantly used for sugarcane cultivation. Sugarcane fetches very good price and also is protected by Minimum Support Price (MSP). Large area is also used for cultivation of vegetables. So growing cash crops could be the reason for majority belonging to medium and high income groups. Similar findings were reported by Akshata (2014) and Soujanya (2014).

5.1.5.2 Livestock income

The average annual income from livestock was Rs. 11831.09 ± 73.63 . Low livestock income was obtained by 41.67 per cent of producers followed by medium (31.67%) and high livestock income (26.66%) (Table 3).

Majority of respondents possessed small herd size or less number of in-milk animals. Co-operatives fix the price based on fat per cent of the milk. If animals are not fed scientifically the fat per cent remains low in milk. So this could be the reason for three fourth producers obtaining low to medium levels of income from livestock. Results are in line with Khin Mar Oo (2005) and Chaudhari (2006).

5.1.6 Average crop residue produced by the respondents from their cropping system

Maize stover was produced by 65.00 per cent producers with average availability of 3.06 tons per year per farmer by incurring an average cost of Rs. 6,699.00, *kharif* paddy straw was produced by 16.67 per cent of a producers with average availability of 4.90 tons per year per farmer by incurring average cost of Rs. 1,680.00, wheat straw and bajra stover were produced by 4.16 per cent and 1.67 per cent producers, respectively. The average availability was 0.13 tons per year per farmer and 0.067 tons with incurred cost of Rs. 2,700.00 and Rs. 4,500.00 for wheat straw and bajra stover, respectively. Sugarcane was though produced by half of the respondents (52.50%) its tops were fed to livestock only for 45-60 days (Table 4).

Production of different crop residues is influenced by the crops cultivated by the farmers in a particular year. The soil type, availability of other resources like labour and money to purchase inputs, crops grown in previous years and other factors influence the cropping pattern followed by a particular producer. Maize stover was produced by many farmers as farmers expressed that maize fetches good price in the market besides is less susceptible to weather vagaries as compared to other crops. Half of the respondents reported about the sugarcane tops as study area has assured irrigation facility. Paddy straw was produced by some farmers which depends on availability of paddy fields with the farmer as upland paddy is prevailed in the region. Bajra and wheat straw availability was less might be due to less number of farmers cultivating these crops. The similar results were reported by Kashappa (2013) and Akshata (2014).

5.1.7 Extent of participation of producers in mass media

Newspapers were never read by half of the respondents, occasionally by 37.50 per cent and regularly by 13.34 per cent producers for general news items. Almost all the producers never (95.00%) used newspaper for reading agricultural

related news items. Only four and two producers reported that they regularly and occasionally, respectively read newspaper for agricultural items. Radio was never used for general programs (60.84%) and agricultural programs (85.00%). It was used occasionally for general (26.66%) and agricultural (8.33%) programs. Television was regularly viewed for general (35.84%) and agricultural (35.84%) programs. It was viewed occasionally for general (64.16%) and agricultural (38.34%) programs by producers. Little above one fourth (28.83%) producers never used television to view agricultural program (Table 5). It was observed from the table that negligible per cent (3.34%) of respondents regularly read agricultural information in news paper as compared to general information. The television viewing and radio listening were done for purpose other than agricultural programs which might be due to the improper telecasting and/or broadcasting times, less attractive and useful programs for the producers. Other factors like accessibility to news papers and farm magazines, interest in the topics and time availability with the farmers might also influence the reading behavior of producers. The findings were in line with Kashappa (2013), Akshata (2014) and Soujanya (2014).

5.1.8 Participation of respondents in extension activities

Producers participated in krishimela regularly (40.00%) and occasionally (46.67%) and never (13.33%). Participation of producers in other extension activities was extremely poor as 99.16 per cent each never participated in training programs, group discussions, 96.66 per cent in agricultural exhibitions and 95.48 per cent in field visits (Table 6).

Majority of the respondents participated in Krishimela occasionally, might be due to motivation extended by milk Co-operative societies and/or state line departments. All most all the producers poorly participated in training programs, group discussions, field visits and agricultural exhibitions might be due to lack of interest, inability to approach the institutions or less number of such programs being conducted. The finding were in line with Anita (2004) and Khin Mar Oo (2005).

5.1.9 Extent of extension contact of producers with extension agencies

More than half of the producers (59.16%) contacted Raith Sampark Kendra (RSK) or agricultural department official whenever there was a need. Only 8.34 per

cent producers visited it once in a month and 32.50 per cent never visited. The reason might be that, RSKs are located at Panchayat level and hence give better accessibility to the producers to approach whenever they have a need. Krishi Vigyan Kendra (KVK) was contacted by 17.50 per cent producers whenever there was a need, 5.83 per cent once in a month and 76.67 per cent of producers never contacted. All most all the producers never contacted UAS scientists (95.84%) and private company extension officers (95.50%). Only 4.16 per cent and 5 per cent of producers contacted UAS scientists and private company extension officers, respectively when there was need, meager 6.66 per cent once in a month and 11.67 per cent never contacted them might be because they could get the solutions for their problems at RSK it-self and the need to approach KVKs, UAS scientists and private company extension officers could have rarely aroused. Majority of producers (81.67%) contacted veterinary officials whenever need arises, only 6.66 per cent of producers contacted once in a month, where as 11.67 per cent of producers never contacted veterinary officials (Table 7). Most of the villages selected have better access to veterinary health centers of state government as well as that of milk federation. Vaccination and Artificial Insemination services are regular services availed for livestock by the producers and hence the finding. Similar results were reported by Bhatt (2012) and Khashappa (2013).

5.2 Value chain mapping of farmers to end consumers

5.2.1 In milk animals owned by the producers

Nearly three fourth of producers (72.50%) owned 3-5 lactating cows. One fourth possessed 1-3 lactating animals and 2.50 per cent producers owned 5-7 lactating cows. Sixty per cent producers owned 2-4, 33.34 per cent owned 1-2 and 6.66 per cent owned 4-6 lactating buffaloes. The average milk produced by the household was 9.93 ± 0.071 liter per day (Table 8). So majority owned 1-5 lactating cows and 1-4 lactating buffaloes at the time of the study. As the study area has adequate irrigation facility, there was more cropping intensity. Adequate availability of crop residue and purchasing capacity of farmers to buy concentrated feed could be the reasons for more number of in milk animals. Additionally access to AI service also helps to maintain the gestation cycle of animals. Similar results were reported by Murthy *et al.* (2012).

5.2.2 Milk utilization pattern of the producers

Out of the total amount of milk produced, 85.84 per cent producers retained less than 25 per cent of milk produced and 13.32 per cent retained 26 to 75 per cent of milk produced. The average milk retained by the household was 0.87 ± 0.0035 liters per day per household. On the contrary the reverse figure were observed for quantity of milk sold as 85.84 per cent, 13.34 per cent, 0.82 per cent sold more than 75.00 per cent, 26.00 to 75.00 per cent, less than 25.00 per cent respectively, the average was 9.065 ± 0.07 liters per day per household. This might be due to small family size, perishable nature of milk and the urge to earn more by retaining less for the family (Table 8 and Fig. 2).

All most all the respondents (98.33%) processed 25 per cent of milk retained either in the form of curd or butter milk. Only one producer each processed 26.00 to 75.00 per cent and more than 75.00 per cent of the milk retained. Average milk processed was 0.38 ± 0.0045 liters per day per household. Curd forms the part of daily diet in this part of study area that belongs to semi arid tropical region. Milk is used for drinking (especially for children), for preparation of tea for adults and for preparing curd which is used as a part of daily food. So at least 25.00 per cent of milk retained is used by almost all the producers for preparation of curd. Same findings were reported by Milan and Liesbeth (2012), Michael (2010) and Surendra *et al.* (2009).

5.2.3 Benefit cost ratio of milk production of producers

The benefit cost ratio of 2.60:1.00 was obtained for milk production cost. Total cost (Rs. 38,728.40) incurred by the producers was computed by incorporating residue value (Rs. 6,575.00), feed value (Rs. 19,298.00), labor cost (Rs. 12,700.00) and veterinary cost (Rs. 155.40). The return obtained due to sale value of milk produced was Rs. 1,00,795.95 with annual net returns of Rs. 62,067.55 (Table 9).

This might be due to all the dairy co-operatives situated in the villages were the major actors who closely support small holder dairy farmers in provision of different inputs to improve the production and productivity of the livestock such as good quality animal feed, animal health and AI services at discounted price. Own farm crop residues were used to feed their animals and family labors were employed for maintaining the animal that ensures the quality of crop residues fed to livestock

and labour efficiency. The animal feed supplied by the dairy cooperatives is known for its quality that has direct bearing on quality and quantity of milk produced. Due to these reasons the benefit cost ratio was found to be positive. Similar findings were reported by Murthy *et al.* (2012).

5.2.4 Volume of milk yield obtained by the producers

The average, maximum, minimum milk yields were 7 liters, 12 liters, 2 liters in peak season; 5 liters, 8 liters, 2 liters in initial stage; 4.25 liters, 7.5 liters, 1 liter in last stage by cows, respectively. The average, maximum and minimum milk yield were 4.5 liters, 6 liters, 3 liters in peak season; 3.5 liters, 5 liters, 2 liters in initial stage; 3 liters, 5 liters, 1 liter in last stage by buffaloes, respectively (Table 10).

Studies indicated that the initial milk yield is a reliable indicator of the animal genetic potential, at parturition milk production commence at a relatively high rate, and the amount secreted continues to increase for about 3-6 weeks. After the peak is attained, milk production gradually declines. Milk production is high during May to September since the feed supply is adequate. Milk yield also depends upon both genetic and non-genetic factors. The genetic influence is due to species, breeds and ability to reproduce. The non-genetic factors are management, amount and quality of feed and skill of the farmers to detect the heat and illness. Factors which are beyond their control such as climate, temperature and humidity etc also influence volume of milk yield. Buffaloes are said to be hard milkers than cows and variation in milk yield is because of their slow milk ejection reflex and their hard teat muscles sphincters. These findings were similar with findings of Girima and Marco (2014).

5.2.5 Fat percentage in the milk obtained by the producers

Fat per cent in cow milk varied from 4.57 ± 0.0043 per cent, 4.78 ± 0.005 per cent, 5.24 ± 0.0047 per cent respectively, for initial, peak season, last stages. In buffalo milk fat per cent in initial stage was 6.74 ± 0.0061 per cent, during peak season it was 7.10 ± 0.0064 per cent and last stage it was 7.44 ± 0.0068 per cent (Table 11).

Finding indicating increase in fat percentage from initial to last stage was due to the facts that the fat per cent in milk will be slightly less during the early lactation and then increases as total production decreases with advancing lactation. Similarly

milk protein, lactose and mineral concentration gradually increases with advancing lactation. Most of the increase in Solid Not Fat (SNF) components of milk is associated with advancing stage of concurrent pregnancy rather than stage of lactation. These findings were similar with findings of Girima and Marco (2014).

5.2.6 Percentage of producers processing milk for house hold consumption only

Curd was prepared regularly by 98.83 per cent producers for family use. More than half (50.83%) producers reported that butter milk for family use was prepared. Only 2.50 per cent respondents prepared ghee for family use (Table 12). The reasons quoted earlier like food habits of the producers hold good for this finding also. Similar findings were reported by Fayad (2009).

5.2.7 Value chains of different types of milk of Belgaum co-operative dairy plant

. For all types of milk, toned milk, homogenized toned milk (HTM), homogenized cow milk (HCM) and shubham, raw material cost accounted for 73.00 per cent, procurement cost to the extent of 3.00 per cent, processing cost 7.00 per cent together add into 83.00 per cent production cost. Distribution cost slightly varied from 7.75 per cent of the total cost for toned milk, 7.85 per cent for HTM, 8.28 per cent for shubham and 8.31 per cent for HCM. Though the total cost remains all most same for toned (Rs. 29.52), HTM (Rs. 29.55), HCM (Rs. 29.64) and shubham (Rs. 29.69). The selling price for three types of milk fixed were Rs. 30.00, Rs. 31.00, Rs. 34.00 and Rs. 36.00 respectively, because of this the marketing margin was Rs. 6.31 for shubham, Rs. 4.36 for HCM, Rs. 1.45 for HTM and Rs. 0.48 for toned milk. Total marketing cost and margin was Rs. 11.77, Rs. 9.77, Rs. 6.77, Rs. 5.77 for shubham, HCM, HTM, toned milk respectively. The marketing efficiency thus obtained was highest for shubham 1.15 followed by HCM (Rs. 0.81), HTM (Rs. 0.27) and toned milk (0.09) (Table 13).

So marketing margin, marketing efficiency and selling price realized were higher in Shubham as compared to toned milk, homogenized toned milk and homogenized cow milk. The apparent reason for this is as the fat percentage increases these factors show higher values. Thus higher the fat per cent in milk, higher the marketing cost and efficiency. So, it can be inferred that Shubham milk

production is more profitable for Belgaum milk co-operative dairy plant. Similar findings were reported by Babu and Verma (2010).

5.2.8 Value chain of curd for co-operative dairy plant

Cursory look of Table 14 indicate that irrespective of the quantity of product the percentage of material cost remains almost same. But processing cost was more for smaller quantity. As a result, total cost of production for 200 g curd packet is more than that of 500 g pack. This has further impact on all other prices like selling price and margins of retailers. As a result on per Kg basis 200 g curd costs more than 500 g. Similarly selling of 200 g packs fetched more margin for the retailers and more contribution to the milk union on per Kg basis. However on per pack basis 500 g curd's contribution is moderately higher than 200 g pack.

This indicates that smaller the quantity, expenditure on resources like man power, electricity, packaging cost are more leading to higher price. The same results were reported by Babu and Verma (2010).

5.2.9 Value chain of butter milk for co-operative dairy plant

Cost of raw material was Rs. 23.21/l for both sweet and masala butter milk with a percentage share to total cost being 44.80 per cent and 90.21 per cent respectively. Processing cost was Rs. 28.40/l (sweet) and Rs. 2.52/l (masala) that accounts to 50.20 per cent and 9.79 per cent of total production cost. Total cost was Rs. 51.61 and Rs. 25.73 for one liter of sweet and masala butter milk, respectively. Yield per liter of milk was 3 liter and 4 liter for sweet and masala butter milk, respectively. Cost of butter milk per liter was Rs. 17.20 (sweet) and Rs. 6.43 (masala). Packaging cost was Rs. 1.50 for sweet and Rs. 1.20 for masala butter milk. Selling price was Rs. 40.00 and Rs. 25.00 for sweet and masala butter milk. Contribution of Rs. 21.30/l (sweet) and Rs. 17.07/l (masala) were allocated that lead to Rs. 4.26 (sweet) and Rs. 3.41 (masala) on per packet basis (Table 15).

It was observed from the Table 13 that processing cost of masala butter milk is lower than sweet butter milk. Higher cost for the latter was due to the expensive ingredients like sugar, spices and flavours and the total ingredient cost was Rs. 9.30 per liter. However masala butter milk is more watery with less of solids and spices

and its ingredient cost was only Rs. 0.72. So total cost and selling price for per liter is more in case of sweet butter milk than for masala butter milk. As a result dairy union makes more profit from sweet butter milk production. The same results were in line with that of Babu and Verma (2010).

5.2.11 Dealers margin for value added products of milk and milk products

Results presented in Table 16 indicate that dealers margin was highest for Shubham (Rs. 1.52) followed by HTM (Rs. 1.44), HCM (Rs. 1.28) and toned milk (Rs. 1.20) among milk types. Dealers' margin was Rs. 4.00 for 500 g curd pack and Rs. 1.50 for 200 g curd pack. Lassi attracted dealers' margin of Rs. 2.00 and Rs. 3.00 for plain and mango flavor. Masala butter milk and masala butter milk tetra attracted Rs. 0.75 and Rs. 1.50 dealers margin, respectively. The dealers price and maximum retail price for the products are toned milk (Rs. 28.80, Rs. 30.00), HTM (Rs. 34.56, Rs. 36.00), HCM (Rs. 30.72, Rs. 32.00), Shubham (Rs. 36.48, Rs. 38.00) all for 1 litre packs, curd-200 g (Rs. 8.50, Rs. 10.00), curd-500 g (Rs. 36.00, Rs. 40.00), lassi plain-200 ml (Rs. 8.00, Rs. 10.00), lassi mango-200 ml (Rs. 12.00, Rs. 3.00), masala butter milk-200 ml (Rs. 4.25, Rs. 5.00) and masala butter milk tetra-200 ml (Rs. 8.50, Rs. 10.00).

Dealers' margin was dependent on type and quantity of the products. Shubham has highest dealers margin among milk types as it accounts for higher fat per cent as reported earlier. Similarly masala butter milk tetra fetched more dealers' margin compared to only masala butter milk. As the quantity of product increased the dealers' margin too increased for all product types. However among all the products dealers' margin was highest for 500 g curd (Rs. 4.00) and lowest for masala butter milk (Rs. 0.75).

5.3 Documentation of value chain experiences of milk producers in cooperative dairy sector

5.3.1 Willingness of producers to continue as a member of milk co-operative society

Cent per cent of producers expressed their willingness to continue as a member of milk cooperative societies of their villages. Large majority (93.34%) expressed correct payment as the reason. Half of the producers expressed that

assured market (50.84%) was the reason. Availability of quality feed (7.50%), advisory services (5.83%) and others like opportunity for learning and loan availability etc (1.75%) were the reasons given by small number of producers (Table 17).

Cooperatives operate according to the core principles and values. The main purpose of cooperatives is to improve the quality of life of its members. They work on mutual interest and trust. Regular and correct payment to members helps to keep up the trust between the members and cooperative society. This reason thus was expressed by nearly 94.00 per cent of producers. Cooperative societies at village level are established primarily for the purpose of its members to market their produce more profitably than is possible through private traders. Thus half of the respondents mentioned assured market as the reason for continuing as its members. Education, training and information are other core functions of cooperatives besides providing credit facilities to them. Few producers thus quoted these reasons also. Karnataka Milk Federation, under which Belgaum milk union functions, is one of the highly successful cooperative federation in the country as is observing cooperative principles. Many villages where cooperative society does not exist strive to get one owing to the benefits it provides. Murthy *et al.* (2012) reported similar results.

5.3.2 Producer's experiences of services rendered by co-operative society

Table 18 and Fig. 3 revealed that all the producers expressed payment at regular interval as very good experience because producers were getting correct payment within time period that is once in a week. Dairy producers were satisfied with the rate offered by co-operative society. Fairness in quality of milk testing was mentioned as very good by 99.17 per cent and good by 0.83 per cent producers. This might be due to well trained employees with well equipped electronic milk tester at all the societies as observed during field study. AI services at right time were experienced as very good by majority (86.67%) of the producers. Low cost of AI service coupled with timely service and high success rate could be the reasons for it. Distribution of feed at discounted price was another very good experience of more than half (65.83%) of producers. The feed distributed by the society is of best quality as compared to the one available outside. Besides the cost of it is discounted and deducted from the weekly milk bill which forms a very convenient way for the producers to opt for it. Quality of feed received was experienced as very good and

good, together by 83.32 per cent producers. Quality of feed supplied has direct bearing on quantity of milk collected by the societies at village level as well as on the overall business of milk union. Karnataka milk federation has its own feed manufacturing units by which it ensures specific quality of feed supplied to the societies. Immediate veterinary service was viewed moderately by half (52.50%) of the producers probably due to lack of manpower in this field at village level, as veterinary service requires highly trained professionals. Participation in trainings and demonstrations conducted was viewed as moderate by large per cent of producers (66.67%). This could be due to the less number of such programs being conducted by cooperative societies/milk union. Half of the producer's experience (50.84%) about supply of fodder seeds of desired type was moderate. The reasons could be lack of awareness of producers about the different fodder crops, milk union might be supplying seeds of only few fodder crops in limited quantity. One more reason could be lack of production and availability of seeds of different fodder crops in Karnataka or elsewhere in the country. Again many respondents were not happy with the bank linkage facility extended by societies to the producers. This could be due to several reasons like individual member's poor credit worthiness, not meeting specific terms and conditions of bank by the producers or simply due to lack of interest on the part of societies to push for better linkages with the financial institutions. More than three fourth (76.66%) of the producers' experience about continuous and regular advisory services of societies was moderate might be due to lack of adequate such services to them. Almost similar results were reported by Girima and Marco (2014).

5.4.1 Backward services obtained by the producers from the co-operative society in a year

All the producers in previous year availed artificial insemination service to their livestock from the milk cooperative society. Mean herd size of producers was 2.71 ACUs and artificial insemination is widely used practice in recent years not just for impregnation but for livestock improvement. In this, the germplasm of the bulls of superior quality can be effectively utilized with the least regard for their location in far away places. By adoption of artificial insemination, there would be considerable reduction in both genital and non-genital diseases in the farm stock. So, milk unions are providing this service very effectively to all the producers through their village

level societies. Majority of the producers obtained feed at discounted price (88.33%) might be because of its quality along with its reasonable price and availed veterinary services (75.84%) even though they did not have good experience about it. More than half of the producers' took help from the cooperative society to get linked with the bank. Purchase of animals require loan from the bank and being a milk cooperative society member it self is a strong point and reason to get linked with the banks. Fodder seeds were taken from the society by half of the producers (51.67%) as in summer to feed green to the livestock, cultivation of fodder maize (African tall) is widely encouraged by the society. Besides, producers (34.10%) availed advisory services on selection of breeds. Farmer must choose the breed that fits well into his management practices besides being good milk yielder. Owing to prevalence of many breeds today, farmers might have preferred to go for expert advice. Some of the producers also availed advise on participation in exposure visits (17.50%) and training programs (9.16%) as they might have felt that such programs would increase their skills and capacities on livestock management (Table 19). The same similar results were reported by Prakash kumar (2012) and Girima and Marco (2014).

5.4.2 Role perception of producers in proper functioning of cooperative milk society

Producers identified their five roles in proper functioning of cooperative milk society. All the producers felt that it is their responsibility to give right quality of milk to the society. This has mutual benefits, the first is society is benefited with fair practice and the second one is producers get more money by selling good quality milk as the price is fixed based on fat and SNF percentage. Almost all of them (98.34%) felt that asking more prices for the milk as and when cost of livestock rearing increases is also one of their important role to improve their economic status. Sensitizing the authorities about the higher price to be fixed is needed whenever the cost of rearing livestock increases. Nearly three fourth (71.67% and 67.5%) producers expressed that obtaining quality feed and fodder seeds of adequate quantity, as their roles. Without fodder and feeds of adequate quantity and quality throughout the year, livestock rearing cannot be profitable. Producers based on their experience of livestock rearing might have recognized this as one of the important role. One third of them (33.34%) expressed demanding better education and advisory services on livestock rearing as another role to ensure proper functioning of cooperative milk

society to acquire more knowledge, better management and maintenance of hygiene at the cattle shed (Table 20). Milan and Liesbeth (2012) reported similar findings.

5.4.3 Difficulties in operating milk cooperative societies as perceived by their secretaries

Difficulties of milk cooperative societies were analyzed under four heads as difficulties with respect to members, facilities, financing and working environment. However, only two difficulties were expressed by them. Irregularity in carrying milk to the society by members was the main difficulty expressed by 62.5 per cent milk cooperative societies. Members owing to some of the difficulties from family at times may sell milk to the middlemen leading to irregularity. Societies in such cases find it difficult to estimate the quantity of milk likely to be collected leading to other operational problems like inadequate capacity utilization *etc.* However 12.5 per cent of them viewed lack of computerization as the difficulty with regard to the facilities extended to the cooperative society by the milk union. Most of the societies pay weekly to the members. This demands perfect account keeping for every member on daily basis. Computer helps to resolve this issue and also it automatically records the fat and SNF details member wise. As it is more convenient, societies lacking this facility might have expressed this as a difficulty (Table 21). Nguyen (2013) reported similar results.

5.4.4 Roles performed by societies for effective functioning of milk co-operative societies

Ten thousand kilos of seeds of fodder maize were distributed by Ambadagatti society followed by 200 kg by Bailur and 30 kg by Holinagalapura societies of Bailhongal taluk in the previous one year. Distribution of fodder maize seeds was comparatively very low for previous year as only 25 kg and 20 kg were distributed by Shindikurbet and Munyal societies of Gokak taluk, respectively. Farmers of Gokak taluk used to feed their animals with sugarcane tops as it is grown extensively. Whereas in Bailhongal taluk, sugarcane is not grown in large area, so to meet the fodder requirement, farmers of this area might be insisting for more quantity of maize seeds. An average of 1200 bags of feeds were distributed monthly by Bailur, 100 bags by Ambadagatti, 65 bags by Nagnur and 30 bags by Holinagalapura societies of

Bailhongal taluk. On the contrary, large quantities of feed bags were distributed monthly by societies of Gokak highest by Hallur society (3000 bags/month) followed by 2900 bags by Kanatti society, 2800 bags by Shindikurbet and 2500 bags by Munyal societies. Quantity of feeds distributed however depends on many factors like number of members in a society, willingness of members to buy feeds and livestock feeding practices prevailed in the region.

Monthly, on an average 180 AI services were extended by Ambadagatti society followed by 150 Nagnur, 80 Bailur and 50 Holinaglapura societies of Bailhongal. Similarly, Munyal (180), Hallur (160), Shindikurbet (150) and Kanatti (109) societies of Gokak extended AI services monthly. This might be because of large herd size in Gokak compared to Bailhongal taluk. Average weekly disbursement of payment in Bailhongal taluk was highest for Ambadagatti (Rs. 226000.00) followed by Bailur (Rs. 175000.00), Nagnur (Rs. 100000.00) and Holinaglapur (Rs. 70517.00). The same, in Gokak taluk, was highest for Munyal (Rs. 206895.00) followed by Kanatti (Rs. 189562.25), Hallur (Rs. 152768.00) and Shindikurbet (Rs. 60525.50). Results indicated that large amount of disbursement of payment was found in Gokak taluk. Amount of money disbursed depends on the quantity of milk collected. Trainings on various aspects were also conducted by societies to improve the knowledge and skills of members. Different roles performed by societies targeted at managing the production risk faced by rural landless dairy farmers and to realize potential of small scale dairy production. Raising the productivity of dairy farms and mitigation of their production risk requires the availability of improved seeds and fodder resources, breeding services, targeted preventive animal health care and better feeding strategies (Table 22). The results are in line with the findings of Babu and Verma (2010).

5.4.5 Forward business support extended by dealers to milk unions

It is evident from Table 23 that the dealers were earning more in full cream milk (Rs. 5426.46) in a month followed by standard milk (Rs. 4327.52) and toned milk (Rs. 1257.08). So full cream milk was contributing more profit to the dealers among other milk types. In case of butter milk, masala butter milk was having more demand

but less price. So dealers procured it in more quantity but were getting profit from sweet lassi. Curd and other products were not fetchning more money to the dealers. So, dealers earning was mainly through the sale of full cream milk. Babu and Verma (2010) reported similar results.

5.4.6 Backward support received by dealers from milk unions

Totally six dealers attended trainings organized by milk union to dealers in previous year (Table 24). Of these, 13.89 per cent each dealers attended trainings on management and marketing topics, 11.12 per cent on cold storage and 8.34 on hygiene in handling milk to improve the keeping quality without spoilage. The percentage of dealers who have attended meeting was very less. The reasons could be less number of training programs organized for dealer and the lack of interest among dealers to attend such trainings. More than half of the dealers (58.34%) received advisory services in last one year on various aspects mainly on storage of products owing to perishable nature of the product. The similar results were reported by Girima and Marco (2014)

5.4.7 Consumer response for Nandini milk and milk products as perceived by dealers

Almost 64.00 per cent of dealers felt that their consumers rate Nandini milk and milk products as excellent (Table 25 and Fig. 4). Besides products being good quality, due to the training in marketing aspects dealers must be making their consumers to feel good about the services they provide to them. Meeting consumer's desire for fresh and quality products accompanied with good service could be the reason for the above finding.

5.4.8 Basic characteristics of milk consumers

Majority of the consumers (70.00%) belonged to old age group followed by 25.00 per cent to middle and 5.00 per cent to young age groups. The mean age of the consumers was 41.85 ± 0.24 years. This might be due to old age people owing free time might go for purchasing milk, might have come forward to give their experience during the study. Majority of the consumers studied up-to high school (32.50%) and beyond (55.00%). The buying behavior of educated and uneducated

differs. Educated persons prefer quality and purity. They behave in more rational manner than uneducated people.

Half of the consumers' (55.00%) family takes 1 liter milk daily. Only 12.50 per cent consumers reported that their family consumes 2 liters of milk daily. For the average family size of 5 members, considering the per capita milk requirement of 220 g/day prescribed by Indian Council of Medical Research, one liter of milk consumption per family is little bit less. However, owing to its cost and perishability, consumer might be restricting the quantity of milk purchased. Correspondingly 57.50 per-cent consumers spend Rs. 900.00 to Rs. 1200.00 monthly on milk. Selling price of different types of milk varied between Rs. 30.00/l to Rs. 36.00/l (Table 26) that roughly amounts in the range of Rs. 900.00 to Rs. 1200.00 per month. Half of the consumers (52.50%) purchased milk from dealer's point, followed by 27.50 per cent from dairy booth and 5.00 per cent from other shops. However, 15.00 per cent consumers resorted to home delivery of milk packets. Dealer's points might be more convenient to consumers, located near to home as well as they can get fresh products. In the study area less number of other shops were selling packaged milk of Nandini. Similar results were reported by Aluregowda (2013). Toned milk was purchased by 57.50 per cent consumers and double toned milk by 42.50 per cent consumers. This might be due to low price of toned milk (Rs. 30.00) compared to double toned milk (Rs. 38.00). Purchase decisions were influenced by media for 82.50 per cent. Nilson (1995) states that internationalization of the media has changed the market conditions. He explains that the media's influence and ability to change perceptions and behaviors is very strong which supports the result of the present study (Table 26).

5.4.9 Buying behavior for milk products

Curd was purchased daily by 80.00 per cent consumers as in the study area it forms the part of the meal. Ghee was purchased monthly by 90.00 per cent and fortnightly by 2.50 per cent consumers and butter was purchased monthly by 12.50 per cent consumers. Daily consumption of ghee and butter is not prevalent in the study area and usually it is consumed during festivals. Even if consumed daily the quantity used is very less. Sweet milk products like pedha and kunda were purchased only by few consumers at monthly intervals. The same is true with other

milk products like paneer, khoa *etc.* In India, it is observed that about three-fourth of the total milk production is consumed in the form of liquid milk and use of milk products as seen from the study is very low (Table 27). Aluregowda (2013) reported similar results from his study conducted at Mandya district for Nandini products.

5.4.10 Value addition to milk by consumer at home

More than half of consumers (65.00%) added value to milk by preparing curd, less than half (40.00%) through butter milk preparation, 12.50 per cent in the form of ghee, 10.00 per cent by preparing other products like kheer and khoa and butter by 5.00 per cent consumers. However, only 12.50 per cent expressed that milk products were not prepared by them (Table 28). As mentioned earlier, consumers usually buy the milk mainly for the purpose of drinking or for tea preparation. Curd is prepared by three fourth of consumers as it forms a part of daily meal. Butter milk, butter and ghee were prepared occasionally to meet the needs of families. Babu and Verma (2010) reported similar results.

5.4.11 Brand loyalty of consumers to Nandini products

One fifth (20.00%) consumers expressed brand loyalty to Nandini from 1 to 5 years and 65.00 per cent between 5 to 10 years. Only 15.00 per cent consumers' brand loyalty was for 10 to 15 years. Reasons for exhibiting brand loyalty as per the consumers' response were low price of the milk (75.00%), assured quantity (45.00%), good quality milk (42.50%), popular brand (12.50%) and hygiene maintained as expressed by 7.50 per cent consumers (Table 29). Nandini is the reputed brand, it is perceived as the brand devoid of adulteration and provides value for money. Its freshness, quality in terms of fat percentage and taste fetched brand loyalty of consumers. Similar results were reported by Aluregowda (2013).

5.5 Final mapping of milk value chain

Regular payment at every stage is a strong forward support on which whole business would run successfully. All services, veterinary services to producers, and animal health care facilities were depicted as strong links in the map (fig 5). Livestock play vital role in agriculture. They are viewed as ready source of cash to buy household needs and inputs for crop production. So livestock not only do they

produce food directly, they also provide essential needs of a family and key inputs to agriculture. AI services, veterinary services, feeds and animal health care, all under one roof of cooperative society certainly makes rearing livestock much convenient as almost all the needs are met through these services. Employment generation by appointing required staff in each society and credit and cold storage facilities to dealers were also viewed as strong links. Moderate level of backward supports were providing extension services to dealers by the milk union, feed back from consumers to dealers and balanced cattle feed to producers from society. Some of the societies mentioned that required quantities of feeds were not supplied to them. Providing extension services and fodder seeds to producers and providing training to dealers were the weak linkages. The fodder seed production system in the country is weak as it has not received much attention from the government. Similarly due to more emphasis on forward services, extension or advisory services might have been viewed as secondary activities. However emphasis on these would surely yield very good result in long term. Dealers receive extension/advisory services and cold storage facilities from union. However extension and advisory services to dealers when analyzed in detail it was found that only some of the dealers attended training programs conducted for them. Dealers sell milk and its products to consumers and also through informal discussions get feedback from consumers to meet their requirements which in turn is passed on to the milk union. Consumer pay to the dealers for the product they get as a forward support. The system to regularly collect consumer feedback was not traced in the study though is done on informal basis by the dealers. As consumer satisfaction is most important at union level it might plan some activities to the consumers using media mix by which it can also collect their feedback (Fig. 2).

5.6 Step wise regression analysis of amount of milk sent to cooperative societies versus with selected variables; predominating variables retained at the last step

Amount of milk sent to cooperative societies by the producer is an important factor that influences value chain at all levels. The causal variables which have been found generating critical influence on this are- total milk production, milk retained for family, annual income from livestock, backward services availed, herd size and price

of the milk. These variables together have explained variation to the extent of 99.8 per cent. Among all these variables, backward services availed sends a strong message that it should not be neglected if business has to be sustained profitably at different levels. Artificial insemination services, educating producers about scientific breeding and feeding aspects, supplying quality feeds, immunization etc have influence on milk production. The milk productivity in the country could be considerably enhanced by timely extending the backward services to the producers. Since many small holders have looked at animal husbandry as subsidiary activity, the milk production has always remained low without actually realizing the genetic potential of livestock breeds. However the necessary skills and knowledge for scientific rearing of animals can be achieved through providing advisory services like balanced feeding, health management etc through village based trained local resource persons.

5.7 SWOT analysis of dairy value chain.

Strengths, weaknesses, opportunities and threats of producers, cooperative societies, dealers and consumers were presented in Table 31. Six strengths, 5 weaknesses, 3 opportunities and 2 threats emerged for producers. For cooperative societies, 12 strengths, 4 weaknesses, 5 opportunities and 3 threats were identified. In case of dealers 10 strengths, 6 weaknesses, 6 opportunities and 5 threats were identified. Consumers could specify only 6 strengths and 4 weaknesses; no opportunity and threat were hence mentioned by them.

From the table 28, the study revealed that, as the milk is perishable in nature, farmers were in need of immediate sale and the cooperative collects milk two times a day, in the morning and evening time in the milk collection centers. Milk collection records were maintained using computers and every regular milk supplier member of the cooperative has his/her own milk collection book/card which shows transparency in trading of milk, so they were getting better price for their quality of milk from the co-operative society. So they perceived assured market (99.16%) as major strength. Farmers were paid for their milk one day before the market day of village within time period and also the discussion with producers members of the cooperative revealed that members were happy to get their payment once in a week to fulfill their needs. In this regard, the producers expressed that, payment system of the cooperative was

regular and excellent without any hickups. So farmers perceived 'correct payment' (98.38%) as a second major strength. KMF supplied balanced concentrate feed produced from its own feed processing plant under the brand name- "Nandini cattle feed" at a reasonable price and in proper quality. Apart from concentrate feeds, the union also supplied bypass protein feed for high yielding animals for minimizing the cost of milk production. Cooperatives fulfilled members' demand of feed supply with discounted price. Thus members preferred to purchase the feeds of the cooperative. So farmers thought that cattle feed at discounted price (89.16%) as one of the major strength. Little more than half of the respondents (56.67%) expressed timely veterinary service as one of the strength as they were receiving vaccination, first aid to animals, de-worming and various other curative services.

Shortage of professional manpower and other facilities at village level by cooperatives leads to absence of 24 X 7 AI service at village level (92.50%), under-capacity of the feed processing plant and/or high demand for cattle feed might at times lead to non-availability of cattle feed (22.50%); specific time period for milk collection is one of the disadvantage (9.16%) as it might be difficult for the farmers some times to strictly follow the specified time schedule; distance to milk collection point is more (6.67%) might be few producers' need to traverse few extra kilometers and variation in fat and SNF percentages leads to confusion at times (6.67%), might be because of their low education and knowledge level. These were the major weaknesses expressed by the producers. Among the opportunities, helps to become office bearer that fetches social recognition (81.67%) and more learning opportunities (58.33%) as cooperatives provide training and advisory services on livestock production aspects. These two were major opportunities out of the three mentioned by them. Major threats were 'no control over the price' (99.16%) as milk union fixes the price of the milk. Politics in the society and federation (56.67%) was viewed as threat might be due to presence of some political persons at policy making bodies of the milk union. Studies of Arunkumar (2007), Prakashkumar (2011), Ravinder and Shridhar (2012), Girima and Marco (2014) and Himabindu (2014) reported similar results.

Cent per cent of secretaries of society expressed that co-operatives act as a strong marketing channel as a major strength because the cooperative collects milk

two times a day, in the milk collection centers based at village level. Milk collection records were maintained using computers and every regular milk supplier member of the cooperative has his/her own milk collection book/card. Members were paid on weekly basis for the milk they supplied to the society. Good animal health services (100.00%) and AI service at reasonable price (100.00%) were the other major strengths as expressed by societies. The reasons mentioned above for the producers hold good here also. Besides, the societies regularly carry out disease surveillance, disease eradication and vaccination programs in the villages. Breeding services provided by societies included performing AI and conducting animal breeding and infertility camps. The villages presently having village level AI workers are well trained by the union to act as fulltime AI technicians in order to get higher fertility rates by inseminating in appropriate time with reasonable price. Cent per cent of officials perceived that peoples' support to the society is also a major strength as they work on democratic principles. Feeds are provided at discounted rates was perceived as strength by 87.50 per cent of co-operative societies. More the feeds provided to the producers higher would be the milk collected. 'Government support to the society' (75.00%) is also perceived as one of the strength because of various government support the popular one being Rs. 0.20 incentive to the society for 1 kg of milk collected. 'Mutuality with the farmers' (75.00%) and 'rural accessibility of society' (62.50%) were also the major strengths, as with the co-operation of members the societies were established at the grass root level. As the principal of co-operatives, there are equal opportunities for every member to avail the services in all the aspects. So 62.50 per cent of co-operatives officials thought that 'democratic control' is also one of the strength. 'Providing more number of milk collecting centers' facilitates for better accessibility to the members to bring in milk at specified time period. Thus providing more number of milk collecting centers (50.00%) is regarded as one of the strength. Opportunities for social participation in the society (50.00%) were also a major strength because this will help society to improve its reputation in the village.

Since the society is co-operative, it depends heavily on state government funds. So majority of secretaries of co-operative society thought that dependency on state aid (75.00%) is a major weakness. Political interference (37.50%) leads to favouritism and biasness thus weakening the cooperative establishments. Shortage

of professional manpower in the provision of service by the co-operatives *i.e.* 'absence of professionalism' (25.00%) was another weakness perceived by officials of society. Diversification of activities (87.50%) is the major opportunity as perceived by secretaries of society as more the activities e.g establishment of ice cream parlour more will be the returns to society. Presence of good government policy which help dairy co-operative to improve its position in milk value chain (75.00%) is another opportunity expressed, because favorable government policies in infrastructure, procurement, processing, marketing *etc.*, enhance and ease the function of union/society. Improving the economic level of the farmers through Amruta yojana and milk incentive (Rs. 4/liter of milk) programs from government (75.00%) was viewed as another opportunity as it improves the visibility of the society in the village. Professional management (37.50%) was also another opportunity expressed as societies are managed by skilled and trained personnel in milk testing, collecting, accounting and managing. Prevailing scope of value addition at the society level or by giving training to women dairy farmers in sweet preparation might have lead to viewing expansion of business as opportunity by 37.50 per cent societies. High level of competition from private sector (37.50%) was the major threat mentioned. In recent years many private competitors have been penetrating to rural areas by creating their own facilities. This provides a good scope for possibility of milk being sold to private players by the producers affecting business of cooperative societies.

Similar findings were reported by Arunkumar (2007), Prakashkumar (2011) Ravinder and Shridhar (2012) and Himabindu (2014).

Three strengths were expressed by more than one third of the dealers. They were home delivery to customers (47.23%), employment to family (38.89%) and monopoly like situation in market (33.34%). Service with convenience of consumers, any member of the dealer's family can operate and exclusive nandini shop in a locality might be the reasons for them. Most of the weaknesses mentioned were not expressed by many dealers. One of the weakness reported was non-availability of labors (16.67%) as milk has to be delivered to consumer's home in morning hours braving weather conditions.; two opportunities expressed by more than one fourth dealers were scope to establish ice cream parlor (33.33%) as milk union provides financial support for it and growing demand (25.00%) for nandini products as it helps for the growth of the business. Among the threats poor cold storage (30.55%) and

delivery problem (30.55%) were expressed by about one third dealers. Persihability of the product not only requires cold storage facility but also delivery to the dealer at right time so as to sell the products to the consumers at right time every day to keep the consumer loyalty. Results were in line with the findings of Eyassu *et al.* (2011), Milan and Liesbeth (2012), Tsang (2013) and Jeroïn (2013).

Table 28 revealed that, consumer strength for Nandini milk and milk products were low price for milk (75.00%), good quality without adulteration (62.50%), quantity assured (45.00%), popular brand (12.50%), hygiene maintained (7.50%), available in retail outlets (7.50%). These all were due to high brand loyalty of consumers towards Nandini milk and milk products. Scarcity of milk and milk products some time (17.50%) was the only weakness expressed by more than one tenth of the consumers. This could be due to sudden high demand at specific times like in festivals and functions. Other weaknesses were not mentioned by many consumers. These results were in line with the findings of Milan and Liesbeth (2012), Jeroïn (2013) and Tsang (2013).

6. SUMMARY AND POLICY IMPLICATIONS

India ranks first in the world in milk production, which has risen from 17 million tons (Mt) in 1950-51 to about 127.9 Mt by 2012-13 (GOI, 2012). Karnataka ranks 11th in overall milk production in the country (Anonymous, 2014) and per capita availability of milk is 254 gms/day as on 2013-14. Karnataka Milk Federation (KMF) procures an average 4.8 Mt milk/day and per capita availability is 216 gms/day in Karnataka. It has milk processing capacity of 2.10 lakh liters per day with a brand name 'Nandini'

Value chains are the linked groups of people and processes by which a specific commodity is supplied to the final consumer. Value chains are the input, production and marketing chains that supply livestock products to the consumer. Value chain analysis can be a useful tool as it directs and identifies people and organizations that need to be involved in order for an intervention to succeed. Value chain mapping acts as a focus for communicating knowledge, and can play a very important role in risk communication, thus leading to more transparent decision-making.

Though India stands first in milk production in the world the per capita livestock productivity is less. Besides 80.00 per cent of the milk collection is handled through unorganized sector. But it is essential to shift the farmers towards organized sector by improving the backward linkages through extension advisory services. This can be addressed effectively by conducting a study to map the present backward and forward services rendered to producers and processors. This will help to understand how to make the services more attractive and effective to loop in more number of livestock farmers to the organized sector as well as to improve the livestock productivity by better management practices. In view of this study was undertaken with following objectives-

1. To map the milk value chain from farmer to end consumer
2. To document value chain experiences of milk producers in co-operative dairy sector

3. To analyze the role of different stakeholders in backward and forward linkages of dairy value chain.
4. SWOT analysis of dairy value chain

Belgaum lies in the zone of cultural transition between Karnataka, Maharastra and Goa. It has an average elevation of 751 metres (2463 feet) above sea level. The district was selected for the study as it is the highest milk producing district and ranks first in livestock population in the state. Further, Gokak and Bailhongal taluks of Belgaum district were selected as the locale of the study, since they have highest functional milk co-operative societies and the highest average milk collection over a 5 year period from 2009 to 2014. From each taluk four villages having societies with highest milk procurement in 2013-14 were selected. Thus study in all covered 8 villages of 2 taluks of Belgaum district. One of the criteria for selection of producer was they should be a member of co-operative society and should be a milk producer at the time of the study. Fifteen such producers from each village were randomly selected, thus forming a sample of 120 producers from 8 villages. Only one milk processor is operating in study area under Belgaum milk union and was so included to collect related information. Totally one hundred and twenty milk producers, 8 milk cooperative societies, one processor, 34 dealers and 40 consumers together formed, the sample of the study.

The variables identified by the study were age, education, land holding, herd size, annual income, availability of crop residue, mass media participation, extension participation, extension contact, milk utilization pattern, backward service, forward support and milk & milk products value chain were considered for the study. Set of interview schedules pre-tested and standardized, comprising both close ended and open ended questions for the study were used to collect the data from producers, milk societies, processor, dealers and consumers. Personal interview technique was the method employed for the study to collect primary data. The appropriate statistical procedures such as frequency, percentages, mean, standard error

and step-wise regression analysis were employed to analyze the data. Statistical package like excel and SPSS were used for analysis.

Major findings of the study were as follows

1. More than half of the producers (57.50%) belonged to middle age category followed by 30 per cent belonged to old age category.
2. Almost equal per cent of producers were educated up to primary school (45.00%) and high school (45.83%).
3. Little more than half of the producers (56.67%) had marginal size landholding, followed by 34.16 per cent of the respondents had small size landholding, 25.83 per cent of the respondents had medium size landholding. The average landholding size was 1.31 ± 0.008 hectares.
4. Small herd size was owned by 51.66 per cent producers, medium herd size was possessed by 31.67 per cent producers and large herd size was possessed by 16.67 per cent of producers.
5. Majority of the producers (44.17%) belonged to high annual income group from crops and 41.67 per cent of respondents belonged to low income from livestock.
6. Overall, maize stover was produced by 65.00 per cent of producers with average availability of 3.06 tons per year per farmer by incurring an average cost of Rs. 6,699.00 and least produced was bajra stover (1.67%) by producers with average availability of 0.067 tons per year per farmer and with cost incurred of Rs. 4500.00. Sugarcane was though produced by half of the respondents (52.50%) it's tops were fed to livestock only for 45-60 days.
7. Newspapers were never read by half of the producers, occasionally by 37.50 per cent of producers and regularly by 13.34 per cent producers for general news items. Radio was never used for general programs (60.84%) and agricultural programs (85.00%). More than half of the producers (64.16%) viewed television for general program and for

agriculture program (35.84%). Little above one fourth (28.83%) producers never used television to view agricultural program.

8. Producers participated in krishimela regularly (40.00%) and occasionally (46.67%) and never (13.33%). Participation of producers in other extension activities was extremely poor.
9. Raith Sampark Kendra (RSK) or agricultural department official was contacted by 59.16 per cent of the respondents and Krishi Vigyan Kendra was contacted by 17.50 per cent of producers whenever there was a need. Only 4.16 per cent and 5.00 per cent of producers contacted UAS scientists and private company extension officers, respectively when there was a need. Majority of producers (81.67%) contacted veterinary officials whenever there was a need.
10. Three fourth of producers (72.50%) owned 3-5 lactating cows. Sixty per cent producers owned 2-4 lactating buffaloes. The average milk produced by the household was 9.93 ± 0.071 liter per day.
11. Out of the total amount of milk produced, 85.84 per cent producers retained less than 25.00 per cent of milk produced. The average milk retained by the household was 0.87 ± 0.0035 liters per day per household. Majority (85.84%) of producers sold more than 75.00 per cent of total milk produced. The average milk produced was 9.065 ± 0.07 liters per day per household.
12. Total cost of milk production incurred by the producer was Rs. 38,728.40 per annum. The return obtained due to sale value of milk produced was Rs. 1,00,795.95 with annual net returns of Rs. 62,067.55. So the benefit cost ratio for milk production was 2.60:1.00.
13. Majority of the respondents (98.83%) processed curd regularly for family use.
14. Marketing efficiency was Rs. 0.09, Rs. 0.27, Rs. 0.81, Rs. 1.15 for toned, HCM, HTM, Shubham milks, respectively.

15. Total cost was Rs. 28.30 for 200 g curd pack and Rs. 27.70 for 500 g curd pack. Selling price was Rs. 45.00 per kg and Rs. 36.20 per kg respectively for 200 g and 500 g curd packs. Contributions of Rs. 12.95 per kg and Rs. 6.30 per kg were allocated for curd that leads to Rs. 2.59 (200g) and Rs. 3.15 (500g) on per packet basis.
16. Total cost for sweet and masala butter milk were Rs. 51.61 and Rs. 25.73 per liter, respectively. Selling prices were Rs. 40.00 and Rs. 25.00 for sweet and masala butter milks, respectively. Contribution of Rs. 21.30/l (sweet) and Rs. 17.07/l (masala) were allocated that lead to Rs. 4.26 (sweet) and Rs. 3.41 (masala) on per packet basis.
17. Among the different types of milk, dealers' margin was higher for Shubham (Rs. 1.52) and least for toned milk (Rs. 1.20). Among milk products it was more for 200 g curd packet (Rs. 1.50) and least for 200 ml masala butter milk packet (Rs. 0.75).
18. Cent per cent of producers had willingness to continue as member of milk cooperative societies. Majority (93.34%) expressed correct payment as the reason and small number of producers (1.75%) were given the reason as opportunity for learning and loan availability.
19. Cent per cent producers expressed payment at regular interval as very good experience. Fairness of quality of milk testing was mentioned as very good by 99.17 per cent producers. AI services at right time was experienced as very good (86.67%), by majority producers. Continuous and regular advisory services were expressed as very good (0.83%), good (4.17%), moderate (76.66%) and poor (18.34%) experiences by the producers.
20. Cent per cent of the producers availed artificial insemination service to their livestock from the milk cooperative society followed by, feeds at discounted price (88.33%), availing veterinary services (75.84%) and little more than half of the producers availed the help to get linked with bank (54.17%), and for getting fodder seeds (51.67%), respectively. More than one fourth (34.10%) of the producers was availing advisory

services. Only 9.16 per cent of producers participated in training programs.

21. To give right quality of milk to the society was the major role expressed by cent per cent of producers followed by asking more price for milk (98.34%).
22. Only two difficulties were expressed by the societies. They were irregularity in carrying milk to the society by the producers (62.5%) and lack of computerization (12.50%).
23. In case of distribution of feeds, providing AI service and disbursing payment .Gokak taluks' societies performed better than Bailhongal taluks' societies except in fodder seeds distribution.
24. Dealers' were earning more in full cream milk (Rs. 5426.46) in a month among other milk types. Dealers procured masala butter milk in more quantity but were getting profit from sweet lassi. Curd and other products were not fetching more money to the dealers.
25. Only 16.67 per cent of dealers attended training given by KMF. Of these majority of dealers attended training on management and marketing (13.89%) and least in hygiene (8.34%). Dealers opted advisory services (58.34%) from milk union on various aspects mainly on storage of products and sweet preparation (16.67%) followed by marketing aspects and managements of shop (13.89%).
26. Majority of dealers' (63.88%) perceived consumer response as excellent for Nandini milk and milk products.
27. Majority of the consumers (70.00%) belonged to old age category. Little more than half of the respondents (55.00%) received PUC and above education. More than half (57.50%) of consumers reported that monthly they spend an amount between Rs. 900 to Rs. 1200 for milk. Half of the consumers (52.50%) purchased milk from dealer's point.

Toned milk was purchased by 57.50 per cent consumers. Purchase decisions were influenced by media for 82.50 per cent consumers.

28. Most of the consumers (65.00%) had a brand loyalty for Nandini milk and milk products from 5 to 10 years, and the major reason given by consumers' was low price for milk (75.00%).
29. Milk producer supply their milk to primary milk co-operative societies (PMCS), where the milk was weighed, graded, collected and transported it to its district milk union. The milk, after processing and/or value addition, packaging in the district milk union dairy plant, reaches consumer either via directly from milk union and/or through dealers.
30. Almost all the producers (99.16%) perceived assured market as a major strength, non availability of 24X7 AI service (92.50%) as a weakness; major opportunity and threat were helps to become bearer in the society (81.67%) and no control over the price (99.16%), respectively.
31. Providing strong marketing channel as major strength as perceived by secretaries of co-operative society. Weakness was dependency on state aid (75.00%); opportunity and threat were diversification of activities (87.50%) and high level of competition from private sector (87.50%).
32. SWOT analysis of dealers' showed that home delivery to consumers (47.23%) as a major strength, non availability of labors (16.67%) as a major weakness, scope for establishment of ice-cream parlor (33.33%) as an opportunity and poor cold storage facility (38.39%) as a threat.
33. Three fourth of consumers perceived low price for Nandini milk as a major strength, and only 17.50 per cent of consumers felt that scarcity of milk and milk products as a major weakness. No opportunity and threats were expressed by the consumers.

Implications of the study

1. The milk value chain mapping indicated a weak service of providing extension/advisory services and fodder seeds between cooperative milk union and the milk producers. These should be strengthened for improving business at all levels. Further more infrastructure should be created to improve the AI service facilities as well as quantity of feed supplied to its members.
2. There is large scope for dairy cooperative societies to organize more extension and advisory services to the milk producers especially on scientific breeding and feeding aspects to enhance milk production from present level of 9.93 ± 0.071 liter per day
3. Producers are selling large quantity of milk produced to the cooperative society. In those villages where sufficient milk collection prevails through out the season milk union should plan to start production of more value added products from milk like ghee, curd, butter, cheese, khoa, *etc.* which can provide more opportunity for producers, societies as well as dealers to improve their businesses.
4. The cost of feed constitutes nearly 60 to 70 per cent of total cost of milk production. Improving quality fodder availability to the livestock would reduce this cost substantially. This can be achieved by educating producers on importance of cultivation of high yielding fodder crops like Bajra Napier hybrids, Guinea grass, perennial fodder sorghum and Lucerne. The study area has good irrigation source and by cultivating these crops producers can ensure regular supply of quality green fodder to their livestock round the year. Milk union should identify some farmers as seed producers of these crop by which they can ensure regular and quality seeds to their farmers.
5. The Karnataka Milk Federation may also organize more number of off-campus training programs for dairy farmers and dealers so as to provide an opportunity for maximum participation in training programs. This is because especially dairy farmers may not be able to move out

from villages and participate in the out station training programs conducted at KMF training centers.

6. More proactive role of cooperative societies in linking its members with financial institutions would help the members to rear better high yielding livestock breeds and produce more milk.
7. Study has clearly brought out some weaknesses for all the actors. Some of these weaknesses need little resources and management decisions. Where ever possible, such weaknesses must not be ignored but be dealt to make the business chain more vibrant.

Future line of work

- ❖ The present study did milk value chain analysis of only one district. However, to get broader and picture, similar study could be taken up for Karnataka state as a whole.
- ❖ The value chain analysis for cooperative milk sector is taken up. However, on the similar lines study can be taken up for private milk players.
- ❖ In depth study to analyze and strengthen backward services in milk value chain of cooperatives could be taken up.

REFERENCES

- Abdallah, A. H., 2012, SWOT analysis of Mango production in Ghana, *Int. J. Agric. Res.*, 32 (5) : 53-57.
- Abdul Hai, Srivastava, R. M., and Singh, R. P., 2003, Livestock farmers' preference of communication media and their use by extension workers in tribal area of Bihar. *Indian J. Extn. Edu.*, 39 (1 & 2) : 31-34.
- Akshata, K. K., 2014, A study on crop residues management for livestock by farmers. *M. Sc. (Agri.) Thesis (Unpubl.)*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Aluregowda, 2013, A Study on Brand Image towards Nandini Products at Manmul in Mandya. *Int. J. Engg. Mngt. Res.*, 3(6) : 1-8.
- Anand, K., 1995, Analysis of farmers constraints in cotton production. *Indian J. Extn. Edu.*, 14 : 111-116.
- Anita, B., 2004, A study on entrepreneurial behavior and market participation of dairy farmwomen in Bangalore rural district of Karnataka. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Bangalore, Karnataka (India).
- Anonymous, 1966, Karnataka Land Reforms Act 38-99 and 195-196: Sec 2 (a) 32.
- Anonymous, 2003, National Dairy Development Board. Government of India, 17th livestock census. *Annu. Rep. 2003-2004*, p. 27-34.
- Anonymous, 2003, The state of dairy cattle in India., Dairy report, p. 1-36.
- Anonymous, 2011, Dairy Value Chain in India : Background proposal for the CGIAR Research Program on Livestock and Fish. <http://cgspace.cgiar.org/handle/10568/3248/pdf>. Retrieved on 21 July 2014.
- Anonymous, 2011, Dairy Value Chain in India : Background proposal for the CGIAR Research.
- Anonymous, 2012, National Dairy Development Board. Government of India, 19th livestock census. *Annu. Rep. (2012-2013)*, pp. 17-26.

- Anonymous, 2013, Belagavi district profile, www.kar.nic.in Retrieved on 7/2/2015, p. 12.
- Anonymous, 2013, Churning of milk. *Down to Earth India*, 5 (8) : 1-20.
- Anonymous, 2013, Dairy value chain and mapping and analysis in Syria. *Intern. J. Agric. Econ.*, 15 (1 & 2) : 531-539. Retrieved on 14-02-2015.
- Anonymous, 2013, www.kmf.nic.in.
- Anonymous, 2014, Karnataka 11th in Milk Production, *The Hindu Newslett.*, 09 : 22-26.
- Arcadia, A. P., 2012, Profile of the South African dairy market value chain in Durban. *African J. Agric. Res.*, 8 (3) : 25-32.
- Arora, A. S., Avadshesh Kumar, Bardhan, D. and Dabas, Y. P. S., 2006, Socio-Economic and communication variables associated with level of knowledge and degree of adoption about improved dairy husbandry practiced in Uttaranchal. *Indian J. Dairy Sci.*, 59 (5): 337-343.
- Arularasan, G. S., 2013, SWOT analysis of integrated tribal development program in western ghats of south India. *Mysore J. Agric. Sci.*, 47 (2) : 391-394.
- Arunkumar, T. D., 2007, Profile of self help groups and their contribution for livestock development in Karnataka *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Babu, D. and Verma, N. K., 2010, Value Chains of Milk and Milk Products in Organized Sector of Tamil Nadu A Comparative Analysis, *Agric. Econ. Res. Rev.*, 23 (8) : 479-486.
- Bamman, C., 2008, Smallholder market participation : concepts and evidence from eastern and southern Africa. *Food Policy*, 33 (4) : 299-317.
- Bamman, H., 2000, The governance of global value chains. *Rev. Intl. Polit. Econ.*, 12 : 78-104.

- Bhanja, A. M., And Dubey, V. K., 1987, Critical factors in organization of dairy co-operatives. *J. Rural Dev.*, 6 : 466-474.
- Bhanja, J., Serrano, A., Howard, J., 2000, Linking farmers to market; different approaches to human capital development. *Food Policy*, 28 (4) : 405-419.
- Bharadwaj, A., Dixit, V. B. and Sethi, R. K., 2006, Economics of Buffalo milk production in Hisar District of Haryana state. *Indian J. Dairy. Sci.*, 59 (5) : 322-327.
- Bhatt, S. K., 2011, Extent of knowledge of dairy farmers regarding improved animal husbandry practices under Village resource center's programme in Aanand, Gujarat. *J. Agric. Res.*, 12 (4) : 34-38.
- Bordoloi, J. P., Laskar, S. K., Haque, A. and Bora, N. N., 2005, Socio-economic characteristics of dairy households of Guwahati in Assam. *Indian Veter. J.*, 82 (4) : 427-429.
- Bowender, 2005, ICT application in a dairy industry : The e-experience of Amul in Aanand, Gujarat. *Indian J. Agric. Res.*, 31 (4) : 45-52.
- Chaudhari, R. R., 2006, A study on entrepreneurial behaviour of dairy farmers in Dharwad district. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Chauhan, D. S., Kamble, V. J., Padghan, P. N., Sawant, R. C. and Kamble, R. R., 2004, Impact of farmers status on milk production in tribal area of Kinwat tahasil (Marathwada region). *Indian J. Animal Res.*, 38 (2) : 137-140.
- Chengappa, M. and Nagaraj, N., 2005, Strengthening backward and forward linkages in horticulture, SAFAL market in Bangalore district of Karnataka *J. Horti.* 3(5) : 1334-1449.
- Cummins, D., 2010, SWOT analysis on rice supply chain in Lao PDR, *Int. J. Agric. Sci.*, 5 (11) : 9-12.
- Daniel. L., 2013, SWOT analysis system of vegetables and fruit industry and Texas A & M Agrilife programs. <http://agrilifescience.tamu.edu/agroempresas/>

pdf/manual4_collectivemarketing.pdf ISBN-1-58161-418-7. Retrieved on 10-01-2015.

De Leeuw, P. N., 1997, Crop residues in tropical Africa : trends, in supply, demand and use. In : C. Renard (ed.). Crop residue in sustainable mixed crop/ livestock farming systems. CAB International, New York, *CropresiduesChao %203.html* Retrieved on 17. 02-2014.

Debebe. L. M., 2010, Value chain financing : The case of Selalea area dairy value chain in Selalea of Ethiopia *J. Agric. Res.*, 6 (9) : 543-549.

Desai, A. H., 2003, Performance of Farmers' Service Societies (FSS) in Zhang district of Punjab. *Indian J. Extn. Edu.*, 4 (8) : 456-523.

Eyassu, F. S., 2009, Value chain analysis of milk and milk products in Borana pastoralist, Addis Aababa, Ethiopia, *Int. J. Agric. Res.*, 18 (5) : 8-15.

Eyassu, S., Kurt, J. and Wolfgang, B., 2011, Analysis of dairy value chain-case study of Dire Dawa city, Eastern Ethiopia. *Ph. D Thesis, Haramaya Univ, Alemaya* (Ethiopia) [http:// www. yonad@ethionet./bea/regional/spi.htm](http://www.yonad@ethionet.bea/regional/spi.htm) Retrieved on 26 July 2014.

Fatima, B., 2014, A study on women dairy farmers in Madurai district, *Int. J. Econ. Business Rev.*, 2 (8) : 98-104.

Fayad, F., 2009, Sector Study and value Chain analysis of the dairy sector in Syria. *Int. J. Dairy Res.*, 15 (2) : 1-50.

Fernandez-Rivera, S., Williams, T. O., Hiernaux, P. and Powell, J. M., 1995, Fecal excretion by ruminants and manure availability for crop production in semi arid West Africa. *Proc. Intl. Conf. ILCA*, Addis Ababa, Ethiopia, pp. 149-169.

Frank, H., 2007, Value chain program design : promoting market - based solutions for industry competitiveness. *IOSR J. Vet. Sci.*, 7 (1) : 62-66.

Frank, L. and Henry, P. 2007, Value Chain Programme Design : Promoting Market Based Solution for MSME and Industry Competitiveness. Action for

Enterprise (AFE) N. 14th St, Suite 30 Arlington, VA 22201 <http://www.actionforenterprise.org/USAID/G/EGAD/MD/finfidmu.htm>, Washington, DC. Retrieved on 10-01-2015.

Gajendra, A. J., 2011, Perspective of farmers on effect of climate change on agriculture and livestock, *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).

Ganeshagowda, I. P., Parmod, K. and Manjunatha, A. V., 2013, Impact of KSAMBS' free SMS to farmers on agricultural marketing prices - A case study in Karnataka (India). *Science Discovery*, 1 (3) : 28-34.

Garnevskia, I., 2010, SWOT analysis of the horticultural farms in the Plovdiv region of Bulgaria, *J. Horti.*, 8 (2) : 256-259.

Gasana, M., 2011, Exploring the determinants of joining dairy farmers' cooperatives in Rwanda : A perspective of Matimba and Isangano cooperatives, *J. Agric. Res.*, 21 (4) : 25-29.

Gbolagade, N. A., 2013, Comparative analysis of public and private veterinary services delivery among commercial poultry farmers in Delta state, Nigeria. *J. Sust. Dev. Africa*, 15 (7) : 12-28.

Girima, D. and Marco, V., 2014, Assessment of factors and factors affecting milk value chain in small holder dairy farmers : A case study of Ada's district, East Shawa zone of Oromia regional state, Ethiopia. *African J. Agric. Res.*, 9 (3) : 345-352.

Girima, D. and Marco. V., 2014, Analysis of milk value chain-the case of Ada'a dairy cooperative in Ada's district, East Shawa zone of Oromia regional state, Ethiopia. *Wudpecker, J. Agric. Res.*, 3 (1) : 016-025.

Gol (Government of India), 2009, *Economic Survey, 2009-10*, Ministry of Finance, Economic Division, New- Delhi.

Gol (Government of India), 2012, *Economic Survey, 2012-13*, Ministry of Finance, Economic Division, New- Delhi.

- Grygiel, E., R., 2007, Kosovo dairy value chain : A case study, *Int. J. Dairy Res.*, 25 (6) : 86-95.
- Gupta, P. R., 2012, Dairy India year book. Thomson Press (India) Limited, New Delhi.
- Herr, M. and Muzira, T., 2009, Value chain development for recent work: A guide for development practitioners, government and private sector initiatives, Geneva. *Int. J. Dairy Res.*, 15 (5): 540-562.
- Himabindu, T., 2014, SWOT Analysis of Dairy Industry in India. *Int. J. Sci. Res.*, 3 (1) : 249-251.
- Hinge, R. B., 2009, A study on diffusion and adoption of wine grape production technology in Maharashtra. *M. Sc. (Agric.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Hirevenkanagoudar, L. V., 1998, A scientific investigation on the impact of dairy development programmes of KDDC a small farmers, marginal farmers and agricultural labourers of Bangalore district of Karnataka. *Ph. D. Thesis*, Univ. Agric. Sci., Bangalore, Karnataka (India).
- Hobbs, J., Cooney, A. and Fulton, M., 2000, Value chains analysis of dairy sector in Denmark. *Int. J. Agric. Econ.*, 22 (2) : 145-151.
- Javanmard, M., 2008, A SWOT analysis of organic dried Fig. production in Iran, *J. Emt. Sci.*, 6 (1) : 101-110.
- Jeroin, T. H., 2013, Dairy value chain mapping and analysis in Ethiopia. *Int. J. Econ. Business Rev.*, 29 (7) : 540-562.
- Jiang, S. S., Zhuang, D., Fu, J., 2012, Bio-energy potential from crop residues in China : availability and distribution, *Renew. Sust. Energy Rev.*, 16 (5) : 1377-1382.
- Kaplinsky, R. and Morris, M., 2002, A handbook for value chain research. International Development Research Centre (IDRC). <http://www.globalvaluechains.org/docs/VchNov01.pdf> Retrieved on 21 July 2014.

- Karim, A. L., 2005, A "SWOT" Analysis of Medicinal Plant Production in Iran, *Int. J. Agric. Res.*, 86 (5) : 66-68.
- Kashappa, M. N., 2013, A comparative study on dairy and non dairy farmers in Belgaum district of Karnataka. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Kayouli, C., 1996, The role of feeding system based on cereal residues in integrated farming system in Sub-Saharan Africa. <http://ces.iisc.ernet.in/hpg/envis/livdoc1121.html> Retrieved on 17-02-2014.
- Kerlinger, F. N., 1973, *Foundations of Behavioural Research*, Holt Rinehart and Winston Inc., New York.
- Khin Mar Oo, 2005, Knowledge and adoption of improved dairy management practices by women dairy farmers in Dharwad district. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Kim, B., 2008, E-business & the dairy and grains industry value chains in Australia, *Int. J. Econ. Business Rev.*, 5 (9) : 506-512.
- Kohls, A. D., 2011, Value chain analysis of the dairy industry in Botswana. *African J. Agric. Res.*, 15 (2) : 234-239.
- Lule, D., Kaba, W., and Nagesh, M., 2012, Optimizing livelihood and environmental benefits from crop residues in small holder crops- livestock system in Western Oromia, <http://cgspace.cgiar.org> Retrieved on 21-3-2014.
- Mande, J. V. and Thombre, B. M., 2009, Adoption of cattle rearing practices by owners in Latur district. *Dairy Farming Foods and Home Sci.*, 28 (3/4) : 176-180.
- McIntyre, J., Reed, J. D. and Fedla, A., 1998, Evaluating sorghum cultivars for grain and straw yield. *Proc. of a Workshop held at ILCA, Addis Ababa Ethiopia*. pp. 283-304.
- Michael, H. M., 2010, Developing market linkage for small holder farmers in Tanzania, *M. Sc. thesis*, Copenhagan Business school, 562-580 Retrieved on 1-02-2015 [http : //cgspace. cgiar. org](http://cgspace.cgiar.org).

- Milan, M. and Liesbeth, D., 2012, Value Chain Analysis in the Montenegrin Dairy sector. European Training Foundation, Montenegro. *Int. J. Extn. Edu.*, 5(2) : 1-6.
- Mittal, S., 2007, Strengthening backward and forward linkages in horticulture : some successful initiatives. *Agric. Econ. Res. Rev.*, 20 (2) : 457-469.
- MoA (Ministry of Agriculture), 2012, *Annu. Survey Rep., 2012*, Govt. of India, New Delhi, Retrieved on 19-02-2014.
- Monika, D. D., 2009, Contribution of livestock production system to farmer's livelihood in western region of Maharashtra. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Moyo, G., 2011, Multi-stakeholder platform contribution to value chain development in Sarah drost of Ethiopia. *Agric. Econ. Res. Rev.*, 9 (4) : 789-812.
- Muriukiet, G. H., 2010, A study on small scale milk marketing and processing in Ethiopia, *Int. J. Dairy Res.*, 24 (5) : 589-601.
- Murthy, M. R. K., Rao, K. H. and Reddy, G. P. 2012, Evaluating Value chain and Retailing of Milk in Chittoor, Andhra Pradesh. *Int. J. Engg. Res. Technol.*, 9 (2) : 643-651.
- Nancy, A. M., 2008, The value chain of fresh milk in the north of Vietnam, the case study in Sonla. http://www.vietnam_journals.com/NRI/2008/summary_report/original/contents.html Retrieved on 26 July 2014.
- Nataraju, H, 2013, A study on participation of women in dairy farming in Chikkamagalore, *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Bangalore, Karnataka (India).
- Nguyen, H. A., 2013, Production and marketing constraints of dairy farmers in Son La milk value chain, Vietnam. *Greener J. Business & Mngt. Business Studies*, 26 (5) : 58-62.
- Nguyen, V. K., 2013, Wicked problems- a value chain approach from Vietnam's dairy product, *Int. J. Agric. Econ.*, 5 (2) : 2-161.

- Nilson, T., 1995, *Chaos Marketing*, London. McGraw-Hill Company.
- Ntengua. T, 1999, Dairy products demand and marketing in Kilimanjaro Region of Tanzania. *African J. Agric. Res.*, 7 (2) : 347-358.
- Ochja, F. O., 2010, Economics of veterinary services delivery among commercial poultry farmers in a market-driven economy: Evidence from delta state, Nigeria. *Int. J. Poultry Sci.*, 9 (12) : 1140-1145.
- Oladele, H., 2013, Factors influencing demand for animal health services and knowledge of bio-security among livestock farmers along border villages of South Africa and Namibia. *African J. Animal Husbandry*, 5 (4) : 57-63
- Pandey, S. K., 2012, Analysis of dairy sub sector industry and value chain in Zambia, *Int. J. Agric. Res.*, 10 (7) : 433-436.
- Peter, 2013, Dairy value chain mapping and analysis in Malawi. *Int. J. Agric. Econ.*, 12(5) : 45-52.
- Pieters, A., 2010, Dairy farming value chain analysis and potential for expansion of processed milk industry in Ethiopia, *African J. Agric. Res.*, 5 (9) : 307-312.
- Pieters, Y., 2012, A study on dairy farming, value chain analysis and potential for expansion of processed milk industry in Land O' Lakes of Ethiopia, *Int. J. Dairy Res.*, 20 (3) : 689-697.
- Porter. M., 1985, Review of guidelines and manuals for value chain analysis for agricultural and forest products. Nairobi, Kenya. *Int. J. Dairy Res.*, 69 (17) : 1-30.
- Prakashkumar, R., 2012, Farmers perception towards livestock extension service : A case study in western Maharashtra, *Indian J. Extn. Edu.*, 2 (1) : 1-6.
- Prakashkumar, R., 2011, SWOT analysis of dairy cooperatives : a case study of western Maharashtra, *Int. J. Res. Comm. Mngt.*, 2 (8) : 32-35.

- Pushpa, P., 2006, A study on livestock production systems of rural and peri-urban livestock owners in Belagaum district. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Rajanna, N., Singh, A. and Srinivas, E., 2003, Training needs and consultancy pattern of dairy farmers of Warangal district. *Maharashtra J. Extn. Edu.*, 22 (1) : 60-62.
- Rajinder, K., 2011, Services provided and availed by the dairy farmers from selected milk processing agencies in Jargon block of Punjab. *Agriculture Update*, 6(1) : 5-7.
- Ramchandra, K. S., Taneja, V. K., Sampath, K. Y., and Angadi, U. B., 2007, Livestock feed resources in different agro-ecosystem of India : Availability, requirement and their management, *Indian J. Extn. Edu.*, 26 (5) : 258-262.
- Ranjit, K., 1999, Impact of dairy co-operatives on the rural economy in Nalanda district. *J. Dairy. Food Home Sci.*, 18 (2) : 92-97.
- Ravi, S. K., 2010, Private extension services in India and SWOT analysis, *Indian J. Extn. Edu.*, 5 (3) : 32-37.
- Ravinder, N. V. and Shridhar, S. P. 2012, BIOINFOLET : SWOT analysis of dairy farming as perceived by the dairy owners 586-589 <http://www.IndiaJournals.com/Doc/dairy.pdf>. Retrieved on 5 April 2014.
- Reddy, C., 2013, A study on value chain analysis of dry land agricultural commodities in Patancheru of Andhra Pradesh, *Indian J. Extn. Edu.*, 10 (5) : 103-119.
- Reddy, K., M., 2013, A study on value chain analysis of dry land agricultural commodities in Ranga Reddy district of Andhra Pradesh, *Indian J. Extn. Edu.*, 10 (4) : 108-121.
- Reddy, T. H., 2009, Analysis of dairy value chain in Coimbatore district of Tamil Nadu, *Indian J. Extn. Edu.*, 12 (2) : 382-390.

- Roger, G. and Daniel, O., 2004, The Economic Importance of the Iowa Dairy Industry. Ames, Iowa. *Int. J. Dairy Res.*, 15 (5) : 348-361.
- Satyanarayan, K. and Jagadeeswary, V., 2010, A study on knowledge and adoption behaviour of livestock farmers in Uttarkannada. *Indian J. Animal Res.*, 44 (2) : 100-106.
- Savitha, S. S., 2004, Role of rural women in animal husbandry In Dharwad district of Karanataka. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Seema, P., 2013, SWOT analysis of an entrepreneurial venture set up by entrepreneurs in Agra Nagar Nigam. *J. Extn. Edu.*, 8 (1 & 2) : 207-211.
- Senthilkumar, T., Sudeepkumar, N. K. and Subramanian, R., 2005, Profile of urban dairy farmers utilizing mobile artificial insemination services in Tamil Nadu. *J. Extn. Edu.*, 16 (1&2) : 3745-3748.
- Shantanu, K., 2006, SWOT analysis of potato cultivation in east khasi hills district of Meghalaya : farmers' perception. *Potato J.*, 33 (3 - 4) : 144-148.
- Sikka, P. and Dixit, V. B., 2006, Perception of rural women on buffalo husbandry in Zind of Haryana. *Agric. Ext. Rev.*, 12 (5) : 35-38.
- Singh Bal, H. S. and Narinder Kumar, 1987, Production and marketing channels of milk in different regions of Punjab. *Indian J. Agric. Mktg*, 30 (1) : 34-38.
- Singh, D. R., Kaul, S., and Sivaramone, N., 2006, Migratory sheep and goat production system: The mainstay of tribal hill economy in Himachal Pradesh. *Indian J. Extn. Edu.*, 16 (5) : 56-65.
- Sivapalan, A. and Rajendran, K., 2012, A Study on Value Chain Analysis in Dairy Sector in Kilinochchi District, Sri Lanka. *Global J. Mngt Business Res.*, 21 (12) : 1-15.
- Soujanya, S., 2014, Management efficiency of dairy farm women in Belagaum district. of Karnataka. *M. Sc. (Agri.) Thesis (Unpubl.)*, Univ. Agric. Sci., Dharwad, Karnataka (India).

- Subhash, C., 2012, A study on farmers' satisfaction with delivery of veterinary services in Karanool district of Andhra Pradesh, *Indian J. Animal Res.*, 48 (1) : 67-70.
- Surendra, R. J., Bhim, R. G., and Gurung, L., 2009, Value chain analysis of dairy in Merak and Sakteng, Bhootan. *Int. J. Extn. Edu.*, 26 (5) : 89-95.
- Suresh, H., 2004, Entrepreneurial behaviour of milk producers in Chittoor district of Andhra Pradesh - A critical study. *M. V. Sc. Thesis*, Acharya N. G. Ranga Agric. Univ., Hyderabad (India).
- Swami, S., 2006, A study on technological gap and constraints of bidi tobacco cultivation in Belgaum district, Karnataka state. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Taskeen, M. D., 2012, Mechanization needs of sugarcane growers in Belagaum district. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- Tsang, S., 2013, Dairy value chain mapping and analysis in Syria. *Int. J. Agric. Res.*, 21 (5).
- Uhls, A. M., 2008, Dairy value chain in Rwanda, *African J. Agric. Res.*, 9 (15) : 25-35.
- Valk, V. D., 2010, Formal dairy chain of Addis Ababa : an analysis of the integration of small scale dairy farmers in Ethiopia, *J. Dairy Res.*, 24 (4) : 293-316.
- Van den Berg, M., Boomsma, M., Cucco, I., Cuna, L., Janssen, N., Moustier, P., Prota, L., Purcell, T., Smith, D. and van Wijk, S., 2009, Making value chains work better for the poor : A tool book for practitioners of value chain analysis. Making markets work better for the poor (M4P). http://www.markets4poor.org/sites/default/files/file/Publications/M4P1/VC%20toolbook_eng.pdf Retrieved on 5-2-2015.

- Veeranna, K. C. and Singh, D. P., 2004, Gender analysis of dairy and crop production systems in Bidar district of Karnataka. *Karnataka J. Agric. Sci.*, 17 (2) : 32-36.
- Venkatakonda, T., 2006, SWOT analysis of cotton cultivation in Andhra Pradesh. *Andhra Agric. J.*, 54 (3&4) : 127-128.
- Wadear, P. R., Kiresur, V. R. and Gaddi, G. M., 2003, Human labour absorption in dairy farm in Karnataka – An economic analysis. *Rural India*, 66 (12) : 243-247.

INTERVIEW SCHEDULE

Appendix Ia: MILK PRODUCERS

Investigator:

Date of investigation:

General Information:

1. Name of the respondent -
2. Village -
3. Taluka -
4. Contact number -
5. Age -
6. Education -

7. Landholding

Type of land	Total acres
Rain fed	
Irrigated	
Garden	
Other	
Total	

8. Cropping system

Sl. No.	Crops		Area coverage (acres)	Total Grain Yield (tons)	Total Value (Rs.)	Total Residue yield	Total value
1	Kharif	1					
		2					
		3					
2	Rabi	1					
		2					
		3					

3	Summer	1					
		2					
		3					
4	Long duration crops	1					
		2					
		3					
5	Perennial crops	1					
		2					
		3					

9. Herd size

Species	Category	Total Number
Buffalo	>2.5 years	
	1.0 – 2.5 years	
	< 1.0 years	
Cattle	>2.5 years	
	1.0 – 2.5 years	
	< 1.0 years	
Sheep/Goat	>1 year	
	<1 year	

10. Total annual income

Sources	Amount
Crops	
Livestock	
Wage labor	
Service	
Other (mention)	

I. To map the value chain from farmer to end consumer

1. How many livestock are now in milking stage?

Cows	
Buffaloes	

2. How much milk is produced by them at different stages?

Animal type	Initial stage (milk & fat)	Peak season	Last stage	Fat (%)
Cow	Milk	Milk	Milk	
	Fat	Fat	Fat	
Buffaloes	Milk	Milk	Milk	
	Fat	Fat	Fat	

3. How much milk is retained for consumption?

4. How much milk is processed, if any?

5. What is the daily quantity of milk sent to co-operative society?

6. Cost of production of milk

Sl. No.	Cost of production of milk	Quantity / animal / day	Total cost
a.	Dry fodder		
b.	Concentrated feed		
c.	Labor 1 family labor 2 Hired labor		

		Rs/Animal/Year	Total cost
A	Veterinary services		
B	Others (Specify)		

7.

Sl. No.	Selling price of milk	Amount	Months
1	Highest selling price received		
2	Lowest selling price received		
3	Price from Co-operative society		
4	Government incentives		

8. Do you process milk?

a. Yes

b. No

9. Sale of processed products details

Sl. No.	Product type	Quantity produced	Amount received	Place of selling	Type of consumers
1					
2					
3					
4					
5					
6					
7					

10. Services received by your family from co-operative society

Sl. No.	Services	Details
1	Feed at discounted price	
2	Veterinary services in one year	
3	A.I services	
4	Fodder seeds Type Quantity	
5	Advisory services a. Selection of breeds b. Exposure visits	

	c. Training , specify	
6	Bank linkage	
	a. Name of the bank	
	b. Total amount of loan	
	i. How many times you avail the loans- 1	
	2	
	3	
	c. Interest rate	
7	Any other services, specify	

11. Constraints or deficiency in receiving the services

- i. Payment mode – through account/cheque/cash
- ii. Payment duration- once in week/fortnight/ month

12. Strengths of becoming a member:

1. Assured market
2. Cattle feed at discounted price
3. Timely veterinary services
4. Good access to advisory services
5. Correct payment
6. Opportunities for training and exposure visits
7. Any other (specify)

13. Weaknesses

1. Distance to milk collection point is more
2. Specific time period for milk collection some times becomes disadvantages
3. Non availability of adequate quantity of cattle feed at times.
4. 24 X 7 A.I services not available
5. Variation in fat and S.N.F percentages leads to confusion at times
6. Any other (specify)

14. Opportunities

1. Helps to become office bearer in the society
2. More learning opportunities
3. Credit linkage possibility is more

4. Any other (Specify)

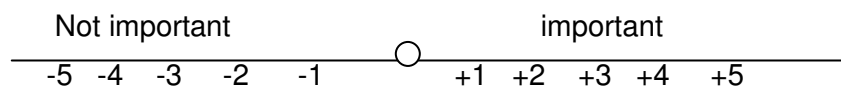
15. Threats

1. No control over the price
2. Politics in the society and federation
3. Any other (Specify)

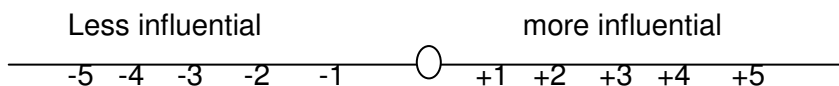
16. What is your role in proper functioning of society?

- a. Giving right quality of milk
- b. Ensuring that feed supplied is good quality
- c. Demanding required fodder seeds of adequate quantity
- d. To demand better education and advisory services
- e. Demand for more price for milk
- f. Any other (Specify)

17. How important are you in successful running of milk society. Give your answers in terms of scale.



18. How influential are you in successful running of milk society. Give your answers in terms of scale



II. To document value chain experiences of milk producer in Co-operative dairy sector

1. Do you want to continue as member of co-operative society?

a. Yes

b. No

i. If yes, give reason

ii. If no, give reason

2. Please specify your experiences with regard to membership and services rendered by Co-operative society.

Sl. No.	Services	Experiences			
		Very good	Good	Moderate	Poor
1	Feed at discounted price, Specify				
2	Quality of the feed received				
3	veterinary assistance				
4	AI services at right time				
5	Supply of fodder seed of desired type				
6	Continues and regular advisory services				
7	Facilitates for bank linkage to obtain credit				
8	Participation in training and demonstrations conducted				
9	Receipt of payment at regular interval				
10	Testing of milk quality on par with your observations				

General Information

1. Mass media participation

Please, indicate your response to the following statements.

Sl. No.	Mass media	Subscribed / Owned	Programs	Frequently of use		
				Regular	Occasional	Never
1.	News paper		Agricultural articles			
			Information / News			
			Recreational articles			
2.	Farm magazines		Agricultural articles			
			Information / News			
			Recreational articles			

3.	Radio		Agricultural articles			
			Information / News			
			Recreational articles			
4	Television		Agricultural articles			
			Information / News			
			Recreational articles			

2. Extension participation

Please, indicate your response to the following statements.

Sl. No.	Extension activities	Subject matter	Organized by whom	Extent of participation		
				Regular	Occasional	Never
1.	Krishimela					
2.	Training programme					
3.	Extension meetings					
4.	Group discussions					
5.	Field visits					
6.	Agricultural exhibitions					
7.	Study tour					
8.	Any other, specify					

3. Extension system link / Extension contact

Please indicate the frequency of contact with extension agency.

Sl. No.	Extension workers	Once in a week	Once in a fortnight	Once in a month	Whenever problem arises	Never
1	RSK/Agril. Dept officials					
2	Officials of horticulture dept.					
3	KVK officers					
4	UAS scientists					
	Private agency extension					
5	Officers					
6	Veterinary officials					
7	Any other (specify)					

Appendix Ib: CO-OPERATIVE SOCIETY LEADERS

Investigator:

Date of investigation:

III. To analyze the role of different stakeholders in backward and forward linkages of dairy value chain

1. Name of the society:
2. Year established:
3. Name of the leader:
4. Age:
5. Education:
6. Designation:
7. Year of becoming member:
8. Year of becoming chairman:
9. Remuneration received:
10. Maximum quantity of milk collected in a day:
11. Minimum quantity of milk collected in a day:
12. Average daily collection:
13. Milk collection duration:
14. Total number of members in the society:
15. What percent of revenue is given to society for one kg of milk collected?
16. Have you faced any difficulty in operating milk society?

a. Difficulty with respect to members

1. Irregular carrying of milk to the society
2. Any operation problems
3. Any other specify

b. Difficulty with respect to facilities

1. Lack of computerization
2. Lack of mechanization
3. Lack of laboratory equipments
4. Any other specify

c. Difficulty with respect to financing

1. Irregular payment to the members
2. Any other specify

d. Difficulty with respect to working environment**e. Any other difficulties****17. What is your role in proper functioning of this society?**

Sl. No.	Functions	Quantity in last year
1	Distribution of fodder seeds	
2	Distribution of feeds	
3	Providing AI services	
4	Disbursing payments	
5	Conducting training	
6	Any other	

18. What is your role in increasing milk collection of your society?

19. Do you influence Decisions at higher level? Yes/No

20. If yes, mention the incidents

21. If no, mention the incidents

22. How important are you in successful running of milk union. Give your answers in terms of scale.

4. Presence of good govt policy which help dairy co-op to improve its position in milk value chain
5. Improving the economic level of farmers by giving the livestock and some incentives from govts
6. Any other specify

27. Threats:

1. High level of competition from private sectors
2. Dis-loyalty of members
3. Corruptive practices
4. Red tapism in decision making
5. Any other specify

Appendix Ic: PROCESSORS

Investigator:
investigation:

Date of

General information about milk processing plant:

1. Location of milk processing unit:
2. Name of milk processing plant:
3. Year established:
4. Annual turnover in 2013:
5. What kind of milk is purchased for processing?
 - i. cow's milk
 - ii. buffaloes milk
 - iii sheep's milk
 - iv. goat's milk
6. Quantity of milk procured (tons per day)
 1. in 2011 (tons per day)
 2. in 2012 (tons per day)
 3. in 2013 (tons per day)
7. Quantity of milk processed (tons per day)
 1. in 2011 (tons per day)
 2. in 2012 (tons per day)
 3. in 2013 (tons per day)
8. Milk processing capacity (tons per day):
 - a. Planned processing capacity (tons per day):
 - b. Average price charged for processed milk
 - i. cow's milk
 - ii. buffaloes milk
 - iii sheep's milk
 - iv goat's milk

9. What are all the value added products of milk your processing unit is preparing?

[illegible]

10. Marketing of dairy products in general:

1. Directly via shops (%)
2. Via wholesale traders (%)
3. Direct to retail chains (%)

11. If you sell to wholesaler, how many wholesalers do you deal with?

12. If you sell through retail chain, how many retail chains do you deal with?

13. If you sell through shops, how many shops do you deal with?

Sl. No.	Total numbers	Average Quantity sold

14. Types of retail chains.

15. Does it depend on type of product or region or something else?

16. What kind of requirement do these wholesalers and retailers have?

17. Have you experienced specific problems, difficulties or requirements relating to the different marketing channel?

18. Have you taken training on different aspects of dairy processing?

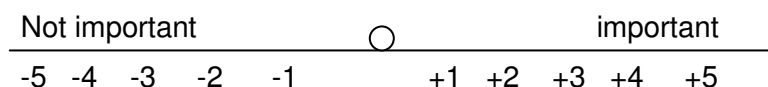
19. What is the most crucial support you need from the co-operative societies?

- 1 access to cheap credit,
- 2 good quality milk in adequate quantity
- 3 education and training opportunities

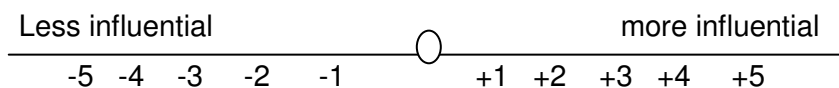
20. Are there any regional specialty dairy products?

21. What are they?

22. Do you think this product is worth producing in large quantities?
23. What is your experience with this product?
24. Would you be interested in getting involved in this type of production if it offered opportunities for growth?
25. What are the most widely sold and most popular dairy products?
26. Do your customers display specific behaviors and tastes when it comes to dairy products?
27. Could you add possible requirements that you find crucial in terms of the products that you buy or demand or the way that they are delivered?
28. Would you be interested in selling more domestic brands of dairy products?
29. Future line of support you would like to extend to your producer and society?
30. How important are you in successful running of milk federation. Give your answers in terms of scale.



31. How influential are you in successful running of milk federation. Give your answers in terms of scale



32. Strengths of your processing unit

33. Weakness

- 34 Opportunities

34. Threats

Appendix Id: DEALERS

Investigator:

Date of investigation:

1. Name and Address:
2. Age:
3. Education:
4. Dealership No:
5. Year of getting dealership license:
6. Validity of license:
7. Initial license fees paid:
8. Renewal fees:
9. Cost of operating dealership:
 - a) Establishment cost (rental)
 - b) Labor cost / manpower cost
 - c) Electricity cost
 - d) Any other cost (Specify)
10. Average number of consumer in a week / daily ?
11. Give details about the following, based on previous six months sales experience.

SI No.	Product type	Frequency of purchase	Quantity procured		Quantity sold		Quantity retained	
			Procured	Value	Procured	Value	Procured	Value

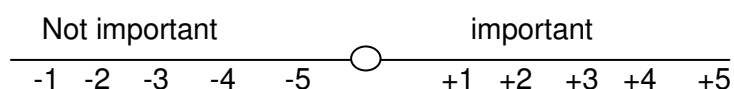
SI No.	Product type	Frequency of purchase	Quantity procured		Quantity sold		Quantity retained	
			Procured	Value	Procured	Value	Procured	Value

12. Is KMF giving training to you?
13. If yes, what would be the most important training issues for you?
- Management
 - Hygiene
 - Cold storage
 - Food safety standards
 - Marketing
 - Any other specify
14. Is KMF giving advisory services?
15. If yes, in what aspects?
16. Frequency of meetings.
17. Do you have any special trade links with the producers and /or processors?
18. If yes, which are they?
19. IF no, why?

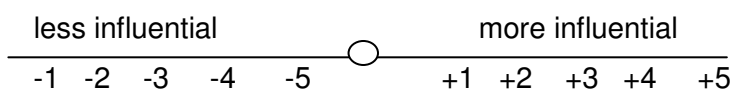
20. How is the consumer response for the Nandini milk and milk products?

- Excellent
- Very good
- Good
- Average

21. How important are you in successful running of milk dealer shop give your answers in terms of scale.



19. How influential are you in successful running of milk dealer shop give your answers in terms of scale



20. Do you have any plan to expand your dealer shop activities?

21. Strengths of your dealer shop

22. Weaknesses

23. Opportunities

24. Threats

Investigator:

Date of investigation:

1. Name:

2. Address:

3. Village:

4. Taluka:

5 Age:

6 Education:

7 How many liters of milk does your family consume in a day?

Total amount spent on milk per month.....

- a) Rs. <300
- b) Rs. 300-600
- c) Rs. 600-900
- d) Rs. 900-1,200
- e) Rs. > 1200 (Specify Please Rs. / month.....)

8 Which coloured packed milk do you use?

- a. Blue
- b. Orange
- c. Dark brown

9 Please mention the purchase point for the packaged milk:

- a) Dealer's point b) Shop c) Dairy Booth d) Home delivery

10. Which type of milk are you buying?

- a) Toned b) Double toned c) Whole milk

11 The purpose of using milk

- a) Coffee/ Tea ---- ----- b) Ghee making----- c) For Curd making-----
 d) For Sweets ----- e) For drinking ----- f) For all purpose -----
 g) If any other specify

12 Who influences your purchase decision?

- a) Media
 b) Word of Mouth
 c) Agents/ Sales Man
 d) Any other.....

13. Buying behaviour for milk products

Sl. No.	Milk products	Consumer on daily/weekly/ bimonthly/ monthly basis	Season of purchase	Average quantity consumed per day	Most preferable purchase point

14 DO you prepare value added products of milk at home?

Yes

No

15 If yes, please mention

16. Since how long are you buying this particular brand of milk and milk products and why?

17. Strengths of milk and milk products you purchase

18 Weaknesses

19 Opportunities

20. Threats

VALUE CHAIN ANALYSIS IN DAIRY ENTERPRISE IN BELGAUM DISTRICT

RAJANI M. MURAGOD

2015

Dr. NAGARATNA BIRADAR

Major Advisor

ABSTRACT

Dairy has immense potential for supplementing income and employment generation for the rural people. Value chain analysis is a useful tool to study range of actors involved in a business. A study was conducted in 8 villages of Belgaum district. The objectives were - map the milk value chain from farmer to end – consumer, document value chain experiences of milk producers in co-operative dairy sector, analyze roles of stakeholders in backward and forward linkages and SWOT analysis of dairy value chain. Milk producers, cooperative societies, processors, dealers and consumers together formed sample for study (206). Data was collected from a set of pre-tested interview schedules through personal interview technique.

Majority (85.84%) of producers retained less than 25 per cent of the milk produced and sold remaining part. Marketing efficiency was highest in 'Shubham' milk. All producers were willing to continue as member of milk societies for regular payment. Most availed backward services were-AI services (100% producers) and advisory services (58.34% dealers). Brand loyalty for Nandini milk and milk products was expressed by 65.00 per cent consumers.

Assured market (99.16%), non availability of 24X7 AI services (92.50%), provides platform to become office bearer/member (81.67%) and no control over the price (99.16%); strong marketing channel (100%), dependency on state aid (75.00%), diversification of activities (87.50%) and competition from private sector (37.50%); home delivery to customers (47.23%), non-availability of labors (16.67%), scope for establishment of ice cream parlor (33.33%), poor cold storage facility (38.39%) were the major perceived strengths, weaknesses, opportunities and threats, respectively for producers, societies and dealers. Low milk price (75.00%) and at times scarcity of milk and milk products (17.50%) were strengths and weakness perceived by consumers. It is thus suggested to strengthen identified weaknesses for improving the business of dairy sector.